



REPORT

Closure and Post-Closure Plan, Revision 1

Drains Pond System CCR Surface Impoundment

Submitted to:

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FIGURES

Figure 1: Coal Creek Station CCR Facilities

Figure 2: Coal Creek Station Drains Pond System Process Flow Diagram

1.0 INTRODUCTION

Great River Energy (GRE) owns and operates Coal Creek Station (CCS) located near Underwood, North Dakota. The Drains Pond System CCR Surface Impoundment (Drains Pond System) is comprised of three cells (west, center and east), and is located approximately 0.5 miles east of the CCR generating units (see Figure 1). The west cell is used as a dewatering/storage facility for coal combustion residuals (CCR) including bottom ash and economizer ash. The center cell is used as a dewatering/storage facility for plant drains sediment which contains CCR, coal fines, and soil that enter the plant drains. The east cell is part of the plant process water storage inventory and acts as clarifier impoundment cell for process water conveyed with CCRs and plant drains flows.

Golder Associates Inc. (Golder) has prepared this closure plan and post-closure plan for the Drains Pond System on behalf of GRE to serve as the written closure plan required under 40 CFR §257.102(b), and the written post-closure plan required under 40 CFR §257.104(d). The east cell of the Drains Pond System will be closed by removal of CCR in accordance with the requirements of 40 CFR §257.102(c) while the west and center cells will be closed with CCRs in place in accordance with the requirements of 40 CFR §257.102(d). At the completion of closure activities in accordance with the closure plan, the post-closure care period will commence. Closure activities associated with the east cell are planned to be completed in late 2019. Closure of the west and center cells is not anticipated until power production operations at CCS cease, which has not been determined.

2.0 DRAINS POND SYSTEM DESIGN AND OPERATIONS

The Drains Pond System has approximately 17.5 acres of lined surface impoundment, of which approximately 7 acres was composite-lined in 1994 (east cell), and the remaining 10.5 acres (center cell and west cell) was constructed and composite-lined in 2015.

Historically, the east cell of the Drains Pond System received flows from the plant drains system (which contained sediment with CCR). When the center cell and west cell were constructed in 2015, the plant drains flow was rerouted to the center cell of the Drains Pond System and no longer contributed sediment (containing CCR) directly to the east cell.

CCR materials are sluiced to the west cell of the Drains Pond System through 12-inch pipelines and are allowed to passively dewater. Plant drains enter the center cell via a 30-inch pipeline and sediment (containing CCR) is allowed to settle. Conveyance water from the west cell and center cell flow to the east cell via cross-over pipes. Conveyance water and contact water from the Upstream Raise 91 CCR Surface Impoundment flows to either the center cell or east cell via cross-over pipes. These hydraulic connections within the Drains Pond System are shown in Figure 2. The east cell is used for system process water storage and conveys process water back to Coal Creek Station for reuse, to the onsite evaporation ponds, or to the permitted underground injection well.

3.0 CLOSURE PLAN

3.1 Narrative Description of Facility Closure

The east cell of the Drains Pond System is planned to be closed by removal of CCR, while the west and center cells are planned to be closed with permitted material remaining in place. The Drains Pond System is a critical part of the current process water management practice and removal from service prior to closure of CCS would impact plant operations.

Prior to closure, the Drains Pond System will be drained of free water. Portable pumps may be used to remove as much free water as practical from each cell of the Drains Pond System in preparation for closure. The west and

center cells of the Drains Pond System will be filled and closed independently by filling with dewatered CCR materials (or other permitted non-CCR materials) to final grades. At closure, these cells will be filled so that each has a 3% to 5% crown to promote surface water drainage. Installation of final cover will occur when placement of dewatered CCR materials (or other permitted non-CCR materials) has been complete to final design grades. Future final cover will be installed in accordance with the Closure Plan in effect at the time of closure.

The primary closure activities include drainage and stabilization of CCR (as applicable), adjusting CCR grades if necessary, installing the final cover system with surface water controls, and establishing vegetation.

3.1.1 East Cell Closure by Removal

40 CFR §257.53 defines a CCR surface impoundment as “a natural topographic depression, man-made excavation, or diked area, which is designed to hold an accumulation of CCR and liquids, and the unit treats, stores, or disposes of CCR.” The east cell received CCR associated with sediment in the plant drains system up until December 2015 when the plant drains was re-routed to the center cell. The intent of closure of the east cell is to remove sediment containing CCR and return the east cell to operation as a non-CCR surface impoundment for the management of site process water. The east cell will not be used to treat, store, or dispose of CCR.

CCRs historically conveyed as sediment to the east cell via the plant drains system will be excavated and disposed of in Upstream Raise 91 or other permitted CCR facilities at CCS. Since the east cell is critical to the process water management system at CCS, the east cell will remain intact as a clarifying and water management facility, including the existing protective cover and the composite liner system. The existing protective cover consists of approximately 2-feet of cemented fly ash overlying 12 inches of sand on the side slopes, and approximately 6 to 12 inches of bottom ash overlying 12 inches of sand along the floor. The CCRs used as protective cover are beneficially used to protect the existing composite liner from damage caused by equipment or wildlife, and are not placed for storage or disposal. A verification that sediment containing CCR material has been removed from the east cell will be performed prior to returning the east cell to operation.

Once the CCR is removed from the east cell, it will no longer be treated as a CCR Surface Impoundment regulated by the CCR Rule. The east cell will continue to be regulated by the North Dakota Department of Environmental Quality (NDDEQ) as part of the Drains Pond System surface impoundment and will continue to be monitored by the Drains Pond System groundwater monitoring network. At plant closure, the protective cover and underlying composite liner system of the east cell are planned to be excavated and disposed of in appropriate permitted and regulated facilities. Additional embankment materials may be excavated at closure depending on final site closure grades and surface water drainage designs.

3.1.2 Drainage and Stabilization of CCR

Bottom ash and economizer ash are conveyed to the west cell, with the center cell receiving miscellaneous solids from the plant drains system. The center cell of the Drains Pond System will be dewatered by pumping water through the dedicated buried outlet pipe near the floor of this cell via the Drains Pond Transfer Pumphouse located north of the facility. Additional minor dewatering may occur through the use of portable pumps installed at topographically low areas to remove remaining water.

Free water in the west cell of the Drains Pond System will be removed by developing temporary sumps in topographically low areas and installing portable pumps. Water will be pumped to the other cells of the Drains Pond System prior to distribution to the site evaporation ponds or the permitted underground injection well.

After dewatering, dry CCR materials (or other permitted non-CCR materials) placed in the west and center cells of the Drains Pond System will be spread, and compacted to achieve stable final grades.

3.1.3 Final Cover System Installation

The final cover system will be installed using conventional soil placement techniques and common earthmoving equipment, such as bulldozers, haul trucks, scrapers, motor graders, and/or compactors. Soils that are suitable for use in the final cover system will be obtained from select on-site stockpiles and borrow sources. Disruption of the integrity of the final cover system will be inhibited by compacting the underlying CCRs to establish a firm and unyielding subgrade prior to installation of the final cover system and by establishing a slope of approximately 3% to 5% across the top surface to provide positive drainage, limit ponding, and mitigate the potential effects of settling and subsidence.

Final cover soil placement, moisture conditioning, compaction, and testing will be done in accordance with the site construction quality assurance plan (Golder 2013). A North Dakota Registered Professional Engineer or a person working under their direct supervision will observe the placement of the final cover. A report indicating that closure was in compliance with the Closure Plan and signed by a North Dakota-registered Professional Engineer will be prepared after the closure of the facility. The closure report will be placed into the operating record of the facility.

3.1.4 Surface Water Controls

The west and center cells of the Drains Pond System will be closed with 3% to 5% slopes. The 3% to 5% slopes will promote surface water run-off, aid in preventing surface water from ponding on the final cover, and allow for maintenance of the final cover (erosion repairs, mowing, etc.). The design slopes are flat enough to minimize erosion of the final cover soils without construction of surface water controls such as terrace channels and armored down-chute channels. The combination of soil types, native vegetation (grass) and final grades are designed to control long-term soil loss.

3.1.5 Vegetation

Vegetation enhances evapotranspiration and reduces erosion, thus playing an important part in surface water control. Vegetation activities will include preparing the soil surface, applying fertilizer if necessary, seeding, and mulching.

The seedbed should be roughened to a depth of 4 to 6 inches by scarifying, disking, harrowing, or equivalent methods. Rows should be spaced a minimum of 12 inches apart. Immediately prior to seeding in areas that have been heavily compacted by trucks or equipment, the topsoil surface should be ripped and scarified. All areas to be seeded should be dozer-tracked prior to seeding. The seedbed should not be prepared prior to completion of earthwork activities and no more than 2 weeks prior to planting.

Seed rates should be applied by broadcast or drilled methods, or by the hydraulic seeding method and are to be applied as directed in the facility's Operations Plan (Golder 2015). If broadcast or drilled, seed should be buried by harrowing, chain dragging, or other scarification measures. Equipment and procedures should be appropriate for the seed as recommended by the seed supplier. A suitable native species seed mix and application rates shall be selected at the time of final cover placement.

Straw mulch should be applied immediately after seeding at a rate of 2 tons per acre. To prevent dispersal or removal of straw by wind, mulch should be anchored using a crimper run perpendicular to the prevailing wind direction. A disc should not be used for crimping. The mulch should be applied over the seed in a separate application. At least 50% of individual straws should be 6 inches or greater in length.

3.2 Final Cover System

The federal CCR rule requires the final cover system to meet the requirements of §257.102(d)(3) with a minimum 18-inch infiltration layer and 6-inch erosion layer. The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less.

The west and center cells of the Drains Pond System have a composite liner system consisting of (from bottom to top):

- 2 feet of compacted clay rich material with a hydraulic conductivity of 1×10^{-7} cm/sec or less
- 60-mil high density polyethylene (HDPE) geomembrane liner

3.2.1 Alternative Final Cover System

An alternative cover design utilizing an evapotranspiration (ET) cover has been previously permitted by the NDDEQ for this site based on both modeling and test plot instrumentation. The ET cover design consists of the following layers (from the top down):

- 6 inches of topsoil (erosion layer) that is capable of sustaining native plant growth,
- 30 inches of clay-rich, plant root zone soil (growth medium/infiltration layer), being compacted between 80% and 95% of the maximum dry unit weight as determined by ASTM D698 (standard Proctor).

GRE intends to update the alternative cover demonstration previously done to show that the cover system described above is in compliance with the requirements of §257.102(d)(3). If this demonstration cannot be made, GRE will adjust the cover design as required. No final cover will be placed until either the demonstration is successfully completed, or the cover design is adjusted to meet the requirements of §257.102(d)(3).

3.3 Closure Estimates

3.3.1 Maximum Inventory of CCR

After removal of CCR from the east cell, the maximum inventory of CCR in the Drains Pond System is approximately 189,000 cubic yards: approximately 126,000 cubic yards in the west cell and 63,000 cubic yards in the center cell.

3.3.2 Largest Area Requiring Final Cover

The three cells of the Drains Pond System will be closed separately. The area requiring final cover is approximately 6.7 acres for the west cell and 3.8 acres for the center cell (east cell will be closed by removal of CCR). The current maximum area requiring final cover is approximately 10.5 acres.

3.4 Closure Schedule

Within 30 days after the last receipt of waste (either CCR or any non-CCR waste stream) permitted for disposal, the closure plan will be implemented. Notification of intent to close the facility will be placed in the operating record prior to the commencement of closure activities. The NDDEQ will also be notified in accordance with the engineering design and operations plan for the facility. Closure activities for the west and center cells of the Drains Pond System are not anticipated to begin until power production operations at CCS cease which has not been determined. Therefore, a date for closure of these facilities is unknown, but will be updated as required to

meet the requirements of §257.102(b)(vi). Closure of the east cell by removal of CCR and re-purposing as a non-CCR surface impoundment for the management of site process water is expected to be completed in 2019.

Closure activities will be completed in accordance with the closure plan within 5 years after commencing closure activities, or as allowed through a closure extension demonstration in accordance with §257.102(f)(2)(i). Closure activities to be completed during this time include draining any remaining free water from the west and center cells of the Drains Pond System, regrading of CCR materials and permitted non-CCR materials to final grades, preparation of bid documents and solicitation of contractor's bids, installation of the final cover system, and preparation and submittal of as-built documents and certifications as required under §257.102(f)(3) and the engineering design and operations plan for the facility. An extension of the closure timeframe may be pursued in accordance with §257.102(f)(2)(i).

Notification that closure of the Drains Pond System has been completed will be placed in the operating record within 30 days of the completion of closure activities. This notification will include certification by a qualified professional engineer that closure has been completed in accordance with the closure plan. Following closure of the Drains Pond System, GRE will record a notation on the deed to the property (or another instrument that is normally examined during title search) that will notify potential purchasers of the land that the land has been used as a CCR landfill and its use is restricted under post-closure care requirements. Within 30 days of recording the notation, notification will be placed in the operating record.

4.0 POST-CLOSURE PLAN

During the post-closure care period for the Drains Pond System, GRE will implement inspection, maintenance, and monitoring programs to maintain the integrity of the final cover system, maintain the groundwater monitoring system, and monitor groundwater in accordance with the requirements of §257.90 through §257.98. The post-closure care period will be 30 years in duration. If GRE is operating under assessment monitoring in accordance with §257.95 at the conclusion of the post-closure care period, GRE will continue to conduct post-closure care until it can return to detection monitoring in accordance with §257.95. Within 60 days following the completion of the post-closure care period, GRE will prepare a notification certified by a qualified professional engineer that post-closure care has been completed in accordance with the post-closure plan and will place the notification in the operating record.

4.1 Inspection

Regular inspections will be conducted during the post-closure care period to help ensure that the integrity of the Drains Pond System is maintained. The final cover system will be inspected for signs of settlement, subsidence, erosion, and other damage or deficiency. Surface components of groundwater monitoring wells will be inspected for damage.

During the first five years of the post-closure period as vegetation is becoming established, semi-annual inspections of the facility will be made, typically in the spring and fall. Once healthy vegetation is established (the remaining 25 years), inspections of the facility will be made annually, typically in the spring or fall, to facilitate inspection of the final cover vegetation. To maintain consistency in the inspection process, trained GRE employees or contract employees will conduct the inspections. Issues identified during the inspections will be reported to the person responsible for compliance with this post-closure plan as soon as practical.

4.2 Maintenance

GRE will oversee post-closure maintenance of the Drains Pond System, using appropriate internal resources and/or third-party personnel and equipment. Post-closure maintenance of the Drains Pond System will include making necessary repairs to the final cover system to maintain its integrity and effectiveness. Earthen fill will be placed as needed to correct the effects of settlement, subsidence, and erosion and to prevent run-on and run-off from eroding or otherwise damaging the final cover system. The final cover system will be reseeded in areas that have been repaired and where additional vegetation is needed to effectively limit erosion and promote transpiration of soil moisture. GRE will control noxious weeds and unwanted trees and shrubs from becoming established on the Drains Pond System.

4.3 Monitoring

Groundwater monitoring will be conducted during the post-closure care period in accordance with the requirements of §257.90 through §257.98. Groundwater samples will be collected and analyzed in accordance with the sampling and analysis program for the Drains Pond System. Results of the analyses will be placed in the operating record.

4.4 Contact Information

The post-closure contact for the Drains Pond System will be:

Great River Energy
Coal Creek Station
2875 Third Street SW
Underwood, North Dakota 58576
(701) 442-3211

Great River Energy
12300 Elm Creek Boulevard
Maple Grove, Minnesota 55369
(763) 445-5000

4.5 Planned Property Usage

The closed Drains Pond System will be designated as open space during the post-closure period and will be controlled via earthworks grading features, fence, and/or signage. No agricultural, recreational, public, or otherwise active uses are planned for the facility during the post-closure care period. There will be no grazing or feeding of farm or domestic animals at the Drains Pond System during the post-closure care period. Activities on GRE property are anticipated to include the continued operation of a power generating station, and will be managed to not disturb the integrity of the final cover or function of the monitoring systems associated with the facility.

5.0 CERTIFICATION

The undersigned attest to the completeness and accuracy of this closure and post-closure plan, and certify that the plan meets the requirements of 40 CFR §257.102(b) and 40 CFR §257.104(d).

Golder Associates Inc.



Craig Schuettpelz, PE
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Todd Stong, PE
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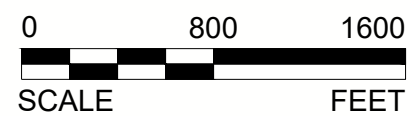


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FIGURES

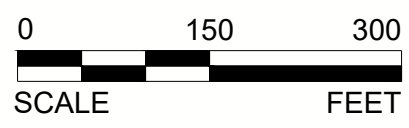
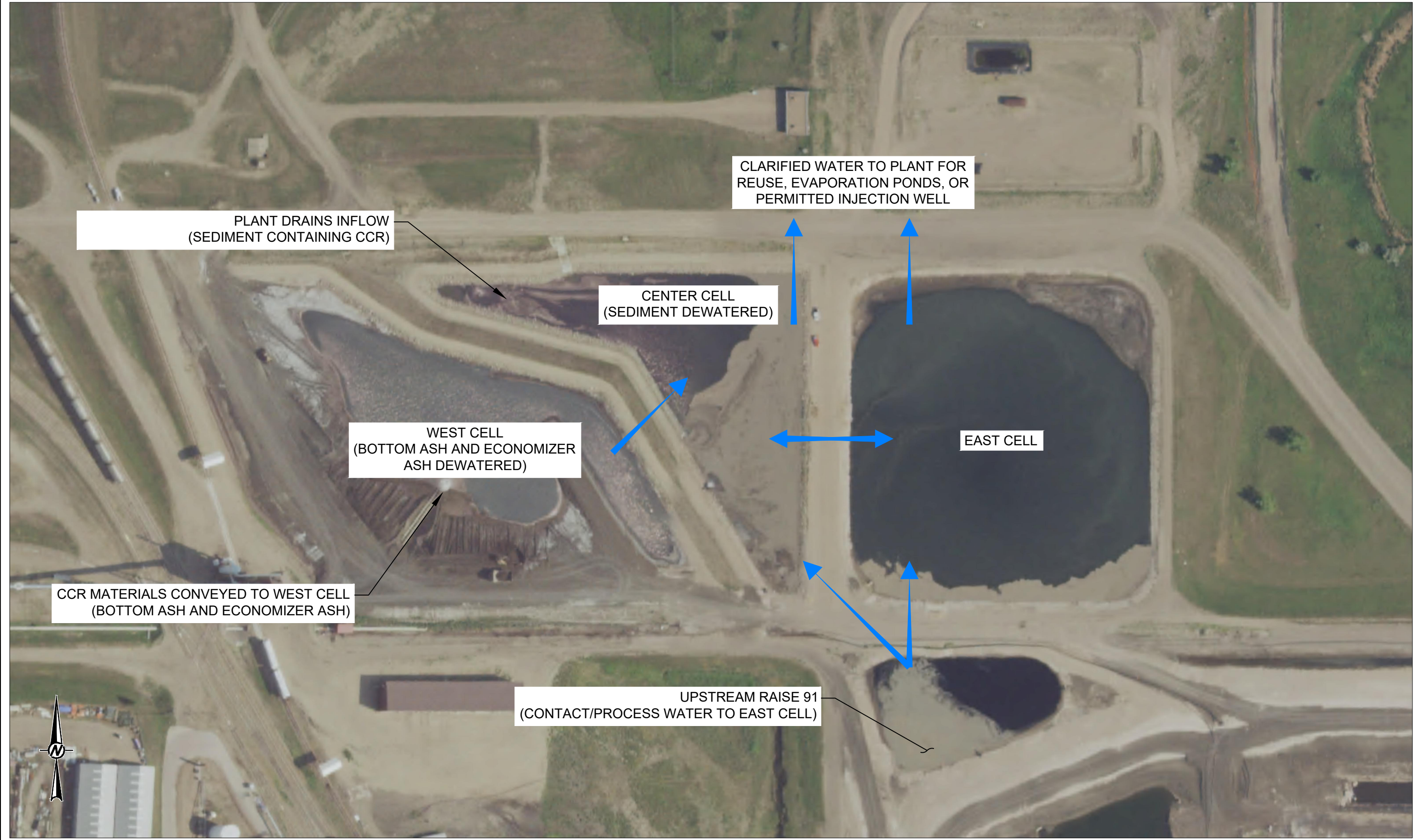
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COAL CREEK STATION
CCR FACILITIES

FIGURE 1

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COAL CREEK STATION
DRAINS POND SYSTEM PROCESS FLOW DIAGRAM

FIGURE 2



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