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**Waste Facility Plan
for St. Charles County
Sioux Energy Center Utility Waste Landfill
St. Charles County, Missouri**

Prepared for:



**Power Operation Services
3700 South Lindbergh Blvd.
St. Louis, Missouri 63127**

NOVEMBER 2013 (Revised)

**Ameren Missouri Sioux Energy Center
Utility Waste Landfill
Waste Facility Plan
St. Charles County, Missouri**

Revised November 2013

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1.0. WASTE FACILITY BACKGROUND SUMMARY

Union Electric, doing business as (dba) Ameren Missouri (hereafter referred to as Ameren), has been issued a St. Charles County license to operate a Utility Waste Landfill (UWL) in northeastern St. Charles County. The UWL name is “Ameren Missouri Sioux Power Plant Utility Waste Landfill”.

The landfill design and operating procedures have been prepared in accordance with the Missouri Solid Waste Management Law and Rules and the St. Charles County Solid Waste Management Code UWL requirements. In addition, the design and operation of the UWL has been developed in accordance with accepted engineering practice. The Waste Facility Plan (WFP) and supporting appendices have been organized in a format consistent with St. Charles County Solid Waste Management Code.

This WFP details compliance with the St. Charles County Solid Waste Management Code, Article VI, Section 240.620, Application for Sanitary Landfill License; Article XI, Section 240.1150, Additional Standards for Operation of Sanitary Landfills; Article XI, Section 240.1180, Signs Required at Entrances to Landfills, Waste Processing Facilities and Transfer Stations; Article XII, Sections 1210 and 1220, Closure; and Article XIII, Section 1310, Restrictions Before and After Closure. St. Charles County requested that this report be prepared to address the County Code requirements for sanitary landfills, noting where sanitary landfill requirements are not applicable.

The current design and operation of the UWL are described in the report titled **Ameren Missouri Sioux Power Plant Utility Waste Landfill Proposed Construction Permit Modification, Construction Permit Number 0918301, St. Charles County, Missouri**, dated June 2010 with a final revision of February 2012 and includes 33 full size plan sheets (collectively the Modified Construction Permit Application or Modified CPA). The Modified CPA demonstrates that the design and operational techniques outlined for the UWL meet or exceed the minimum requirements of the St. Charles County Solid Waste Management Code. The UWL has been approved by the Missouri Department of Natural Resources to allow permanent disposal of both WFGD gypsum using “gypsum stack” concepts and dry disposal of coal combustion products (CCPs) produced by the Sioux Plant. Ameren acknowledges that the “gypsum stack” concepts utilize techniques other than those outlined in the State and County Code. The report titled **Detailed Geologic and Hydrologic Site Investigation Report for Ameren UE Sioux Power Plant, Proposed Utility Waste Disposal Area, St. Charles County, Missouri, Volume I and II** (DSI), dated August 2006 also demonstrates that the design techniques meet or exceed minimum requirements.

1.1. Site Background

Ameren is an electric power producer and distributor that operates a coal-fired power plant known as the Ameren Sioux Energy Center, located immediately north of State Highway 94 within the incorporated boundary of West Alton, Missouri. Ameren also owns and operates the utility waste landfill site adjacent to the Sioux Energy Center immediately south of State Highway 94 in unincorporated St. Charles County. Coal combustion products (fly ash, bottom ash, and boiler slag) and wet flue gas desulfurization (WFGD) gypsum generated by the plant that cannot be beneficially reused will be managed in the UWL. Over the life of the UWL, CCPs disposed at the UWL will potentially include various combinations of fly ash, bottom ash, boiler slag, and gypsum.

1.2. Site Description

The UWL site is located south of State Highway 94, adjacent to the energy center, in unincorporated St. Charles County, in the southeastern part of Township 48 North, Range 6 East. The site is approximately two (2) miles east of the town of Portage des Sioux, and twelve (12) miles west-northwest of the confluence of the Mississippi and Missouri Rivers (Figure 1). The UWL is proposed within a tract of land totaling 398.04 acres, of which 183.5 acres are proposed for use as the active disposal area. The remaining acreage includes a proposed 19.6 acre wastewater recycle pond (permitted separately by the Water Pollution Control Program), soil borrow areas for soil liner and final cover, as needed, access roads, flood protection berms and buffer area.

1.3. Permitting

The UWL development process began with the Missouri Department of Natural Resources (MDNR) with a "Request of Preliminary Site Approval" in May 2005 and later a St. Charles County Request for Zoning Special Use Permit in March 2006. Following the preliminary site approval by MDNR, a detailed site investigation (DSI) was conducted at the site and a detailed report published of the findings. Subsequent public information sessions were conducted in St. Charles County in accordance with MDNR requirements. St. Charles County has rezoned the site, granted a conditional use permit and approved the site development plan. An application for construction permit was filed with MDNR on February 7, 2007. The MDNR issued Construction Permit Number 0918301 for the UWL in March 28, 2008. Subsequently, Cell 1 and the Recycle pond were constructed and the Missouri Solid Waste Disposal Area Operating Permit Number 0918301 was issued by MDNR on July 30, 2010.

Application for a construction/operating license from St. Charles County was filed with the County on February 9, 2007 under the provisions of the St. Charles County Solid Waste Management Code. Subsequently, St. Charles County held the required public hearing on May 9, 2007, and issued a letter dated May 8, 2008, acknowledging receipt and review of documents and reports preparatory to approval of initial construction activity. The letter stated, in part: "DES considers the documentation provided thus far in the process to be complete and adequate to demonstrate compliance with County Solid Waste Management Code provisions sufficient to authorize initial construction activities." After Cell 1 and the Recycle Pond were constructed and the necessary documentation submitted, the St. Charles County Department of Community Health and the Environment issued Solid Waste Facility License 04303 (operating permit) for the Sioux Plant UWL on November 1, 2010. The Solid Waste Facility License requires annual renewal.

A fully executed Agreement for Easement, Notice and Covenant Running with the Land was filed with Saint Charles County Recorder of Deeds in February 2010.

On June 25, 2010, Ameren made written requests to MDNR and St. Charles County to modify Construction Permit No. 0918301 to include design and operation of dry disposal Cells 4, 5, 6 and 7, in addition to the wet gypsum disposal process already approved within the footprint of the UWL. Wet gypsum disposal is ongoing in Cell 1 and planned for future Cells 2 and 3. Dry disposal of CCPs is planned for Cells 4, 5, 6 and 7, which are developed within the footprint of former wet gypsum disposal Cells, 4, 5 and 6. The letter was accompanied by three copies of the report titled **Ameren Sioux Power Plant Utility Waste Landfill Proposed Construction Permit Modification, Construction Permit Number 0918301, St. Charles County, Missouri**, and included 33 plan sheets

(collectively the Modified CPA). MDNR approved the Modified CPA in their letter dated February 8, 2013.

MDNR issued Water Pollution Control Construction Permit #22-7667 for the Recycle Pond, a component of the UWL, on August 5, 2008. Construction of the Recycle Pond was completed in late 2009 and a Certification of Work Completed form and completion report was submitted to MDNR on May 20, 2010 allowing the Recycle Pond to immediately begin operation. Wastewater discharges from the Sioux Energy Center are authorized by NPDES Permit MO-0000353. The currently effective permit was issued on April 16, 2004 but is administratively continued as a timely renewal application was submitted on October 16, 2008. Reissuance of this permit is currently pending with the MDNR. The issued Recycle Pond construction permit required identification of the emergency overflow as Outfall 007, however the renewal application requested that MDNR review this determination and delete Outfall 007.

The regulatory agency for air quality at the site is MDNR's Air Pollution Control Program. A permit from the Air Pollution Control Program is not required for the proposed UWL operations.

The MDNR Dam Reservoir Safety Program (DRSP) is the regulatory agency for dam safety. The DRSP issued a Construction Permit (C-426) for the Cell 1 gypsum stack on April 1, 2008 which was valid for one year. Because the UWL will be constantly under construction throughout its operating life, a special provision of the DRSP Construction Permit is that it will be annually extended by DRSP on or before April 1 throughout the life of the landfill. Upon closure of the landfill, Ameren will submit an application for a dam operating permit. The DRSP issued the most recent amendment to Construction Permit C-426 on March 29, 2013, extending the Construction Permit to April 1, 2014.

The UWL entrances and crossings of Highway 94 have been completed and approved by the Missouri Department of Transportation.

1.4. Glossary of Terms

This section lists acronyms used in the text of the Waste Facility Plan.

- Base Flood Elevation (**BFE**)
- Clay Soil - High Plasticity (**CH**)
- Clay Soil- Low Plasticity (**CL**)
- Coal combustion products including fly ash, bottom ash, boiler slag, and FGD gypsum (**CCP**)
- Conditional Use Permit (**CUP**)
- Construction Quality Assurance (**CQA**)
- Dam Reservoir Safety Program (**DRSP**)
- *Detailed Geologic and Hydrologic Site Investigation Report for Ameren UE Sioux Power Plant, Proposed Utility Waste Disposal Area, St. Charles County, Missouri, Volume I and II*, dated August 2006 (**DSI**)
- Emergency Implementation Procedures (**EIP**)
- High Density Polyethylene Geomembrane Landfill Liner (**HDPE**)
- Missouri Department of Natural Resources (**MDNR**)
- *Ameren Missouri Sioux Power Plant Utility Waste Landfill Proposed Construction Permit Modification, Construction Permit Number 0918301, St. Charles County, Missouri*, dated June 2010 with a final revision of February 2012, including 33 plan sheets (**Modified CPA**)

- Silty Soil (**ML**)
- National Pollutant Discharge Elimination System (**NPDES**)
- Set of 33 Plan Sheets titled *Ameren UE Sioux Power Plant, Utility Waste Landfill, Construction Permit Number 0918301, St. Charles County, Missouri*, with final revision of February 2012 (**Plans**)
- United States Department of Agriculture (**USDA**)
- Utility Waste Landfill (**UWL**)
- Waste Facility Plan (**WFP**)
- Wet Flue Gas Desulfurization (**WFGD**)

2.0. APPLICATION/CONSTRUCTION STANDARDS

This section summarizes compliance with the requirements of Sections 240.620 and 240.1220 of the St. Charles County Solid Waste Management Code.

- 2.1. Section 240.620.A** - All documents related to the site development, waste facility plans and compliance monitoring reporting have been prepared directly by, or under the supervision of, a Missouri registered Professional Engineer or Registered Geologist.
- 2.2. Section 240.620.B** - Ameren made a written request to the County to issue a license in letter dated February 6, 2007. The letter was accompanied by three copies of: a two-volume report titled *Detailed Geologic and Hydrologic Site Investigation Report for Ameren UE Sioux Power Plant, Proposed Utility Waste Disposal Area, St. Charles County, Missouri* (hereafter referred to as DSI); a report titled *AmerenUE Sioux Power Plant Construction Permit Application for a Proposed Utility Waste Landfill, St. Charles County, Missouri*; and a set of 22 Plan Sheets titled *Ameren UE Sioux Power Plant, Proposed Utility Waste Landfill, St. Charles County, Missouri*. These reports were revised and subsequently resubmitted to the County, in whole or in part, as attachments to an Ameren letter dated September 20, 2007. These documents were the basis for the majority of the information described in the previous Waste Facility Plan dated April 2010. Subsequently, St. Charles County held the required public hearing, and issued a letter dated May 8, 2008, that stated, in part: “DES considers the documentation provided thus far in the process to be complete and adequate to demonstrate compliance with County Solid Waste Management Code provisions sufficient to authorize initial construction activities.” After Cell 1 and the Recycle Pond were constructed, the St. Charles County Department of Community Health and the Environment issued Solid Waste Facility License 04303 (operating permit) for Cell 1 of the Sioux Plant UWL on November 1, 2010.

On June 25, 2010, Ameren made a written request to MDNR and the County to modify Construction Permit No. 0918301 to include design and operation of dry disposal Cells 4, 5, 6 and 7, in addition to the wet gypsum disposal process already approved within the footprint of the UWL under this Construction Permit. The letter was accompanied by three copies of the report titled ***AmerenUE Sioux Power Plant Utility Waste Landfill Proposed Construction Permit Modification, Construction Permit Number 0918301, St. Charles County, Missouri*** and 33 plan sheets. These documents dated June 2010 with a final revision of February 2012 were approved by MDNR in their February 8, 2013 letter. These Modified CPA documents are the basis for the majority of the

information described in this current Waste Facility Plan.

- 2.3. Section 240.620.B(1)** – The UWL will accept: fly ash, bottom ash, boiler slag or other slag waste and gypsum generated primarily from the combustion of coal or other fossil fuels.
- 2.4. Section 240.620.B(2)** – As designed and approved, the geosynthetic drainage components for the liner are a 60-mil geomembrane, and 12-ounce non-woven geotextile. Ameren Missouri chose to utilize an 80-mil HDPE liner for the construction of Cell 1 which was better than the approved minimum, due to the fact that Cell 1 would be ‘wet’ and the thicker geomembrane will provide an additional measure to minimize the possibility of a leak. The leachate collection system for Cells 4, 5, 6 and 7 includes a geo-net composite above the HDPE geomembrane. The geosynthetic drainage components for the cap are a 60-mil geomembrane and 16-ounce non-woven geotextile on the UWL top.
- 2.5. Section 240.620.B(3)** – The property was originally zoned Agricultural District with Floodway Fringe and Density Floodway Overlay Districts (A/FF/DF). On May 30, 2006, St. Charles County Ordinance 06-074 formally rezoned 398.04 acres of the site to Solid Waste Disposal District with Floodway Fringe and Density Floodway Overlay Districts (SWD/FF/DF) as per Application 1716. Concurrently, St. Charles County Ordinance 06-075 granted Conditional Use Permit C665 and approved a Site Development Plan for a Utility Waste Management Facility on the 398.04-acre site.
- 2.6. Section 240.620.B(4)** – The metes and bounds description of the 398.04 property follows:

TRACT 1 BEING PART OF U.S. SURVEY NO. 1838 IN TOWNSHIP 48 NORTH, RANGE 6 AND 7 EAST OF THE FIFTH PRINCIPAL MERIDIAN, ST. CHARLES COUNTY, MISSOURI, AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT A CONCRETE MONUMENT AT THE INTERSECTION OF THE WESTERLY LINE OF THE UNION ELECTRIC COMPANY TRACT WITH THE NORTHERLY RIGHT OF WAY LINE OF MISSOURI STATE HIGHWAY NO. 94, SAID POINT BEING 4,450 FEET EASTERLY OF THE WESTERLY LINE OF SAID U.S. SURVEY NO. 1838; THENCE SOUTH 07 DEGREES 52 MINUTES 24 SECONDS WEST ON SAID WESTERLY LINE OF THE UNION ELECTRIC COMPANY TRACT, 60.14 FEET TO A POINT IN THE SOUTHERLY RIGHT OF WAY LINE OF MISSOURI STATE HIGHWAY NO. 94; THENCE SOUTH 85 DEGREES 58 MINUTES 46 SECONDS EAST, ON SAID LINE 1,319.82 FEET, TO THE POINT OF BEGINNING OF TRACT 1 HEREIN DESCRIBED;

FROM SAID POINT OF BEGINNING ON SAID SOUTHERLY RIGHT OF WAY LINE OF MISSOURI STATE HIGHWAY NO. 94 THE FOLLOWING 10 CALLS: 1) THENCE SOUTH 85 DEGREES 58 MINUTES 46 SECONDS EAST, 223.33 FEET; 2) THENCE SOUTH 84 DEGREES 12 MINUTES 26 SECONDS EAST, 1,060.63 FEET; 3) THENCE SOUTH 83 DEGREES 49 MINUTES 46 SECONDS EAST, 1,685.49 FEET; 4) THENCE SOUTH 85 DEGREES 29 MINUTES 46 SECONDS EAST, 351.13 FEET; 5) THENCE SOUTH 82 DEGREES 53 MINUTES 46 SECONDS EAST, 245.43 FEET; 6) THENCE EASTERLY ON A CURVE TO THE RIGHT, HAVING A RADIUS OF 2,834.90 FEET, THE CHORD OF WHICH BEARS SOUTH 80 DEGREES 23 MINUTES 46 SECONDS EAST, AN ARC DISTANCE OF 247.39 FEET; 7) THENCE SOUTH 77 DEGREES 53 MINUTES 46 SECONDS EAST, 359.01 FEET; 8) THENCE EASTERLY ON A CURVE TO THE RIGHT, HAVING A RADIUS OF 2,834.90 FEET, THE CHORD OF WHICH BEARS SOUTH 75 DEGREES 47 MINUTES 46 SECONDS EAST, AN ARC DISTANCE OF 207.81 FEET; 9) THENCE SOUTH 73 DEGREES 41 MINUTES 46 SECONDS EAST, 465.81 FEET; 10) THENCE EASTERLY ON A CURVE TO THE RIGHT, HAVING A RADIUS OF 2,010.00 FEET, THE CHORD OF WHICH BEARS SOUTH 71 DEGREES 27 MINUTES 29

SECONDS EAST, AN ARC DISTANCE OF 156.15 FEET TO A CONCRETE MONUMENT ON THE EASTERLY LINE OF SAID UNION ELECTRIC COMPANY TRACT; THENCE ON SAID EASTERLY LINE, SOUTH 07 DEGREES 26 MINUTES 56 SECONDS WEST, 2,484.34 FEET; THENCE NORTH 82 DEGREES 35 MINUTES 13 SECONDS WEST ALONG THE CENTERLINE OF DWIGGINS (40'W) ROAD 725.13 FEET TO THE NORTHWESTERLY CORNER OF PART OF LOT 1 OF JOSEPH DWIGGINS PARTITION BEING THE INTERSECTION OF SAID LINE WITH THE CENTERLINE OF SAALE (40'W) ROAD; THENCE SOUTH 07 DEGREES 48 MINUTES 37 SECONDS WEST ALONG THE CENTERLINE OF SAALE (40'W) ROAD 1745.80 FEET TO THE POINT OF INTERSECTION OF SAID LINE WITH THE NORTHEASTERLY LINE OF THE MISSOURI PACIFIC (100'W) RAILROAD; THENCE ON THE NORTHEASTERLY RIGHT OF WAY LINE OF THE MISSOURI PACIFIC RAILROAD THE FOLLOWING 4 CALLS: 1) NORTH 59 DEGREES 43 MINUTES 21 SECONDS WEST, 4,173.31 FEET; 2) NORTH 08 DEGREES 08 MINUTES 33 SECONDS EAST, 158.00 FEET; 3) NORTH 84 DEGREES 17 MINUTES 37 SECONDS WEST, 351.97 FEET; 4) NORTH 59 DEGREES 43 MINUTES 21 SECONDS WEST, 359.92 FEET; THENCE LEAVING SAID NORTHEASTERLY RIGHT-OF-WAY LINE ON A CURVE TO THE RIGHT, HAVING A RADIUS OF 443.82 FEET, THE CHORD OF WHICH BEARS NORTH 18 DEGREES 23 MINUTES 11 SECONDS WEST, AN ARC DISTANCE OF 640.39 FEET; THENCE NORTH 22 DEGREES 57 MINUTES 00 SECONDS EAST, 1,343.37 FEET; THENCE NORTH 24 DEGREES 26 MINUTES 57 SECONDS EAST, 591.67 FEET TO THE POINT OF BEGINNING.

SAID TRACT OF LAND CONTAINING 398.04 ACRES, MORE OR LESS, AND BEING SITUATED IN ST. CHARLES COUNTY, MISSOURI.

- 2.7. Section 240.620.B(5)** – Only CCPs generated by Ameren’s Sioux Energy Center will be accepted at the UWL. The total volume of airspace of the landfill is estimated to be 21,900,000 cubic yards. Final cover is estimated to occupy 777,000 cubic yards of this airspace. Therefore, the total waste volume estimated to be available at the site is 21,123,000 cubic yards. This equates to an estimated 20,532,000 tons of landfill capacity, assuming an average in place waste density of 84 pound per cubic foot for the gypsum stack, 65 pounds per cubic foot for flyash, and 75 pounds per cubic foot for bottom ash and boiler slag. Assuming the average in-place dry density for the respective CCPs and a total average waste generation rate of 410,000 tons of CCPs per year, the calculated life expectancy of the landfill is approximately 48 years.
- 2.8. Section 240.620.B(6)** – Existing topography of the site is shown on Plan Sheet 2. Proposed final topography of the site is shown on Plan Sheet 15.
- 2.9. Section 240.620.B(7)** – All maps and plans were prepared by, or under the supervision of, a Missouri registered professional engineer.
- a. The land use and zoning information required by this section of the County Code is shown on Plan Sheet 4.
 - b. Plan Sheet 2 shows the existing site conditions, including all existing utilities. The existing utilities within the Ameren property are oil and gas pipelines, underground telephone, overhead power (electric), fiber optic cable, and small drainage culverts.
 - c. The site location and public road access within a one (1) mile radius of the site is shown on Plan Sheet 1.
- 2.10. Section 240.620.B(8)** – The following discussion addresses the UWL construction and operation plans. All documents related to the site development and waste facility plans have been prepared directly by, or under the supervision

of, a Missouri registered Professional Engineer or Registered Geologist.

- a. The UWL will cover approximately 184 acres located on the 398.04-acre tract, which is divided in the east-west direction by Dwiggins Road. The portion north of Dwiggins Road will be used for utility waste disposal and the portion south of Dwiggins Road will be used for a soil borrow area, if necessary. The entire 398.04-acre tract is included in the project site and has appropriate local county zoning as SWD (refer to Plan Sheet 4) with the total UWL permitted waste boundary acreage of 183.5. Just north of the 183.5 UWL portion of the acreage, 19.6 acres will be utilized for a process wastewater recycle pond permitted as a no discharge facility by MDNR. The remainder of the 398.04-acre tract will be used for soil and cover material stockpile areas, flood protection, perimeter stormwater control structures, site access, perimeter fencing, required buffer zones, and groundwater monitoring. Plan Sheet 3 provides an overview of the proposed UWL project.
- b. The following addresses required elements that describe and characterize the geology and hydrology of the UWL site. The DSI and Modified CPA include numerous, related sections.
 - i. The landfill is located in a rural area. It is bordered by agricultural fields with a few residences to the east, west, and south, and the Ameren Sioux Energy Center to the north. There are no public or private wells within one-quarter mile of the UWL. Potable water is supplied to the area in an underground piped system from the town of Portage des Sioux's. The plant obtains potable water from Portage des Sioux. Process water is obtained from an intake on the Mississippi River. Projected use of water resources is not anticipated to change. Hydrogeologic investigation of the proposed landfill site has shown that groundwater is present in the sandy soils underlying the site. Modified CPA *Appendix Y – Groundwater Monitoring Data* provides a summary of hydraulic and hydrologic information relating to groundwater monitoring from August 2005 through June 2007.
 - ii. The DSI, Modified CPA, and Plans address the distance between the lowest excavated point in the cell and the maximum elevation of the water table. Groundwater levels were monitored on multiple occasions and evaluated in relation to concurrent river stage levels to evaluate the influence of the respective river stages on the groundwater elevations, gradient and direction of flow. Summary results of the hydrogeologic information are provided in Modified CPA *Appendix Y – Groundwater Monitoring Data*. The Bottom Grading Plan for the UWL can be found on Plan Sheet 5.
 - iii. During early June 2006, as part of the DSI Report, groundwater in piezometers around the site perimeter and select surface water locations were sampled for basic laboratory chemical tests (*Appendix 13 – Basic Groundwater Quality* of the DSI Report). The purpose of this sampling and testing program was to determine potential spatial variations in groundwater quality to use as the basis for the conceptual design of a groundwater monitoring network. The first four quarters of groundwater data were submitted to MDNR and the county on July 1, 2009. Laboratory reports and quality control data for subsequent

quarterly monitoring events have been submitted as required by the County.

- iv. *Modified CPA Appendix Z – Documentation of Groundwater Monitoring Well Design* provides a summary of the methodology and rationale used to establish the proposed groundwater detection monitoring system. The system includes four (4) "upgradient, UG-wells" and twelve (12) "downgradient DG-wells". Upgradient wells are located along the northern boundary of the UWL, and downgradient wells are located along the southern boundary of the UWL. Proposed well locations are shown on Plan Sheets 3, 5, and 15. All wells were installed by June 3, 2008. Ameren's groundwater sampling and analysis plan can be found in *Modified CPA Appendix S – Groundwater Sampling and Analysis Plan*.

A proposed design for each well is described in *Modified CPA Appendix Z – Documentation of Groundwater Monitoring Well Design* and shown in a table on Plan Sheet 3. A typical groundwater monitoring well detail (2/20) is on Plan Sheet 20. The design for each well includes: northing and easting coordinates; total depth of well; elevation range for monitored interval (bottom of drill hole to top of primary filter pack); top of primary filter pack; well slot size; filter pack gradation; surface seal; and surface completion. The "monitored interval" includes the length of the primary filter pack, and not simply the length of the well screen. The well slot width and gradation of the primary filter is identified. The backfill from the top of the filter pack to the ground surface will be a cement-bentonite grout.

- v. The UWL site is located in the flood plains of both the Mississippi and Missouri rivers. The uppermost aquifer is an unconfined aquifer within the alluvial geologic formation that is recharged by and strongly influenced by the water flowing within the two rivers. Groundwater elevations beneath the site fluctuate with and are influenced by the respective river stages. During and subsequent to the DSI, multiple groundwater levels were monitored on multiple occasions and evaluated in relation to concurrent river stage levels to evaluate the influence of the respective river stages on the groundwater elevations, gradient and direction of flow. Summary results of the hydrogeologic information are provided in *Modified CPA Appendix Y – Groundwater Monitoring Data*. A summary of the groundwater well modeling process and conclusions can be found in *Modified CPA Appendix Z – Documentation of Groundwater Monitoring Well Design*.
- vi. Because of the thickness of alluvial deposits and depth to bedrock, bedrock does not impact water quality protection at this site. Site-specific soils investigations are detailed in *Appendix 7 – Logs for Geotechnical Borings* and *Appendix 8 – Soil Test Results* of the DSI; and the report entitled, "*Geotechnical Engineering Report for Construction Permit Application*" contained in Appendix K of the Modified CPA.
- vii. Stormwater will be controlled by a system consisting of perimeter berms, let down channels, side slope bench drainageways and a

perimeter ditch, all ultimately directing stormwater runoff to the Recycle Pond. The surface water structures are designed to manage volumes and velocities caused by runoff from the 100-year, 1-hour rainfall event, which is more conservative than the 20-year rainfall event referenced in the St. Charles County Solid Waste Management Code. The height and final slopes of the landfill were designed to maximize runoff while minimizing erosion of the final cover over the gypsum.

- viii.** The landfill is designed with a no discharge water management system. Water that comes into contact with CCPs is managed as leachate that is pumped back to the plant for reuse in a closed loop system. In the wet gypsum stack disposal process, the water managed as leachate includes the decant from the sedimentation ponds on top of the UWL as the solids settle out of the slurry and consolidation water generated as the gypsum consolidates and water is expelled from within the landfill through the seepage collection system. The seepage collection and removal system for the landfill is referred to as “ring drains”. In dry disposal cells, leachate created by surface runoff percolating through the UWL cap and CCPs is managed by a leachate collection system installed immediately above the HPDE component of the composite bottom liner system. The leachate collection system allows the leachate to flow by gravity to a sump where it is collected and pumped back to the Recycle Pond to maintain less than 12-inches of hydraulic head on the composite bottom liner system. Any excess water that is collected within the UWL and Recycle Pond during operation will be pumped to the Ameren Sioux Energy Center for reuse or disposal under a water discharge permit.
 - ix.** After the UWL has been closed, consolidation water from the gypsum stack will be collected in the perimeter ditch by installing header collection pipes running to the Recycle Pond. Leachate from the dry disposal cells will continue to be pumped to the Recycle Pond in pipes as it is during active UWL operation. The perimeter ditch will be covered with two feet of nominally compacted soil to minimize the excess infiltration of surface water into the collection systems and vegetation will be established on the cover. At closure, the side slope storm water letdown structures will be reconstructed to extend over the covered perimeter ditch to carry uncontaminated storm water from the top and upper side slopes to natural site drainageways outside of the perimeter berm. The consolidation water and leachate will be recycled or managed as required through an NPDES discharge permit as a part of the Ameren Sioux Energy Center. Information on the financing of leachate treatment systems post-closure can be found in Modified CPA *Appendix T – Closure and Post-Closure Plans*.
 - x.** There are no public or private water wells within one-quarter mile of the landfill site.
- c.** The effects of precipitation, evapotranspiration, and climatological conditions were considered in the landfill design and operation of the no discharge water management system. A detailed discussion on the effects of precipitation, evapotranspiration, and climate conditions on the operation of the UWL and its

environs is provided in Modified CPA *Appendix R – Water Balance Calculations*. An overview of how these conditions impact the gypsum stack can be found in Modified CPA *Appendix Q - Report Titled 'Gypsum Stack' Process for Management of WFGD By-Products*.

- d. Gypsum will be conveyed to the UWL as a slurry for disposal (Phase I, Cells 1, 2 and 3). This disposal method will minimize vehicular traffic at the facility to the pickup trucks of those workers required to periodically manage the gypsum stacking operation and provide security for the UWL. CCPs will be disposed of in the dry cells (Phase II and III, Cells 4, 5, 6 and 7) over discrete periods of time with the cell remaining inactive for extended periods, typically more than 1-year, between filling events. This operation will require excavation of the CCPs temporarily stored in the existing ash pond at the Sioux Energy Center on the north side of Highway 94, and transportation of the CCPs by truck to the UWL for disposal similar to a typical “dig and haul” earth moving operation. This operation will require vehicular construction traffic on the existing ash pond, internal Ameren-owned roads between the ash pond and UWL, and on the CCP fill in the dry cell. The internal roads between the ash pond and UWL have either gravel or paved surfaces. If required during these periodic operations, the internal access roads and CCPs within the dry cell will be watered to control fugitive dust emissions and potential mud tracking. Section 240.620.B(8)e. of this report describes the dust control program. Sections 2.9.1, 3.11, and 4.6.1 of the Modified CPA provide details on the types and uses of soils found on site. Site-specific soils investigations are detailed in Modified CPA *Appendix K - Geotechnical Engineering Report for Construction Permit Application*, and *Appendix 7 – Logs for Geotechnical Borings*, and *Appendix 8 – Soil Test Results of the DSI*.

Due to the nature of the CCPs disposed in the dry cells and the operational techniques used in the wet gypsum stack process, daily cover is not required. Intermediate cover will be applied on top of the CCPs in the dry cells on areas that are dormant for more than 60 days, and will be vegetated in areas that are anticipated to remain inactive for more than 180 days. The intermediate cover will consist of 1-foot of compacted soil that may be stripped off and reused when CCPs are placed in previously inactive areas. As they rise above the perimeter flood protection berms, the exterior slopes of the CCPs and gypsum will be covered with a temporary vegetated soil cover in ten foot vertical increments to control erosion and improve aesthetics.

- e. The disposal methods will limit vehicular traffic to the existing ash pond at the Sioux Energy Center, internal gravel or paved roads between the ash pond and UWL, and the CCP fill in the dry cell. If necessary during these periodic operations, the internal gravel access roads and CCPs within the dry cell will be watered to control fugitive dust emissions. "Raw" water, Mississippi River water that is strained but not treated, will be used for dust control with the raw water obtained at the power plant. No other dust control is necessary.
- f. Due to the inorganic chemical composition of the CCP, decomposition gases associated with municipal solid waste will not be generated.
- g. Since only inorganic utility wastes will be disposed of in the UWL, mosquitoes are the only possible vector anticipated at the UWL. Should mosquitoes be determined to be a problem, a mosquito eradication program will be

- implemented.
- h.** The following section addresses plans for effectively receiving and covering waste.
- i.** According to the USDA Soil Survey for St. Charles County (1982), the three predominant surface soil groups are the Waldron silty clay, the Blake silty clay loam, and the Haynie silt loam. The Unified Soil Classification System (USCS) designation is mostly CL and CH, with some occurrences of ML soils.

Site-specific soils investigations are detailed in the Appendices 7 and 8 of the DSI, and the report entitled, "*Geotechnical Engineering Report for Construction Permit Application*", contained in Appendix K of the Modified CPA.

The results of the geotechnical investigations and laboratory testing show that much of the on-site soil and borrow source will meet the requirements for clay liners and final cover (permeability of 1×10^{-7} cm/sec or less). Soils from cut and borrow areas will be segregated and used during construction to meet three principal classifications: 1) UWL liner and cover materials with a permeability of 1×10^{-7} cm/sec or less; 2) UWL vegetative cover soils with approximate permeability of 1×10^{-5} cm/sec; and 3) perimeter berm and general fill with no specific permeability requirements.

Sufficient quantity and quality of soil materials exist on-site to construct the final cover systems. The relatively uniform, clayey soil materials (CH and CL) will be utilized to construct the compacted clay portion of the final cover.

Available clayey soils (CH and CL), or silty soils (ML) excavated from the UWL footprint or adjacent borrow areas will be used for construction of the first twelve (12) inches of the vegetation layer on the composite final cover system. The upper one (1) foot of soil at the site will be excavated and stockpiled separately for use as the upper twelve (12) inches of the vegetative layer on the composite final cover system.

- ii.** Due to the inorganic composition of the utility waste, fire hazards, odors, litter, and decomposition gases typically associated with municipal solid waste landfills will not occur. Mosquitoes are the only possible vector anticipated. Should mosquitoes be determined to be a problem, a mosquito eradication program will be implemented. The wet stack gypsum disposal process and cementitious nature of CCPs periodically disposed of in the dry cells, coupled with the use of intermediate cover in dry cell operations, will control fugitive dust emissions during the transportation, placement and sedimentation (or compaction) of the CCPs in the UWL. Modified CPA Appendix Q – Report Titled "*Gypsum Stack Process for Management of WFGD By-Products*", dated August 2006, provides an overview of the properties of gypsum solids and discusses why the gypsum stacking process will not require the use of daily soil cover material.
- iii.** The height and final slopes of the landfill were designed to maximize

runoff while minimizing erosion of the final cover over the CCPs. Management of surface water runoff following closure is addressed by dividing the closed UWL into distinct drainage areas for the purpose of controlling runoff quantities and velocities from the final UWL surface. The side slope benches and letdown structures define the individual drainage areas for the final contours of the landfill. The surface water structures are designed to manage volumes and velocities caused by runoff from the 100-year, 1-hour rainfall event. See Plan Sheets 18 and 19 for further detail on the stormwater management system. Modified CPA *Appendix N – Erosion Calculations* and Modified CPA *Appendix O – Stormwater Calculations* and H.E.L.P. Model Results also include information pertinent to the design of the stormwater management system.

- iv. Any areas that have settled, are severely eroded, or on which previously planted vegetation did not survive will be recovered, regraded or reseeded, as necessary, to maintain cover slope and integrity.

If, after closure, establishing vegetation and stabilizing the slopes is difficult to achieve or maintain, small, temporary diversion berms will be constructed on problem areas perpendicular to the flow of water. Temporary diversion berm can be constructed to drain at an approximate 1% slope to the nearest storm water “let down” structure. The construction of small diversion structures will significantly reduce the length of the side slopes of the landfill, further decreasing erosion of the final cover.

After the facility is closed, the final cover will be inspected quarterly for stressed vegetation, poor vegetative coverage and erosion of final cover. The vegetation will be routinely maintained to promote a healthy vegetative cover and to prevent the growth of trees. As necessary and indicated by the quarterly inspections, the soil will be tested to determine if fertilizer or other nutrients are recommended to improve the vegetative cover. Areas that have become eroded or lack hardy vegetative cover will be repaired with additional soil, fertilizer and/or seed.

- v. Vegetation will be established within 180 days of reaching final elevations. Any areas that have settled, are severely eroded, or on which previously planted vegetation did not survive will be recovered, regraded or reseeded, as necessary. The vegetation will be routinely maintained to promote a healthy vegetative cover and to prevent the growth of trees. As necessary and indicated by the quarterly inspections, the soil will be tested to determine if fertilizer or other nutrients are recommended to improve the vegetative cover. Areas that have become eroded or lack hardy vegetative cover will be repaired with additional soil, fertilizer and/or seed.
 - i. Groundwater sampling will be conducted in accordance with the St. Charles County Solid Waste Facility license and the St. Charles County Solid Waste Management Code.

2.11. Section 240.620.B(9) – Due to the operational techniques used in the Phase I

wet stack disposal process, on-site equipment is not required to spread and compact the waste and cover material, as is typically required in a municipal solid waste landfill. CCPs will be disposed of in the Phase II and III dry cells over discrete periods of time with the cell remaining inactive for extended periods, typically more than 1-year, between filling events. The “dig and haul” earth moving-type operation used to fill the dry cells will typically be subcontracted by Ameren to a qualified third party earthwork contractor. During operations, infiltration will be minimized on side slopes by using an optimum slope, applying periodic soil cover and establishing temporary vegetation.

The equipment used on site for operation of the wet stack, and periodic maintenance of the dry cells will include the following types or equivalent: CAT D-7 Bulldozer, CAT 953 Loader (Backup to Bulldozer), Water Truck (up to 3,000 gallons), Four Wheel Drive Pick-Up Truck, and Track Hydraulic Excavator. This equipment is capable of meeting the daily operational needs for the anticipated volume and operating conditions. The equipment temporarily needed to periodically dispose of CCPs in the dry cells will be provided Ameren’s third party earthwork contractor. This will include bulldozers, loaders, excavators, and water trucks as describe above as well as trucks to haul the CCPs from the Sioux Plant to the UWL. As capacities increase, additional earth moving capabilities can be obtained, if needed.

Initial site preparation and excavation, liner construction and closure activities will increase the equipment needs of the landfill. Site preparation, liner construction and closure activities will require soil excavation, movement and compaction equipment. Excavation of materials from the adjacent borrow areas may require track-type dozers and self-propelled scrapers. Final cover construction for closure will require additional equipment such as sheep’s foot rollers or additional wheeled compactors, a mobile water tank, and an industrial disc or scarifier. Establishment of vegetation will require standard farm equipment, such as tractors, discs and seeders. Ameren will periodically subcontract with qualified third party earthwork contractors to provide the equipment and manpower necessary to complete these additional intermittent site operations.

- 2.12. Section 240.620.B(10)** – The landfill has redundant pieces of equipment for use in most emergency situations. The landfill's proximity to the St. Louis metropolitan area assures an adequate supply of equipment dealers and contractors who are willing and able to supply equipment to the landfill on short notice.
- 2.13. Section 240.620.B(11)** – The calculated life expectancy of the landfill is approximately 48 years.
- 2.14. Section 240.620.B(12)** – This section covers issues that must be addressed in a plan for closure.
 - a.** On May 30, 2006, St. Charles County Ordinance 06-074 formally rezoned 398.04 acres of the site to Solid Waste Disposal District with Floodway Fringe and Density Floodway Overlay Districts (SWD/FF/DF) as per Application 1716. Concurrently, St. Charles County Ordinance 06-075 granted Conditional Use Permit C665 and approved a Site Development Plan for a Utility Waste Management Facility on the 398.04-acre site.

St. Charles County was the local floodplain administrator with responsibility for approving the disposal area's location within the regulatory floodplain. The County provided conceptual approval for development of the UWL in the floodplain in their April 19, 2006 staff recommendations for approval of the site's rezoning, CUP and Site Development Plan. Recommendation 1 of the CUP required a Floodplain Development Permit be issued before earthwork began at the site. The Floodplain Development Permit was issued September 25, 2007.

- b.** The final contour and grading plan is shown on Plan Sheets 14, and 15. The horizontal and vertical extents of the proposed landfill were designed to maximize the use of the proposed site on the portion of the site bounded by MO Highway 94 and Dwiggins Road, on the north and south, respectively. The site will be filled to a maximum elevation of 525 feet (top of final cover). This maximum fill elevation was established by the St. Charles County C.U.P. The solid waste boundary (e.g., horizontal limit of solid waste disposal) will be a minimum of 100 feet from all existing property boundaries and any road easements.
- c.** Vegetation will be established within 180 days of reaching final elevations. Any areas that have settled, are severely eroded, or on which previously planted vegetation did not survive will be recovered, regraded or reseeded, as necessary. The vegetation will be routinely maintained to promote a healthy vegetative cover and to prevent the growth of trees. As necessary and indicated by the quarterly inspections, the soil will be tested to determine if fertilizer or other nutrients are recommended to improve the vegetative cover. Areas that have become eroded or lack hardy vegetative cover will be repaired with additional soil, fertilizer and/or seed.
- d.** A hardy vegetative cover will prevent erosion of final grades that are less than 33%. A hardy vegetative cover will also prevent erosion on final stormwater channels with slopes less than 5%. For stormwater channels with steeper grades and/or higher water velocities, riprap or other acceptable erosion control methods will be used to prevent erosion in the drainageways. The permanent letdowns will be lined with rip-rap to dissipate energy and prevent erosion of the final slope and final cover.

Erosion of the final cover, side slope benches, stormwater letdown structures, and perimeter ditches were evaluated using North American Green's Version 4.31 Erosion Control Materials Design software. The software conservatively evaluates channel erosion using the maximum shear strength method outlined in the Federal Highway Administration's HEC #15 and the United States Agricultural Department's (USDA's) Ag Handbook #667. All drainage structures will be protected from erosion using one of several possible materials: an erosion control mat, limestone rip rap, or an articulated concrete blanket. The results of the erosion evaluation are provided in Modified CPA *Appendix N – Erosion Calculations*. Appendix N also identifies the minimum type of required erosion protection for each section of the drainageways.

- e.** Due to the inorganic composition of the utility waste, decomposition gases associated with municipal solid waste will not be generated.
- f.** Ameren will monitor and maintain the following landfill systems and associated equipment during the life of the landfill and the post-closure period: stormwater pumps, drainage channels, ponds, sumps, outfalls and inlets; leachate pumps

and appurtenances; Recycle Pond pumps and appurtenances; decant siphon and emergency spillway structures in the sedimentation ponds; and Influent slurry piping from the Sioux Energy Center.

- g.** Any areas that have settled, are severely eroded, or on which previously planted vegetation did not survive will be recovered, regraded or reseeded, as necessary, to maintain cover slope and integrity.
- h.** The final cover system design is different for the flat top of the landfill (less than 5% slope) than for the steeper sideslopes (no greater than 33% slope). On the top of the completed UWL, the final cover will consist of a 60 mil HDPE liner placed directly on the CCPs, overlain by a geotextile, and covered with a two (2) foot layer of nominally compacted soil. The upper layer of the soil will be capable of supporting the final vegetative cover. On the landfill's exterior side slopes, the final cover will consist of a one (1) foot layer of compacted clay placed directly on the gypsum, covered with a two (2) foot layer of nominally compacted soil, for a total final cover thickness of three (3) feet. The upper layer of the soil will be capable of supporting the final vegetative cover. Sufficient quantity and quality of soil materials exist on-site to construct the final cover systems.

The one (1) foot compacted clay layer of the sloped final cover system will be constructed in two thin lifts with density and moisture testing conducted on each layer. The clayey soils to be used for final cover will be tested and compaction criteria will be developed to determine the range of dry unit weights and moisture contents that will achieve the required maximum permeability of 1×10^{-5} cm/sec. Soil will be placed in 8 to 9 inch layers and compacted with a sheep's foot roller, or equivalent, to a uniform density. The second lift will be constructed after quality assurance testing has been conducted, verifying the proper construction of the previous lift.

The first twelve (12) inches of the vegetative layer will be constructed by spreading 16 inches of soil over the geomembrane liner with a bulldozer, or equivalent. Compaction will be provided by the traffic of pan scrapers used to haul the remaining soil to the active work area. The final twelve (12) inches of soil will be constructed by placing the soil material in two (2) loose, 8-inch lifts. The vegetative soil layer will be placed with a scraper. The lifts will be smoothed and compacted with one pass using a bulldozer. Final cover details are shown on Plan Sheets 14, 15, and 16.

- i.** A seven-foot high security fence is installed around the UWL's perimeter. Locked gates are located on the north side of the UWL at the entrance roads to control access to the disposal area. Ameren Sioux Energy Center security staff are on duty 24-hours per day and will provide additional security to the UWL through routine site monitoring. Fire extinguishers will be located on all landfill equipment. Communication equipment used at the landfill will consist of two-way radios. The Ameren Sioux Energy Center has an existing Emergency Implementing Procedures (EIP) Report, which covers response procedures for emergencies and natural disasters. The index for the EIP can be found in Appendix A.
- j.** Ameren will provide site access to County representatives for the purpose of inspection during operations, closure activities and the post-closure maintenance period, in accordance with the County Code. In accordance with state law and

rules, an easement to the site and adjacent soil borrow area has been executed with MDNR and filed with the St. Charles County Recorder of Deeds. This easement grants access for MDNR, its agents, or its contractors to the permitted area to complete work specified in the closure plan, to monitor or maintain the utility waste disposal area, or to take remedial action during the post-closure period. A copy of the unexecuted easement agreement can be found in Modified CPA Appendix T – Closure and Post-Closure Plan.

- k. The UWL has been designed as a closed loop, no-discharge water management system. Consolidation water, slurry decant water, and leachate will be collected and routed to the Recycle Pond for containment, storage, and reuse. Stormwater will be managed to minimize erosion of the active and closed UWL. During active operations, stormwater will be collected and routed via the perimeter ditch to the Recycle Pond. All water collected and stored in the Recycle Pond will be pumped to the Ameren Sioux Energy Center for reuse in the WFGD scrubber systems. No discharge of consolidation water, slurry decant water, leachate, or stormwater will occur unless allowed by a future NPDES permit, or equivalent.

Management of surface water runoff following closure is addressed by dividing the closed UWL into distinct drainage areas for the purpose of controlling runoff quantities and velocities from the final UWL surface. Uncontaminated stormwater runoff from the top and the upper side slopes of the UWL will be discharged through a series of stormwater let down structures. The stormwater runoff will be directed over the perimeter ditch and perimeter berm for discharge outside of permitted boundary. This uncontaminated stormwater will be kept out of the Recycle Pond to minimize the amount of water requiring reuse. Following proper closure, all uncontaminated stormwater runoff will be controlled and monitored to assure that State and St. Charles County water quality standards are met. Plan Sheet 18 shows the overall Stormwater Management Plan for the closed landfill and the location of stormwater control structures.

- l. The report titled, *Groundwater Monitoring Well Installation and Summary Report*, dated June 2008, has previously been submitted to the county and provides the location and installation logs for groundwater monitoring wells.
- m. The landfill is designed with a no discharge water management system. Water that has come into contact with CCPs is managed as leachate. After closure, consolidation water from the gypsum stack will be collected in the perimeter ditch by installing header collection pipes running to the Recycle Pond. The perimeter ditch will be covered with two feet of nominally compacted soil to minimize the excess infiltration of surface water into the collection system and vegetation will be established on the cover. Leachate from the dry disposal cells will be managed by the leachate collection system that allows the leachate to flow by gravity to one of seven (7) sumps where it is collected and pumped to the Recycle Pond. The sumps are equipped with submersible pumps with automatic controls to maintain less than 12-inches of leachate on the composite bottom liner system. Section 3.11 of the Modified CPA and Plan Sheets 5, 26 and 31 provide details on the leachate management system for the dry cells. The leachate will be discharged into the Recycle Pond for management as part of the Ameren Sioux Energy Center operations. At closure, the side slope storm water letdown structures will be reconstructed to extend over the covered perimeter

ditch to carry uncontaminated storm water from the top and upper side slopes to natural site drainageways outside of the perimeter berm.

- n. Post-closure care will include maintenance, sampling, testing and statistical analysis of the groundwater monitoring wells. Post-closure maintenance will continue for 20 years from the date of final closure of the facility, as currently required by state law.
- o. Due to the inorganic composition of the utility waste, decomposition gases associated with municipal solid waste will not be generated.

2.15. Section 240.620.B(13) – The following describes the projected use of the completed landfill property.

- a. Due to the inorganic composition of the utility waste, decomposition gases associated with municipal solid waste will not be generated. Post-closure care will include maintenance, sampling, testing and statistical analysis of the groundwater monitoring wells. Post-closure maintenance will continue for 20 years from the date of final closure of the facility.
- b. On the top of the completed UWL, the final cover will consist of an HDPE liner placed directly on the CCPs, overlain by a geotextile, and covered with a two (2) foot layer of nominally compacted soil. The upper layer of the soil will be capable of supporting the final vegetative cover. On the landfill's exterior side slopes, the final cover will consist of a one (1) foot layer of compacted clay placed directly on the CCPs, covered with a two (2) foot layer of nominally compacted soil, for a total final cover thickness of three (3) feet. The upper layer of the soil will be capable of supporting the final vegetative cover. The depth of final cover is adequate for the planned vegetation. Cultivation for growing agricultural crops on the final cover is not planned. Final cover details are shown on Plan Sheets 15, and 16.
- c. No physical structures are currently planned on the completed landfill (e.g., over waste footprint area).

2.16. Section 240.620.B(14) – On May 30, 2006, St. Charles County Ordinance 06-074 formally rezoned 398.04 acres of the site to Solid Waste Disposal District with Floodway Fringe and Density Floodway Overlay Districts (SWD/FF/DF) as per Application 1716. Concurrently, St. Charles County Ordinance 06-075 granted Conditional Use Permit C665 and approved a Site Development Plan for a Utility Waste Management Facility on the 398.04-acre site.

2.17. Section 240.620.B(15) – The landfill is divided into three distinct phases for the development, construction and operation. Phase I will include the gypsum stacking operation comprised of three cells (Cells 1 through 3). Phases II and III will include dry disposal of CCPs in Cells 4 and 5, and 6 and 7 respectively. Construction of the Phase I cells will progress in a west-to-east pattern, beginning with Cell 1 at the western boundary of the UWL. Phase I will total 96.9 acres in 3 cells. Construction of the Phase II cells will overlap operation of Phase I and proceed from west to east beginning with Cell 4 on the east side of the Recycle Pond. Phase II will total 42.0 acres of disposal area in two cells. Construction of the Phase III cells will also include two cells and proceed from west to east beginning on the east side of Cell 3. Phase III will create a total additional disposal area of 44.5 acres. Construction of Cell 1 and the Recycle

Pond was completed in 2009 and the operating license issued in November 2010. Cell 4 is currently under construction and is planned for completion in October 2013. Section 4.1 of the Modified CPA and Plan Sheets 3 and 5 provide a more detailed schedule of the remaining phased construction and operation. This section can be found in Appendix D of the WFP.

- 2.18. Section 240.620.B(16) – Disaster Management Plan** – The Ameren Sioux Energy Center has an existing Emergency Implementing Procedures (EIP) Report, which covers response procedures for emergencies and natural disasters. The index for the Ameren Sioux Energy Center EIP can be found in Appendix A.
- 2.19. Section 240.620.B(16) – Site Safety Plan** – The Ameren Sioux Energy Center has an existing Safe Work Rules Handbook, which covers general safety guidelines, task specific safety procedures, and Ameren’s Corporate Safety & Health Policy. The index for the Ameren Sioux Energy Center Safe Work Rules Handbook can be found in Appendix B.
- 2.20. Section 240.1210** – MDNR will be notified in writing at least 180 days prior to the anticipated last receipt of waste in the landfill. Ameren will make provisions to begin closure within 30 days of receiving final waste and will complete closure within 180 days of beginning closure on the landfill. The St. Charles County Division Director will be included in communications between Ameren and MDNR regarding closure activities.
- 2.21. Section 240.1220.A** – The following section outlines additional criteria for landfill closure. Modified CPA Section 3.18 and Modified CPA *Appendix T - Closure and Post-Closure Plan* outline closure practices that will be adhered to.
- 2.22. Section 240.1220.A(1)** – On the top of the completed UWL, the final cover will consist of an HDPE liner placed directly on the CCPs, overlain by a geotextile, and covered with a two (2) foot layer of nominally compacted soil. The upper layer of the soil will be capable of supporting the final vegetative cover. On the landfill’s exterior side slopes, the final cover will consist of a one (1) foot layer of compacted clay placed directly on the CCPs, covered with a two (2) foot layer of nominally compacted soil, for a total final cover thickness of three (3) feet. The upper layer of the soil will be capable of supporting the final vegetative cover. Final cover details are shown on Plan Sheets 14, 15, and 16. The final cover design meets the current state requirements and is equivalent in function and performance to the requirements of the County Code.
- 2.23. Section 240.1220.A(2)** – Vegetation will be established within 180 days of reaching final elevations. Any areas that have settled, are severely eroded, or on which previously planted vegetation did not survive will be recovered, regraded or reseeded, as necessary. The vegetation will be routinely maintained to promote a healthy vegetative cover and to prevent the growth of trees. As necessary and indicated by the quarterly inspections, the soil will be tested to determine if fertilizer or other nutrients are recommended to improve the vegetative cover. Areas that have become eroded or lack hardy vegetative cover will be repaired with additional soil, fertilizer and/or seed.
- 2.24. Section 240.1220.A(3)** – There are no public or private water wells within one-

quarter mile of the landfill site. The current system of groundwater monitoring wells installed at the site will be monitored semi-annually for 20-years following closure of the UWL.

- 2.25. Section 240.1220.A(4)** – The current system of groundwater monitoring wells will be sampled quarterly for the contaminants outlined in Modified CPA *Appendix S - Groundwater Sampling and Analysis Plan*. This monitoring schedule has been approved by MDNR and is equivalent in function and performance to the requirements of the County Code.
- 2.26. Section 240.1220.A(5)** – Upon MDNR approved closure of the landfill and approved survey plat, the survey plat identifying the boundaries and existence of the landfill will be recorded within 30 days with the St. Charles County Recorder of Deeds. The survey plat will include the types of waste disposed of at the site, the location of wastes, depth of the fill, and location and description of any leachate, gas control, or other monitoring systems which are to be maintained and a designation of the party responsible for maintaining such systems.
- 2.27. Section 240.1220.B** – As allowed by this part of the County Code, Ameren’s proposed UWL closure and post-closure procedures may differ from the requirements for a sanitary landfill. However, the proposed closure and post-closure procedures are equivalent in function and performance to the requirements of the County Code. The Closure and Post-Closure Plan provides the criteria necessary to properly close and maintain the Ameren Sioux Power Plant utility waste landfill, owned and operated by Ameren. The plan includes the methods and schedule anticipated to properly close the entire landfill during or at the end of its operating life. Closure activities will be completed according to the approved permit documents, including the Construction Permit Application and associated Plan Sheets and the Construction Quality Assurance Plan.

3.0. OPERATIONAL STANDARDS

This section summarizes compliance with the requirements of Sections 240.1150, 240.1180 and 240.1310 of the St. Charles County Solid Waste Management Code. Modified CPA *Section 4.0 – Landfill Operation* incorporates the operation standards of MDNR and St. Charles County rules into an operating manual. Section 4.0 of the Modified CPA can be removed and used as an independent operational manual, and is included as Appendix D.

The UWL will allow permanent disposal of gypsum using wet stacking concepts in Phase I (Cells 1, 2 and 3) and dry disposal of CCPs in Phases II and III (Cells 4, 5, 6 and 7). Dry disposal will implement many of the typical procedures used for municipal solid waste landfills. Due to the operational techniques proposed for the wet stack disposal process, many of the rules associated with municipal solid waste landfills do not apply. Modified CPA *Appendix Q – Report Titled “Gypsum Stack’ Process for Management of WFGD By-Products”, dated August 2006*, provides further detail on the properties of gypsum solids and how this portion of the landfill operation will differ from a traditional sanitary landfill.

- 3.1. Section 240.1150(1)** – Incoming waste in the Phase I wet stack will be received and deposited as a slurry following wet stacking procedures. Therefore, a maximum layer thickness and waste compaction is not applicable to the Phase I UWL operation. Incoming CCPs in the Phase II and III dry cells will be trucked

- to the UWL and placed in lifts not exceeding two feet then compacted using typical earth moving equipment and procedures.
- 3.2. Section 240.1150(2)** –Due to the operational techniques proposed for the Phase I wet stack disposal process, there will be no “working face” as defined for a sanitary landfill. CCPs will be disposed of in the Phase II and III dry cells over discrete periods of time with each dry cell remaining inactive for extended periods between filling events. During inactive periods of more than 60 days where no CCPs are placed in a dry cell, all CCPs in the dry cell will be covered with a 1-foot thick intermediate cover. The intermediate cover will be removed prior to the placement of additional CCPs placed during subsequent periods of active filling. The intermediate cover will be reinstalled over the CCPs at the completion of each distinct filling operation.
 - 3.3. Section 240.1150(3)** – Due to the operational techniques proposed for the Phase I wet stack disposal process, the requirement for daily cover is not applicable. Because of the unique physical properties of the utility wastes in the UWL, daily cover of CCPs in the Phase II and III dry cells is also not required. However, intermediate cover will be placed over the CCPs at the completion of each distinct filling operation.
 - 3.4. Section 240.1150(4)** – The landfill manager and at least one other employee of the landfill will be Certified Solid Waste Technicians, as required by state law and rule. The other employee who is a Certified Solid Waste Technician will be qualified to serve the role of landfill manager during the manager’s absence.
 - 3.5. Section 240.1150(5)** – Only utility wastes generated by Ameren’s Sioux Energy Center will be accepted at the UWL.
 - 3.6. Section 240.1150(6)** – See Section 240.1150(5) above.
 - 3.7. Section 240.1150(7)** – See Section 240.1150(5) above.
 - 3.8. Section 240.1150(8)** – See Section 240.1150(5) above.
 - 3.9. Section 240.1150(9)** – See Section 240.1150(5) above.
 - 3.10. Section 240.1150(10)** – The Phase I wet stack disposal process minimizes fugitive dust emissions during the transportation, placement and sedimentation (or compaction) of the gypsum solids. The majority of the interior of the active gypsum stack disposal area is the active settling cells that are covered with water, eliminating this area as a potential source of fugitive dust. Active filling of the Phase II and III dry cells will limit vehicular traffic to the existing ash pond at the Sioux Energy Center, internal gravel or paved roads between the ash pond and UWL, and the CCP fill in the dry cell. If necessary during these periodic operations, the gravel access roads, Cell perimeter roads, and CCPs within the dry cell will be watered to control fugitive dust emissions similar to typical earth moving operations. No other dust control is necessary.
 - 3.11. Section 240.1150(11)** – Stormwater will be controlled by a system consisting of perimeter berms, let down channels, side slope bench drainageways and a perimeter ditch, all ultimately directing stormwater runoff to the Recycle Pond. The surface water structures are designed to manage volumes and velocities caused by runoff from the 100-year, 1-hour rainfall event, which is more conservative than the 20-year rainfall event referenced in the St. Charles County

Solid Waste Management Code. Erosion control Best Management Practices will be used during all periods of construction. A hardy vegetative cover will prevent erosion of final grades that are less than 33%.

- 3.12. Section 240.1150(12)** – The DSI, Modified CPA, & Plans address the distance between the lowest excavated point in the cell and the maximum height of the water table. These documents were approved by MDNR and the Division Director before issuing the construction permit.
- 3.13. Section 240.1150(13)** – The capacity for the site geology to protect water quality was addressed throughout the DSI and Modified CPA. In addition, MDNR issued Solid Waste Disposal Area Construction Permit No. 0918301 on March 28, 2008, and approved the Modification to this Permit on February 8, 2013. See Section 240.620.B(8)b.vi. for more detail on on-site water quality protection provided by existing earth materials.
- 3.14. Section 240.1150(14)** – A composite liner that exceeds the minimum requirements of MDNR and the County will be installed in the bottom of the UWL. The landfill is designed with a no discharge water management system. Water that has come into contact with CCPs is managed as leachate. In the wet stack disposal process, this can include the decant from the sedimentation ponds on top of the UWL as the solids settle out of the slurry and consolidation water generated as the gypsum consolidates and water is expelled from within the landfill through the seepage collection system. In the dry cells, leachate created by surface runoff percolating through the UWL cap and CCPs is managed by a leachate collection system that allows the leachate to flow by gravity to a sump where it is collected and pumped back to the Recycle Pond. Any excess water that is collected within the UWL and Recycle Pond during operation will be pumped to the Ameren Sioux Energy Center.
- 3.15. Section 240.1150(15)** – The UWL is designed as a No Discharge facility. No discharge of consolidation water, slurry decant water, leachate, or stormwater will occur unless allowed by an NPDES permit, or equivalent.
- 3.16. Section 240.1150(16)** – The composite liner system and application of final cover, prevent ground and/or surface water from coming into contact with the waste. The floodplain between the Mississippi and Missouri Rivers in the vicinity of the proposed UWL is protected from lesser flood events by the L-15 agricultural levee. In addition, a perimeter berm will be constructed around the entire disposal area that will function as a flood protection dike. The Flood Insurance Study reports the regulatory 100-Year Flood Elevation (Base Flood Elevation, or BFE) at Section D (RM 208.9) on the Mississippi River at 438.7. The top of the perimeter berm will be constructed to elevation 446. The DSI and Modified CPA provide further detail.
- 3.17. Section 240.1150(17)** – No open burning of waste is anticipated on the property, but appropriate permits and/or approvals will be obtained if it is determined that open burning will be required.
- 3.18. Section 240.1150(18)** – Due to the inorganic composition of the utility waste, decomposition gases associated with municipal solid waste will not be generated.
- 3.19. Section 240.1150(19)** – See Section 240.1150(18) above.

- 3.20. Section 240.1150(20)** – Mosquitoes are the only vector anticipated. Should mosquitoes become a problem, a mosquito eradication program will be implemented.
- 3.21. Section 240.1150(21)** – Only utility wastes generated by Ameren’s Sioux Energy Center will be accepted at the UWL. Due to the physical characteristics and properties of the waste, no litter will be produced.
- 3.22. Section 240.1150(22)** – By its nature, the Phase I wet stack disposal process minimizes wind-blown waste during the transportation, placement and sedimentation (or compaction) of the gypsum solids. The majority of the interior of the active gypsum stack disposal area is the active settling cells that are covered with water, eliminating this area as a potential source of fugitive dust. Gravel access roads, Cell perimeter roads, and CCPs within the UWL footprint will be watered as necessary to control dust during the periodic filling of the Phase II and III dry cells. During the inactive periods between periodic filling events, CCPs in the dry cells will have an intermediate cover to control windblown erosion. The CCPs also “crust over” as they dry out, limiting their susceptibility to wind erosion, and when exposed to precipitation, the crust reforms, again limiting wind erosion.
- 3.23. Section 240.1150(23)** – The overall appearance of the landfill will not detract from the agricultural activities of adjacent property owners, and care will be taken to maintain the existing aesthetics of the area. Vegetative growth will be established to improve the appearance of the landfill. Windbreaks are not proposed due to the lack of litter and the topography and land use of adjacent properties. The perimeter berms will be constructed prior to the operation of the UWL and will provide visual screening of many of the UWL operational activities. Section 240.1150(22) above includes a discussion on wind-borne waste.
- 3.24. Section 240.1150(24)** – Only utility wastes generated by Ameren’s Sioux Energy Center will be accepted at the UWL. Any future mining operations for the purpose of removing material from the UWL for beneficial reuse will be conducted so as not to detract from the general aesthetic of the landfill.
- 3.25. Section 240.1150(25)** – A preventative maintenance program will be implemented for the landfill equipment to minimize equipment failure and maximize equipment life. The landfill has redundant pieces of equipment for use in most emergency situations. The landfill’s proximity to the St. Louis metropolitan area assures an adequate supply of equipment dealers and contractors who are willing and able to supply equipment to the landfill on short notice.
- 3.26. Section 240.1150(26)** – Each piece of equipment will be equipped with a fire extinguisher.
- 3.27. Section 240.1150(27)** – Only inorganic utility wastes generated by Ameren’s Sioux Energy Center will be accepted at the UWL and are not flammable. See Section 240.1150(26) above.
- 3.28. Section 240.1150(28)** – Two-way radios or other communication devices will be assigned to personnel working on-site. This ensures all staff have communication equipment on their person at all times and provides direct access to the Ameren Sioux Energy Center office, which can summon police and fire

services quickly.

- 3.29. Section 240.1150(29)** – The prohibition against scavenging of solid waste is not applicable to a UWL. The future reclamation of CCPs may be allowed for accepted beneficial uses, but a reclamation plan will be submitted to MDNR and St. Charles County prior to initiating any reclamation activities.
- 3.30. Section 240.1150(30)** – Routine vehicular access to the landfill will be limited to gated access points accessible from MO Highway 94 on the northern portion of the site. Access points will be limited to Ameren personnel, landfill staff or maintenance contractors. The access gates will be locked when the Ameren personnel, landfill staff or maintenance contractors are not on-site.
- 3.31. Section 240.1150(31)** – The gypsum will be piped to the UWL as a slurry from the Ameren Sioux Energy Center to the north. No appreciable truck traffic is expected into the site for transporting gypsum. CCPs will be periodically trucked from the Sioux Energy Center to the UWL on private Ameren-owned roads, crossing Highway 94 perpendicular to traffic flow at a designated MoDOT approved location. This operation will only occur intermittently and will be tightly controlled by Ameren under formal contract agreements.
- 3.32. Section 240.1150(32)** – The Phase I wet gypsum stack process minimizes fugitive dust emissions during the transportation, placement and sedimentation (or compaction) of the gypsum solids. The primary potential source of dust during the Phase II and III dry cell operations will be internal construction traffic on the gravel access roads, Cell perimeter roads, and CCPs in the UWL footprint. CCPs in the dry cells “crust over” as they dry out, limiting their susceptibility to wind erosion, and when exposed to precipitation, the crust reforms, again limiting wind erosion. The exposed CCPs and internal gravel roads will be watered as necessary to control dust during all vehicular operations. The dormant dry cells will also have an intermediate cover to control dust.
- 3.33. Section 240.1150(33)** – Due to the design and operational techniques proposed for the gypsum stack, intermediate cover on inactive areas is not necessary to prevent wind or water erosion of the deposited gypsum. A 1-foot thick intermediate cover will be placed on areas that are inactive for more than 60 days in the dry cells to prevent wind or water erosion of the deposited CCPs.
- 3.34. Section 240.1150(34)** – On the uppermost “flat” area of the completed UWL, the final cover will consist of a 60-mil geomembrane liner, overlain by a geotextile, covered with a two (2) foot layer of nominally compacted soil. On the exterior side slopes of the UWL, the final cover will consist of a one (1) foot layer of compacted clay soil, covered with two (2) feet of nominally compacted soil.
- 3.35. Section 240.1150(35)** – Vegetation will be established within 180 days of reaching final elevations. Any areas that have settled, are severely eroded, or on which previously planted vegetation did not survive will be recovered, regraded or reseeded, as necessary. The vegetation will be routinely maintained to promote a healthy vegetative cover and to prevent the growth of trees. As necessary and indicated by the quarterly inspections, the soil will be tested to determine if fertilizer or other nutrients are recommended to improve the vegetative cover. Areas that have become eroded or lack hardy vegetative cover will be repaired with additional soil, fertilizer and/or seed.

- 3.36. Section 240.1150(36)** – Ameren will maintain the documents and records required by State and County regulation. At a minimum, the following records will be kept:
- a. Major operational problems, complaints, or difficulties regarding the landfill operation.
 - b. Any demonstrations, certifications, finding, monitoring, testing or analytical data required under 10 CSR 80-11.010 (9).
 - c. Records associated with any future corrective measures, as required by 10 CSR 80-11.010 (11).
 - d. Major operational problems, complaints, or difficulties, including vector control.
 - e. Dust control efforts
 - f. Quantitative measurements of the waste handled and an estimate of the air space remaining in the landfill. These measurements will be submitted to MDNR by January 31 in even-numbered years. A copy will also be submitted to St. Charles County.
- 3.37. Section 240.1150(37)** – There are no public or private water wells within one-quarter mile of the landfill site.
- 3.38. Section 240.1180(1)** – A sign will be displayed at the entrance to the landfill containing the following text in letters at least two (2) inches high and one-half (1/2) inches wide:
- Approved Utility Waste Landfill operated under License No. 04303 issued by the Division Director of the Division of Environmental Services of the St. Charles County Department of Community Health and the Environment and Solid Waste Disposal Area Operating Permit No. 0918301 issued by the Missouri Department of Natural Resources.**
- The UWL will only accept: fly ash, bottom ash, or other flue gas scrubber byproducts generated by the Ameren Missouri Sioux Power Plant.**
- 3.39. Section 240.1180(2)** – Signs will be displayed at all entrances to the landfill containing the information shown in Section 240.1180(1), above, in letters at least two (2) inches high and one-half (1/2) inches wide.
- 3.40. Section 240.1310** – Ameren acknowledges that they may not salvage, excavate, disrupt or remove any deposited material from the active UWL without prior approval from both MDNR and St. Charles County. In the event that Ameren determines that it is preferable to recover the CCPs placed in the landfill, future mining activities of in-place materials will not be commenced without the written notification and consent of MDNR and St. Charles County.
- 3.41.** The permitted maximum tonnage is 30,000 tons per month, unless a notice is submitted to the division at least seven days prior to exceeding the volume or traffic allowances due to a necessary event, in accordance with the current Solid Waste Facility License. If the 30 day increase in volume or traffic allowances must be extended, then a written approval for an extension will be requested.

- 3.42.** No off-site waste shall be disposed of in the UWL. Any changes in that status will require revision to the License and the WFP in accordance with the St. Charles County Solid Waste Management Code.

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Appendix A

Ameren Sioux Energy Center Emergency Implementation Procedures Index

Appendix B

Ameren Missouri Sioux Energy Center Safe Work Rules Handbook Index

Appendix C
Set of 33 Plan Sheets Revised February 2012

Appendix D

Modified CPA Section 4.0 – Landfill Operation

Appendix E
Waste Management Code Summary Table