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Witness: James L. Arndt
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Sponsoring Party: Grain Belt Express Clean Line LLC
Case No.: EA-2016-0358
Date of Testimony: August 30, 2016

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO. EA-2016-0358

DIRECT TESTIMONY OF

JAMES L. ARNDT, Ph.D.

ON BEHALF OF

GRAIN BELT EXPRESS CLEAN LINE LLC

August 30, 2016

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I. WITNESS INTRODUCTION AND PURPOSE OF TESTIMONY

Q. Please state your name, present position and business address.

A. My name James L. Arndt. I am a Senior Project Manager at Merjent, Inc. ("Merjent"). My business address is 800 Washington Avenue North, Suite 315, Minneapolis, MN 55401.

Q. Please describe your education and professional background.

A. I received my Bachelor of Science Degree in 1980 from the University of Wisconsin – Stevens Point with a major in Soil Science. I then received my Masters of Science and Doctorate degrees in Soil Science from North Dakota State University in 1987 and 1995, respectively. My educational and research specialties are in soil interpretations, soil nutrition, soil pedology and survey, and soil chemistry, physics, and hydrology.

Q. What work experience have you had that is relevant to your involvement in the Grain Belt Express Clean Line transmission project ("Grain Belt Express Project" or "Project")?

A. I am currently licensed as a Professional Soil Scientist in Minnesota (#30684) and Wisconsin (#112), Professional Soil Classifier in North Dakota (#64), and a nationally Certified Professional Soil Scientist (American Registry of Certified Professionals in Agronomy Crops and Soils #24904). I successfully completed Environmental Inspector Organic Training developed by the Independent Organic Inspectors Association and am certified to perform Agricultural Compliance Inspection services on National Organic Program Certified Organic Farms. I have served as President of the Minnesota Association of Professional Soil Scientists.

All of these certifications require me to take and pass written tests, and show educational and professional experience in the area of soil science. I have had to sign ethics

pledges for all four certifications that require me to provide ethical services to my clients and the greater community. The certifications I currently hold are the highest certifications that can be obtained for Soil Scientists in the United States. A complete list of my qualifications and research is attached as **Schedule JLA-1**.

From 2005 to present, while working for various companies (including Merjent), my primary responsibilities have been to provide clients in the pipeline, electric transmission, and mining industries with environmental permitting services, including the preparation of Environmental Assessments and Environmental Impact Statements under the National Environmental Policy Act and/or relevant state programs, and preparation of permit applications under Sections 404 and 401 of the Clean Water Act. With specific reference to agriculture and soil quality, I have been the lead author of several "Resource Report 7 - Soils" reports, which are an element of comprehensive Environmental Reports submitted to the Federal Energy Regulatory Commission ("FERC"), pursuant to its regulations regarding proposed natural gas pipeline projects. Resource Report 7's provide a detailed assessment of soil properties and limitations along pipeline rights-of-way ("ROWs"), and include construction-related practices that avoid, minimize, and mitigate impacts to soil quality and agricultural use.

I also provide environmental survey and technical support involving the characterization and interpretation of land-use, soils, agricultural issues, wetlands, and hydrologic features along linear ROW projects. I routinely work with commercial scale utility applicants and agencies to develop and implement Agricultural Impact Mitigation Plans ("AIMP"), and related plans and agreements, including Organic Farm Crossing Plans, Spill Prevention Control and Countermeasure ("SPCC") Plans, Stormwater

Pollution Prevention Plans ("SWPPP"), and land restoration plans. I have trained Agricultural and Environmental Inspectors and Monitors in the implementation of various plans during construction, and perform on-site inspections during construction.

From 1995 to 2005 I was Vice President of Peterson Environmental Consulting, Inc. In this role, I was in direct charge of performing natural resource assessments along linear ROWs in the upper Midwest. As a preferred sub-contractor to the Corps of Engineers, I provided wetlands and soils support for several large Environmental Impact Statements, including an assessment of soil salinization hazards and their effects on irrigable land associated with the proposed outlet to control flooding in Devils Lake, North Dakota.

From 1980 to 1995 I worked in various capacities for the North Dakota State University Department of Soil Science. My duties included the collection, processing, evaluation and interpretation of soil and water data. I attended and assisted in the U.S. Department of Agriculture's Natural Resources Conservation Service field reviews of county soil surveys, and collected typifying soil profile descriptions, and soil correlation samples for characterization and presentation in interpretative tables in county soil surveys. As Supervisor of the U.S Department of Agriculture's Soils and Water Environmental Laboratory, I provided assistance to agricultural producers requiring information on soil-water compatibility and interpretation of water and soil analyses from locations throughout the state.

Q. What is the purpose of your testimony in this case?

A. On behalf of Grain Belt Express Clean Line LLC ("Grain Belt Express" or "Company"), I discuss the potential agricultural impacts that may result from the construction or

operation of the Grain Belt Express Project, and describe the measures the Company has adopted to avoid, minimize, and mitigate for any potential impacts. I will specifically discuss potential impacts to agricultural operations in Missouri, including soil resources. Grain Belt Express' proposed avoidance, minimization, and mitigation efforts during construction and post-construction restoration are documented in the Missouri Agricultural Impact Mitigation Protocol ("Mo Ag Protocol"), which is attached as **Schedule JLA-2** to my testimony. My testimony will also focus on Clean Line Energy Partner LLC's ("Clean Line") understanding of agricultural impacts and concerns as documented in Clean Line's corporate Agricultural Impact Mitigation Policy ("AIM Policy"), attached as **Schedule JLA-3** to my testimony, as well as the process by which Clean Line has proposed to address these issues.

Q. Have you previously testified before any regulatory commissions?

A. Yes. During 2012 I testified on behalf of Xcel Energy's CapX2020 Monticello to St. Cloud Project on soil quality issues to assist in farm valuation under Minnesota's "Buy the Farm" legislation (Minn. Stat. 216E.12).

During 2012, I was retained by Enbridge Energy to evaluate pipeline construction impacts to agricultural land placed into the Wetland Reserve Program by a landowner in Wisconsin.

In 2009, I was retained by the South Dakota Public Utilities Commission to provide testimony evaluating the Soils Section and the Erosion and Sedimentation Section of the TransCanada Keystone, LP application to the South Dakota PUC for a permit to construct the Keystone XL Project. In this role, I evaluated portions of Keystone's Construction, Mitigation, and Reclamation Plan to determine whether important soil limitations

identified in the application were addressed such that areas affected by construction-related activities would be restored to pre-construction conditions within a reasonable timeframe.

In 2008 and 2009, I provided testimony at two condemnation hearings involving alleged damages to certified organic farm operations crossed by the MinnCan Pipeline project located in Scott and McLeod Counties, Minnesota. I also provided testimony at several other condemnation hearings regarding alleged damages to various aspects of soil quality for the MinnCan Pipeline project.

In 2004 I examined agricultural and soil quality issues, and presented testimony on behalf of the City of Hutchinson regarding alleged violations of the Agricultural Impact Mitigation Plan prepared by the Hutchinson Utilities Commission and approved by the Minnesota Department of Agriculture for the construction of the City of Hutchinson Gas Transmission Pipeline.

II. MERJENT QUALIFICATIONS AND EXPERIENCE

Q. Please describe the business of Merjent.

A. Merjent is an environmental and social consultancy firm that provides a wide range of permitting, technical support, and compliance inspection services to the oil and gas, biofuels, electric transmission, wind and solar energy, and mining sectors. Merjent also assists and advises government agencies across North America. Our goal is to help our clients achieve high standards of environmental and social performance, while effectively managing issues and challenges that arise in large-scale, commercial utility infrastructure projects.

Q. Does Merjent have experience with agricultural impact mitigation related to linear projects, including overhead electric transmission lines?

A. Yes. Merjent has experience in developing and implementing AIMPs (or equivalents), including drafting and editing AIMPs, and serving in the role of inspector or monitor to ensure compliance with AIMP requirements during construction. Merjent currently serves as the independent Environmental Monitor on the 345 kilovolt Badger Coulee Transmission Line in Wisconsin, reporting to state agencies including the Wisconsin Department of Agriculture, Trade, and Consumer Protection. Merjent served as Agency Inspection Reporting Lead during the installation of Otter Tail Power Company's Bemidji to Grand Rapids 230 kilovolt Transmission Project in Minnesota, with trained monitors reporting to State agencies that included the Minnesota Department of Agriculture. Merjent provided independent Environmental Monitors, reporting to the Minnesota Department of Agriculture, during construction of Enbridge Energy's LSr and Alberta Clipper Pipeline Projects in Minnesota and Wisconsin.

Q. Please describe your direct personal experience with agricultural impact mitigation associated with linear infrastructure.

A. I have been involved as author, collaborator, and editor of AIMPs and Environmental Mitigation Plans ("EMPs") for several linear oil and gas pipeline and electrical power transmission projects in Minnesota, Wisconsin, North Dakota, and South Dakota, as noted above and as described in **Schedule JLA-1**.

III. INDUSTRY STANDARD PRACTICES

Q. Are there any federal or state requirements that outline specific agricultural impact mitigation practices governing the construction of an overhead electric transmission line?

A. There are no federal level or Missouri requirements regarding the implementation of specific agricultural impact mitigation practices to intra or interstate linear projects, including overhead electric transmission lines. Some states provide guidance for the construction of electric transmission ROW projects through agricultural land. Illinois has a voluntary agreement (Agricultural Impact Mitigation Agreement ("AIMA") for the siting and construction of electric transmission lines that can be tailored for each project. The AIMAs are reviewed, approved, authorized and administered under the Illinois Department of Agriculture. The Illinois AIMA can be made mandatory by county governments under applicable Special Use Permits. New York has guidelines for electric transmission ROW projects through the New York Department of Agriculture and Markets. In Wisconsin, utility projects such as oil and gas pipelines and electric transmission lines are subject to impact evaluation via an Agricultural Impact Statement prepared by the state of Wisconsin based on its agriculture land information and project information supplied by the applicant.

Q. Are there industry standards regarding the mitigation of agricultural impacts in relation to the construction of an electric transmission line?

A. Generally yes. In practice, AIMPs applicable to electric transmission lines are sometimes developed and proposed voluntarily by project proponents and are implemented to: (1) ensure that landowner and tenant concerns regarding impacts are addressed, and adverse impacts to conventional agriculture are avoided, minimized, or mitigated to the extent practicable; (2) streamline applicable state and/or federal environmental review; (3) ensure consistency in interstate construction; and (4) ensure compliance with applicable Organic System Plans developed by each organic farm operation to certify and maintain certification under the National Organic Program.

AIMPs developed for linear projects like transmission lines typically include the following construction protocols:

1. In conjunction with landowner consultation, and subject to engineering and environmental constraints, "micro siting" adjustments to structure placement across a given parcel to minimize to the extent practicable potential impacts to site-specific grower and related agricultural operations;
2. Incorporation of excess sub-soil and rock (excavation spoil typically associated with foundation structure installation) into the soil is avoided, and spoil removal requirements are specified;
3. Maintenance of topsoil quality in agricultural land is addressed by implementing certain soil protection mechanisms. These protections are dependent on site-specific criteria, but generally may include matting, topsoil stripping, segregation and replacement within the construction workspace, including temporary and permanent access roads;
4. Ensure timely repair of damaged subsurface tile and ensure that drainage systems affected by construction are repaired to pre-construction or better condition. This may include installation of additional tile or implementing minor tile redesign, as necessary;
5. Removal of construction debris during construction and post construction clean-up;
6. Ensure that soil quality in areas affected by compaction or rutting is restored to pre-construction conditions, as practicable, by implementing appropriate de-compaction, fertilization, liming, tillage, and related soil restoration techniques;

7. Ensure that all damaged conservation practices are returned to their pre-construction state;

8. Ensure that invasive weeds are not brought into the site by construction equipment, and that invasive weeds present within the construction ROW are controlled;

9. Manage construction and transmission line configuration to avoid impacts to the operation of existing and proposed irrigation systems;

10. Ensure appropriate restoration of temporary roads to the pre-construction condition;

11. Avoid and minimize compaction and rutting by developing wet weather construction protocols, including wet weather shutdown;

12. Provide specific procedures for determining construction-related damages and providing adequate compensation;

13. Provide each landowner with advance notice of access during construction, and comply with access notice requirements specified in the landowner easement agreement; and

14. Provide a construction compliance inspection and monitoring program, including information on inspector training and background requirements, compliance and non-compliance reporting protocols, and procedures and contact protocols for landowners to use to advise a project proponent of non-compliance and other issues observed during construction and post-construction reclamation.

Conditions in AIMPs do not supersede conditions attached to other required state and federal permits, but are developed to augment such permits where necessary to protect

the agricultural resource and to address landowner and tenant concerns regarding agriculture land use.

All construction plans, permits, and their respective conditions are usually collected into a permit book kept on the construction site to be consulted by contractors, environmental and agriculture inspectors, and agricultural monitors, as needed. Permits with conditions potentially related to AIMPs include: a National Pollution Discharge Elimination (NPDES) Permit (i.e., construction stormwater discharge permit); a SWPPP; a SPCC Plan; and, Section 401 Water Quality Certification. The crossings of waters of the United States including wetlands and streams in agricultural land is regulated by the Corps of Engineers Clean Water Act Section 404 Permit. Others permits with conditions applicable to agricultural land are possible and are discussed in the Direct Testimony of Company witness James Puckett.

Q. Does Clean Line have an Agricultural Impact Mitigation Policy that incorporates these best practices?

A. Yes. As I will describe further in my testimony, Clean Line has a company-wide Agricultural Impact Mitigation Policy (AIM Policy) that is consistent with these practices. Clean Line's AIM Policy is attached as **Schedule JLA-3**.

Q. Please provide a summary of Clean Line's AIM Policy.

A. Clean Line has implemented its AIM Policy as a commitment to stakeholders to ensure that construction and operation activities on private agricultural land avoid or minimize adverse impacts (including impacts to current and planned agricultural operation, soil quality and crop yield) to the extent practicable, and that appropriate mitigation actions will address any unavoidable impacts.

Clean Line's AIM Policy specifies: (1) the measures that the Company will undertake to ensure necessary communications occur between potentially affected landowners and Grain Belt Express during the easement acquisition process; (2) measures that will be employed to avoid and minimize construction impacts to agricultural operations, soil quality, and yields; (3) measures to ensure a successful restoration of lands affected within the construction ROW; and (4) measures that will maintain agricultural operations after construction and restoration. Clean Line's AIM Policy includes a commitment to establish communication and mitigation measures that are consistent with industry best practices as implemented in the Mo Ag Protocol. Most importantly, these include:

1. Open Communication with Landowners and Tenants.

Grain Belt Express will continue to collaborate with landowners during the easement acquisition process to avoid or minimize potential impacts associated with final siting and design of Project facilities, including structure and access road locations. The Company will also schedule construction to minimize operational impacts to agricultural operations and soil quality, while considering constraints imposed by conditions adjacent to the agricultural operations.

2. Avoid and Minimize Construction Impacts to Agricultural Operations, Soil Quality, and Yields

During the easement acquisition process, Grain Belt Express will, with input from landowners and/or tenants, identify all surface and subsurface drainage features, soil conservation practices, and type and configuration of irrigation systems, and will avoid and minimize impacts to the extent practicable.

The Company will return all agricultural infrastructure (including conservation measures) affected during construction to pre-construction quality or better. Landowners and/or tenants damaged by any unavoidable impacts will be fully compensated.

Grain Belt Express will identify areas requiring topsoil stripping and segregation, post-construction decompaction, specific fertilizer amendments, tillage, or planting procedures (temporary and permanent cover) to ensure successful ROW reclamation. The Company's standard construction Best Management Practices ("BMPs") will be adjusted to accommodate specific reasonable landowner and tenant requests where these requests differ from routine restoration procedures.

Q. What additional steps has Grain Belt Express taken to address impacts to agricultural operations in Missouri?

A. Grain Belt Express has adopted the Missouri Agricultural Impact Mitigation Protocol ("MO Ag Protocol") to further avoid and minimize impacts to agricultural lands. The MO Ag Protocol is attached as **Schedule JLA-2**. The MO Ag Protocol builds on the commitments made in Clean Line's AIM Policy by identifying specific protection measures and practices that, when implemented, will provide greater certainty that agricultural issues are avoided, minimized, and mitigated throughout construction and operation of the Project.

Q. Do the AIM Policy and the MO Ag Protocol meet or exceed the industry best practices?

A. In my opinion, they meet or exceed industry best practices. The AIM Policy establishes Clean Line's commitment to landowners actively engaged in agriculture on lands crossed by the Grain Belt Express Project. These commitments are implemented in its Mo Ag

Protocol, and provide a clear, organized, and practical approach to avoiding, minimizing, or mitigating potential agricultural impacts of Project construction in Missouri.

IV. POTENTIAL AGRICULTURAL IMPACTS ASSOCIATED WITH THE GRAIN BELT EXPRESS PROJECT

Q. How much farmland will be removed from production due to structure placement associated with the Project?

A. The amount of agricultural land potentially removed from production by foundations and associated support structures (e.g., guy wires) depends on structure type and location. These can be generally placed into two location categories (in-field/edge of field and field corner), and three structure type categories (lattice, lattice mast, and monopole). Land removed as a result of the footprint of the foundation is a direct impact.

Guy wires that may be used to stabilize and provide additional support to certain structures remove additional agricultural land from production. However, Grain Belt Express is not proposing to use structures with guyed wires in cropland areas. Therefore, guy wires are not anticipated to be a significant consideration regarding removal of agricultural land from production along the Project route in Missouri.

Graphics illustrating the various structure types are found in **Schedule JLA-4**. Based on the three varieties of structures, the total amount of land that will be directly removed from production by the Project is set forth below in Table 1 by county. Between approximately .4347 (monopole or lattice mast) and 8.694 (lattice) acres would be removed from production depending on structure type.

Potential indirect impact resulting from the physical and practical inability of agricultural equipment to operate within a specific distance of the structure foundation and

guy wires may also occur. Grain Belt Express will coordinate with landowners to better understand the potential for indirect impacts, and may adjust the final structure placement to minimize potential indirect impacts, as practicable.

Table 1. Estimated Acres of Agricultural Land Removed from Production by Clean Line Energy's Grain Belt Express Project in Missouri Based

County	# of Structures	Location[1]		
		Lattice	Lattice Mast	Monopole
		Acres[2]		
Buchanan	56	1.008	0.0504	0.0504
Clinton	54	0.972	0.0486	0.0486
Caldwell	39	0.702	0.0351	0.0351
Carroll	29	0.522	0.0261	0.0261
Chariton	79	1.422	0.0711	0.0711
Randolph	34	0.612	0.0306	0.0306
Monroe	97	1.746	0.0873	0.0873
Ralls	95	1.71	0.0855	0.0855
Total	483	8.694	0.4347	0.4347

1 See Exhibit JA-4 for typical drawings of structure locations.

2 Acreage is a conservative estimate based on current routing configuration. Additional route modification and structure micrositing may result from future coordination with landowners. Per structure acreage is calculated based on typical footprint for each structure type. A typical single foundation lattice mast of monopole structure has a footprint of 0.0009 acre. A typical lattice structure has a footprint of 0.018 acre.

Q. What percentage of the total ROW does that amount to?

A. Based on a conservative estimate, no more than 9 acres of land would be taken out of production due to the direct effects of the structures located in cultivated lands. Depending on the structure type, this represents between .008 percent (monopole or lattice mast) and 0.17 percent (lattice) of the total right of way in Missouri[1]. Approximately 2,768 acres of

[1] Approximately 4,986.67 acres would be located within the 205.7 mile long, 200 feet wide right of way in Missouri.

cropland would be located within the right of way in Missouri, of which between .016 percent and 0.3 percent would be directly impacted by structures.

Q. What are the potential impacts to irrigation systems?

A. Irrigation is not expected to be a common agricultural land use along the preferred route in Missouri. Most of the counties crossed have aquifers and soils that are not favorable for large-scale center pivot irrigation. The Missouri Route Selection Study (March 2014) conducted by the Louis Berger Group, Inc. on behalf of Grain Belt Express indicated that there were no center pivot irrigation systems crossed by the Project. The 2016 Route Selection Study Addendum (June 2016, attached to the Direct Testimony of Company witness James Puckett as **Schedule JPG-2**) also confirmed that there were no center pivot irrigation systems crossed by the Proposed Route in Missouri.

However, while center pivot irrigation systems are of primary concern because of the nature of the permanent infrastructure associated with center pivot system design, other irrigation systems may be employed by growers along the Project route that utilize surface water appropriation. Carroll and Chariton counties have the Missouri River as their southern boundary, and the Salt River flows through Monroe County. The United States Department of Agriculture National Agricultural Statistics Service has indicated that these counties have the most irrigated agriculture of the counties crossed by the Grain Belt Express Project. If currently unknown irrigation systems are intersected along the route, Grain Belt Express will coordinate with the landowner and/or tenant to avoid or minimize direct impacts to the irrigation systems in accordance with the MO Ag Protocol.

Q. Please explain the approaches that Grain Belt Express will use to prevent or limit impacts to irrigation on agricultural land while constructing the Project.

A. It is unlikely that potential effects to irrigated agriculture will be extensive, and may be completely absent. Avoidance, minimization, and mitigation of potential impacts to irrigation are addressed in Section 7 of Grain Belt Express' MO Ag Protocol.

Potential direct impacts of Project construction to irrigation will be temporary. In accordance with the AIM Policy, Grain Belt Express has worked with landowners and/or tenants to identify existing or planned irrigation systems and has adjusted the proposed location of the route to avoid and minimize impacts to potentially affected irrigation agriculture to the extent practicable. During construction, Grain Belt Express will follow the MO Ag Protocol to ensure that all affected farm facilities, including irrigation systems, are returned to their pre-construction or better state.

Grain Belt Express will work with landowners and/or tenants to minimize any permanent impacts to irrigation systems and will negotiate appropriate compensation for any permanent impacts in the respective easement agreements.

Q. What are the potential impacts to drainage systems from the Project?

A. Drainage systems consist of: (1) a series of surface ditches dug at intervals sufficiently close to lower the water table to favor suited crops; (2) subsurface drain tiles consisting of interconnected perforated-pipe mains and laterals of a specific diameter, installed at a sufficient depth and constructed with a gradient to lower the water table to a depth that does not affect crop germination and growth; or (3) a combination of surface ditching and subsurface tile drainage.

Drainage systems are typically needed in nearly level areas with persistent high water tables that adversely affect crop yields in the absence of drainage. Along the Project route in Missouri, these conditions are associated with: (1) large riparian floodplains of the

Missouri, Grand, Chariton, and Salt rivers and other drainages; (2) isolated, generally small, nearly level to sloping areas at the heads of drainage swales in glacial till areas; and (3) on nearly level, broad upland terraces of the Central Claypan Major Land Resource Area, shown in **Schedule JLA-5**. The Project crosses several areas of extensive surface and subsurface drained agricultural lands in Missouri.

Avoidance, minimization, and mitigation of potential impacts to drainage systems are addressed in Section 6 of Grain Belt Express' MO Ag Protocol.

While structures would be sited to avoid known subsurface tiles, unknown subsurface tile present within the ROW may be encountered during excavation for certain structure foundations. Any change to the grade of a subsurface tile system or the integrity of the tile can adversely affect the operation of the drainage system. Also, depending on installation depth and tile type, tile may be crushed when crossed by heavy construction equipment operating along access roads or portions of the ROW. The presence of old concrete or clay tiles, shallow tiles, and tile systems of unknown configuration can complicate the assessment of tile damage. Recent drainage systems are typically constructed of perforated, corrugated plastic pipe and have an installation schematic available so they can be avoided, to the extent practicable.

Q. Please explain the approaches that Grain Belt Express will use to prevent or limit impacts to drainage equipment and drainage system operation on agricultural land while constructing the Project.

A. In accordance with the AIM Policy, Grain Belt Express has worked with the landowners and/or tenant to identify existing or planned irrigation systems, surface and subsurface

drainage systems, and conservation practices to adjust the planned location and route to avoid and minimize impacts to agricultural operations to the extent practicable.

Project structures will not be sited or placed within a known surface drainage ditch to the extent practicable and will be sited to avoid excavation impacts to subsurface tile located within the ROW. When encountered along the construction ROW or construction access roads, surface drainage ditches are typically crossed using a free-span bridge constructed of timber mats, the bed of a railroad car, or equivalent, and do not affect the flow characteristics of surface ditches. Thus, the integrity of the drainage ditch is maintained both during and after construction.

Avoidance, minimization, and mitigation of potential impacts to drainage systems are addressed in Section 6 of Grain Belt Express' MO Ag Protocol. During construction, Grain Belt Express will follow the MO Ag Protocol to ensure that drainage systems are identified, located, and avoided to the extent practicable. Drainage systems unavoidably impacted will be returned to their pre-construction or better state by replacement of affected drain tile or through minor avoidance reconfiguration.

The Company will complete all temporary repairs of drainage tiles within a reasonable time following the identification of an impacted tile. Unless otherwise agreed to by the landowner, all permanent repairs will be performed within 45 days following final reclamation of the Project, weather permitting. Affected landowners may elect to negotiate a fair settlement with Grain Belt Express for the landowner or tenant to undertake the responsibility for repair, relocation, or reconfiguration of the damaged drainage feature; however, in these cases Grain Belt Express will not be responsible for correcting repairs after completion of the Project.

Q. What are the potential impacts to farm conservation practices?

A. Many Missouri growers have highly erodible land ("HEL") and wetlands on their farms and may also participate in one or more farm programs. Construction of the Project has the potential to modify or adversely affect several conservation practices installed by the grower under an approved conservation plan or system. Such conservation practices are necessary to comply with the HEL Conservation and Wetland Conservation ("WC") compliance provisions of the 2014 and earlier Farm Bills, which require growers to certify that they will not plant or produce an agricultural commodity on HEL without following a U.S. Department of Agriculture Natural Resources Conservation Service approved conservation plan or system. In addition, growers planning to conduct activities that may affect their HEL or WC compliance must notify the Department of Agriculture's Farm Service Agency and National Resources Conservation Service, who will then provide HEL or wetland technical evaluations and issue determinations, if needed.

Examples of Conservation Practices in common use in Missouri and potentially affected by construction of the Project include, but are not limited to:

- Grassed waterways and buffers;
- Terraces;
- Contour farming and strip-cropping;
- Maintenance of field borders and vegetative barriers, hedgerows, and windbreaks;
- Maintenance of cover crop or permanent cover;
- Streambank and shoreline protection; and
- Water control structures.

Q. Please explain the approaches that Grain Belt Express will use to prevent or limit impacts to conservation practices on agricultural land while constructing the Project.

A. In accordance with the AIM Policy, Grain Belt Express will work with the landowner and/or tenant to identify existing or planned conservation practices to adjust the planned structure type, location, and route to avoid and minimize impacts to agricultural operations to the extent practicable.

Avoidance, minimization, and mitigation of potential impacts to conservation practices are addressed in Section 10 of Grain Belt Express' MO Ag Protocol. During construction, Grain Belt Express will follow the MO Ag Protocol to ensure that conservation practices are identified, located, and avoided to the extent practicable. Conservation practices unavoidably impacted will be returned to their pre-construction or better state by replacement or repair in accordance with county Soil and Water Conservation District standards, consistent with existing farm plans, and any other local, state, or federal requirements, as applicable.

Grain Belt Express will repair or pay to have repaired any damage to soil conservation practices within 45 days, weather and landowner permitting, of the completion of the Project.

Q. What are the potential soil compaction, soil mixing and rutting implications?

A. Soil compaction results when susceptible soils are subject to a surface load that can deform and disrupt soil structure, resulting in a temporary to relatively permanent reduction in soil porosity and an increase in soil density. The change in the physical characteristics of the soil can affect seed germination and growth, restrict plant root penetration, reduce water infiltration and percolation, and increase soil erosion.

Soil compaction is an issue with normal agricultural equipment traffic, and can be aggravated whenever agricultural land is trafficked by heavy construction equipment, is subject to repeated traffic such as that experienced along a construction access road, or is trafficked during wet periods where the soils are at an optimal moisture content to favor compaction (typically field moisture capacity). Compaction hazards vary with the ground pressure weight of a particular piece of construction equipment and are related to the speed equipment travels, axle load, and tire inflation.

Soil mixing is an issue when there is a possibility of mixing topsoil with subsoil, thus diluting the agronomically important characteristics of high organic matter, higher fertility, and better tilth (the condition of tilled soil with respect to the suitability for sowing seeds) with the poorer quality subsoil. Topsoil can be mixed with subsoil directly during excavation, or indirectly by rutting caused by equipment tires traversing soils immediately after high precipitation events or naturally wet soils in and on the periphery of wetlands.

Rutting is the breakdown of soil structure that occurs when wet soils are trafficked by heavy equipment, resulting in plastic behavior when the soils are under a load (rutting should not be confused with compaction, discussed above). The resulting plastic soil deformation can produce shallow-to-deep ruts in the soil, depending on the degree of wetness in the surface layer and the depth of wetting. Such deformation can destroy the structure of the surface soil, resulting in a soil that is hard and massive when dry, and "puddled" when wet. Rutted soil is naturally mitigated by freeze-thaw processes and by tillage, but soil mixed by rutting will produce a relatively permanent impact.

Q. What measures will Grain Belt Express employ to prevent or limit soil compaction, rutting, and soil mixing on agricultural land while constructing the transmission line?

A. In accordance with the AIM Policy as implemented under the MO Ag Protocol, Grain Belt Express will work with the landowner or tenant to prevent or limit soil compaction, rutting, and soil mixing on agricultural land during construction of the Project. The susceptibility of soils to compaction can be minimized by: (1) identifying compaction prone soils; (2) limiting heavy construction traffic when soils are wet; and (3) using low ground pressure tracked construction equipment. Unavoidable compaction will be remediated by on-ROW versus off-ROW testing and subsequent decompaction using rippers when the soil is within an optimum moisture range for decompaction. Rippers are large curved, knife-like implements that can be variably spaced along an implement bar and pulled through the soil to break up compacted soils to a specified depth, usually 18 to 24 inches.

Rutting in upland soils is minimized by having Agricultural or Construction Inspectors shut down construction in susceptible areas during wet weather where soil mixing due to extensive rutting is observed. Construction would proceed after the affected area has dried sufficiently to limit rutting in upland areas that typically drain excess water and dry rapidly. Rutting is avoided in wetlands by placing a timber mat road or equivalent in wet soils and restricting construction traffic to the mat road during the time construction is occurring. If rutting occurs, Grain Belt Express will repair or pay to have repaired any compaction or rutting within 45 days of the completion of construction, weather and landowner permitting.

Grain Belt Express will avoid soil mixing and will maintain the topsoil quality in agricultural land. The Company will require topsoil segregation, consisting of stripping the top 12 inches of topsoil or the full depth of topsoil, whichever is greater, separate topsoil storage on the ROW, and replacement to the approximate locations from which the topsoil

was removed after the subsoil has been backfilled. Topsoil segregations will occur along portions of the ROW with structure installations, and at all contractor yards and staging areas when these areas are in agricultural land. Details of the approaches to be used by Grain Belt Express to accomplish topsoil segregation are discussed in Section 15 of the MO Ag Protocol.

Q. Should soil compaction occur as a result of construction activities, what measures will Grain Belt Express take to remediate it?

A. In areas subject to construction traffic, on-versus-off ROW soil density determinations will be collected using a cone penetrometer to assess compaction. Soil density determinations will be performed by trained agricultural inspectors after construction but prior to restoration. Where on-ROW density is greater than 120% of off- ROW density, agricultural rippers will be used to decompact the soil to a depth not less than 18 inches. Decompaction operations will be scheduled for periods when soil moisture content is not too wet to compromise effective decompaction. In areas affected by construction but receiving light or no construction traffic, the soils will be prepared by using standard chisel plows (after final grading, if any is necessary). Details of the approaches to be used by Grain Belt Express to accomplish this are included in the MO Ag Protocol.

Q. What are the potential erosion implications?

A. Soil erosion is associated with the detachment and displacement of soil particles by the agents of wind or water. It is a complex process that is controlled by the intensity and amount of rainfall, degree and length of slope, amount of vegetative cover, surface soil texture and structure, and antecedent moisture content. Because water moves into and through wet soils slower than dry soils, soils in a wet condition are more easily eroded.

Excessive erosion in agricultural land can affect soil quality at the site of erosion and in areas that receive eroded sediment. Topsoil eroded from susceptible soils reduces soil fertility and degrades soil tilth, which can become especially severe when the topsoil is eroded completely. Similarly, sediments deposited downslope can affect plant germination and growth through burial, adversely affect soil tilth, contaminate nearby wetlands, lakes, streams and rivers, with sediment, and compromise farm program enrollment.

Several areas of the construction ROW in agricultural areas proposed for disturbance by construction of the Project have potential erosion hazards, including areas of the ROW with erosive soils, steep slopes, long slopes, or that lack vegetative cover. Such areas would also include temporary access roads, support structure construction areas, construction staging, and structure lay-down areas. Erosion associated with construction sites is regulated specifically to minimize the inadvertent delivery of sediment from the construction site to streams, rivers, wetlands, ponds, and lakes.

Q. What measures will the Company employ in constructing the transmission line to prevent or control erosion?

A. Avoidance, minimization, and mitigation of accelerated erosion resulting from construction are addressed in Section 11 of Grain Belt Express' MO Ag Protocol. Grain Belt Express will work with the landowner or tenant and applicable regulatory agencies to address, prevent or control soil erosion of agricultural land during construction of the proposed transmission line. The Company will be required to control erosion under the conditions of a Stormwater Pollution Prevention Plan (SWPPP) that fulfills the requirements of the National Pollution Discharge Elimination System.

Q. Please explain the National Pollution Discharge Elimination System ("NPDES").

A. In Missouri, the sponsor of a project that is likely to result in erosion on sites with greater than one acre of aggregate soil disturbance for the entire project is required to develop a SWPPP that implements the NPDES requirements. The NPDES permit and associated SWPPP are authorized for a given project by the Missouri Department of Natural Resources under a Land Disturbance Permit. Because the Project will disturb greater than one acre of soil, it must obtain such a permit and prepare an SWPPP. The applicable Missouri Land Disturbance Permit is entitled "Missouri State General Operating Permit."

The Primary requirement of the permit is the development of a SWPPP which incorporates site specific practices and Best Management Practices ("BMPs") to best minimize soil exposure, erosion, and the discharge of pollutants. The permit applies to all disturbed land, and must be issued prior to any land disturbance.

Q. Please describe how Grain Belt Express' Storm Water Pollution Prevention Plan will address potential erosion in agricultural lands.

A. The purpose of the SWPPP is to ensure the design, implementation, management and maintenance of BMPs that avoid and minimize the delivery of sediment and other pollutants in stormwater discharges associated with the land disturbance activities to receiving water bodies. BMPs authorized in Missouri are found in the manual entitled "Protecting Water Quality - A Field Guide to Erosion, Sediment and Stormwater Best Management Practices for Development Sites in Missouri and Kansas."[2]

Grain Belt Express will develop a SWPPP that applies to all potentially disturbed sites along the Project. It will provide specific information on site characteristics (e.g. size, configuration, soils, slope degree and length, vegetative cover, etc.) and the suite of BMPs

[2] http://dnr.mo.gov/env/wpp/wpcp-guide.htm

selected to control erosion, including installation specifics. It will also provide information on compliance inspection. The mandated implementation of the SWPPP within areas proposed for construction will ensure that erosion along the route has been avoided, minimized, and mitigated to the extent practicable. In addition, the SWPPP will require regular inspections, with additional inspections after significant rain events to ensure that the prescribed erosion control BMPs are operational and effective. Those BMPs in poor condition will be repaired or replaced. Post-construction inspections will be required until restoration or revegetation is complete under the conditions of the SWPPP. The implementation of BMPs described in a SWPPP will avoid and minimize the potential for erosion to occur during the construction and reclamation phases of the Project.

Q. What are the potential impacts to global positioning system ("GPS") commonly found on farming equipment?

A. Many growers use "precision agriculture" techniques, which rely on accurate GPS to tailor seeding specifications, and fertilizer, herbicide, and/or pesticide applications to specific areas of the field based on yield and soil maps. Precision agriculture methods have resulted in significant reductions in costs and increases in yields and profits for agricultural operations.

Effective use of precision agriculture methods depends on accurate location of compatible farm equipment to tailor seeding and applications. Several recent technical investigations[3] have evaluated the potential for stray voltage and electromagnetic fields

[3] Bancroft, J.B., A. Morrison and G. Lachapelle. 2012. Validation of GNSS under 500,000 Volt Direct Current (DC) Transmission Lines. Computers and Electronics in Agriculture 83:58-67.

Massie, L., A. Halpin, and Michael Wyatt. 2009. Agricultural Impacts. Interference with Precision Farming. P53-56. In L. Massie and P. Nauth eds. Agricultural Impact Statement American Transmission Company, LLC Rockdale-West Middleton Transmission Line. Wisconsin Department of Agriculture Trade and Consumer Protection DATCP #3487.

("EMF") from HVDC lines to interfere with GPS system accuracy. The data show that there is no evidence of power lines interfering with GPS but for a possible blockage degradation of signal immediately next to a large monopole. Instances of signal loss associated with support structures are uncommon and typically would only occur for a short period of time, if at all.

Q. Are there available technologies to enable farm equipment to navigate around transmission towers?

A. Yes. Structures on agricultural land that represent an obstruction to farming operations will have to be avoided. However, the relatively modest footprint of the Project's structures will have a minimal effect on these operations. The use of GPS navigation to steer farm equipment will greatly reduce the inconvenience associated with navigating around support structures. A small area adjacent to the structure may be traversed twice. However, current precision farming technologies allow for more efficient farming practices around obstacles that may occur in a field by implementing auto row shutoffs on planters and section control on sprayers, fertilizer spreaders, and toolbars, all of which help to minimize any farming overlap issues. This will decrease or avoid any inefficiencies or impact to crop yields.

Grain Belt Express will provide GPS coordinates of installed structures and potential obstructions to agricultural operations (based on an as-built survey) to the landowner or tenant for use in precision agriculture and to facilitate the planning of aerial applications.

Q. What are the potential impacts to aerial application measures?

A. The Project's structures, guy wires, and conductors do not preclude aerial application, but they must be considered by aerial applicators as one of the many obstructions that are

encountered in a rural airspace. Aerial applicators are qualified pilots that commonly deal with structure and wire obstructions, and typically perform a reconnaissance to identify all obstructions and develop a plan for safe aerial applications. The National Agricultural Aviation Association ("NAAA") has developed a safety video called "Wires and Obstructions" that discusses the considerations that agricultural aviators must consider when working near structures and wires, including those associated with transmission lines.

Each agricultural parcel using aerial application will likely have a unique set of obstructions that need to be considered by the aerial applicator, including low electrical distribution lines, shelter belts and fence rows, met towers and cell towers with associated guy wires, large electric transmission line structures, as well as agricultural facilities such as barns, silos, storage tanks, and homesteads. Aerial applicators may fly over or under transmission line conductors, depending on the elevation of the wire, the degree of sag, the proximity to other obstructions, and the configuration of the field.

In most situations, aerial applications can occur around electric transmission line structures. However, if the airspace in the vicinity of the line's structures and conductors is too congested with other above ground features (such as other above ground utilities, farmsteads, barns, silos, shelter belts, fence rows, etc.), the effectiveness of aerial agriculture for the affected parcel may be reduced.

Q. What measures has Grain Belt Express employed to prevent interference with aerial applications?

A. The specific relationship between pole type, span length, and number of poles per given parcel will depend on a number of factors, including parcel configuration, size, topographic relief, specifics of the landowner operation, potential future land uses, proximity of roads

and other utility corridors, and adjacent land uses. During the routing process, Grain Belt Express coordinated with landowners to minimize aerial application impacts by micrositing the alignment to follow adjacent to field edges when practicable.

Additionally, the final location of the Project's structures within the ROW easement may be modified as practicable to minimize influence on aerial operations. For example, micro-siting of structure locations to be placed along field boundaries rather than in fields, when practicable, will reduce the overall obstruction impact to a field.

Grain Belt Express will work with the landowner or tenant grower and their aerial applicators to appropriately site and mark conductors and structures to facilitate safe aerial seeding and spray applications. This will include avoiding the use of guy wires for structure support in agricultural fields.

Q. Are there alternatives to aerial application?

A. Yes, and they are commonly used. In areas that are congested with a variety of obstructions, aerial agriculture may not be feasible. However, it would be unusual for aerial application to be precluded from all areas of the field because obstructions are generally confined to specific areas. In areas where aerial application is precluded, landowners may develop application plans using ground-based application equipment such as high clearance spray vehicles to cover areas no longer suitable for aerial application. It is not necessary to take farmland out of production because a portion of a given field is no longer suitable for aerial application. In the event a landowner experiences a loss in crop yields that is attributable to the inability to spray certain rows of crops due to the presence of the transmission line, Grain Belt Express will pay the value of such loss in yield for so long as the losses occur.

Q. Has Grain Belt Express committed to open communications and cooperation with landowners during this process?

A. Yes. As detailed in the MO Ag Protocol, Grain Belt Express will communicate with the landowner or tenant to address construction and operation/maintenance related to agricultural concerns associated with the Project. The Company is committed to continued open communications and cooperation with landowners throughout easement acquisition, pre-construction planning, construction, post-construction reclamation, and operations. Grain Belt Express will comply with its AIM Policy and MO Ag Protocol that involves a collaborative approach between the Company , the affected landowner and tenant, and contractors to implement specific construction procedures based on: (1) agricultural operations and farming practice data collected from the landowner during the easement acquisition process; (2) appropriate design, siting and routing to optimize the configuration of the transmission line to avoid and minimize potential impacts to the landowner's operations, as practicable; (3) industry standard construction procedures to be implemented by the contractor to avoid, minimize and mitigate impacts to soil quality and future yields, and facilitate a rapid and complete restoration of affected land to the pre-construction condition and productivity; and (4) a process to ensure appropriate compensation for any adverse impacts that occur during construction, restoration, and post construction maintenance. Details of the approaches to be used by Grain Belt Express to accomplish this is included in the MO Ag Protocol that has been adopted for construction of the project in Missouri.

Q. Will Grain Belt Express take steps to compensate landowners for any inconvenience associated with potential impacts of Grain Belt Express on agricultural operations?

A. Yes. Specific aspects of compensation for temporary impacts to agricultural productivity are covered in the Direct Testimony of Company witness Deann Lanz. However, specifically under the AIM Policy and the Mo Ag Protocol, Grain Belt Express will communicate with landowners and tenants on the status of the Project and discuss potential impacts and concerns with respect to specific agriculture operations. Compensation to landowners for optional, landowner-responsible mitigation is covered in the applicable sections of the Mo Ag Protocol, including for example landowner responsible decompaction, reimbursement for landowner-responsible fertilizing and seeding restoration, and landowner responsible drain tile repairs. Moreover, Grain Belt Express has committed to retain Agricultural Inspectors that will be available to address landowner concerns. Grain Belt Express has also committed to compensate landowners for any construction related damage to property on agricultural land, and any real effects to enrollment in agricultural and conservation programs.

V. SUMMARY AND PROFESSIONAL CONCLUSION

Q. Based upon your review of the facts of this case, including the AIM Policy and the procedures the Company intends to follow in Missouri, is Grain Belt Express proposing to adhere to nationally recognized standards and best practices?

A. Yes, it is. The commitments to landowners that Grain Belt Express has included in its AIM Policy and will implement in its MO Ag Protocols are consistent with the best industry standards for construction of linear projects including HVDC transmission lines. Grain Belt Express has made a commitment to engage landowners well in advance of construction to identify issues, has developed procedures to avoid and minimize impacts to agricultural operations, and will mitigate and appropriately compensate for unavoidable impacts.

All large linear construction projects, including construction of alternating current and direct current transmission lines, as well as gas and oil pipelines, have the potential to adversely affect agricultural operations during construction, post-construction restoration, and operations & maintenance activities. However, the construction of such projects is "non-consumptive" in that the agricultural land uses within the construction ROW are only temporarily affected by construction. Pre-existing uses are generally compatible with the post-construction management of permanent easement areas.

The Company's adherence to the AIM Policy and the MO Ag Protocol for the construction of the Project in Missouri addresses impacts to farm operations, landowner and tenant concerns, soil quality, and crop yields while considering appropriate compensation for unavoidable impacts. Based on these considerations, I believe that the construction of the Grain Belt Express Project will not have any substantive impact to the operations, soil quality, or crop yields of individual agricultural operations of landowners and tenants.

Q. Does this conclude your Direct Testimony?

A. Yes.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Grain Belt Express Clean Line LLC for a Certificate of Convenience and Necessity Authorizing it to Construct, Own, Control, Manage, Operate and Maintain a High Voltage, Direct Current Transmission Line and an Associated Converter Station Providing an Interconnection on the Maywood-Montgomery 345 kV Transmission Line	)	Case No. EA-2016-0358

AFFIDAVIT OF JAMES L. ARNDT

STATE OF Minnesota)
) **ss**
COUNTY OF Hennepin)

James L. Arndt, being first duly sworn on his oath, states:

1. My name is James L. Arndt. I am a Senior Project Manager at Merjent, Inc.

2. Attached hereto and made a part hereof for all purposes is my Direct Testimony on behalf of Grain Belt Express Clean Line LLC consisting of 34 pages, having been prepared in written form for introduction into evidence in the above-captioned docket.

3. I have knowledge of the matters set forth therein. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded, including any attachments thereto, are true and accurate to the best of my knowledge, information and belief.

James L. Arndt

Subscribed and sworn before me this 26 day of August, 2016.

Melissa Adele Delfino
Notary Public
State of Minnesota
My Comm. Exp. 1-31-19

Notary Public

My commission expires: 1/31/19