Cherokee Wind Energy Development

Feasibility & Pre-Construction Studies

FINAL REPORT

June 30, 2017

Cherokee Nation Businesses
777 West Cherokee St
Catoosa, OK 74015

Project Title:	Cherokee Wind Energy Development: Feasibility and Pre-Construction Studies
Award Number:	DE-EE0002498
Report Date:	June 30, 2017
Recipient Organization:	Cherokee Nation Businesses, LLC 777 West Cherokee Street Catoosa, OK 74015
Award Number:	DE-EE0002498
Recipient Contact:	Andy McMillan Director – Economic Development 777 West Cherokee St Catoosa, OK 74015 918-384-7774
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I. Executive Summary

Cherokee Nation Businesses (CNB) received a grant from the US Department of Energy to explore feasibility and pursue development of a wind power generation facility on Cherokee land in north-central Oklahoma. This project followed several years of initial study exploring the possibility of commercial-scale wind power generation on primarily agricultural land owned by the Cherokee Nation. This project produced detailed analysis of the legal, financial and market viability of such generation facilities, and encompassed a full technical evaluation of the engineering, environmental, and geotechnical aspects of installing this capacity. During the course of this project, information gleaned from this exploration changed CNB's thinking about the best course of action for Cherokee participation in the development, eventually moving away from an equity-owner model and towards utilization of the land asset as a resource while mitigating Cherokee financial and operational risk. As a result of this multi-year project, Cherokee Nation and CNB entered into a long-term ground lease with PNE Wind USA, Inc. (PNE). PNE is developing a wind farm producing in excess of 150MW of renewable electricity on Cherokee land as part of a larger 200MW development also involving adjacent tribal lands. Cherokee Nation will receive the benefit of lease payments and retain ultimate ownership of the land, and the region will see an increase in installed capacity for clean, renewable wind power.

II. Table of Contents

III. Project Overview

A. Cherokee Nation:

The Cherokee Nation is the largest federally-recognized sovereign Indian Nation in the United States, with over 330,000 citizens. The tribal headquarters for Cherokee Nation is located in Tahlequah, Oklahoma. The jurisdiction of Cherokee Nation consists of a 14-county area in northeastern Oklahoma. Cherokee Nation's citizens are represented by an elected, 17-member Tribal Council, tasked with creating and enacting the laws of the Nation and providing oversight on behalf of their constituents. The government of the Cherokee Nation is administered by an elected Principal Chief, and its Constitution and laws are safeguarded by an appointed and confirmed judicial system overseen by district courts and the Cherokee Supreme Court. Combined with its business entities, the Cherokee Nation employs over 10,000 people and has over a $1.2B impact on the regional economy while supporting the preservation and continuance of Cherokee culture, promoting and funding education, providing robust healthcare to Cherokees and Native people across the region, and providing various services like housing, nutrition, workforce and economic development throughout the region.

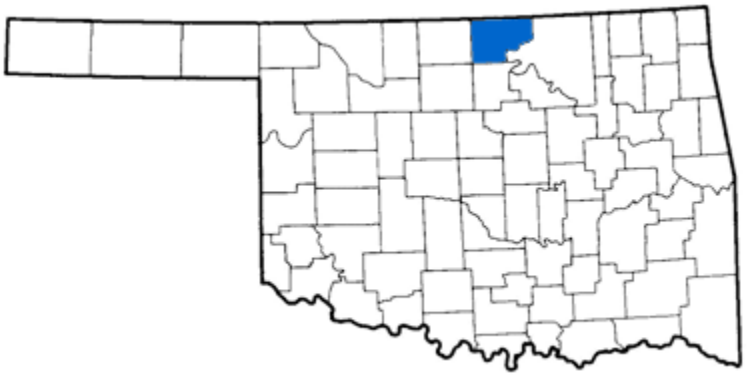
B. Cherokee Nation Businesses:

Cherokee Nation Businesses, LLC, (CNB) is the economic engine of the Cherokee Nation, and is wholly-owned by the tribe. CNB has its primary offices in Catoosa, Oklahoma. It is overseen by a board of directors appointed by the Principal Chief and confirmed by the Cherokee Nation Tribal Council. CNB has interests in diverse industries ranging from manufacturing, supply chain and logistics management, to property management, gaming, and hospitality operations. CNB was the recipient of this Department of Energy award in 2009, and managed the project and grant funds from project start in 2010 through completion in 2017.

C. Project Location:

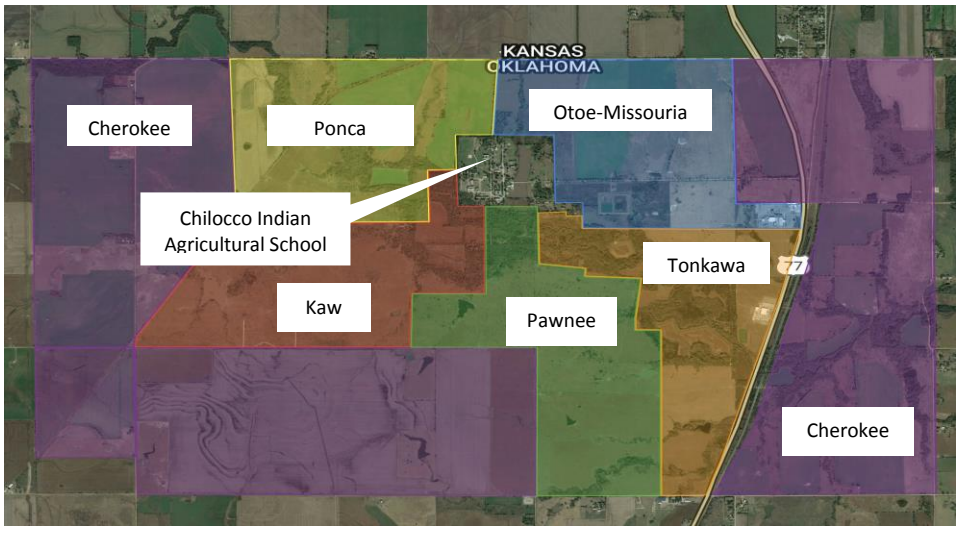
The project is sited in north-central Kay County, Oklahoma (Fig 1).

Fig 1. – Kay County



This property is known locally as the "Chilocco area," so named for the former Chilocco Indian Agricultural School situated in close proximity and the creek that runs through the area. The Cherokee-owned land is part of a larger group of properties in the area owned by several Indian Nations (Fig 2). This area is itself part of a larger region known as the "Cherokee Outlet" that stretched across the northern portion of Oklahoma (then Indian Territory). The total land base for this project is 4,275 acres, divided into two separate tracts of land less than one mile apart, both of which are held in trust for the benefit of the Cherokee Nation by the US government. These tracts are optimal for wind energy production as well as a substation location, and are adjacent to additional lands under development for wind power production. The historic Chilocco Indian Agricultural School will not be disturbed as a result of this development. Upon completion of wind power generation facilities, it is expected that agricultural uses can continue.

Fig 2. Chilocco Area Tribal Lands



D. Project History / Purpose

Cherokee Nation, though endowed with significant natural resources, has not historically been an energy-producing tribe given its geography and the relatively small amounts of accessible petroleum and natural gas reserves within its jurisdictional area. The Nation has long held a keen interest in environmental issues, and has been focused on conservation and responsible stewardship of the natural environment and resources. Renewable power generation via wind turbines captured the attention of the Nation as more and more viable options emerged for wind power production in the central United States in the early 2000s. CNB received support for the concept of developing wind power generation in this area from the Department of Energy (DOE) starting with a small award in 2003, beginning with initial wind measurements, and continuing with some support from the Department of the Interior in 2006, 2007, and 2008. Project support culminated with the completion of this DOE project. This award was provided to continue exploration and analysis of establishing wind power generation with either direct or indirect involvement of the Cherokee Nation and its entities. The project focused on continuing pre-construction activities, the creation of a Cherokee-owned power generation capability and attendant marketing and sales, and to develop knowledge in wind farm development including technical aspects of resource assessment, equipment selection and layout, transmission and power purchasing, commissioning, and ongoing operations. Over the course of this project, CNB examined the commercial viability of wind at this location, gained knowledge of the wind power industry, gained understanding of power markets and pricing, and received detailed analysis on the viability of wind power production on this site. CNB selected PNE Wind USA, Inc. (PNE) as its project manager and developer for this project based on their interest in the Oklahoma wind market and history of developing projects in Europe.

Project development and studies continued with this award in 2010, and proceeded through 2013. At that point, Cherokee Nation and CNB's risk tolerance began to shift, and the project was put on hold after appetite for participation as an equity investor and operator waned. After a hiatus, the project concept shifted focus toward a private developer leasing the ground from Cherokee Nation and proceeding with commercial power development. Cherokee Nation and CNB restarted the project with this concept in mind in 2016 and pursued development of a ground lease, wind resource development agreements, and consulting agreements to achieve installation and activation of this project.

IV. Objectives:

From the application and award documents, the stated project objectives were as follows:

- Complete Power Purchase Agreement(s)
  Result: Draft completed

- Complete Phase II and Phase III of the transmission and interconnection study
  Result: Study completed

- Determine project size per verified location as it pertains to load and wind resource
  Result: Project size verified, resource and technology analyses completed

- Complete Wind Farm Project Cost Analysis
  Result: Various cost analyses complete

- Gain knowledge in the area of wind farm development
  Result: Deeper understanding of wind resource development and power production and marketing gained, resulting in business decision on how to proceed with development.

V. Scope of Work and Activities:

From the application and award documents, the following scope of work and activities were included in this phase of the project to address the stated project objectives:

- Continue Phases II and III of the Transmission and Interconnect Study
- Negotiate interconnect and power purchase agreements
- Determine project size (MW)
- Complete wind farm project cost analysis
- Complete environmental and NEPA studies
- Conduct soil sampling and design turbine foundations
- Complete turbine assessment and selection
- Design turbine communication system
- Lay out electrical and civil engineering
- Continue to gather load data
- Update the wind energy business plan

CNB contracted with PNE to accomplish specific tasks in pursuit of the project's objectives. PNE, in turn, acquired expertise in various fields to bring the project forward.

A. **Southwest Power Pool Integrated Market Study:** In order to gain a greater understanding and bolster the chances of signing a power purchase agreement for the generation from the Chilocco Wind Farm and potential future generation a consulting firm experienced in market forecasts of the SPP IM (Burns and McDonnell) was engaged. The purpose of this study was to provide a future rate estimate for the power that would be sold into the newly created SPP IM to determine the profitability of such sales, and to provide a transmission engineering review.

   See Appendix A for SPP Integrated Market Study
   See Appendix B for Review of SPP Cost Allocation Proposal

B. **Legal and Regulatory Review:** CNB requested a review of federal and state laws and regulations to determine the operating boundaries for tribal organizations to act as their own hub for the purchase and resale of electrical generation and to develop necessary frameworks for tribal participation in the power market, and in this project in particular including strategies to address issues of tribal sovereignty. These consulting services took place over an extended period of time and involved numerous meetings and a great deal of research and correspondence. Development of necessary ground leases, resource development agreements, and consulting agreements resulted in the successful completion of a ground lease with Cherokee Nation, approved by the Bureau of Indian Affairs.

   See Appendix C for Project FAQ Developed For Cherokee Nation

C. **Power Purchase Agreement:** Draft document templates were developed and refined resulting in a draft Power Purchase Agreement (PPA) and the creation of a number of draft sub-PPAs. These documents were drafted with the idea that CNB would continue to be an investor and operator.

   See Appendix D for Template PPA

D. **Economic and Pro Forma Analysis:** Various scenarios were modelled based on assumptions about market pricing for power, financing costs, and ownership structure. Ultimately, with the change in proposed structure away from CNB as an investor and operator, the focus shifted toward a return structure based on land lease rates and capturing excess upside for the benefit of the Nation.

See Appendix E-1 – E3 for Sample Pro Formas and CN Return Summary
See Appendix F for Detailed Market Analysis

E. Geotechnical and Engineering Reports: CNB acquired various technical engineering, geotechnical, and site-specific reports to support wind power development on the project site. These pre-constructions reports included the soils report, preliminary mechanical and electrical engineering design plans, preliminary civil engineering designs plans, and site layouts.

See Appendix G for Geotechnical Report
See Appendix H Soils Report
See Appendix I for Preliminary M&E Design
See Appendix J for Electrical Impedance Table
See Appendix K for Preliminary Civil Design
See Appendix L for Site Layout Diagram

F. Environmental Reports: CNB received comprehensive environmental impact reports evaluating the potential disruptions caused by placing wind turbines in the project area, as well as archaeological and cultural assessments to ensure that no critical historical or cultural sites would be negatively impacted by this development. Two separate evaluations were provided, as the initial concept included only the western parcel. As the eastern parcel was added, an additional study was performed to identify any issues there as well. As a result of these studies, permits were submitted and received as noted in the Conclusions section below.

See Appendix M for Wetlands Study
See Appendix N-1 - N-4 for Avian and Wildlife Studies
See Appendix O for Critical Issues Analysis – Cultural Resources
See Appendix P1 and P2 for Archaeological Study – West Parcel
See Appendix Q1 and Q2 for Archaeological Studies – East Parcel
See Appendix R for Water Resource Maps
See Appendix S for EPA Water Quality Certification Submittal
See Appendix T for USACE NWP Letter

G. Turbine Assessment: CNB requested updated analysis of the energy potential and recommended turbine technologies useful to the site, resulting in a detailed analysis of the potential power generated and a recommendation on turbine size.

See Appendix U for Energy and Turbine Assessment

H. Business Plan Update: CNB requested updates to the wind power business plan over time, with that plan taking on various iterations as thinking on the project shifted from an ownership model to a ground lease.

See Appendix V For Business Plan Update
See Appendix W For Term and Document Review Process

See Appendix X For Potential Buyer Investment Summary
See Appendix Y For Electric Power Source Options Decision Tree
See Appendix Z for 2016 Plan Briefing to DOE

VI. Conclusions and Recommendations:

Cherokee Nation and CNB concluded that commercial renewable power generation is both technically feasible and economically viable in this location. Negative environmental impacts are minor and / or relatively uncomplicated to mitigate. The legal and regulatory environment is acceptable for the production of renewable power from this location. The technical recommendations and analyses included in the project moved the endeavor from an exploratory phase to implementation, with work proceeding currently to develop generation.

CNB made the recommendation to Cherokee Nation to consider entering into a ground lease rather than participate as an equity investor and operator. Ultimately, after exploring the project thoroughly, Cherokee Nation and CNB made the decision to lease land to an experienced developer rather than act as developer or equity investor. The Cherokee Nation Tribal Council approved a resolution to lease the land in 2016, and the lease package was submitted for review and approval by the Bureau of Indian Affairs in late 2016. The permitting process was also finalized for project in 2017 culminating with final approvals from relevant agencies and a final determination by the Bureau of Indian Affairs:

- United State Fish and Wildlife-Endanger Species Act-Section 7
- National Historic Preservation Act-Section 106
- United States Army Core of Engineers-Section 404
- EPA Clean Water Act 401
- Bureau of Indian Affairs-Finding of No Significant Impact

Ongoing development of the project provides the opportunity for the Nation and CNB to continue to observe and learn from renewable power development and operations while mitigating some of the substantial financial burden and attendant risk that would have placed a potential constraint on the project and / or constrained Cherokee Nation and CNB's capacity to provide necessary focus and services to Cherokee citizens and the broader region. Adjacent tribal landowners – Kaw Nation and Otoe-Missouria – are participants in the larger wind farm development as well. Through long-term ground leases, renewable power generation – in total over 200MW worth - will be installed as part of a series of developments now populating north-central Oklahoma and creating significant zero-emissions capacity in the region. Cherokee Nation will benefit

from the financial outputs of the project (primarily rent). Via arrangement with the developer, Cherokee Nation has the potential to benefit in any project upside as the development matures and market conditions evolve.

CNB notes that as the development is underway at present, certain technical materials are potentially sensitive and could negatively impact the ability of the developer to bring the project successfully to market. As a result, CNB is attempting to exercise great care in disseminating those materials while maintaining an interest in disclosure and the prudent utilization of public funds.

VII. Lessons Learned:

- CNB and Cherokee Nation determined that the current power market continues to be favorable for the development of renewable generation.

- CNB determined that equity participation in the project as an owner-operator was not preferable given the company's current operating environment and strategic objectives.

- CNB and Cherokee Nation came to the conclusion that a long-term ground lease would result in the highest and best use for this land asset.

- Cherokee Nation has long experience managing leases on properties held in trust, and has extensive experience in collaborating with the Bureau of Indian Affairs and the Department of the Interior on such matters. As such, Cherokee Nation is better suited as a landlord and facilitator for development of this kind of project rather than as an owner-operator.

- CNB and Cherokee Nation gained significant experience navigating the legal, regulatory, and business environment for developing and commissioning renewable wind power generation facilities, and gained a deeper understanding of how power markets function. This knowledge will inform Cherokee Nation's ongoing exploration of another long-standing renewable energy project. Further, this project has led to renewed exploration in the positive and negative aspects of establishing a tribal utility authority.

APPENDICES

BURNS McDONNELL

Oklahoma I Transfer Study Report

PNE Wind USA, Inc.

Oklahoma I Transfer Study
Project No. 90053

Revision 1
06/29/2016

Oklahoma I
Transfer Study Report

prepared for

PNE Wind USA, Inc.
Oklahoma I Transfer Study
Chicago, Illinois

Project No. 90053

06/29/2016

prepared by

Burns & McDonnell Engineering Company, Inc.
Houston, Texas

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EXECUTIVE SUMMARY

Burns & McDonnell was retained by PNE Wind USA, Inc. to determine the potential network impacts of interconnecting the proposed Oklahoma I Project (Project), a 200 MW project wind farm on the Western Farmers Electric Cooperative (WFEC) transmission system. The proposed Point of Interconnection (POI) is the existing Chilocco 138 kV substation. The purpose of this study was to identify the incremental transfer limit that can be injected at the POI without additional loading violations on the system.

A transfer analysis was performed to determine the amount of power (MW) that could be injected at the Chilocco 138 kV substation before any thermal loading violations were reported as a result of the Project, and to identify the thresholds for additional thermal loading violations at generation intervals up to 200 MW.

With the planned in-service date of the generation as Q4 2016 or Q1 2017, a 2017 Summer peak and a 2020 Summer peak power flow model from the SPP 2015 MDWG model series was used for the study.

The transfer analysis was performed using the Transmission Adequacy and Reliability Assessment (TARA) software. The loading levels in the study system were monitored according to the reliability criteria outlined in Section 2.1 during the simulation. Thermal violations and the assicated transfer amount was recorded.. The injection of the Project was displaced by all other generators in the SPP footprint.

The study results indicated that the Project is limited to 106 MW without causing thermal overloads in the study system. The only constratint that was reported for an injection amount of 200 MW is the Middleton Tap to Chilocco 138 kV line.

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1.0 INTRODUCTION

Burns & McDonnell was retained by PNE Wind USA, Inc. to determine the potential network impacts of interconnecting the proposed Oklahoma I Project (Project), a 200 MW project wind farm on the Western Farmers Electric Cooperative (WFEC) transmission system. The proposed Point of Interconnection (POI) is the existing Chilocco 138 kV substation. The purpose of this study was to identify the incremental transfer limit that can be injected at the POI without additional loading violations on the system.

A transfer analysis was performed to determine the amount of power (MW) that could be injected at the Chilocco 138 kV substation before any thermal loading violations were reported as a result of the Project, and to identify the thresholds for additional thermal loading violations at generation intervals up to 200 MW.

1.1 Limitations

In the preparation of this report, the information provided to Burns & McDonnell by others was used by Burns & McDonnell to make certain assumptions with respect to conditions which may exist in the future. While Burns & McDonnell believes the assumptions made are reasonable for the purposes of this report, Burns & McDonnell makes no representation that the conditions assumed will, in fact, occur. In addition, while Burns & McDonnell has no reason to believe that the information provided by others, and on which this report is based, is inaccurate in any material respect, Burns & McDonnell has not independently verified such information and cannot guarantee its accuracy or completeness. To the extent that actual future conditions differ from those assumed herein or from the information provided to Burns & McDonnell, the actual results will vary from those presented.

2.0 STUDY ASSUMPTIONS, CRITERIA AND METHODOLOGY

The following criteria, assumptions and methodology reflect the development of the study cases and the methodology used in the study.

2.1 Reliability Criteria

This study was performed in accordance to the SPP reliability criteria. Equipment loadings were monitored to identify any thermal violations based on their applicable 100% static rating. The reliability criteria require all transmission elements to operate within their thermal ratings under normal system conditions (Rate A) as well as loss of any single transmission element (Rate B). Loading levels that exceeded the 'Rate A' or 'Rate B' rating of the facility for normal system or single transmission element out-of-service (N-1) were identified as overloads.

2.2 Base Study Model

With the planned in-service date of the generation as Q4 2016 or Q1 2017, a 2017 Summer peak and a 2020 Summer peak power flow model from the SPP 2015 MDWG model series was used for the study. It is important to note that the SPP power flow models may not reflect the most up-to-date study area facility configuration information, as well as load and generation expectations. As a result, the conclusions of this study should be evaluated with the consideration for the limitations of the study assumptions.

2.3 Study Model

The 2017 summer peak and 2020 summer peak study models were developed to identify the transfer limit at which the injection of the Project would create loading violations in the system. GenOFF models were created by adding a generator dispatched to zero with a capacity of 200 MW to the base models described in Section 2.2.

2.4 Study Methodology

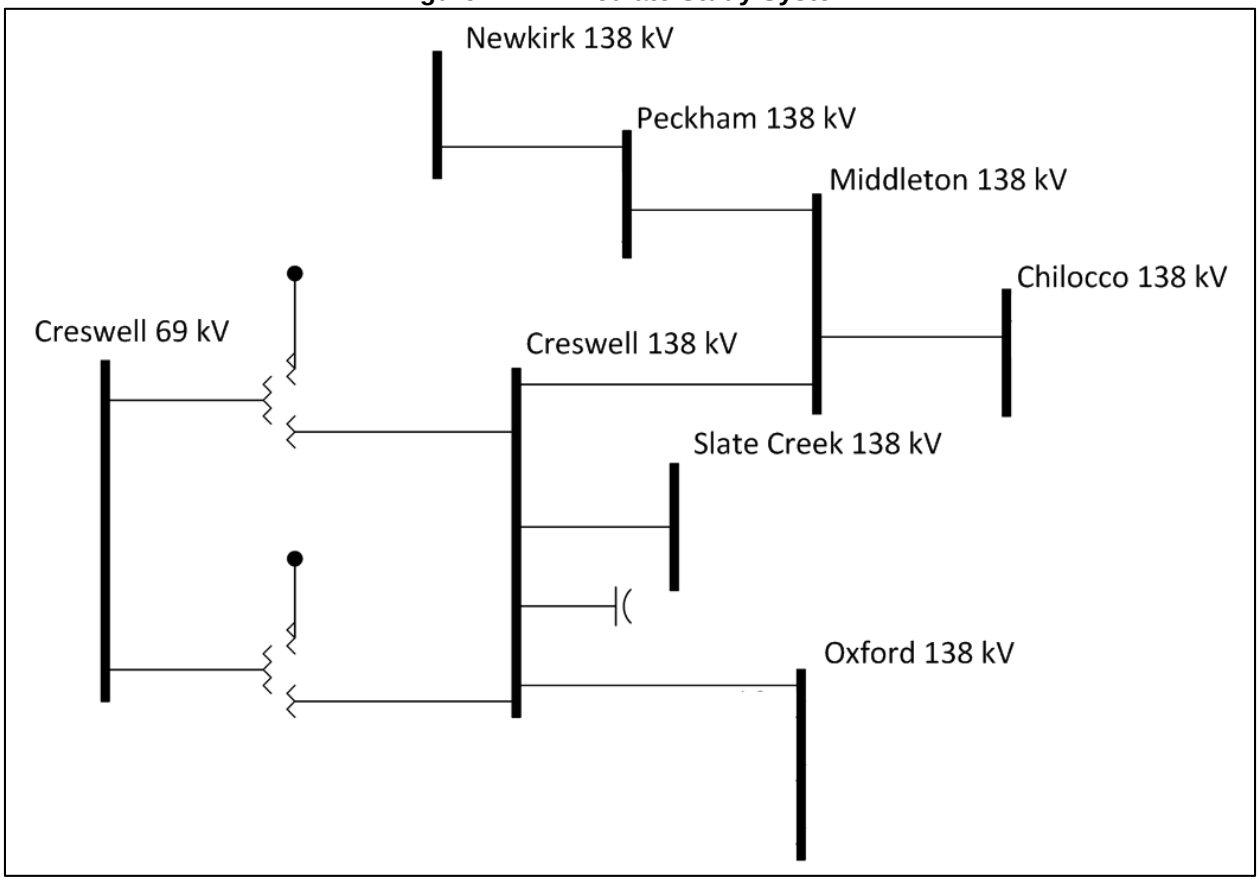
The transfer analysis was performed using the Transmission Adequacy and Reliability Assessment (TARA) software. The loading levels in the study system were monitored according to the reliability criteria outlined in Section 2.1 during the simulation. Thermal violations and the assicated transfer amount was recorded.. The injection of the Project was displaced by all other generators in the SPP footprint.

2.5 Study System

The study system consisted of facilities within Western Farmers Electric Cooperative, Westar Energy systems and their direct neighbors. Equipment loadings were monitored for all elements 100kV and above

in the study system. Figure 2-1 provides a one-line diagram of the point of interconnection and local transmission facilities.

Figure 2-1: Immediate Study System



3.0 STUDY RESULTS

The following sections summarize the results of the transfer study.

3.1 Transfer Study Results

For both study cases, the maximum injection at the POI is limited by the radial transmission line from the Oklahoma Gas & Electric (OG&E) owned Middleton Tap 138 kV substation to the Western Farmers Electric Cooperative owned Chilocco 138 kV substation. The tabular results of the transfer study for the 2017 and 2020 summer peak cases are shown in Table 3-1 and Table 3-2 below.

Table 3-1: 2017 Summer Peak Transfer Study Results

Monitored Facility	Rating (MVA)	Contingency Name	2017 Summer			
			Injection Limit (MW)	AC %Loading No Injection	AC %Loading at Injection Limit	% Impact
Middleton □ap to Chilocco □□□ □□ line	□□□	□ase Case	□□□□□	□□□	□□□□□	□□□□
Middleton □ap to Chilocco □□□ □□ line	□□□	Middleton □ap to Cres□ell □□□ □□ line	□□□□□	□□□	□□□□□	□□□□
Middleton □ap to Chilocco □□□ □□ line	□□□	Kildare to □e□□ir□ □ap □□□ □□ line	□□□□□	□□□	□□□□□	□□□□

Table 3-2: 2020 Summer Peak Transfer Study Results

Monitored Facility	Rating (MVA)	Contingency Name	2020 Summer			
			Injection Limit (MW)	AC %Loading No Injection	AC %Loading at Injection Limit	% Impact
Middleton □ap to Chilocco □□□ □□ line	□□□	□ase Case	□□□□□	□□□	□□□□□	□□□□
Middleton □ap to Chilocco □□□ □□ line	□□□	Middleton □ap to Cres□ell □□□ □□ line	□□□□□	□□□	□□□□□	□□□□
Middleton □ap to Chilocco □□□ □□ line	□□□	Kildare to □e□□ir□ □ap □□□ □□ line	□□□□□	□□□	□□□□□	□□□□

3.2 Conclusion

The study results indicated that the Project is limited to 106 MW without causing thermal overloads in the study system. The only constratint that was reported for an injection amount of 200 MW is the Middleton Tap to Chilocco 138 kV line.

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Appendix B

SPP Cost Allocation Proposal Analysis

Vendor: nFront Consulting

Date: 3/3/2017

		Scenarios	Base	Scenario A	Scenario B	Scenario C	Scenario D	Scenario B + C + D
ID	*Total Upgrade Costs*	Upgrades	DISIS Results	Gen-2016-012 and 2016-024 Withdraw - Voltage Instability remains	Gen-2016-012 and 2016-024 Withdraw - Voltage Instability alleviated	Neosho to Riverton upgrade not required	Gen-2015-083 Exits Queue	Scenario B + C + D all together
0	*$4,612,190*	Interconnection	$4,612,190	$4,612,190	$4,612,190	$4,612,190	$4,612,190	$4,612,190
1	*$117,126,900*	Wolf Creek- Neosho 345kV	$8,827,993	$16,703,877	$0	$8,827,993	$8,827,993	$0
2	*$10,545,000*	Osage-Webb Tap 138kV	$8,027,870	$8,027,870	$8,027,870	$8,027,870	$8,027,870	$8,027,870
3	*$9,000,000*	Farber-Belle Plains 138kV	$6,102,762	$6,102,762	$6,102,762	$6,102,762	$0	$0
4	*$3,000,000*	Middleton Tap- Chilocco 138kV	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000	$3,000,000
5	*$2,805,000*	Kildare- White Eagle 138kV	$2,805,000	$2,805,000	$2,805,000	$2,805,000	$2,805,000	$2,805,000
6	*$23,000,000*	Neosho-Riverton 161kV	$2,132,495	$2,132,495	$2,132,495	$0	$2,132,495	$0
7	*$600,000*	Kinze-McElroy 138kV	$270,477	$270,477	$270,477	$270,477	$270,477	$270,477
8	*$500,000*	Caney River-Neosho 345kV	$90,002	$90,002	$90,002	$90,002	$90,002	$90,002
9	*$500,000*	Cleveland-Tulsa 345kV	$52,867	$52,867	$52,867	$52,867	$52,867	$52,867
10	*$50,000*	Osage-White Eagles 138kV	$48,992	$48,992	$48,992	$48,992	$48,992	$48,992
11	*$31,600,000*	Gen-2016-012 Tap-Waverly Tap	$31,798	$0	$0	$31,798	$31,798	$0
12	*$500,000*	Gen 2016-012Tap-La Cygne 345kV	$2,009,614	$0	$0	$2,009,614	$2,009,614	$0
		Total Cost	$38,012,060	$43,846,532	$27,142,655	$35,879,565	$31,909,298	$18,907,398
		Change from Base Scenaro		$5,834,472	($10,869,405)	($2,132,495)	($6,102,762)	($19,104,662)

Scenario A Allocated upgrade costs for both 2016-012 and 2016-024 are each ~$83M ($416/kW and $1660/kW respecitvely) and could likely exit queue. May not resolve need for Wolf Creek - Neosho Upgrade, would increase allocated cost of Wolf Creek - Neosho upgrade to $16.7M. Upgrade #12 removed for 16-012 withdrawal.

Scenario B Allocated upgrade costs for both 2016-012 and 2016-024 are each ~$83M ($416/kW and $1660/kW respecitvely) and could likely exit queue. If no longer voltage stability in models, Wolf Creek - Neosho Upgrade no longer required. Upgrade #12 removed for 16-012 withdrawal.

Scenario C No results reported for this line being impacted by Project in DISIS. Line scheduled for upgrade to 243 MVA in July 2018. Unknown if Base Rating will be increased for N-0 violations.

Scenario D Alleviates Farber to Belle Plains upgrade. Total Interconnection Costs ~$7M. Unlikely gen will exit queue due to interconnect costs.

Causes of Upgrades per DISIS 2016-001

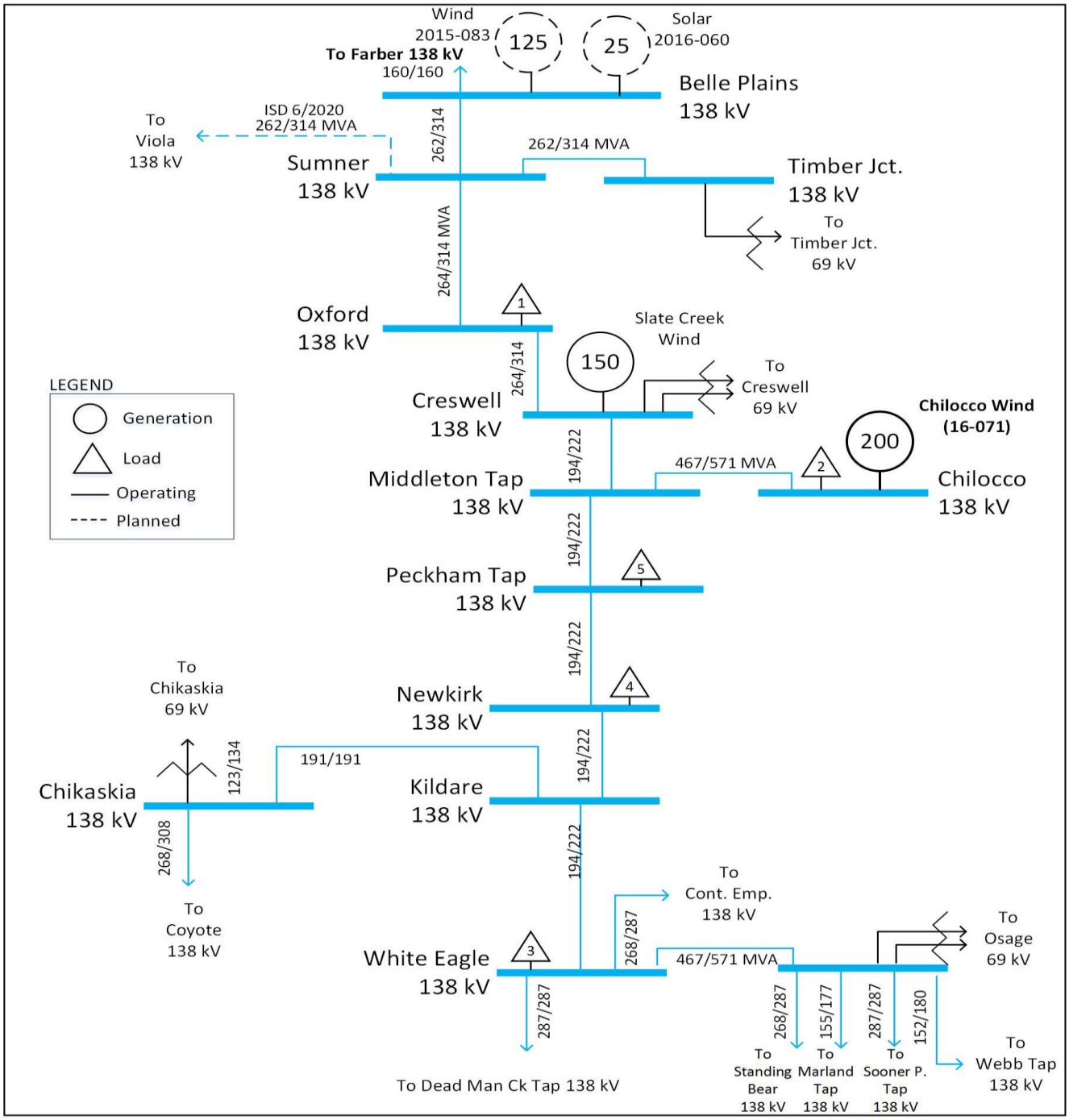
ID	Upgrades
0	Interconnection
1	Wolf Creek- Neosho 345kV
2	Osage-Webb Tap 138kV
3	Farber-Belle Plains 138kV
4	Middleton Tap- Chilocco 138kV
5	Kildare- White Eagle 138kV
6	Neosho-Riverton 161kV
7	Kinze-McElroy 138kV
8	Caney River-Neosho 345kV
9	Cleveland-Tulsa 345kV
10	Osage-White Eagles 138kV
11	Gen-2016-012 Tap-Waverly Tap
12	Gen 2016-012Tap-La Cygne 345kV

v2

Monitored Element
Non-Convergence
BUTLER - MIDIAN 138KV CKT 1
WOLF CREEK (WOLF TX-6) 345/69/17.0KV TRANSFORMER CKT 1
PAWHUSKA TAP - WEST PAWHUSKA 138KV CKT 1
SHIDLER - WEST PAWHUSKA 138KV CKT 1
OSAGE - WEBB CITY TAP 138KV CKT 1
FARBER - SUMNER COUNTY NO. 10 BELLE PLAIN 138KV CKT 1
FARBER - SUMNER COUNTY NO. 10 BELLE PLAIN 138KV CKT 1
CHILOCCO4 138.00 - MIDLTNT4 138.00 138KV CKT 1
KILDARE4 - WHITE EAGLE 138KV CKT 1
NEOSHO - SUB 452 - RIVERTON 161KV CKT 1
NEOSHO - SUB 452 - RIVERTON 161KV CKT 1
KINZE - MCELROY 138KV CKT 1
CANEYRV7 345.00 - NEOSHO 345KV CKT 1
CLEVELAND - TULSA NORTH 345KV CKT 1
OSAGE - WHITE EAGLE 138KV CKT 1
G16-012-TAP 345.00 - WAVERLY 345KV CKT 1
G16-012-TAP 345.00 - LACYGNE 345KV CKT 1
G16-012-TAP 345.00 - LACYGNE 345KV CKT 1

Contigency	Type	DF	Total Cost
			$4,612,190
MIDIAN (MIDI TX-1) 138/69/13.2KV TRANSFORMER CKT 1 G16-012-TAP 345.00 -LACYGNE 345KV CKT 1 CLEVELAND - TULSA NORTH 345KV CKT 1 CLEVELAND - TULSA NORTH 345KV CKT 1	ERIS NRIS NRIS NRIS NRIS		$117,126,900
System Intact	ERIS	7.0%	$10,545,000
System Intact MIDLTNT4 138.00 -PECKHAM TAP 138KV CKT 1	ERIS ERIS	25.4% 69.4%	$9,000,000
System Intact	ERIS	100%	$3,000,000
HUNTERS7 345.00 -WOODRING 345KV CKT 1	ERIS	40.2%	$2,805,000
System Intact LITCHFIELD - SUB 349 -ASBURY 161KV CKT 1	ERIS NRIS		$23,000,000
System Intact	ERIS	3.7%	$600,000
System Intact	ERIS	5.9%	$500,000
System Intact	ERIS	6.7%	$500,000
CONTINENTAL EMPIRE - WHITE EAGLE 138KV CKT 1	ERIS	22.0%	$50,000
NEOSHO - WOLF CREEK 345KV CKT 1	ERIS		$500,000
System Intact CANEYRV7 345.00 -NEOSHO 345KV CKT 1	ERIS ERIS		$31,600,000

Allocated Cost	Re-Allocated Cost	Comments
$4,612,190	$4,612,190	
$8,827,993	$8,827,993	Required for voltage stability. Not required stand alone.
$8,027,870	$8,027,870	Constraint still exists as stand alone, but barely 102.3% and for only 20L Scen 2
$6,102,762	$6,102,762	Constraint still exists as stand alone in multiple seasons. 10 mi. may not have to be reconductored
$3,000,000	$3,000,000	Gen outlet. 100% project. But rating in power flow model show 467 MVA not 106 MVA
$2,805,000	$2,805,000	Only Gen contributing. Line showing up as constraint in SCED often
$2,132,495	$0	No results reported for this line being impacted by Project. Line scheduled for upgrade to 243 MVA 7/2018. Base rate should be 209 MVA not 190 MVA
$270,477	$270,477	Constraint still exists as stand alone at 103.6% for 2017 only
$90,002	$90,002	Not required if ALL projects drop out. 20L case O/L for N-0 only. Some projects dropping out can alleviate this constraint
$52,867	$52,867	Not required if ALL projects drop out. 20L case O/L for N-0 only. Some projects dropping out can alleviate this constraint
$48,992	$48,992	Only Gen contributing.
$31,798	$31,798	No results reported for this line being impacted by Project.
$2,009,614	$0	Some projects dropping out can alleviate this constraint (G16_012 the biggest)
$38,012,060	**$33,869,951**	


Wind
2015-083
125
25
Solar
2016-060
To Farber 138 kV
160/160
Belle Plains
138 kV
To
Viola
138 kV
ISD 6/2020
262/314 MVA
262/314
Sumner
138 kV
262/314 MVA
Timber Jct.
138 kV
To
Timber Jct.
69 kV
264/314 MVA
Oxford
138 kV
1
Slate Creek
Wind
150
To
Creswell
69 kV
264/314
Creswell
138 kV
Chilocco Wind
(16-071)
200
194/222
467/571 MVA
2
Middleton Tap
138 kV
Chilocco
138 kV
194/222
Peckham Tap
138 kV
5
194/222
To
Chikaskia
69 kV
Newkirk
138 kV
4
123/134
191/191
194/222
Chikaskia
138 kV
Kildare
138 kV
268/308
To
Coyote
138 kV
194/222
To
Cont. Emp.
138 kV
268/287
To
Osage
69 kV
White Eagle
138 kV
3
467/571 MVA
287/287
268/287
155/177
287/287
152/180
To
Standing
Bear
138 kV
To
Marland
Tap
138 kV
To
Sooner P.
Tap
138 kV
To
Webb Tap
138 kV
To Dead Man Ck Tap 138 kV
LEGEND
Generation
Load
Operating
Planned

Group 8

#	Request	Size (MW)	Generation	Point of Interconnection	Total Allocated Cost	Wolf Creek- Neosho 345kV		
							$117,126,900	
1	Gen-2016-009	29		Osage 69kV OKGE	$956.218	0	0.00%	
2	Gen-2016-012	200	wind	Tap Waverly (532799) La Cygne (542981) 345kV, (G16-012-TAP.560073)	$83,146,835	$50,458,207	43.08%	
3	Gen-2016-022	151.8	wind	Ranch Road 345kV (515576)	$14.451.758	$6.556.740	5.60%	
4	Gen-2016-024	50	solar	Midian 138kV (532990)	$83.451.511	$4.767.170	4.07%	
5	Gen-2016-031	201.3	wind	Ranch Road 345kV (515576)	$98.825	$64.790	0.06%	
6	Gen-2016-032	200	wind	Tap Marshall (514733)- Cottonwood Creek (514827) 138kV. (G16-032-TAP. 560077)	$6,555,499	$987,369	0.84%	
7	Gen-2016-048	74	solar	Sooner 138kV (514802)	$12.167.241	$887.343	0.76%	
8	Gen-2016-060	25.3	wind	Belle Plain 138kV (533063)	$5.337.686	$2.031.702	1.73%	
9	Gen-2016-061	250.7	wind	Tap Woodring (514715) –Sooner (514803) 345kV (G16-061-TAP, 560084)	$21,118,904	$4,507,759	3.85%	
10	Gen-2016-068	250	wind	Woodring 345kV (514715)	$16.188.399	$5.448.694	4.65%	
11	Gen-2016-071	200.1	wind	Chilocco 138kV (521198)	$38.012.060	$8.827.993	7.54%	$16.703.877
12	Gen-2016-072	300	wind	Renfrow (515543) 345 kV	$33.983.746	$14.052.677	12.00%	
13	Gen-2016-073	220	wind	Tap on Thistle (539801) to Wichita (532796) 345kV, ckt1&2 (Buffalo Flats 345kV:560033)	$33,825,320	$18,536,456	15.83%	
14*	GEN-2016-013	60 winter/52 summer	combustion turbine (gas)		$3,694,351	0	0.00%	
15*	GEN-2016-014	60 winter/52 summer	combustion turbine (gas)		$3,694,351	0	0.00%	

#	Request	Osage-Webb Tap 138kV			Farber-Belle Plains 138kV			Gen-2016-071 Interconnection			Middleton Tap- Chilocco 138kV		
			$10,545,000			$9,000,000			$4,612,190			$3,000,000	
1	Gen-2016-009	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
2	Gen-2016-012	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
3	Gen-2016-022	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
4	Gen-2016-024	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
5	Gen-2016-031	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
6	Gen-2016-032	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
7	Gen-2016-048	$2.517.130	23.87%		$349.221	3.88%		0	0.00%		0	0.00%	
8	Gen-2016-060	0	0.00%		$2.548.017	28.31%		0	0.00%		0	0.00%	
9	Gen-2016-061	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
10	Gen-2016-068	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
11	Gen-2016-071	$8.027.870	76.13%		$6.102.762	67.81%		$4.612.190	100.00%		$3.000.000	100.00%	
12	Gen-2016-072	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
13	Gen-2016-073	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
14*	GEN-2016-013	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
15*	GEN-2016-014	0	0.00%		0	0.00%		0	0.00%		0	0.00%	

#	Request	Kildare- White Eagle 138kV			Neosho-Riverton 161kV			Gen 2016-012Tap-La Cygne 345kV			Kinze-McElroy 138kV		
			$2,805,000			$23,000,000			$31,600,000			$600,000	
1	Gen-2016-009	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
2	Gen-2016-012	0	0.00%		$4,867,001	21.16%		$15,746,430	49.83%		0	0.00%	
3	Gen-2016-022	0	0.00%		$1.624.518	7.06%		$1.729.241	5.47%		0	0.00%	
4	Gen-2016-024	0	0.00%		$1.269.173	5.52%		$800.693	2.53%		0	0.00%	
5	Gen-2016-031	0	0.00%		$16.053	0.07%		$17.087	0.05%		0	0.00%	
6	Gen-2016-032	0	0.00%		$746,713	3.25%		$1,412,447	4.47%		0	0.00%	
7	Gen-2016-048	0	0.00%		$460.542	2.00%		$680.765	2.15%		$329.523	54.92%	
8	Gen-2016-060	0	0.00%		$409.222	1.78%		$321.261	1.02%		0	0.00%	
9	Gen-2016-061	0	0.00%		$1,574,901	6.85%		$2,088,100	6.61%		0	0.00%	
10	Gen-2016-068	0	0.00%		$1.635.106	7.11%		$2.025.663	6.41%		0	0.00%	
11	Gen-2016-071	$2.805.000	100.00%		$2.132.495	9.27%		$2.009.614	6.36%		$270.477	45.08%	
12	Gen-2016-072	0	0.00%		$3.052.791	13.27%		$2.710.247	8.58%		0	0.00%	
13	Gen-2016-073	0	0.00%		$3,322,784	14.45%		$2,058,452	6.51%		0	0.00%	
14*	GEN-2016-013	0	0.00%		$944,351	4.11%		0	0.00%		0	0.00%	
15*	GEN-2016-014	0	0.00%		$944,351	4.11%		0	0.00%		0	0.00%	

#	Request	Caney River-Neosho 345kV			Cleveland-Tulsa 345kV			Osage-White Eagles 138kV			Gen-2016-012 Tap-Waverly Tap		
			$500,000			$500,000			$50,000			$500,000	
1	Gen-2016-009	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
2	Gen-2016-012	0	0.00%		$2,701	0.54%		0	0.00%		$249,152	49.83%	
3	Gen-2016-022	0	0.00%		$63.247	12.65%		0	0.00%		$27.361	5.47%	
4	Gen-2016-024	0	0.00%		$6.962	1.39%		0	0.00%		$12.669	2.53%	
5	Gen-2016-031	0	0.00%		$625	0.13%		0	0.00%		$270	0.05%	
6	Gen-2016-032	0	0.00%		$42,773	8.55%		0	0.00%		$22,349	4.47%	
7	Gen-2016-048	0	0.00%		$34.042	6.81%		$1.008	2.02%		$10.772	2.15%	
8	Gen-2016-060	$17.904	3.58%		$4.496	0.90%		0	0.00%		$5.083	1.02%	
9	Gen-2016-061	$72,092	14.42%		$105,456	21.09%		0	0.00%		$33,040	6.61%	
10	Gen-2016-068	$72.571	14.51%		$80.690	16.14%		0	0.00%		$32.052	6.41%	
11	Gen-2016-071	$90.002	18.00%		$52.867	10.57%		$48.992	97.98%		$31.798	6.36%	
12	Gen-2016-072	$124.583	24.92%		$75.565	15.11%		0	0.00%		$42.884	8.58%	
13	Gen-2016-073	$122,847	24.57%		$30,578	6.12%		0	0.00%		$32,570	6.51%	
14*	GEN-2016-013	0	0.00%		0	0.00%		0	0.00%		0	0.00%	
15*	GEN-2016-014	0	0.00%		0	0.00%		0	0.00%		0	0.00%	

	Monitored Element		OSAGE - WEBB CITY TAP 138KV CKT 1	OSAGE - WEBB CITY TAP 138KV CKT 1	OSAGE - WEBB CITY TAP 138KV CKT 1
	Contigency	Capacty (MW)	System Intact	System Intact	CLEVELAND - G15066_T 345.00 345KV CKT 1
	Line Rating A/B (MVA)		152	152	180
	TC% Loading (%MVA)		105.2	99.8	137.8
	DISIS OverLoad (MW)		7.9	(0.3)	68.1
	Change in flow after Redispatch		0.0	0.0	0.0
	ReDispatch Overload? (MW)		7.9	(0.3)	68.1
	New TC% Loading (%MVA)		*105.2*	*99.8*	*137.8*
In/Out	**Source**				
In	G16_009	29	0.0	0.0	0.0
In	G16_012	200	0.0	0.0	0.0
In	G16_022	151.8	0.0	0.0	0.0
In	G16_024	55.9	0.0	0.0	0.0
In	G16_031	1.5	0.0	0.0	0.0
In	G16-032	200	0.0	0.0	0.0
In	G16_048	82.3	4.3	4.2	4.9
In	G16_060	25.3	0.0	0.0	0.0
In	G16_061	250.7	0.0	0.0	0.0
In	G16_068	250	0.0	0.0	0.0
In	G16_071	200.1	14.0	0.0	0.0
In	G16_072	300	0.0	0.0	0.0
In	G16_073	220	0.0	0.0	0.0
In	G16_013_SP	10	0.0	0.0	0.0
In	G16_014_SP	10	0.0	0.0	0.0
In	G16_013_WP	10	0.0	0.0	0.0
In	G16_014_WP	10	0.0	0.0	0.0

Farber-Belle Plains 138kV	Farber-Belle Plains 138kV	Farber-Belle Plains 138kV	Middleton Tap- Chilocco 138kV	Kildare-White Eagle 138kV	Neosho-Riverton 161kV	Neosho-Riverton 161kV
System Intact	MIDLTNT4 138.00 - PECKHAM TAP 138KV CKT 1	G15-015T 138.00 - MDFRDTP4 138.00 138KVCKT 1	System Intact	HUNTERS7 345.00 - WOODRING 345KV CKT 1	System Intact	LITCHFIELD - SUB 349 - ASBURY 161KV CKT 1
160	160	160	106	222	191	223
126.2	167.5	104.8	**184.2**	***121.0***	***101.7***	***139.1***
41.9	107.9	7.7	89.3	46.7	3.3	87.2
0.0	0.0	0.0	0.0	0.0	0.0	0.0
41.9	107.9	7.7	89.3	46.7	3.3	87.2
126.2	*167.5*	*104.8*	*184.2*	*121.0*	*101.7*	*139.1*
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
2.8	0.0	2.7	0.0	0.0	0.0	0.0
17.7	21.5	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
50.8	138.8	0.0	200.1	80.5	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.6	0.0
0.0	0.0	0.0	0.0	0.0	0.6	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.7
0.0	0.0	0.0	0.0	0.0	0.0	0.7

Kinze-McElroy 138kV	Kinze-McElroy 138kV	Kinze-McElroy 138kV	Gen 2016-012Tap-La Cygne 345kV	Gen 2016-012Tap-La Cygne 345kV	Gen 2016-012Tap-La Cygne 345kV	Gen 2016-012Tap-La Cygne 345kV
System Intact	SOONER (SOONER5) 345/138/13.8KV TRANSFORMER CKT 1	CLEVELAND - G15066_T 345.00 345KV CKT 1	System Intact	CANEYRV7 345.00 - NEOSHO 345KV CKT 1	System Intact	CANEYRV7 345.00 - NEOSHO 345KV CKT 1
194	222	222	1141	1195	1141	1195
107.9	*103.2*	*115.5*	***110.9***	***122.1***	***99.1***	***108.9***
15.3	7.1	34.5	124.5	264.3	(10.3)	106.2
0.0	0.0	0.0	0.0	0.0	0.0	0.0
15.3	7.1	34.5	124.5	264.3	(10.3)	106.2
107.9	*103.2*	*115.5*	*110.9*	*122.1*	*99.1*	*108.9*
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	124.7	121.6	130.9	133.1
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
8.4	19.4	9.0	5.5	0.0	0.0	0.0
0.0	0.0	0.0	3.1	0.0	0.0	0.0
0.0	0.0	0.0	17.1	0.0	0.0	0.0
0.0	0.0	0.0	16.8	0.0	0.0	0.0
7.3	0.0	0.0	18.3	0.0	0.0	0.0
0.0	0.0	0.0	23.5	0.0	0.0	0.0
0.0	0.0	0.0	20.8	0.0	27.6	32.9
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0

CANEYRV7 345.00 - NEOSHO 345KV CKT 1	CANEYRV7 345.00 - NEOSHO 345KV CKT 1	Cleveland-Tulsa 345kV	OSAGE - WHITE EAGLE 138KV CKT 1
System Intact	G16-012-TAP 345.00 - LACYGNE 345KV CKT 1	System Intact	CONTINENTAL EMPIRE - WHITE EAGLE 138KV CKT 1
766	923	1135	191
106.4	***106.2***	***103.4***	***103.4***
48.9	57.0	38.7	6.5
0.0	0.0	0.0	0.0
48.9	57.0	38.7	6.5
106.4	*106.2*	*103.4*	*103.4*
0.0	0.0	0.0	0.0
0.0	32.1	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	2.5	10.3	0.0
2.6	0.0	0.9	0.0
7.9	0.0	32.4	0.0
8.1	9.4	22.4	0.0
11.9	0.0	13.3	44.0
15.8	0.0	18.9	0.0
17.2	20.9	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0

Monitored Element		OSAGE - WEBB CITY TAP 138KV CKT 1	OSAGE - WEBB CITY TAP 138KV CKT 1	OSAGE - WEBB CITY TAP 138KV CKT 1	Farber-Belle Plains 138kV	Farber-Belle Plains 138kV	Farber-Belle Plains 138kV	Middleton Tap-Chilocco 138kV	Kildare-White Eagle 138kV	Neosho-Riverton 161kV	Neosho-Riverton 161kV	Kinze-McElroy 138kV	Kinze-McElroy 138kV	Kinze-McElroy 138kV	Gen 2016-012Tap-La Cygne 345kV	Gen 2016-012Tap-La Cygne 345kV	Gen 2016-012Tap-La Cygne 345kV	Gen 2016-012Tap-La Cygne 345kV	CANEYRV7 345.00 - NEOSHO 345KV CKT 1	CANEYRV7 345.00 - NEOSHO 345KV CKT 1	Cleveland-Tulsa 345kV	OSAGE - WHITE EAGLE 138KV CKT 1
Contigency	Capacity (MW)	System Intact	System Intact	CLEVELAND - G15066_T 345.00 345KV CKT 1	System Intact	MIDLTNT4 138.00 - PECKHAM TAP 138KV CKT 1	G15-015T 138.00 - MDFRDTP4 138.00 138KVCKT 1	System Intact	HUNTERS7 345.00 - WOODRING 345KV CKT 1	System Intact	LITCHFIELD - SUB 349 - ASBURY 161KV CKT 1	System Intact	SOONER (SOONERS) 345/138/13.8KV TRANSFORMER CKT 1	CLEVELAND - G15066_T 345.00 345KV CKT 1	System Intact	CANEYRV7 345.00 - NEOSHO 345KV CKT 1	System Intact	CANEYRV7 345.00 - NEOSHO 345KV CKT 1	System Intact	G16-012-TAP 345.00 - LACYGNE 345KV CKT 1	System Intact	CONTINENTAL EMPIRE - WHITE EAGLE 138KV CKT 1
Line Rating A/B (MVA)		152	152	180	160	160	160	106	222	191	223	194	222	222	1141	1195	1141	1195	766	923	1135	191
TC% Loading (%MVA)		105.1799	99.8	137.8406	126.1996	167.456	104.8009	184.2206	121.0178	101.7166	139.0951	107.8981	103.1848	115.5184	110.913	122.1176	99.1	108.8839	106.3795	106.1701	103.411	103.407
DISIS OverLoad (MW)		7.87	-0.30	68.11	41.92	107.93	7.68	89.27	46.66	3.28	87.18	15.32	7.07	34.45	124.52	264.31	-10.27	106.16	48.87	56.95	38.71	6.51
Source																						
G16_009	29	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_012	200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.6233	0.6079	0.6544	0.6654	0.0000	0.1605	0.0000	0.0000
G16_022	151.8	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_024	55.9	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_031	1.5	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16-032	200	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_048	82.3	0.0525	0.0512	0.0600	0.0342	0.0000	0.0327	0.0000	0.0000	0.0000	0.0000	0.1016	0.2356	0.1091	0.0666	0.0000	0.0000	0.0000	0.0000	0.0305	0.1250	0.0000
G16_060	25.3	0.0000	0.0000	0.0000	0.7011	0.8498	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1241	0.0000	0.0000	0.0000	0.1023	0.0000	0.0349	0.0000
G16_061	250.7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0681	0.0000	0.0000	0.0000	0.0314	0.0000	0.1291	0.0000
G16_068	250	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0671	0.0000	0.0000	0.0000	0.0323	0.0378	0.0897	0.0000
G16_071	200.1	0.0698	0.0000	0.0000	0.2538	0.6939	0.0000	1.0000	0.4021	0.0000	0.0000	0.0367	0.0000	0.0000	0.0915	0.0000	0.0000	0.0000	0.0594	0.0000	0.0666	0.2201
G16_072	300	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0784	0.0000	0.0000	0.0000	0.0528	0.0000	0.0630	0.0000
G16_073	220	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0945	0.0000	0.1257	0.1494	0.0780	0.0950	0.0000	0.0000
G16_013_SP	10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0577	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_014_SP	10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0577	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_013_WP	10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0728	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
G16_014_WP	10	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0728	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Chilocco Wind Project
FAQ - 130308

1. **Why is a Limited Waiver of Sovereign Immunity required?**

   A Limited Waiver is necessary to assure investors and banks who are risking hundreds of millions of dollars that there is a common basis for addressing disputes. Investors and banks want to insure access to the property to operate the project, reclaim the equipment in the event the project owner defaults. Investors and banks require the protection of their investment by the ability to initiate court actions in federal courts, and that all parties to the agreements have agreed to be subject to and bound by federal court for this limited and specific purpose.

2. **Is this the final language for these agreements and the Limited Waiver of Sovereign Immunity?**

   This is a large project (over $300 million) that generates significant income for the CN. The project involves a number of parties and stake holders who will have input into the final agreements. These include the BIA, lender banks, investors and CN. Although there is complete agreement on terms and substantial agreement on the documents as reviews advance there may be changes to the language of some of the documents as they advance through the various reviews and approvals. The terms and the language of the Limited Waiver of Sovereign Immunity have been reviewed and accepted by the banks and developer who assure CN of its acceptability to the investors. If however any changes are needed that require Tribal Council approval then further approvals may be sought although not currently anticipated. The approval of the limited waiver is an important step but it is but a step in the process of implementation of this significant project.

3. **What is the rush for the approval of the Waiver?**

   a. *<u>The Tax Credits for the project are time limited.</u> Recent legislation concerning the "Fiscal Cliff" extended the federal Production Tax Credit (PTC) to include Wind Projects installed before the end of December 31, 2103. This tax credit is sold to investors, and is a major contributor to the financial viability of the Project. Without the PTC, the project is less valuable and perhaps not viable.*

b. *<u>There is an impending deadline on the CNB connection agreement which adds considerable value to the CN's land.</u> The CNB applied for and received a Generator Interconnection Agreement (GIA) that was originally thought to be expiring at the end of 2012. CPV has confirmed with the utility and the regional transmission authorities that it will not expire until September, 2013. The process for reapplying if the GIA expires is costly and time consuming as it has to follow a specific process established by the Federal Energy Regulatory Commission. The GIA provides the Project with the means of fully exporting the power from the Project to its customers. Without this capability, exports from the Project would become hit-or-miss, resulting in a significantly reduced value of the Project until such time as a new GIA could be received. Reapplying for a new GIA could take several years to fully process as once expired the process requires an applicant to start over at the back of the line. While September seems like a long way away…by the time the agreements are completed, investors lined up, bank financing arranged and proper notice is provided to the utility for the connection the September date will be upon us.*
c. *<u>The sooner the Project is started the faster CN gets paid.</u> The Cherokee Nation has now arranged for a significant amount of compensation direct to the general fund at the completion of the project.*

4. What does CN receive and give up in the transaction?

a. *CN gives up the exclusive development rights on its fee and trust lands for a period of three years. This will not interrupt the current surface or mineral rights leases on the property unless a development proceeds and then only minimally.*
b. *CN will receive an estimated total payment of $6,820,000 at the completion of the Project and the sale of the equity in the Project. The ongoing lease payments each year if the project is completed will be a minimum of $391,000 each year that has a net present value of $3,729,855 over 20 years (discounted at 10%).*

5. What if <u>no</u> wind generation facilities are installed on CN lands?

There are three possible outcomes that would have no wind generation facilities installed on CN lands…all highly unlikely.

a. *PNE decides not to execute the WRL within the 3 year period of the WEEL. This could result from investors or financing not materializing, the off take agreement may not be finalized or the BIA may not approve of the lease.*

   In this case CN would receive no compensation and the WEEL would expire and option to lease the property would be dissolved.

b. *PNE exercises its option under the WEEL to execute the WRL but then does not proceed with the project.*

   i. *The WRL terminates one (1) year after the execution of the WRL unless construction on CN fee or trust lands are not commenced beforehand. As such all agreements terminate and the CN would receive no compensation, although none of CN's activities or leases would have been affected.*
   ii. *If the BIA approved the WRL which would have happened prior to its execution, then the wind data held by the developer would be released to CN, which takes time and money to collect and is a valuable asset that could be used to develop the property independently or with another developer.*

c. *Although it is highly unlikely and frankly nearly impossible, but PNE could exercises the option to sign the WRL and build the project entirely on the adjacent land leased from the other tribes.*

   i. *CN would still enjoy the benefits of "ownership" but not of the lease.*
   ii. *CNB's $588,160 non-grant project development expenses would be reimbursed at financial closing.*
   iii. *Assuming BIA has approved the trust portion of the WRL, CN will gain access and use of the wind data previously collected by PNE*
   iv. *CN will earn $15/acre -or- 0.5% of gross project revenues: value is about $39,225/yr (land payment) – the revenue portion should produce a higher return. Assuming the full 153 MW Project is developed, with no facilities on CN lands, CN would earn $9 million over a 20 year period, with a NPV (10% disc) of $3.9 million*
   v. *Per WDA, the five percent ownership granted in CWP remains intact – value is approximately $3.9 million*

6. **Who will fund development of the GIA to keep it from expiring in September?**

   If the project agreements are completed, PNE will pay the deposit to OG&E (estimated at $1.2M) and recoup this expense from proceeds from the project financing or from the sale of the Project to Investors.

7. **Who is CPV?**

   Cimarron Power Ventures, LLC is the consulting subsidiary of Walters Power International, LLC, based in Oklahoma City, Oklahoma. In the power generation and development business for over 18 years WPI has developed large and small project all over the world. WPI is currently an owner developer of two power projects in Pakistan and is part of a consortium awarded a 15 year, $25 billion contract to provide the first liquefied natural gas plant in Pakistan. WPI initiated a new business in 2009 in the United Kingdom to support the renewable energy generation. UK Power Reserve is led by the principal of WPI as Chairman and CEO and has two large institutional investment partners based in the US and England. UKPR current owns and operates 11 plants totaling 129MW and expects to grow significantly in the power reserve markets. WPI own with large institutional partners two power plants in California and has actively pursued renewable energy projects in California. WPI is currently pursuing reserve power projects in the Texas ERCOT market.

8. **Why was CPV engaged to support this project?**

   Cimarron Power Ventures, LLC is involved by invitation of CNB, who contacted CPV in late December, 2012. CPV was asked to independently evaluate the Project and provide its assessment and recommendation regarding the benefits of CN's participation or not. CPV is also under a prior agreement to provide similar guidance and recommendations for similar work to CNB for an evaluation and recommendation of the W.D. Mayo Hydroelectric Project. As such, CPV was a natural selection for providing a fast-turnaround regarding the Chilocco Wind Project.

   CPV's recommendation was submitted to CNB in early February with a recommendation to proceed. CPV has asked to represent CN directly with the developer of the Project and has taken the lead on renegotiating terms and compensation benefits to CN. CPV recommended independent council

to work with the CN AG's office to redraft the documents to further mitigate the risk to CN.

Although an agreement has not yet been signed it is anticipated that CPV will have its cost reimbursed from DOE project grant funds as a project representative and receive a contingent fee based on improvements in compensation to CN that it generates.

9. What does CPV provide that CNB cannot?

CNB has tenaciously pursued the project for many years and organized the DOE grant and the connection application and the developer identification process. A devoted team at CNB has done an excellent job of navigating through the development process. CPV brings an intense level of experience in all aspects of power plant development including financing, building and operations. CPV's parent and principals have bought and sold dozens of large and small projects and are familiar with the project agreements and the issues from both parties perspective.

CPV has established it value by getting the project moving quickly on better terms with less risk to CN.

10. How were the returns increased?

a. *CPV negotiated the inclusion of Phase 1 (CN lands) and Phase 2 (other tribal properties) into the compensation in order for CN to benefit from the efficiencies and increased return to the developer by developing Phase 1 and Phase 2 together. CN's leverage was increased when CPV demonstrated in writing from two sources that the GIA had not in fact expired as the developer maintained; the GIA is a crucial project element that would have threatened its participation in CWF and significantly delayed Phase 1 earnings. This was accomplished by simply substituting a more global SPV to include Phases 1 and 2 rather than just an SPV for Phase 1.*
b. *The result of the above change caused the COD to double and the ownership sales payment to CN upon sale to increase by more than a factor of 5.5X. The later occurred due to the attractiveness to investors of the larger project in addition to CN participating in the sale proceeds from a project twice the size as originally anticipated.*

c. *CPV has also negotiated the reimbursement to CNB of the approximate $588,361 of project-related development expenses not funded by grants expended over the last several years.*
d. *The result of the above is a 175% increase in the year one cash to CN and a 70% increase in the NPV of the project over the 20 year lease period.*

11. Who will purchase the power generated from the plant?

Although proprietary, PNE has secured a purchaser, Western Farmers.

12. Can CN receive power from the project for use at the CN Casinos?

Since the buyer is Western Farmers and CN is served by PSO, who has exclusive jurisdiction in their service territory, it is not possible for CN to buy the energy from the project.

13. What other usage options were considered prior to deciding on a wind farm?

A wind farm was deemed highest and best use due to its location in the "wind corridor" and the current economics (PTCs and public/private green initiatives) that support development, as well as the Federal initiative to develop renewable resources on tribal lands. Legacy usage is agricultural and O&G leases.

14. Is there any opportunity for CN to own the project?

There may be an opportunity for ownership. CPV is currently reviewing the option of CN borrowing the equity required to own the project, recourse only to the project and have the equity loan retired from the tax savings that result from CN's ownership. This is still in the exploration stage.

POWER PURCHASE AGREEMENT

BETWEEN

AND

CHILOCCO WIND FARM LLC

DATED AS OF [_____], 2014

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POWER PURCHASE AGREEMENT

THIS POWER PURCHASE AGREEMENT ("Agreement") is entered into as of the [___] day of [_____], 2014 by and between_____, a ____ ("Buyer"), and Chilocco Wind Farm LLC, a Delaware limited liability company ("Seller"). Each of Buyer and Seller is referred to individually under this Agreement as a "Party" and together they are referred to as the "Parties".

RECITALS

WHEREAS, Seller desires to develop, design, construct, own and operate a wind powered electric generating facility with an expected total nominal nameplate rated capacity of 76.5 MW (the "Facility" as further described herein);

WHEREAS, Seller intends to locate the Facility in Kay County, Oklahoma at the Facility Premises (such term, together with other initially capitalized terms used in the Recitals, having the meaning assigned to it in Section 1.1), and to interconnect the Facility with the Southwest Power Pool ("SPP") transmission network;

WHEREAS, Seller desires to sell and deliver to Buyer 100% of the Energy output from the Facility plus all Environmental Attributes and Buyer desires to accept and purchase the same from Seller; and

WHEREAS, the Parties desire to set forth the terms and conditions pursuant to which such sales and purchases shall be made;

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein set forth, the sufficiency and adequacy of which are hereby acknowledged, the Parties agree as follows:

ARTICLE I
DEFINITIONS AND INTERPRETATION

Section 1.1. Definitions.

The following capitalized terms shall have the following meanings:

"Accountant" means [_____].

"Affiliate" means, as to any Person, any other Person that, directly or indirectly, is in control of, is controlled by or is under common control with such Person or is a director or officer of such Person or of an Affiliate of such Person.

"Agreement" means this Power Purchase Agreement.

"Authorized Auditors" means representatives of Buyer who are authorized to conduct audits on behalf of Buyer.

"Authorized Representative" means, with respect to each Party, the person designated as such Party's authorized representative pursuant to Section 10.6.

"Bankruptcy" means any case, action or proceeding under any bankruptcy, reorganization, debt arrangement, insolvency or receivership law or any dissolution or liquidation proceeding commenced by or against a Person and, if such case, action or proceeding is not commenced by such Person, such case or proceeding shall be consented to, not timely contested or acquiesced in by such Person or shall result in an order for relief or shall remain undismissed for ninety (90) days.

"BOP Contract" means that certain agreement for construction of the Facility balance of plant to be entered into by Seller.

"Business Day" means any calendar day that is not a Saturday, a Sunday, or a day on which commercial banks are authorized or required to be closed in Oklahoma City, Oklahoma.

"Buyer" has the meaning set forth in the Preamble.

"Central Prevailing Time" means Central Standard Time or Central Daylight Savings Time, whichever is in effect in Oklahoma City, Oklahoma.

"Change in Law" has the meaning set forth in Section 11.1(a).

"Code" means the Internal Revenue Code of 1986, as amended, and the U.S. Treasury Regulations promulgated thereunder.

"Commercial Operation" means the satisfaction, occurrence or waiver of the conditions set forth in Section 4.4 with respect to the Facility.

"Commercial Operation Date" means the date on which Commercial Operation is achieved by the Facility.

"Confidential Information" has the meaning set forth in Section 14.19(a).

"Contract Year" means each twelve-month period commencing on the Commercial Operation Date and each anniversary thereof, as applicable, and ending on the day before the subsequent anniversary of the Commercial Operation Date.

"Default" means any of the events or circumstances set forth in Section 12.1.

"Default Termination Notice" has the meaning set forth in Section 12.4(a).

"Defaulting Party" has the meaning set forth in Section 12.1.

"Delivered Output" means the Energy produced by wind turbines at the Facility that is delivered to and metered at the Point of Delivery on and after the Commercial Operation

Date, together with the Environmental Attributes associated therewith, which amount will be adjusted pursuant to Section 8.5(b).

"Delivery Term" has the meaning set forth in Section 2.1.

"Dispute" and "Dispute Notice" have the respective meanings set forth in Section 10.8(a).

"Due Date" has the meaning set forth in Section 6.2.

"Early Termination Payment" has the meaning set forth in Section 7.2.

"Effective Date" has the meaning set forth in Section 2.1.

"Electric Metering Device(s)" means all meters, metering equipment, and data processing equipment used to measure, record, or transmit data relating to the Energy output from the Facility. Electric Metering Devices include the metering current transformers and the metering voltage transformers.

"Energy" means electric energy in MWh.

"Energy Rate" has the meaning set forth in Section 11.1(b).

"Environmental Attributes" means any and all credits, benefits (other than Tax Benefits), offsets, reductions, or allowances, howsoever defined, entitled or recognized, resulting from the generation of renewable Energy and its subsequent displacement of conventional energy generation. Environmental Attributes include without limitation: (1) any avoided emission of carbon dioxide (CO_2), methane (CH_4), or any other greenhouse gas, and (2) any avoided emission of sulfur oxides (SO_x), nitrogen oxides (NO_x), carbon monoxide (CO), particulate matter (PM), or any other sources or air, soil, or water pollution. Environmental Attributes received hereunder may be applied under any governmental, regulatory, or voluntary program, including but not limited to the United Nations Framework Convention on Climate Change (UNFCC) and the Kyoto Protocol to the UNFCC, in accordance with applicable law. Environmental Attributes are also commonly known as renewable energy credits (RECs) and green tags, and the terms shall have identical meanings for the purposes of this Agreement. Seller shall transfer and sell and Buyer shall receive and purchase all Environmental Attributes associated with all Energy produced by wind turbines at the Facility pursuant to Article V.

"Facility" means the wind powered electric generating facility, including the Facility Premises, the wind turbine generators, substation, structures, facilities, equipment, fixtures, improvements and associated real and personal property and the other rights and interests related thereto, as further described in Exhibit A.

"Facility Capacity" means the maximum net continuous output level (in MW) that the Facility is designed to produce and is capable of delivering to the Point of Delivery, which is planned to be 76.5 MW.

"Facility Lender" means any financing party providing senior or subordinated development, construction, interim or long-term debt or equity financing or refinancing (through lease financing or otherwise) for or in connection with the development, construction, purchase, installation or operation of the Facility, including any equity or tax investor or lessor providing financing or refinancing for the Facility or purchasing equity ownership interests of Seller and/or its Affiliates, and any trustee or agent acting on their behalf, and any Person or entity providing interest rate protection agreements to hedge any of the foregoing debt or financing obligations.

"Facility Premises" means the real estate on which the Facility is, or will be, constructed and located, including any interests reasonably necessary for the construction, operation and maintenance of the Facility. The Facility Premises is more specifically described in Exhibit A.

"FERC" means the Federal Energy Regulatory Commission or any successor agency thereto.

"Force Majeure" has the meaning set forth in Section 14.2(b).

"Forced Outage" means the removal of service availability of the Facility, or any portion of the Facility, for emergency reasons or conditions in which the Facility, or any portion thereof, is unavailable due to unanticipated failure, including as a result of Force Majeure.

"Full Access" has the meaning set forth in Section 11.4(b).

"Government Entity" means the United States of America, any state thereof, or any local jurisdiction, or any political subdivision of any of the foregoing including, but not limited to courts, administrative bodies, departments, commissions, boards, bureaus, agencies, municipalities or other instrumentalities.

"Increased Cost Notice" has the meaning set forth in Section 11.1(b).

"Insurance" means the policies of insurance as set forth in Exhibit B.

"Interconnection Agreement" has the meaning set forth in Section 9.2(g).

"Interconnection Facilities" means any and all equipment located from and including the high side of the transformer located on the Facilities Premises to and including the [substation] located on the 136 kV Newkirk Line [owned by Oklahoma Gas & Electric].

"Invoice" has the meaning set forth in Section 6.1(b).

"Law" means any statute, law, rule or regulation or any judicial or administrative interpretation thereof having the effect of the foregoing imposed by a Government Entity.

"Lien" means any lien, mortgage, encumbrance, attachment, pledge, charge, lease, sublease, easement or security interest of any kind.

"Leases and Property Agreements" means (A) the leases and property agreements and instruments under which Seller shall acquire the Facility Premises listed on Schedule 9.1(i), as well as other undeveloped property in connection therewith, and (B) the grants of rights of way and the leases, agreements, deeds and other instruments providing for the acquisition by Seller of the Interconnection Facilities right of way and associated property rights and interests.

"Major Equipment Reserve" has the meaning set forth in Section 10.1(d).

"Minimum Annual Quantity" means, for each Contract Year, eighty percent of the P50 Energy Output as set forth on Schedule 5.2, and the Environmental Attributes associated therewith.

"Monthly Billing Period" has the meaning set forth in Section 6.1(b).

"MW" means megawatt or megawatts, as applicable.

"MWh" means megawatt-hour or megawatt-hours, as applicable.

"NERC" means the North American Electric Reliability Council or its successor organization, if any.

"Non-Defaulting Party" has the meaning set forth in Section 12.4(a).

"Notice" has the meaning set forth in Section 10.7.

"Notifying Party" has the meaning set forth in Section 10.8(a).

"O&M Reserve" has the meaning set forth in Section 10.1(c).

"Operating Insurance" means the Insurance associated with the Facility from and after the Commercial Operation Date, all as set forth in Exhibit B.

"Operating Statement" has the meaning set forth in Section 6.1(a).

"P50 Energy Output" means the annual amount of Energy predicted to be generated by the wind turbines at the Facility with a probability of exceedance of 50%, as set forth in the written certificate delivered pursuant to Section 5.2.

"Party" has the meaning set forth in the Preamble.

"Permitted Assignee" has the meaning set forth in Section 9.3(a).

"Permitted Encumbrances" means (i) any Lien expressly provided for or permitted by the terms of the Agreement, (ii) Liens for taxes not yet due or for taxes being contested in good faith by appropriate proceedings so long as such proceedings do not involve a material risk of the sale, forfeiture, loss or restriction on the use of the Facility or any part thereof, provided that such proceedings end by the expiration of the Delivery Term, (iii) suppliers', vendors', mechanics', workman's, repairman's, employees' or other like Liens arising in the ordinary course of business for work or service performed or materials furnished in

connection with the Facility for amounts the payment of which is either not yet delinquent or is being contested in good faith by appropriate proceedings so long as such proceedings do not involve a material risk of the sale, forfeiture, loss or restriction on use of the Facility or any part thereof, provided that such proceedings end by the expiration of the Delivery Term, (iv) easements, rights of way, use rights, exceptions, encroachments, reservations, restrictions, conditions or limitations, provided that in each case the same do not interfere with or impair the operation or use of the Facility or any interest therein as contemplated by the Agreement, or have a material adverse effect on the value, the remaining useful life or the utility of the Facility or any interest therein, and (v) any Lien against the Facility in connection with any development, construction or interim financing or refinancing of the Facility in effect prior to the Commercial Operation Date.

"Person" means any individual, corporation, partnership, joint venture, limited liability company, association, joint stock company, trust, unincorporated organization, entity, government or other political subdivision.

"Point of Delivery" means Seller's Electric Metering Device situated at the high side of the transformer at the substation located on the Facilities Premises.

"Price" means the price (in $/MWh) specified in Schedule 5.5.

"Project Agreements" means: (i) as to Seller, this Agreement, the Turbine Supply Agreement, the BOP Contract and any operation and maintenance agreement with respect to the Facility and any other contract relating to the Facility having a value greater than $50,000; and (ii) as to Buyer, this Agreement.

"Prudent Utility Practices" means those practices, methods, and acts, that are commonly used by a significant portion of the electric wind power generation industry in prudent engineering and operations to design, construct and operate electric equipment (including wind powered facilities) lawfully and with safety, dependability, efficiency, and economy, including any applicable practices, methods, acts, guidelines, standards and criteria of FERC, NERC, and all applicable Laws.

"Recipient Party" has the meaning set forth in Section 10.8(a).

"Replacement Energy" has the meaning set forth in Section 7.3.

"Scheduled Outage" means any outage with respect to the Facility other than a Forced Outage.

"Seller" has the meaning set forth in the Preamble.

"Shortfall Output" has the meaning set forth in Section 7.1.

"Shortfall Output Payment" has the meaning set forth in Section 7.2.

"Special Purpose Entity" has the meaning set forth in Section 9.1(g).

"SPP" has the meaning set forth in the Recitals.

"Startup and Test Energy" means the energy produced by the Facility and delivered to the Point of Delivery prior to the Commercial Operation Date.

"Step-in Rights" has the meaning set forth in Section 7.4(a).

"Tariff Rates" has the meaning set forth in Section 3.5(b).

"Tax Benefits" means all tax deductions, tax credits, and depreciation and ownership benefits available under applicable Laws to owners or operators of the Facility, including Tax Credits, or such substantially equivalent tax credits that provide Seller with a tax credit based on energy production from any portion of the Facility and all tax deductions, tax credits and depreciation and ownership benefits that are now or may in the future be, applicable to owners and/or operators of the Facility under the laws of the United States or the laws of the State of Oklahoma.

"Tax Credits" means either (a) the Production Tax Credit or "PTCs" under Section 45 of the Code, or (b) the Investment Tax Credit or "ITCs" under Section 48 of the Code, including any grants in lieu of such credits, as such credits may be amended, supplemented, extended or replaced from time to time, and including all successor enactments or legislation relating thereto.

"Taxes" has the meaning set forth in Section 10.9(a).

"Termination Date" has the meaning set forth in Section 11.1(c).

"Termination Notice" has the meaning set forth in Section 11.1(c).

"Transmission Services Agreement" means an agreement between Buyer and [SPP] providing for the transmission of electricity from the Point of Delivery.

"Turbine Supply Agreement" means that certain turbine supply agreement to be entered into by Seller and Turbine Supplier.

"Turbine Supplier" means [General Electric].

"Updated Base Case Model" has the meaning set forth in Section 4.2.

"Wind Expert" has the meaning set forth in Section 5.2.

Section 1.2. Interpretation. In this Agreement, unless a clear contrary intention appears:

(a) the singular number includes the plural number and vice versa;

(b) reference to any Person includes such Person's successors and assigns but, in case of a Party hereto, only if such successors and assigns are permitted by this Agreement,

and reference to a Person in a particular capacity excludes such Person in any other capacity or individually;

(c) reference to any gender includes the other;

(d) reference to any agreement (including this Agreement), document, instrument or tariff means such agreement, document, instrument or tariff as amended or modified and in effect from time to time in accordance with the terms thereof and, if applicable, the terms hereof;

(e) reference to any Article, Section, Schedule or Exhibit means such Article of this Agreement, Section of this Agreement, or such Schedule or Exhibit to this Agreement, as the case may be, and references in any Article or Section or definition to any clause means such clause of such Article or Section or definition;

(f) "hereunder", "hereof", "hereto" and words of similar import shall be deemed references to this Agreement as a whole and not to any particular Article or Section or other provision hereof or thereof;

(g) "including" (and with correlative meaning "include") means including without limiting the generality of any description preceding such term;

(h) relative to the determination of any period of time, "from" means "from and including", "to" means "to but excluding" and "through" means "through and including";

(i) reference to time shall always refer to Central Prevailing Time; and

(j) reference to any "day" shall mean a calendar day unless otherwise indicated.

ARTICLE II
TERM

Section 2.1. Term. This Agreement shall become effective as of the date of its execution (the "Effective Date"). Subject to any early termination provisions set forth herein, this Agreement shall remain in full force and effect for a period of thirty (30) years following the Commercial Operation Date (the "Delivery Term"). The term of this Agreement shall commence on the Effective Date and shall end upon the expiration or termination for any reason of the Delivery Term.

ARTICLE III
FACILITY DESCRIPTION

Section 3.1. Summary Description. Seller shall construct, own and operate and maintain the Facility, which shall consist of wind turbines and associated equipment having an expected Facility Capacity of 76.5 MW. Exhibit A provides a detailed description of the Facility.

Section 3.2. Location. The Facility shall be located on the Facility Premises. A map of the Facility is included in Exhibit A.

Section 3.3. General Design and Operation of the Facility. Seller shall develop, construct, operate and maintain the Facility in compliance with all applicable Laws, Prudent Utility Practices and applicable manufacturer's and operator's warranties, specifications and recommended procedures.

ARTICLE IV
COMMERCIAL OPERATION

Section 4.1. Progress Reports. Commencing upon the Effective Date, and continuing until the Commercial Operation Date, Seller shall provide to Buyer quarterly written reports describing permitting and development activities in the previous quarter and anticipated progress and activities for the upcoming quarter. Seller shall provide to Buyer such other information regarding the permitting, engineering, construction or operations, of Seller, its subcontractors or the Facility, financial or otherwise, and other data concerning Seller, its subcontractors or the Facility as Buyer may, from time to time, reasonably request. Seller shall, as and when reasonably requested, provide Buyer with copies of completion certificates and other deliverables that are required from the counterparties under the Turbine Supply Agreement and the BOP Contract. Buyer shall be permitted to inspect the Facility from time to time upon reasonable notice to Seller and during reasonable business hours, provided that Buyer is accompanied by Seller's employees made available for such purpose. Seller shall provide Buyer the reasonable opportunity to be present for any start-up or other testing of the Facility.

Section 4.2. Commercial Operation. Seller shall provide Buyer with a written notice when Seller believes that all conditions precedent to achieving Commercial Operation of the Facility have been satisfied. The conditions precedent to Commercial Operation are as follows:

(a) The Facility is installed and physically complete, SPP has issued written confirmation that the Interconnection Facilities are complete and operational (but only if such confirmation(s) are required under the Interconnection Agreement), and the Facility and Interconnection Facilities are capable of generating, transmitting, transforming and delivering all of the Energy from the Facility to the Point of Delivery;

(b) An officer of Seller, familiar with the Facility, has provided a list of the Facility's equipment, showing the make, model, and designed maximum output (nameplate capacity) of such equipment, and has certified the Facility Capacity;

(c) The Facility has demonstrated the reliability of its communications systems and communications with SPP;

(d) The wind turbines have been commissioned by the Turbine Supplier as reflected in a commissioning certificate;

(e) Seller and SPP have entered into the Interconnection Agreement;

(f) An officer of Seller, familiar with the Facility, has certified that all arrangements for the supply of required electric services to the Facility, including the supply of station power have been completed by Seller separate from this Agreement, are in effect, and are available for the supply of such electric services to the Facility;

(g) Certificates of insurance evidencing the coverages required under this Agreement have been obtained and submitted to Buyer; and

(h) Seller has submitted to Buyer a certificate of an officer of Seller familiar with the Facility after due inquiry stating that all permits, consents, licenses, approvals, and authorizations required at that time to be obtained by Seller from any Government Entity to operate the Facility in compliance with applicable Law and this Agreement have been obtained and are in full force and effect, and that Seller is in compliance with the terms and conditions of this Agreement in all material respects.

Section 4.3. Startup and Test Energy. Seller shall deliver to Buyer and Buyer shall accept at the Point of Delivery any and all Startup and Test Energy at no charge to Buyer.

ARTICLE V
PURCHASE AND SALE OF ENERGY AND ENVIRONMENTAL ATTRIBUTES; POINT OF DELIVERY

Section 5.1. Sale and Purchase of Energy and Environmental Attributes. From and after the Commercial Operation Date and continuing through the end of the Delivery Term, Seller shall make available and deliver to the Point of Delivery all of the Energy generated by the Facility and all associated Environmental Attributes, and Buyer shall accept and purchase all such Energy and Environmental Attributes in accordance with this Agreement.

Section 5.2. Facility Capacity and P50 Energy Output. [Schedule 5.2 sets forth (in MWh) the P50 Energy Output and the Minimum Annual Quantity, as certified by [DNV] or another independent wind expert of recognized standing selected by Seller and reasonably acceptable to Buyer (the "Wind Expert") on or before the Effective Date.]

Section 5.3. Taxes and Operating Insurance Payments. Commencing on the Commercial Operation Date, Buyer shall reimburse Seller for all Taxes and Operating Insurance premiums following the Commercial Operation Date. Such reimbursement amounts shall be estimated by Seller prior to the year of payment, divided by twelve (12) and included on each Invoice. Any overpayment or underpayment by Buyer of reimbursement amounts for such actual Taxes and Operating Insurance premiums paid by Seller shall be reconciled through an adjustment to the Invoice sent to Buyer in the month following the applicable calendar year of payment.

Section 5.4. Price. Schedule 5.4 sets forth the Price for each Contract Year.

ARTICLE VI
BILLING; PAYMENT

Section 6.1. Operating Statements and Billing Invoices.

(a) No later than ten (10) Business Days after the end of each calendar month, commencing with the calendar month in which the Commercial Operation Date occurs, Seller shall deliver to Buyer a written statement (the "Operating Statement") showing the operations of the Facility for the preceding month. The Operating Statement shall include:

(i) the amount of Delivered Output for such month and the total amount of Delivered Output for the current Contract Year as of the end of such month;

(ii) the number of hours in such month during which the Facility was unable to produce Energy due to events of Force Majeure; and

(iii) in the case of the Operating Statement for the last month in each Contract Year, (A) a statement as to whether the Minimum Annual Quantity was delivered during such Contract Year, (B) the amount, if any, of Shortfall Output that accrued during such Contract Year and (C) the total amount of Shortfall Output outstanding as of the end of such Contract Year.

(b) No later than ten (10) Business Days after the end of each calendar month (the "Monthly Billing Period"), Seller shall provide to Buyer an invoice (the "Invoice") which shall set forth:

(i) the amount owed by Buyer for Delivered Output Section 5.4 and Schedule 5.4;

(ii) the amount owed by Buyer for Taxes and Operating Insurance premiums pursuant to Section 5.3;

(iii) the amount owed by Seller to reimburse Buyer for Replacement Energy pursuant to Section 7.3; and

(iv) the amount owed by Seller to reimburse Buyer for expenses incurred by Buyer in accordance with Section 7.4.

(c) The Operating Statement and Invoice for each Monthly Billing Period may be combined into a single document, and shall be sent to the address of Buyer set forth in Exhibit C, or such other address as may be provided in writing by Buyer to Seller from time to time for such purpose.

(d) Notwithstanding the foregoing, the Operating Statement and Invoice shall be prepared by Buyer for each month during which the Step-in Rights are exercised.

Section 6.2. Payments. Unless otherwise specified herein, payments due under this Agreement shall be due and payable by check or by electronic funds transfer, as designated by the owed Party, on or before twenty (20) days following the date of the Invoice (the "Due Date"). Remittances received by mail will be considered to have been paid when due if the postmark indicates the payment was mailed on or before the Due Date. If the amount due is not paid on or before the Due Date, a late payment charge shall be applied to the unpaid balance and shall be added to the next Invoice. Any unpaid balance shall accrue a late payment interest charge at the rate of one percent (1.0%) per month or the maximum rate permitted by law, whichever is less, from and including the Due Date but excluding the date such payment is made.

Section 6.3. Billing Disputes. In the event any portion of any bill is in dispute, the disputed amount shall nonetheless be paid under protest when due. The Party disputing a payment shall promptly notify the other Party in writing of the basis for the dispute. Billing disputes shall be discussed and resolved by the Authorized Representatives, who shall use their best efforts to amicably and promptly resolve the disputes, and any failure to agree shall be subject to resolution in accordance with Section 10.8. Upon resolution of any billing dispute, the required amount of payment or refund shall be paid within ten (10) days after such determination, with interest accrued at the rate of one percent (1.0%) per month or the maximum rate permitted by law, whichever is less, computed from and including the Due Date but excluding the date such payment or refund is made.

ARTICLE VII
SHORTFALL OUTPUT; STEP-IN RIGHTS

Section 7.1. Shortfall OutputIf Seller fails to deliver the Minimum Annual Quantity during any Contract Year, then the amount of the deficiency shall constitute "Shortfall Output." During any period in which there is Shortfall Output due to Buyer, Seller may from time to time elect upon notice to Buyer to deliver to Buyer an amount of Energy and Environmental Attributes up to the amount of Shortfall Output to reduce or eliminate any amount of Shortfall Output.

(b) Buyer shall keep and maintain accurate books and records showing for each Contract Year the amounts of Shortfall Output which shall be open for inspection by Seller upon reasonable notice. Absent manifest error, Buyer's determination of the amounts of Shortfall Output shall be conclusive and binding upon the Parties.

Section 7.2. Shortfall Output Payment. Upon the expiration or termination of this Agreement prior to the end of the Delivery Term, Seller shall promptly pay to Buyer, in addition to all other amounts payable hereunder, (a) an amount equal to the product of (i) the Price and (ii) the accrued and outstanding amount of Shortfall Output (the "Shortfall Output Payment"). In the event Buyer exercises its Step-in Rights in accordance with Section 7.4, Seller may pay to Buyer the Shortfall Output Payment and following receipt of such payment Buyer shall return possession, control and operation of the Facility to Seller as provided in Section 7.4(c).

Section 7.3. Replacement Energy. If Seller fails to deliver the Minimum Annual Quantity for three consecutive Contract Years, Seller shall, if requested by Buyer,

provide to Buyer replacement energy at the Point of Delivery, or at such other delivery point as may be mutually agreed upon by the parties, including associated Environmental Attributes comparable to those associated with the Energy produced by the Facility ("Replacement Output") within 180-days after the third anniversary, or fourth anniversary if shortfall is caused by events of Force Majeure, on a delivery schedule mutually agreed upon by the Parties, provided that such schedule shall not cause the Delivered Output to be delivered at a rate greater than 76.5 MW. If Seller fails to deliver Replacement Output as described above then Buyer may purchase Replacement Output and promptly notify Seller of the cost of such Replacement Output and Seller shall reimburse Buyer for said Replacement Output as provided in Article VI. Notwithstanding anything in this Section 7.3 to the contrary, in the event a shortfall is caused by events of Force Majeure, Seller shall have no obligation to deliver to Buyer any Replacement Output or to reimburse Buyer for any Replacement Output if (a) Seller has commenced remediation of the Facility, and (b) Seller is proceeding diligently to complete such remediation.

Section 7.4. Step-in RightsIn the event (1) of the Bankruptcy of Seller or (2) that Seller ceases, for a period of ninety (90) days or longer, to operate the Facility in accordance with Prudent Utility Practices resulting in a failure by Seller to deliver the Minimum Annual Quantity during such ninety (90) day period (a "Step-in Event"), Buyer shall have the right to provide written notice to Seller of such Step-in Event and, following such notice, Buyer shall commence a review and investigation of Seller's operation of the Facility. Following receipt of such notice, Seller shall reasonably cooperate with Buyer's review and investigation. The Parties shall mutually cooperate during such review and investigation to cure the Step-in Event.

(b) If, following the review and investigation of the Facility described in Section 7.4(a), which review and investigation shall last no less then ninety (90) days and be pursued diligently by Buyer during such time, (1) the Step-in Event shall remain uncured and (2) the Step-in Event is not due to events of Force Majeure, Seller shall, at Buyer's written request, permit Buyer to step in and possess, assume control of, and operate the Facility as agent for Seller (in accordance with Seller's rights, obligations and interest under this Agreement, all subject and subordinate to the rights of any lender or mortgagee of the Facility (the "Step-in Rights"); provided, that by assuming such possession, control and operational responsibility for the Facility as Seller's agent, Buyer shall in no way become or be liable to any such lender or mortgagee by virtue of sole possession, control and operation.

(c) During the period in which Buyer is in possession of the Facility, Buyer shall operate the Facility using Prudent Utility Practices and Buyer shall use commercially reasonable efforts to maximize the profitability of the Facility; provided that any capital improvements or replacements or repairs of the Facility shall require mutual agreement by Buyer and Seller and Seller shall be obligated to finance and fund all of the costs of any such capital improvements or replacements or repairs of the Facility for its own account, and Buyer shall have no direct or indirect liability to make any such payments. At the end of each Monthly Billing Period, Buyer shall invoice Seller for the full amount of any and all expenses reasonably incurred by Buyer to operate and maintain the Facility during such period, and Seller shall reimburse Buyer for said invoiced amounts in accordance with Section 6.2.

(d) Buyer shall return possession, control and operation of the Facility to Seller and cease acting as Seller's agent under this Section 7.4 upon the earliest to occur of

(i) cure of the Step-in Event, (ii) Buyer's return, in its sole discretion at any time, of possession, control and operation of the Facility to Seller and Buyer's ceasing to act as Seller's agent under this Section 7.4, or (iii) termination of this Agreement. Notwithstanding anything in this Section 7.4 to the contrary, in the event that Seller's failure to deliver the Minimum Annual Quantity is caused by one or more events of Force Majeure, Seller shall have no obligation to permit Buyer to step in and possess, assume control of, and operate the Facility as agent for Seller in accordance with this Section 7.4 if (d) Seller has commenced remediation of the Facility, and (b) Seller is proceeding diligently to complete such remediation.

(e) Seller agrees that, if the balance in the Major Equipment Reserve is less than_____ at the time of Buyer's exercise of its Step-in Rights, then Seller shall contribute to the Major Equipment Reserve the amount of cash necessary to increase the balance of the Major Equipment Reserve to _____.

ARTICLE VIII
POINT OF DELIVERY; METERING

Section 8.1. Point of Delivery. Seller shall deliver Energy to Buyer, and Buyer shall receive Energy from Seller, under this Agreement at the Point of Delivery. Seller will be responsible for all losses to the Point of Delivery. Buyer will be responsible for all losses from the Point of Delivery.

Section 8.2. Title and Risk of Loss. As between the Parties, Seller shall be deemed to be in control of the Energy from the Facility up to and until delivery at the Point of Delivery and Buyer shall be deemed to be in control of such Energy from and after delivery at the Point of Delivery. Title and risk of loss related to the Energy shall transfer from Seller to Buyer at the Point of Delivery.

Section 8.3. Electric Metering Devices. Seller shall be responsible for reading the Electric Metering Devices at the end of each calendar month. All Electric Metering Devices used to measure the Delivered Output made available to Buyer by Seller under this Agreement and to monitor and coordinate operation of the Facility shall be owned, installed, and maintained in accordance with the Interconnection Agreement at no cost to Buyer under this Agreement. If Electric Metering Devices are installed at a location other than the Point of Delivery, meters or meter readings will be adjusted to reflect losses from the Electric Metering Devices to the Point of Delivery. Seller shall provide Buyer access to all Electric Metering Devices for all purposes necessary to perform under this Agreement and shall provide Buyer the reasonable opportunity to be present at any time any Electric Metering Devices are to be inspected and tested or adjusted in accordance with the Interconnection Agreement. Seller shall provide Buyer with all authorizations necessary to have access to the Electric Metering Devices, including obtaining any consent or other agreement from the Interconnection Provider necessary to allow Buyer such access.

Section 8.4. Testing, Inspection and Adjustment of Meters. All Electronic Metering Devices shall be tested, inspected and adjusted, as necessary in accordance with the Interconnection Agreement.

Section 8.5. Scheduling of EnergySeller shall be responsible for scheduling the forecast of Energy to the Point of Delivery during the Delivery Term, on a non-binding basis, in accordance with the terms of the Interconnection Agreement and any dispatch and scheduling procedures that may be updated from time to time by Buyer. Seller shall submit schedules, and any updates to such schedules, to Buyer based on the most current forecast of Energy as reasonably requested by Buyer. All generation scheduling and transmission services shall be performed in accordance with the applicable NERC operating policies, criteria, and any other applicable guidelines and shall be non-binding on Seller as to forecast of Energy deliveries. Seller shall also fulfill the contractual, metering and interconnection requirements set forth in this Agreement, so as to be able to deliver Energy to the Point of Delivery. Notwithstanding anything in this Agreement to the contrary, Seller shall in no event have any liability for any imbalance charges for transmitting energy.

(b) If required by events of Force Majeure, conditions on transmission systems downstream of the Point of Delivery or otherwise by the terms of the Interconnection Agreement, Seller shall curtail deliveries of Energy to the Point of Delivery. For purposes of Section 7.3 and Section 7.4, Seller shall receive a credit against its obligation to deliver the Minimum Annual Quantity in an amount equal to all such curtailed Energy (and associated Environmental Attributes) that would have been Delivered Output had the curtailment not occurred; and such curtailed Energy shall be reasonably estimated by the Parties and deemed Delivered Output for invoicing and payment purposes. All payments due under Section 6.2 shall include all such adjusted Delivered Output. In addition to payments due pursuant to this Agreement for non-curtailed Delivered Output, Buyer shall pay to Seller all amounts, including any applicable Tax Credits, to which Seller would have been entitled but did not receive for Energy and associated Environmental Attributes curtailed by Buyer pursuant to this Section 8.5. Seller shall install sufficient measuring equipment at the Facility to collect data necessary to reasonably estimate the quantity of curtailed Energy.

ARTICLE IX
REPRESENTATIONS, WARRANTIES AND COVENANTS

Section 9.1. Seller's Representations, Warranties and Covenants. Seller hereby represents, warrants and covenants as follows:

(a) Seller is a limited liability company, duly organized, validly existing and in good standing under the laws of the State of Delaware, is qualified to do business in the State of Delaware and has the legal power and authority to own its properties, to carry on its business as now being conducted and to enter into the Project Agreements executed as of the Effective Date and, subject to the receipt of the regulatory approvals identified in Schedule 9.1(d), carry out the transactions contemplated hereby and perform and carry out all covenants and obligations on its part to be performed under and pursuant to the Project Agreements executed as of the Effective Date.

(b) The execution, delivery and performance by Seller of the Project Agreements executed as of the Effective Date have been duly authorized by all necessary action, and do not and will not require any consent or approval of any member or manager of Seller other than that which has been obtained.

(c) The execution and delivery of the Project Agreements executed as of the Effective Date, the consummation of the transactions contemplated hereby and thereby, and the fulfillment of and compliance with the provisions of the Project Agreements executed as of the Effective Date, do not and will not conflict with or constitute a breach of or a default under, any of the terms, conditions or provisions of any Law, or any organizational documents, agreement, deed of trust, mortgage, loan agreement, other evidence of indebtedness or any other agreement or instrument to which Seller is a party or by which it or any of its property is bound, or result in a breach of or a default under any of the foregoing.

(d) Except for those permits, consents, approvals, licenses and authorizations identified in Schedule 9.1(d), which Seller shall use commercially reasonable efforts to obtain, and which Seller anticipates will be obtained by Seller, all permits, consents, approvals, licenses, authorizations, or other action required by any Government Entity to authorize Seller's execution, delivery and performance of the Project Agreements executed as of the Effective Date have been duly obtained and are in full force and effect.

(e) The Project Agreements executed as of the Effective Date constitute the legal, valid and binding obligations of Seller enforceable in accordance with their respective terms, except as such enforceability may be limited by bankruptcy, insolvency, reorganization or similar laws relating to or affecting the enforcement of creditors' rights generally or by general equitable principles, regardless of whether such enforceability is considered in a proceeding in equity or at law.

(f) There is no pending, or to the knowledge of Seller, threatened action or proceeding affecting Seller before any Government Entity, which purports to affect the legality, validity or enforceability of any of the Project Agreements executed as of the Effective Date.

(g) Seller has been, is, and covenants and agrees that it shall remain, a Special Purpose Entity. For purposes of this Agreement, a "Special Purpose Entity" means an entity which:

(i) shall not (A) engage in any dissolution, liquidation or consolidation or merger with or into any other business entity, (B) transfer, lease or sell, in one transaction or any combination of transactions, all or substantially all of its properties or assets except to the extent permitted herein, (C) modify, amend or waive any provisions of its organizational documents related to its status as a Special Purpose Entity or (D) terminate its organizational documents or its qualifications and good standing in any jurisdiction;

(ii) was, is and will be organized solely for the purpose of (A) acquiring, developing, owning, holding, selling, leasing, transferring, exchanging, managing and operating the Facility, and (B) entering into the Project Agreements and transacting lawful business that is incident, necessary and appropriate to accomplish the foregoing;

(iii) has not been, is not, and will not be engaged in any business unrelated to the acquisition, development, ownership, management or operation of the Facility;

(iv) has not failed and will not fail to correct any known misunderstanding regarding the separate identity of such entity; and

(v) has maintained and will maintain its accounts, books, resolutions, agreements and records separate from any other Person and has filed and will file its own tax returns or has filed and will file tax returns together with its sole member.

(h) Seller has (i) not entered into this Agreement or any other documents related thereto with the actual intent to hinder, delay or defraud any creditor and (ii) received reasonably equivalent value in exchange for its obligations under this Agreement. No petition in bankruptcy has been filed against Seller, and neither Seller nor any of its constituent Persons has ever made an assignment for the benefit of creditors or taken advantage of any insolvency act for its benefit as a debtor.

(i) Seller is the legal lessee (by original execution or legal and valid assignment) under all of the Leases and Property Agreements as listed in Schedule 9.1(i). The Leases and Property Agreements provide Seller with all necessary leaseholds or other property rights and interests necessary for Seller to construct, install, operate and maintain the Facility. All Leases and Property Agreements, to the extent recordable under federal or state law, have been duly recorded in the land records of Kay County, Oklahoma or as otherwise provided by applicable law. The Leases and Property Agreements are in full force and effect, and Seller is in compliance with the terms and conditions of the Leases and Property Agreements in all material respects.

(j) Prior to the Commercial Operation Date, Seller and SPP shall enter into an interconnection agreement, to define the equipment to be installed at the Point of Delivery, to provide firm interconnection of the Facility at the Point of Delivery, and to provide for all other interconnection issues (the "Interconnection Agreement").

(k) Seller agrees that on and as of the Commercial Operation Date Seller shall have all Government Entity approvals, permits, consents, licenses and authorizations necessary to own and operate the Facility and to sell electricity at wholesale hereunder, including any FERC or other regulatory approvals.

Section 9.2. Buyer's Representations, Warranties and Covenants. Buyer hereby represents, warrants and covenants as follows:

(a) Buyer is duly organized, validly existing and in good standing under the laws of the State of Oklahoma and has the legal power and authority to (i) own its properties, (ii) carry on its business as now being conducted, (iii) enter into the Project Agreements and carry out the transactions contemplated hereby and thereby and (iv) perform and carry out all covenants and obligations on its part to be performed under and pursuant to the Project Agreements.

(b) The execution, delivery and performance by Buyer of the Project Agreements have been duly authorized by all necessary action, and do not and will not require any consent, approval or other action of Buyer's [governing body] or members, or any Government Entity , other than that which has been obtained.

(c) The execution and delivery of the Project Agreements, the consummation of the transactions contemplated hereby and thereby and the fulfillment of and compliance with the provisions of the Project Agreements do not and will not conflict with or constitute a breach of or a default under, any of the terms, conditions or provisions of any Law, or its organization agreement or bylaws, or any agreement, deed of trust, mortgage, loan agreement, other evidence of indebtedness or any other agreement or instrument to which Buyer is a party or by which it or any of its property is bound, or result in a breach of or a default under any of the foregoing.

(d) The Project Agreements constitute the legal, valid and binding obligations of Buyer enforceable in accordance with their respective terms, except as such enforceability may be limited by bankruptcy, insolvency, reorganization or similar laws relating to or affecting the enforcement of creditors' rights generally or by general equitable principles, regardless of whether such enforceability is considered in a proceeding in equity or at law.

(e) There is no pending, or to the knowledge of Buyer, threatened action or proceeding affecting Buyer before any Government Entity, which purports to affect the legality, validity or enforceability of this Agreement.

(f) Buyer shall, as reasonably requested by Seller, cooperate with Seller in development of the Facility.

ARTICLE X
CONTRACT ADMINISTRATION; NOTICES; DISPUTES

Section 10.1. Facility OperationSeller shall, at all times staff, control, and operate the Facility consistent with all applicable Laws, Prudent Utility Practices, the terms of any operating agreement and applicable manufacturer's and operator's specifications and recommended procedures. Personnel capable of starting, operating, and stopping the Facility shall be available, either at the Facility, or capable of remotely starting, operating, and stopping the Facility within two (2) hours and capable of being at the Facility with no more than two (2) hours notice. In all cases personnel capable of starting, operating and stopping the Facility shall be continuously reachable by phone. Seller shall provide Buyer with copies of any default notice or other notice that Seller may from time to time receive from the operator pursuant to the terms of any operating agreement relating to operation of the Facility.

(b) Seller shall provide annually to Buyer a proposed maintenance schedule for the Facility showing the work to be performed and the duration of all Scheduled Outages, and shall reasonably cooperate with Buyer so that Scheduled Outages occur at such times as shall least interfere with Buyer's utilization of the output of the Facility.

(c) Subject to Prudent Utility Practice, Seller shall, on or before the Commercial Operation Date, establish an operations and maintenance reserve, which shall be a part of the project budget (the "O&M Reserve"). The O&M Reserve may be used for

extraordinary costs and expenses which may arise from time to time following the Commercial Operation Date that directly relate to operation and maintenance of the Facility.

(d) Subject to Prudent Utility Practice, Seller shall, on or before the date that is five years from the Commercial Operation Date, establish a major equipment reserve, which shall be a part of the project budget (the "Major Equipment Reserve"). The Major Equipment Reserve may be used for costs and expenses arising from and incurred in connection with the replacement or refurbishment of the Facility's major equipment.

Section 10.2. Operating Records. Seller and Buyer shall each keep complete and accurate records and all other data required by each of them for the purposes of proper administration of this Agreement, including such records as may be required by a Government Entity in the prescribed format.

Section 10.3. Operating Log. Seller shall maintain an accurate and up-to-date operating log, in electronic format, at the Facility with records of production for each clock hour; changes in operating status; Scheduled Outages and Forced Outages for the purposes of proper administration of this Agreement and preparation of complete and accurate Operating Statements pursuant to Section 6.1, including such records as may be required by a Government Entity in the prescribed format.

Section 10.4. Billing and Payment Records and AuditsTo facilitate payment and verification, Seller and Buyer shall keep and preserve all books and records necessary for billing and payments in accordance with Article VI for a period of not less than six (6) years following the date of final payment under this Agreement.

(b) Seller shall be subject, at any time upon seven (7) days' prior written notice, to an audit by Authorized Auditors relating to the accuracy of all billings and of all costs for which Buyer is required to reimburse Seller pursuant to Article VI. The Authorized Auditors shall have access to all records and data relating to such billings, costs and metering. Seller shall maintain and the Authorized Auditors will have the right to examine and audit all books, records, documents, accounting procedures and practices, and other evidence, regardless of form (e.g., machine readable media such as disk, tape, etc.) or type (e.g., databases, applications software, database management software, utilities, etc.), sufficient to properly reflect all such billings and costs. Any information provided on machine-readable media shall be provided in a format accessible and readable by the Authorized Auditors. Seller shall not, however, be required to furnish the Authorized Auditors with commonly available software. The Authorized Auditors will also have the right to reproduce, photocopy, download, or transcribe, such billing and cost records. Seller shall make such records, or to the extent accepted by the Authorized Auditors, photographs, micro-photographs etc. or other authentic reproductions thereof available to the Authorized Auditors at Seller's offices at all reasonable times and without charge. Notwithstanding the foregoing, if the audit reveals that the overpayment is more than 5% of the billing, Seller shall pay all expenses and costs incurred by the Authorized Auditors arising out of or related to the audit.

Section 10.5. Examination of Records. Subject to the confidentiality provisions of Section 14.19, Seller and Buyer may examine the operating records kept by the other Party

relating to transactions under and administration of this Agreement, at any time during the period the records are required to be maintained, upon request and during normal business hours. Seller shall maintain a copy of all operating records after completion of the Agreement, for five (5) years, or as required by applicable law, whichever time period is greater.

Section 10.6. Authorized Representative. Each Party hereto shall designate an authorized representative who shall be authorized to act on its behalf with respect to those matters contained herein (each an "Authorized Representative"), which shall be the functions and responsibilities of such Authorized Representatives. Each Party may also designate an alternate who may act for the Authorized Representative. Within thirty (30) days after execution of this Agreement, each Party shall notify the other Party in writing of the identity of its Authorized Representative, and alternate if designated, and shall promptly notify the other Party of any subsequent changes in such designation. The Authorized Representatives shall have no authority to alter, modify, or delete any of the provisions of this Agreement. Prior to the Commercial Operation Date, the Authorized Representative of each Party will meet periodically to discuss issues related to the sharing of information on the operation and maintenance of the Facility, provided, however, that Buyer shall have no right to approve Seller's schedules or budgets.

Section 10.7. Notices. Notices, demands and other communications made by one Party to the other pursuant to this Agreement (each, a "Notice") may be sent by facsimile, electronic mail, other mutually acceptable electronic means, a nationally recognized overnight courier service, first class mail or hand delivery at the addresses set forth on Exhibit D. Any Party may change its address at any time by giving notice of such change to the other Party in the manner provided herein. Notice shall be given when received by the addressee, unless received on a day that is not a Business Day or received after 5:00 p.m. on a Business Day, in which case Notice shall be deemed to have been received on the next following Business Day. In the absence of proof of the actual receipt date, the following presumptions will apply: (i) Notice sent by facsimile or electronic mail shall be deemed to have been received upon the sending party's receipt of electronic confirmation of successful transmission; (ii) Notice sent by overnight mail or courier shall be deemed to have been received on the next Business Day after it was sent or such earlier time as is confirmed by the receiving party; and (iii) Notice sent by first class mail shall be deemed to have been received five Business Days after mailing.

Section 10.8. Dispute Resolution. Except as provided in Section 12.2(c), regarding suits for injunctive relief, disputes under this Agreement between Seller and Buyer may be resolved in accordance with the provisions of this Section 10.8.

(a) In the event of any claim, controversy or dispute between the Parties arising out of or relating to or in connection with this Agreement (including any dispute concerning the validity of this Agreement or the scope and interpretation of this Section 10.8) (a "Dispute"), either Party (the "Notifying Party") may deliver to the other Party (the "Recipient Party") notice of the Dispute with a detailed description of the underlying circumstances of such Dispute (a "Dispute Notice"); provided, however, that a Defaulting Party may not deliver a Dispute Notice to a Non-Defaulting Party for the purpose of avoiding the Non-Defaulting Party's rights under Section 12.4, including the Non-Defaulting Party's right to terminate this Agreement.

(b) The Dispute Notice shall include a schedule of the availability of the Notifying Party's managers or senior officers (having a title of senior vice president (or its equivalent) or higher), as applicable, duly authorized to settle the Dispute during the thirty (30) day period following the delivery of the Dispute Notice.

(c) The Recipient Party shall within five (5) Business Days following receipt of the Dispute Notice, provide to the Notifying Party a parallel schedule of availability of the Recipient Party's managers or senior officers (having a title of senior vice president (or its equivalent) or higher), as applicable, duly authorized to settle the Dispute. Following delivery of the respective senior management members' schedules of availability, the senior management of the Parties shall meet and confer as often as they deem reasonably necessary during the remainder of the thirty (30) day period in good faith negotiations to resolve the Dispute to the satisfaction of each Party.

(d) In the event a Dispute is not resolved pursuant to the procedures set forth in Subsections 10.8(a), 10.8(b) and 10.8(c) by the expiration of the thirty (30) day period set forth in Subsection 10.8(b) then either Party may pursue any legal remedy available to it in accordance with Section 14.8.

Section 10.9. TaxesSubject to the limitations in Section 5.4, Buyer will be responsible for, and will reimburse Seller if paid by Seller, lawful state and local taxes assessed within the State of Oklahoma, which are directly associated with the Facility or the delivery or sale of Energy, including all property taxes or payments in lieu of property taxes directly associated with the Facility and excluding income, payroll, and sales taxes other than sales taxes directly imposed on the delivery or sale of Energy ("Taxes"). To the extent reasonably able to do so, either Party, upon written request of the other, shall provide a certificate of exemption or other reasonably satisfactory evidence of exemption if either Party is exempt from any Taxes, and shall use all reasonable efforts to obtain or maintain, or to enable the other Party to obtain or maintain, any exemption from or reduction of any Taxes, whether currently available or becoming available in the future.

(b) Seller will pay all lawful Taxes and will use reasonable efforts to minimize Taxes, and will consult with Buyer on any negotiations Seller may undertake with Government Entities responsible for imposing Taxes. Promptly following its payment of any Taxes, Seller shall provide Buyer with copies of receipts or other evidence of the payment of such Taxes. Seller shall also promptly provide to Buyer copies of all notices, correspondence or other items (including, without limitation, written reports on any verbal exchanges with the relevant taxing authorities) to the extent relating to Taxes, and shall afford Buyer a reasonable opportunity to participate in any discussions or other communications with any taxing authority relating to Taxes. To the extent it is legally able to do so, Seller will follow the written instructions of Buyer with respect to the negotiation, reporting, payment and contest (and shall permit Buyer to conduct such contest, to the extent it is legally able to do so) of any Taxes for which Seller is liable hereunder. Seller shall promptly pay to Buyer the amount of any refunds or other credits against any Taxes or other economic benefits which Seller receives or to which it is entitled with respect to any Taxes for which Buyer is responsible hereunder. Without limiting the generality of the foregoing, the Parties agree that, if beneficial to the efforts of either Party to obtain or maintain any exemption from or reduction of any Taxes, whether currently available or

becoming available in the future, the Parties will cooperate to restructure the transactions contemplated by this Agreement so as to enable either Party to obtain or maintain such exemption or reduction, as the case may be, provided, however, that any such restructuring shall not affect adversely the economic consequences to either Party. Buyer shall have no obligations with respect to any Taxes to the extent such Taxes (i) are attributable to any period prior to the Commercial Operation Date, or following the expiration or termination of this Agreement in accordance with the terms hereof, (ii) are imposed as a result of the gross negligence or willful misconduct by Seller, the breach by Seller of any of its obligations under this Agreement or any related transaction document, or (iii) are imposed as a result of any transfers by Seller of any interest in the Facility, this Agreement or any transaction contemplated hereby or related hereto (except to the extent resulting from a breach by Buyer of its obligations under this Agreement).

Section 10.10. Damage or Destruction. In the event of any damage or destruction of the Facility or any part thereof, the Facility or such part thereof shall be diligently repaired, replaced or reconstructed by Seller so that the Facility or such part thereof shall be restored to substantially the same general condition and use as existed prior to such damage or destruction, unless a different condition or use is approved by Buyer. Proceeds of Insurance with respect to such damage or destruction maintained as provided in this Agreement shall be applied to the payment for such repair, replacement or reconstruction of the damage or destruction as provided in Section 10.11.

Section 10.11. InsuranceSeller shall obtain and maintain the Insurance coverages listed in Exhibit B on the terms set forth in Exhibit B and such premiums shall be reimbursed to Seller by Buyer pursuant to and subject to the limitations of Section 5.4. Insurance coverages for jointly owned facilities shall be apportioned to Seller in an equitable manner. In the event that the cost of obtaining and maintaining coverage required by this Agreement materially increases from the cost that applies to such Insurance coverage as of the Effective Date, or if any risk required to be insured in connection with this Agreement becomes uninsurable after the Effective Date, then at Seller's request the Parties shall, using reasonably prudent risk management practices and insurance industry standards, revise such insurance coverages then in effect as the parties mutually determine to be necessary so as to enable Seller to provide Insurance to the extent available on commercially reasonable terms.

(b) If at any time there shall have occurred a casualty event with respect to all or a substantial portion of the Facility, all Insurance proceeds relating to such event shall be paid by the insurer to an escrow agent named in the insurance policy as the loss payee and deposited in an escrow account held by such escrow agent. Such escrow agent shall be mutually agreed upon by Buyer and Seller. Seller may request a withdrawal or transfer from the escrow account by delivering to the escrow agent, with a copy to Buyer, a requisition of funds no fewer than five (5) days in advance of any proposed transfers or withdrawals from the escrow account. Each requisition of funds shall be accompanied by a certification by a financial officer of Seller to the effect that (i) the directed withdrawals, transfers or payments will be used exclusively for repair, replacement or restoration of the Facility and (ii) such repair, replacement, or restoration are being conducted either (x) pursuant to plans and specifications that have been previously approved in writing by Buyer, or (y) pursuant to such other arrangements approved in writing by Buyer. Upon receipt of a requisition of funds, the escrow agent shall make the withdrawals, transfers or payments directed therein.

ARTICLE XI
CHANGE IN LAW; EARLY TERMINATION

Section 11.1. Change in LawFor purposes of this Agreement, a "Change in Law" means a change in Law occurring after the Effective Date that imposes additional costs on the performance by Seller of its obligations under this Agreement or on Seller's ownership, construction and/or operation and maintenance of the Facility that would cause the development or operation of the Facility to be infeasible or uneconomic. The operation of the Facility shall not be rendered infeasible or uneconomic within the meaning of the preceding sentence unless the Change in Law shall (i) prevent the operation of the Facility as intended by this Agreement or (ii) cause an increase in annual operating expenses exceeding $[25,000]. A "Change in Law" shall not include a loss, reduction or recapture of Tax Benefits resulting from any failure by Seller to maintain its eligibility to receive Tax Benefits or to comply with any ongoing requirements of Law necessary to maintain its right to receive Tax Benefits. For the avoidance of doubt, this Section 11.1 shall not apply to a change in Law relating to Taxes.

(b) Upon the occurrence of a Change in Law, Seller shall have the right to submit a request (an "Increased Cost Notice") to Buyer for an additional payment per MWh of Delivered Output ("Energy Rate") determined by Seller to be the per MWh rate necessary (but not more than the rate necessary) to enable it to recover such increased costs. The Increased Cost Notice shall include sufficient detail regarding the Change in Law, the increased costs imposed on Seller and such revenue and cost projections as shall be reasonably necessary to enable Buyer to verify the proposed Energy Rate. If Buyer determines that it is willing to agree to the Energy Rate proposed by Seller, Buyer shall, within ninety (90) days of the date of the Increased Cost Notice, notify Seller thereof, and the Parties shall amend this Agreement to reflect such Energy Rate and this Agreement, as so amended, shall continue in full force and effect.

(c) If Buyer fails to provide such notice, Seller may elect to terminate this Agreement by providing written notice (a "Termination Notice") to Buyer at any time not less than ninety (90) days nor more than one hundred twenty (120) days from the date of the Increased Cost Notice. The Termination Notice shall specify the date on which termination of this Agreement is to become effective (the "Termination Date"), which shall be not earlier than thirty (30) days from the date of the Termination Notice.

Section 11.2. Early Termination.

(a) On the Termination Date pursuant to termination of this Agreement in accordance with Section 11.1 or Section 12.4, Seller shall pay to Buyer an amount equal to the Shortfall Output Payment, if any.

(b) Upon payment in full of the Shortfall Output Payment, if any, this Agreement shall terminate without any further financial or other obligation of Seller in favor of Buyer as a result of such termination.

ARTICLE XII
DEFAULT; REMEDIES

Section 12.1. Default. Each of the following events or circumstances shall constitute a "Default" by the responsible Party (the "Defaulting Party"):

(a) Payment Default. Failure by either Party to pay any amount when due under this Agreement which is not cured within ten (10) Business Days after receiving written notice thereof from the other Party hereto.

(b) Performance Default. Failure by any Party to perform and observe each of its material covenants and agreements set forth in Article IX or to perform any of its other material duties or obligations under this Agreement, in either case when and as due (other than the failure to make any payment) which is not cured within thirty (30) days after receipt of written notice thereof from the other Party hereto.

(c) Inaccuracy of Representations and Warranties. Inaccuracy of any representations and warranties made herein at the time made or deemed to be made. For the avoidance of doubt, the representations and warranties of the Parties are made on and as of the Effective Date and are deemed to be made on such other dates as are provided herein.

(d) Failure to Achieve Commercial Operation. Failure by Seller to achieve Commercial Operation within ninety (90) days following December 21, 2014, and such failure is not cured within thirty (30) days following Seller's receipt of written notice thereof from Buyer.

(e) Failure to Accept Energy and Environmental Attributes. Failure by Buyer to accept all Energy and Environmental Attributes produced by the Facility.

Section 12.2. Default Remedies.

(a) Upon a Default by Buyer under Section 12.1(a), Seller may, at its sole option, suspend service and sell Energy to third parties or continue to provide services pursuant to its obligations under this Agreement; provided that nothing in this Section 12.2(a) shall affect Seller's rights and remedies set forth in this Section 12.2. If Seller elects to suspend service to Buyer, it shall exercise commercially reasonable efforts to (i) sell the Energy and Environmental Attributes from the Facility to third parties at market rates and (ii) mitigate Buyer's damages. Proceeds from the sale of Energy and Environmental Attributes to third parties shall be allocated in the following order of priority:

(i) *first*, to the reasonable costs and expenses incurred by Seller in remarketing the Energy and Environmental Attributes from the Facility;

(ii) *second*, to the payments due by Buyer under Section 5.4;

(iii) *third*, to Seller.

Seller's continued service to Buyer shall not act to relieve Buyer of any of its duties or obligations under this Agreement.

(b) If Seller is in Default for any reason, Buyer may by notice to Seller invoke and exercise the Step-in Rights as and to the extent provided in Section 7.4. Buyer shall return possession, control and operation of the Facility to Seller and cease acting as Seller's agent under this Section 12.2(b) upon such Default being cured to Buyer's reasonable satisfaction.

(c) Notwithstanding any other provision herein, if any Default has occurred and is continuing, the affected Party may, whether or not the dispute resolution procedure set forth in Section 10.8 has been invoked or completed, bring an action in any state or federal court of competent jurisdiction, as authorized by and consistent with the provisions of Section 14.8 of this Agreement, seeking injunctive relief in accordance with applicable Oklahoma or Federal rules of civil procedure.

(d) Except as expressly limited by this Agreement, if a Default has occurred and is continuing and Buyer is the Defaulting Party, Seller may without further notice exercise any rights and remedies provided herein or otherwise available at law or in equity, including the right to terminate this Agreement pursuant to Section 12.4. No failure of Seller to exercise, and no delay in exercising, any right, remedy or power hereunder shall operate as a waiver thereof, nor shall any single or partial exercise by Seller of any right, remedy or power hereunder preclude any other or future exercise of any right, remedy or power.

(e) Except as expressly limited by this Agreement, if a Default has occurred and is continuing and Seller is the Defaulting Party, Buyer may without further notice exercise any rights and remedies provided for herein, or otherwise available at law or equity, including termination of this Agreement pursuant to Section 12.4. No failure of Buyer to exercise, and no delay in exercising, any right, remedy or power hereunder shall operate as a waiver thereof, nor shall any single or partial exercise by Buyer of any right, remedy or power hereunder preclude any other or future exercise of any right, remedy or power.

Section 12.3. Effect of Termination on Agreements. The expiration or termination for any reason of this Agreement shall not affect the Leases and Property Agreements or the continuing effectiveness thereof.

Section 12.4. Termination for Default.

(a) If a Default occurs, the Party that is not the Defaulting Party (the "Non-Defaulting Party") shall, without limiting any other rights or remedies available to the Non-Defaulting Party under this Agreement, possess the right to terminate this Agreement upon notice (by facsimile or other reasonable means) to the Defaulting Party (a "Default Termination Notice"). A Default Termination Notice shall specify the Termination Date and shall include the Non-Defaulting Party's calculation of the amount owed by Seller on the Termination Date in respect of the Shortfall Output Payment, if any.

(b) On the Termination Date the Shortfall Output Payment, if any, shall be due and payable by Seller.

(c) If the Non-Defaulting Party fails to furnish a Default Termination Notice within one-hundred eighty (180) days following the date on which the Default becomes known to the Non-Defaulting Party (or such later date if the Non-Defaulting and Defaulting Parties

agree to an extension), then such right of termination shall no longer be available to the Non-Defaulting Party as a remedy for the event(s) of Default.

ARTICLE XIII
LEGAL AND REGULATORY COMPLIANCE

Section 13.1. Compliance with Laws. Each Party shall at all times comply with all Laws applicable to it, except for any noncompliance which, individually or in the aggregate, could not reasonably be expected to have a material effect on the business or financial condition of the Party or its ability to fulfill its commitments hereunder. As applicable, each Party shall give all required notices, shall procure and maintain all necessary governmental permits, licenses, and inspections necessary for performance of this Agreement, and shall pay its respective charges and fees in connection therewith. In the event any permits, licenses or similar governmental or regulatory grants of authority necessary to operate or construct the Facility expire, terminate, or are revoked, encumbered, lost or otherwise become ineffective, notice shall immediately be given to the other Party by the Party responsible for obtaining the permit or license. Further that responsible Party shall take all necessary actions to replace or reinstate the permit or license.

Section 13.2. Certificates. Each Party shall deliver or cause to be delivered to the other Party certificates of its officers, accountants, engineers or agents as to matters as may be reasonably requested, and shall make available, upon reasonable request, personnel and records relating to the Facility to the extent that the requesting Party requires the same in order to fulfill any regulatory reporting requirements, or to assist the requesting Party in litigation, including, but not limited to, administrative proceedings before Government Entities.

ARTICLE XIV
MISCELLANEOUS

Section 14.1. Decommissioning and Other Costs. Buyer shall not be responsible for any cost of decommissioning or demolition of the Facility or any environmental liability associated with the construction, operation, or decommissioning thereof without regard to the timing or the cause of such decommissioning or demolition.

Section 14.2. Force Majeure.

(a) Neither Party hereto shall be considered to be in default in the performance of any of its obligations under this Agreement (other than the obligations of a Party to make payment of amounts due under this Agreement, which are not subject to Force Majeure) when the failure of performance shall be due to Force Majeure despite commercially reasonable efforts of such Party to prevent or mitigate its effects. A Party which is not able to perform its obligations under this Agreement as a result of Force Majeure shall give prompt, written notice including a detailed description of the Force Majeure to the other Party, which notice shall include information with respect to the nature, cause and date of commencement of such event, and the anticipated scope and duration of the delay. The Party providing such notice shall be excused from fulfilling its obligations under this Agreement to the extent and until such time that the Force Majeure has ceased to prevent performance or other remedial action is taken, at which

time the Party shall promptly notify the other Party of the resumption of its performance under this Agreement. This Section 14.2 does not excuse Buyer from payments due to Seller up to the time that Seller ceased deliveries of Energy due to a Force Majeure. Any Party whose performance under this Agreement is affected by Force Majeure shall make all reasonable efforts to remove and cure the Force Majeure and perform its obligations under this Agreement and to mitigate the effects of the Force Majeure. It is understood by the Parties that the foregoing provisions do not excuse any obligations of Seller with respect to Shortfall Output resulting from events of Force Majeure.

(b) In the event of any Force Majeure, the milestone deadlines set forth in this Agreement, including the dates by which Seller will achieve Commercial Operation pursuant to Section 12.1(d), shall be extended for the same number of days as the duration of such Force Majeure.

(c) The term "Force Majeure" means causes or events beyond the reasonable control of, and without the fault or negligence of the Party claiming Force Majeure, including, without limitation, acts of God, sudden actions of the elements such as floods, earthquakes, hurricanes, or tornadoes; high winds of sufficient strength or duration to materially damage a facility or significantly impair its operation; lightning; fire; ice storms; sabotage; vandalism beyond that which could reasonably be prevented by Seller or Buyer; terrorism; war; fire; riots; explosion; blockades; insurrection; strike; slow down or labor disruptions (even if such difficulties could be resolved by conceding to the demands of a labor group); actions or inactions by any governmental authority taken after the date hereof (including the adoption or change in any rule or regulation or environmental constraints lawfully imposed by such governmental authority) but only if such requirements, actions, or failures to act prevent or delay performance; and inability, despite due diligence, to obtain any licenses, permits, or approvals required by any governmental authority. A Force Majeure does not include (i) an act of negligence or wrongdoing; (ii) events arising from the failure by Seller to operate and maintain the Facility in accordance with Prudent Utility Practices and the standards set forth in this Agreement; (iii) an increase in the variable and fixed costs of operation and maintenance of the Facility; (iv) failure of third parties to provide goods or services essential to a Party's performance, unless such failure is caused by a Force Majeure; (v) delays in or an inability of a Party hereto to obtain financing or (vi) economic hardship.

Section 14.3. Assignment of Agreement; Facility Lender Accommodations.

(a) Except as set forth in this Section 14.3, neither Party hereto shall assign or transfer this Agreement, in whole or in part, or any of its interests hereunder to any other Person without the prior written consent of the other Party hereto. Such consent shall not be unreasonably withheld by either Party. Any attempt to transfer or assign this Agreement, or any privilege hereunder, without such prior written consent, except as provided herein, shall be void and confer no right on any Person that is not a party to this Agreement.

(b) Buyer's consent shall not be required for Seller to assign this Agreement to an Affiliate of Seller; provided that such assignee is a Special Purpose Entity and provided further that Seller provides reasonable assurances and executes documents reasonably required

by Buyer regarding Seller's continued liability for all of Seller's obligations under this Agreement in the event of any nonperformance on the part of such assignee.

(c) Buyer's consent shall not be required for Affiliates of Seller to assign or sell any membership interest in Seller, provided that Seller remains a Special Purpose Entity.

(d) Buyer's consent shall not be required for Seller to assign this Agreement for collateral purposes to any Facility Lender; provided however that the terms of such financing and the documentation relating thereto shall comply with the applicable terms and conditions of this Agreement. Seller shall provide Buyer with written notice of any such assignment to any Facility Lender no later than thirty (30) days after the assignment.

(e) To facilitate Seller's obtaining of financing to construct and operate the Facility, Buyer shall provide such consents to assignment or other documents as may be reasonably requested by Seller or any Facility Lender in connection with the financing of the Facility, including the acquisition of equity for the development, construction and operation of the Facility; provided however that the terms of such financing and the documentation relating thereto shall comply with the applicable terms and conditions of this Agreement. Seller shall reimburse, or shall cause the Facility Lender to reimburse, Buyer for the incremental direct expenses (including the reasonable fees and expenses of outside counsel) incurred by Buyer in the preparation, negotiation, execution and/or delivery of any documents requested by Seller or the Facility Lender, and provided by Buyer, pursuant to this Section 14.3(e).

(f) Seller may subcontract its duties or obligations under this Agreement without the prior written consent of Buyer, provided, that no such subcontract shall relieve Seller of any of its duties or obligations hereunder.

Section 14.4. Ambiguity. The Parties acknowledge that this Agreement was jointly prepared by them, by and through their respective legal counsel, and any uncertainty or ambiguity existing herein shall not be interpreted against either Party on the basis that the Party drafted the language, but otherwise shall be interpreted according to the application of the rules on interpretation of contracts.

Section 14.5. Attorney Fees & Costs. Both Parties hereto agree that in any action to enforce the terms of this Agreement that each Party shall be responsible for its own attorney fees and costs.

Section 14.6. Voluntary Execution. Both Parties hereto acknowledge that they have read and fully understand the content and effect of this Agreement. The Parties to this Agreement further acknowledge that they have executed this Agreement voluntarily, subject only to the advice of their own counsel, and do not rely on any promise, inducement, representation or warranty that is not expressly stated herein.

Section 14.7. Entire Agreement. This Agreement (including all Appendices, Exhibits and Schedules) contains the entire understanding concerning the subject matter herein and supersedes and replaces any prior negotiations, discussions or agreements between the Parties, or any of them, concerning the subject matter, whether written or oral, except as expressly provided for herein. This is a fully integrated document. Each Party acknowledges

that no other party, representative or agent, has made any promise, representation or warranty, express or implied, that is not expressly contained in this Agreement that induced the other Party to sign this document.

Section 14.8. Governing Law. This Agreement shall be interpreted, governed by, and construed under the laws of the State of Oklahoma without consideration of conflicts of law principles. Each Party irrevocably and unconditionally consents to the jurisdiction of any state or federal court located in Oklahoma City, Oklahoma, and any appellate court from any decision thereof, in any action or proceeding arising out of or relating to this Agreement or for recognition or enforcement of any judgment, and each of the Parties irrevocably and unconditionally agrees that all claims in respect of any such action or proceeding shall be heard and determined in such court, including such court's authority to determine and award damages as well as injunctive and declaratory relief. Only should such courts in Oklahoma City, Oklahoma not have subject matter jurisdiction over the cause or claim for any reason, the Parties agree that each Party may file in such other state or federal court that does have jurisdiction over the cause or claim of that Party. Each of the Parties agrees that a final judgment in any such action or proceeding shall be conclusive and may be enforced in other jurisdictions by suit on the judgment or in any other manner provided by law.

Section 14.9. Tax Treatment of Agreement. It is the intention of the Parties and the Parties acknowledge and agree that this Agreement is not and shall not be construed as a loan or a lease and, pursuant to Section 7701(e)(3) of the Code, this Agreement is and shall be deemed to be a service contract for the sale of electric energy produced at an alternative energy facility. The Parties further agree that this Agreement is not intended to create a partnership between Buyer and Seller for tax purposes.

Section 14.10. Execution in Counterparts. This Agreement may be executed in two or more counterparts, each of which shall be deemed to be an original, but all of which shall be one and the same document. Facsimile or PDF transmission of any signed original document, and retransmission of any facsimile or PDF transmission, will be the same as delivery of any original document. At the request of either Party, the other Party will confirm facsimile or PDF signatures by signing an original document.

Section 14.11. Effect of Section Headings. Section headings appearing in this Agreement are inserted for convenience only and shall not be construed as interpretations of text.

Section 14.12. Waiver. The failure of either Party to this Agreement to enforce or insist upon compliance with or strict performance of any of the terms or conditions hereof, or to take advantage of any of its rights hereunder, shall not constitute a waiver or relinquishment of any such terms, conditions or rights, but the same shall be and remain at all times in full force and effect.

Section 14.13. Independent Contractor; Relationship of the Parties. Seller shall at all times have the status of an independent contractor without the right or authority to impose tort or contractual liability upon Buyer. Neither Buyer nor Seller shall represent to others that one Party is a partner, joint venturer, agent or representative of, or otherwise associated with, the other Party. This Agreement shall not be interpreted to create an association, joint venture or

partnership between the Parties hereto or to impose any partnership obligation or liability upon either such Party. Neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as an agent or representative of, the other Party, except as set forth in Section 7.4.

Section 14.14. Third Party Beneficiaries. This Agreement shall not be construed to create rights in, or to grant remedies to, any third party as a beneficiary of this Agreement or any duty, obligation or undertaking established herein.

Section 14.15. Indemnification.

(a) Seller shall indemnify and defend Buyer and its respective officers, directors and employees against, and hold Buyer and its respective officers, directors and employees harmless from, at all times after the Effective Date, any and all Claims incurred, suffered, sustained or required to be paid, directly or indirectly, by, or sought to be imposed upon, Buyer or any of its respective officers, directors and employees for personal injury or death to persons or damages to property arising out of any negligent act or omission or any intentional misconduct by Seller in connection with this Agreement. "Claims" in this Section means all third party claims or actions, threatened or filed and, whether groundless, false, fraudulent or otherwise, that relate to the subject matter of an indemnity, and the resulting losses, damages, expenses, attorneys' fees and court costs, whether incurred by settlement or otherwise, and whether such claims or actions are threatened or filed prior to or after the termination of this Agreement.

(b) Buyer shall indemnify and defend Seller, its Affiliates and their respective managers, officers, directors and employees against, and hold Seller, its Affiliates and their respective managers, officers, directors and employees harmless from, at all times after the Effective Date, any and all Claims incurred, suffered, sustained or required to be paid, directly or indirectly, by, or sought to be imposed upon, Seller, its Affiliates or any of their respective managers, officers, directors and employees for personal injury or death to persons or damage to property arising out of any negligent act or omission or any intentional misconduct by Buyer in connection with this Agreement.

(c) In the event injury or damage results from the joint or concurrent negligent or intentional acts or omissions of both Buyer and Seller, the Parties shall be deemed to be equally liable for such injury or damages unless it is established that the Parties' relative degree of fault is other than 50/50, in which event each Party shall be liable in proportion to its relative degree of fault.

Section 14.16. Limitation of Liability. Neither Party will be liable to the other Party for indirect, consequential or special damages under this Agreement, except with respect to indemnification obligations related to third party claims. Notwithstanding anything in this Agreement to the contrary, Seller's obligation to make any payments, including the Shortfall Output Payment to Buyer shall be satisfied solely from Seller's assets and no Affiliate of Seller shall have any liability with respect to any such payments.

Section 14.17. Severability. In the event any of the terms, covenants, or conditions of this Agreement, or the application of any such terms, covenants, or conditions, shall be held invalid, illegal or unenforceable by any court or administrative body having jurisdiction, all other terms, covenants, and conditions of this Agreement and their application not adversely affected thereby shall remain in force and effect; provided, however, that Buyer and Seller shall negotiate in good faith to attempt to implement an equitable adjustment in the provisions of this Agreement with a view toward effecting the purposes of this Agreement by replacing the provision that is held invalid, illegal, or unenforceable with a valid provision the economic effect of which comes as close as possible to that of the provision that has been found to be invalid, illegal or unenforceable.

Section 14.18. Survival of Obligations. Cancellation, expiration, or earlier termination of this Agreement shall not relieve the Parties of obligations that by their nature should survive such cancellation, expiration, or termination, prior to the term of the applicable statute of limitations, including without limitation warranties, remedies, or indemnities, which obligations shall survive for the period of the applicable statute(s) of limitation.

Section 14.19. Confidentiality.

(a) Each Party agrees, and shall cause its Affiliates and its and their respective managers, directors, officers, employees and representatives, as a condition to receiving confidential information hereunder, to keep confidential all documents, data, drawings, studies, projections, plans and other information, whether oral or written, that relate to economic benefits to or amounts payable by either Party under this Agreement, and, with respect to any written materials, any other written materials that are clearly marked "Confidential" at the time a Party shares such information with the other Party (collectively, "Confidential Information"). The provisions of this Section 14.19 shall survive and shall continue to be binding upon the Parties for a period of one (1) year following the date of termination of this Agreement. Notwithstanding the foregoing, information shall not be considered confidential which (i) was in the public domain prior to disclosure, (ii) was lawfully in a Party's possession or acquired by a Party outside of this Agreement, which acquisition was not known by the receiving Party to be in breach of any confidentiality obligation, or (iii) developed independently by a Party based solely on information that is not considered confidential under this Agreement.

(b) Either Party may, without violating this Section 14.19, disclose matters that are made confidential by this Agreement:

(i) To actual or prospective, co-owners, lenders, underwriters, contractors, suppliers, and others involved in construction, operation, and financing transactions and arrangements for a Party or its subsidiaries, affiliates, or parent, if the Party making the disclosure obtains, as a condition precedent to the disclosure, a confidentiality agreement with the person, corporation, or other entity to whom the disclosure is being made with terms substantially the same as this Section 14.19; and

(ii) To governmental officials and parties involved in any proceeding in which either Party is seeking a permit, certificate, or other regulatory approval or

order necessary or appropriate to carry out this Agreement, but the Party making the disclosure shall make reasonable efforts to restrict public access to the information disclosed, by protective order or otherwise; to governmental officials or the public as required by any law, regulation, or order, including without limitation laws or regulations requiring disclosure of financial information, information material to financial matters, and filing of financial reports, but the Party making the disclosure shall make reasonable efforts to restrict public access to the information disclosed, by protective order or otherwise.

(c) Notwithstanding anything in this Agreement to the contrary, Buyer and/or Seller may disclose to any and all persons, without limitation of any kind, the U.S. federal income tax treatment and tax structure of any transaction relating to the Facility and all materials of any kind (including opinions and other tax analyses) relating to such tax treatment and tax structure, except where confidentiality is reasonably necessary to comply with securities laws. For this purpose, "tax structure" is limited to facts relevant to the U.S. federal income tax treatment of a transaction and does not include information relating to the identity of the owners of the Facility, their affiliates, agents or advisors.

[SIGNATURE PAGE FOLLOWS]

IN WITNESS WHEREOF, the Parties hereto have executed this Agreement as of the date set forth in the Preamble to this Agreement.

By:_____
Name:
Its:

CHILOCCO WIND FARM LLC

By:_____
Name:
Its:

Chilocco Wind Partners ("CWP")
IRR and Investor Returns

Project Cash Flows ($000)			Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
			3/15/2016	7/1/2017	7/1/2018	7/1/2019	7/1/2020	7/1/2021	7/1/2022	7/1/2023	7/1/2024	7/1/2025	7/1/2026	7/1/2027	7/1/2028	7/1/2029	7/1/2030	7/1/2031	7/1/2032	7/1/2033	7/1/2034	7/1/2035	7/1/2036	7/1/2037	7/1/2038	7/1/2039	7/1/2040	7/1/2041
Buyer PPA with Purchase in Year 10																												
Base Case (27.75 esc 2.50%) Trading Profits (1-10) BT CF (11-25)																												
Share of Development Fee	50%			$1,000																								
Trading Margins				$0	$0	$23	$411	$873	$1,308	$1,508	$1,658	$1,865	$2,071															
Share of BT Profit for Merchant Case	80%													$2,937	$2,756	$2,725	$2,713	$2,879	$3,069	$3,415	$6,162	$6,556	$6,708	$6,850	$6,994	$7,492	$7,412	$8,637
CF Impact from Change in Assumptions																												
Less Net of Debt Purchase Price													($10,000)															
Total Buyer Return				**$1,000**	**$0**	**$23**	**$411**	**$873**	**$1,308**	**$1,508**	**$1,658**	**$1,865**	**($7,929)**	**$2,937**	**$2,756**	**$2,725**	**$2,713**	**$2,879**	**$3,069**	**$3,415**	**$6,162**	**$6,556**	**$6,708**	**$6,850**	**$6,994**	**$7,492**	**$7,412**	**$8,637**
Cumulative Total				$1,000	$1,000	$1,023	$1,434	$2,307	$3,615	$5,123	$6,781	$8,647	$718	$3,655	$6,411	$9,137	$11,850	$14,729	$17,798	$21,213	$27,374	$33,930	$40,638	$47,488	$54,482	$61,974	$69,386	$78,023
NPV (25 year cash flow)	**8%**	**$19,561**									**IRR (Net CF Year 10)**		**40.08%**															
											IRR (Full Price Year 10))		**36.40%**															
Investor Returns with Sale in Year 10																												
Base Case (27.75 esc 2.50%)																												
Share of Development Fee	25%			$500																								
Management Fee	50%			$142	$161	$250	$250	$250	$250	$250	$250	$250	$250															
Share of BT Profit for Base Case	10%													$367	$345	$341	$339	$360	$384	$427	$770	$819	$839	$856	$874	$937	$927	$1,080
CF Impact from Change in Assumptions																												
Net Income from Sale of Plant													$10,000															
Cash Flow from Plant		$0		$568	$942	$897	$979	$1,000	$1,022	$1,046	$1,067	$1,083	$1,105															
Total Investor Return		**($8,358)**		**$1,209**	**$1,103**	**$1,147**	**$1,229**	**$1,250**	**$1,272**	**$1,296**	**$1,317**	**$1,333**	**$11,355**	**$367**	**$345**	**$341**	**$339**	**$360**	**$384**	**$427**	**$770**	**$819**	**$839**	**$856**	**$874**	**$937**	**$927**	**$1,080**
Cumulative Total				$1,209	$2,312	$3,459	$4,688	$5,938	$7,210	$8,506	$9,823	$11,156	$22,511	$22,878	$23,223	$23,563	$23,903	$24,262	$24,646	$25,073	$25,843	$26,663	$27,501	$28,357	$29,232	$30,168	$31,095	$32,174
IRR Full Term		**16.91%**		**IRR First 10 Years Only**			**15.58%**																					
NPV	**8%**	**$6,296**																										
Income Potential for WPI																												
Share of Development Fee	**25%**			$500																								
Management Fee	**50%**			$142	$161	$250	$250	$250	$250	$250	$250	$250	$250															
Ownrshp in Plant CF's	**10%**													$367	$345	$341	$339	$360	$384	$427	$770	$819	$839	$856	$874	$937	$927	$1,080
Total CF				$642	$161	$250	$250	$250	$250	$250	$250	$250	$250	$367	$345	$341	$339	$360	$384	$427	$770	$819	$839	$856	$874	$937	$927	$1,080
Cumulative CF				$642	$802	$1,052	$1,302	$1,552	$1,802	$2,052	$2,302	$2,552	$2,802	$3,169	$3,514	$3,855	$4,194	$4,554	$4,937	$5,364	$6,134	$6,954	$7,792	$8,648	$9,523	$10,459	$11,386	$12,465

Investor-Chilocco, LLC			**Model 48 MW P50 Base Case**																				**10 Yr Totals**					
Initial Capital Contribution	-																						-					
																							-					
Investor-Chilocco Tax Profit (Losses) 48MW P50 Base Case				(126)	(215)	(112)	(50)	(49)	(4)	42	43	44	46											(384)					
CF Changes				-	1	1	1	0	(1)	0	(1)	0	(1)											1					
- Blacklever interest expense	$27,162			(1,644)	(1,644)	(1,605)	(1,570)	(1,522)	(1,468)	(1,408)	(1,342)	(1,270)	(1,190)											(14,663)					
Subtotal Taxable Profits (losses)				(1,770)	(1,858)	(1,717)	(1,620)	(1,571)	(1,473)	(1,366)	(1,300)	(1,226)	(1,145)											(15,046)					
- Investor-Chilocco Equity Financing Interes	$0	5.0%		-	-	-	-	-	-	-	-	-	-											-					
Tax Loss - Annual				(3,540)	(3,716)	(3,433)	(3,240)	(3,142)	(2,945)	(2,732)	(2,600)	(2,453)	(2,290)	-	-	-	-	-	-	-	-	-	-	(15,046)					
																								(15,046)					

estor Sheltered Profits and Cash Flows

			Alt #1 Investor Finance			Alt #2 Investor Equity																						
			(Cash Basis)	(Tax Basis)		(Cash Basis)	(Tax Basis)																					
Sales Price			10,000	-		10,000	-																					
Chilocco CF Distributions (1-10yr.) + CF Changes			34,194	-		34,194	-																					
Chilocco CF Distributions (11-25yr.)			9,663	-		9,663	-																					
Development Fee (Investor Share)			500	500		500	500																					
Management Fee (Investor Share)			2,302	2,302		2,302	2,302																					
Investor BT Profits			56,659	2,802		56,659	2,802																					
Less: Cumulative Tax Losses				(15,046)			(15,046)																					
Less: Equity Debt Service (P&I)			-			n/a	n/a																					
Less: Back Lever Debt Services (P&I)			(24,485)			(24,485)	-																					
Investor BT Cash Flow/Cumulative Ordinary Tax Loss			32,174	(12,244)		32,174	(12,244)																					
Taxable Capital Gain on Sale																												
Sales Price			10,000	10,000		10,000	10,000																					
"Net" Cumulative Interest - Back Lever Debt			(15,046)			(15,046)	-																					
Cumulative Interest - Equity Debt			-			-	-																					
Tax Basis on Sale of Interest						(7,522)	(7,522)																					
Net Taxable Capital Gain			(5,046)	10,000		(12,568)	2,478																					
								Diff.																					
Taxable Income and Gain			41,613	(2,244)		34,091	(9,766)	(7,522)																					
Capital Gains - Tax Estimate	20%	39.6%	14,519			13,014																						
Ordinary Gains - Tax Estimate		39.6%		888			3,867																					
After Tax Income			17,655	(1,355)		19,160	(5,898)																					
			55%			60%																						

Cash Flows																												
Chilocco Ptnrshp Cash Distrib - 48 MW P50 Base Case				2,212	3,296	3,134	3,422	3,499	3,577	3,657	3,737	3,790	3,870										34,193					
Chilocco Ptrnshp Federal & State Tax Benefit				-	-	-	-	-	-	-	-	-	-										-					
Backlever Financing P&I Pmts				(1,644)	(2,354)	(2,238)	(2,444)	(2,499)	(2,554)	(2,612)	(2,669)	(2,707)	(2,764)										(24,485)					
Investor Equity Financing P&I Pmts				-	-	-	-	-	-	-	-	-	-										-					
CF Changes			$ -	$ 1	$ 1	$ 1	$ 0	$ (1)	$ 0	$ (1)	$ 0	$ (1)											1					
Net CF			568	942	897	979	1,000	1,022	1,046	1,067	1,083	1,105	-	-	-	-	-	-	-	-	-	-	9,709					

Base Case Cash Flows - 27.75 with 2.5% - 48MW																												
Before Tax				$568	$942	$896	$978	$1,000	$1,023	$1,045	$1,068	$1,083	$1,106	$1,320	$1,222	$1,235	$1,267	$1,301	$1,335	$1,558	$4,775	$5,056	$5,186	$5,323	$5,465	$6,048	$5,908	$6,977
After Tax				$1,295	$1,703	$1,604	$1,649	$1,653	$1,637	$1,620	$1,617	$1,605	$1,596	$35	$8	-$82	-$101	-$133	-$276	-$187	$2,917	$3,102	$3,175	$3,256	$3,344	$3,697	$3,612	$4,211

Merchant Cash Flows - Brattle Weighted Avg. - 48MW																												
Before Tax				$691	$1,083	$1,183	$1,540	$1,912	$2,261	$2,453	$2,590	$2,753	$2,927	$3,672	$3,445	$3,407	$3,391	$3,599	$3,836	$4,269	$7,702	$8,195	$8,385	$8,562	$8,742	$9,366	$9,265	$10,796
After Tax				$1,416	$1,843	$1,889	$2,207	$2,560	$2,869	$3,021	$3,131	$2,105	$1,221	$1,390	$1,299	$1,218	$1,130	$1,173	$1,228	$1,469	$4,706	$5,018	$5,132	$5,235	$5,347	$5,724	$5,663	$6,544

Chilocco Wind Partners ("CWP")
IRR and Investor Returns

Project Cash Flows ($000)		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 21	Year 22	Year 23	Year 24	Year 25
		2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
		3/15/2016	7/1/2017	7/1/2018	7/1/2019	7/1/2020	7/1/2021	7/1/2022	7/1/2023	7/1/2024	7/1/2025	7/1/2026	7/1/2027	7/1/2028	7/1/2029	7/1/2030	7/1/2031	7/1/2032	7/1/2033	7/1/2034	7/1/2035	7/1/2036	7/1/2037	7/1/2038	7/1/2039	7/1/2040	7/1/2041
Investor Returns with Sale in Year 10																											
Base Case																											
Net Income from Sale of Plant												$8,000															
Cash Flow from Plant		$0	$234	$590	$524	$586	$586	$586	$586	$585	$575	$572															
Total Investor Return		($8,358)	**$234**	**$590**	**$524**	**$586**	**$586**	**$586**	**$586**	**$585**	**$575**	**$8,572**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
Cumulative Total			$234	$824	$1,349	$1,935	$2,520	$3,107	$3,693	$4,278	$4,853	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426	$13,426
Pre Tax IRR Full Term		**6.04%**	**IRR First 10 Years Only**		**6.04%**																						
Pre Tax NPV	8%	($1,022)																									
Corporate Fed/Ok Tax Benefit			$820	$862	$815	$785	$774	$744	$712	$695	$676	$468															
AT Total Investor Return		($8,358)	**$1,055**	**$1,452**	**$1,339**	**$1,371**	**$1,360**	**$1,331**	**$1,298**	**$1,280**	**$1,252**	**$9,040**															
Cumultative Total			$1,055	$2,506	$3,846	$5,217	$6,577	$7,907	$9,206	$10,486	$11,737	$20,778															
After Tax IRR Full Term		**15.17%**																									
CF with Tax Benefit NPV	8%	**$3,667**	**$5,064**																								

Investor-Chilocco, LLC			**Model 48 MW P50 Base Case**																				**10 Yr Totals**
Initial Capital Contribution		-																					-
Taxable Gain from Sale of Chilocco												478											478
Investor-Chilocco Tax Profit (Losses) 48MW P50 Base Case			(126)	(215)	(112)	(50)	(49)	(4)	42	43	44	46											(384)
CF Changes			(333)	(352)	(371)	(392)	(414)	(437)	(459)	(483)	(507)	(534)											(4,283)
- Blacklever interest expense	$27,162		(1,644)	(1,644)	(1,605)	(1,570)	(1,522)	(1,468)	(1,408)	(1,342)	(1,270)	(1,190)											(14,663)
Subtotal Taxable Profits (losses)			(2,103)	(2,210)	(2,089)	(2,013)	(1,985)	(1,909)	(1,825)	(1,783)	(1,734)	(1,200)											(18,851)
- Investor-Chilocco Equity Financing Inter	$0	5.0%	-	-	-	-	-	-	-	-	-	-											-
Tax Loss - Annual			(2,103)	(2,210)	(2,089)	(2,013)	(1,985)	(1,909)	(1,825)	(1,783)	(1,734)	(1,200)	-	-	-	-	-	-	-	-	-	-	(18,851)
Corporate Blended Tax Benefit		39.00%	820	862	815	785	774	744	712	695	676	468											
																							(18,851)

estor Sheltered Profits and Cash Flows

			Alt #1 Investor Finance (Cash Basis)	(Tax Basis)		Alt #2 Investor Equity (Cash Basis)	(Tax Basis)																
Sales Price			8,000	-		8,000	-																
Chilocco CF Distributions (1-10yr.) + CF Changes			29,911	-		29,911	-																
Investor BT Profits			37,911	-		37,911	-																
Less: Cumulative Tax Losses				(19,329)			(19,329)																
Less: Equity Debt Service (P&I)			-			n/a	n/a																
Less: Back Lever Debt Services (P&I)			(24,485)			(24,485)	-																
Investor BT Cash Flow/Cumulative Ordinary Tax Loss			13,426	(19,329)		13,426	(19,329)																
Taxable Capital Gain on Sale																							
Sales Price			8,000	8,000		8,000	8,000																
"Net" Cumulative Interest - Back Lever Debt			(19,329)			(19,329)	-																
Cumulative Interest - Equity Debt			-			-	-																
Tax Basis on Sale of Interest	90%					(7,522)	(7,522)																
Net Taxable Capital Gain			(11,329)	8,000		(18,851)	478																
								Diff.															
Taxable Income and Gain			18,582	(11,329)		11,059	(18,851)	(7,522)															
Capital Gains - Tax Estimate	20%	39.6%	5,790			4,286																	
Ordinary Gains - Tax Estimate		39.6%		4,486			7,465																
After Tax Income			7,635	(6,843)		9,140	(11,386)																
			57%			68%																	
Cash Flows																							
Chilocco Ptnrshp Cash Distrib - 48 MW P50 Base Case			2,212	3,296	3,134	3,422	3,499	3,577	3,657	3,737	3,790	3,870											34,193
Chilocco Ptrnshp Federal & State Tax Benefit			-	-	-	-	-	-	-	-	-	-											
Backlever Financing P&I Pmts			(1,644)	(2,354)	(2,238)	(2,444)	(2,499)	(2,554)	(2,612)	(2,669)	(2,707)	(2,764)											(24,485)
Investor Equity Financing P&I Pmts			-	-	-	-	-	-	-	-	-	-											-
CF Changes			$ (333)	$ (352)	$ (371)	$ (392)	$ (414)	$ (437)	$ (459)	$ (483)	$ (507)	$ (534)											(4,283)
Net CF			234	590	524	586	586	586	586	585	575	572	-	-	-	-	-	-	-	-	-	-	5,426

#1 Base Case Cash Flows - 27.75 with 2.5% - 48MW																											
Before Tax			$568	$942	$896	$978	$1,000	$1,023	$1,045	$1,068	$1,083	$1,106	$1,320	$1,222	$1,235	$1,267	$1,301	$1,335	$1,558	$4,775	$5,056	$5,186	$5,323	$5,465	$6,048	$5,908	$6,977
After Tax			$1,295	$1,703	$1,604	$1,649	$1,653	$1,637	$1,620	$1,617	$1,605	$1,596	$35	$8	-$82	-$101	-$133	-$276	-$187	$2,917	$3,102	$3,175	$3,256	$3,344	$3,697	$3,612	$4,211
#2 Base Case Cash Flows - 25.75 with 2.25% - 48MW																											
Before Tax			$502	$805	$758	$830	$846	$716	$727	$751	$768	$792	$1,017	$922	$938	$971	$1,007	$1,043	$1,080	$1,256	$4,043	$4,174	$4,311	$4,451	$5,032	$4,888	$5,826
After Tax			$1,114	$1,452	$1,352	$1,388	$1,388	$1,225	$1,207	$1,217	$1,218	$1,223	$97	$80	$3	-$2	-$19	-$109	-$189	-$172	$2,492	$2,617	$2,703	$2,712	$3,213	$3,012	$5,615
Merchant Cash Flows - Brattle Weighted Avg. - 48MW																											4.0%
Before Tax			$691	$1,083	$1,183	$1,540	$1,912	$2,261	$2,453	$2,590	$2,753	$2,927	$3,672	$3,445	$3,407	$3,391	$3,599	$3,836	$4,269	$7,702	$8,195	$8,385	$8,562	$8,742	$9,366	$9,265	$10,796
After Tax			$1,416	$1,843	$1,889	$2,207	$2,560	$2,869	$3,021	$3,131	$2,105	$1,221	$1,390	$1,299	$1,218	$1,130	$1,173	$1,228	$1,469	$4,706	$5,018	$5,132	$5,235	$5,347	$5,724	$5,663	$6,544
year to year growth				57%	9%	30%	24%	18%	8%	6%	6%	6%	25%	-6%	-1%	0%	6%	7%	11%	80%	6%	2%	2%	2%	7%	-1%	17%

Appendix E□□

Chero□ee □ation Ret□rn S□mmary

Redacted for Confidentiality

Appendix □

Po□er Mar□et Analysis

Redacted for Confidentiality

PRELIMINARY GEOTECHNICAL REPORT

CHILOCCO WIND PROJECT
KAY COUNTY, OKLAHOMA

RRC Renewable Resource Consultants

September 11, 2013

www.RenewableLLC.com

3801 Doris Lane
Round Rock, TX 78664
512.992.2087

September 11, 2013

Mortenson Construction
700 Meadow Lane
Minneapolis, MN 55422

Attn: Mr. Aaron Rasmus

Re: Preliminary Geotechnical Report
Chilocco Wind Project
Kay County, Oklahoma
RRC Project No. 130222

Dear Mr. Rasmus:

Renewable Resource Consultants (RRC) has completed the authorized subsurface exploration and preliminary geotechnical engineering evaluation for the proposed Chilocco Wind project. The purpose of the geotechnical engineering study was to explore and evaluate the subsurface conditions at various locations on the site, and develop preliminary geotechnical design and construction recommendations for the project. The attached report contains:

- A description of our findings from the field exploration and laboratory-testing program;
- Our engineering interpretation of the results with respect to the project characteristics; and
- Our preliminary geotechnical site development and foundation design recommendations for the planned project.

We appreciate the opportunity to be of service to Mortenson Construction and are prepared to provide final geotechnical engineering services, structural engineering design services, and construction materials testing services during the construction phase of the project. Please call us if you have any questions concerning this report or any of our services.

Respectfully submitted,
RENEWABLE RESOURCE CONSULTANTS, LLC

Mohammed H. Abusalih, P.E.
Associate Principal

PRELIMINARY GEOTECHNICAL REPORT

CHILOCCO WIND PROJECT
KAY COUNTY, OKLAHOMA

prepared for

MORTENSON CONSTRUCTION
MINNEAPOLIS, MINNESOTA

Prepared by

Eng-Chew Ang, Ph.D, P.E. (KS)
Senior Structural Engineer

Reviewed by

Mohammed H. Abusalih, P.E.
Associate Principal

September 11, 2013 ***Project No. 130222***

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Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely, on Your ASFE-Member Geotechncial Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you ASFE-member geotechnical engineer for more information.

ASFE
The Best People on Earth

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IIGER06045.0M

PRELIMINARY GEOTECHNICAL REPORT

CHILOCCO WIND PROJECT
KAY COUNTY, OKLAHOMA

1.0 INTRODUCTION

RRC has completed the authorized subsurface exploration and preliminary geotechnical engineering evaluation for the proposed Chilocco Wind Project. The site is located about 5 to 8 miles north of the Town of Newkirk in Kay County, Oklahoma. The approximate boundaries of the site are shown on Figure 1, Site Location Map.

The purpose of this investigation and preliminary report was to:

- Explore subsurface soil, bedrock and groundwater conditions;
- Conduct field and laboratory testing to characterize the subsurface soil and bedrock properties at selected locations across the site; and
- Provide preliminary geotechnical engineering parameters for the design of foundation systems and private access roadways.

The recommendations contained in this report are based upon results of field and laboratory testing, engineering analyses, experience with similar soil and bedrock conditions, and our understanding of the proposed project. As part this preliminary study, laboratory thermal resistivity testing was performed on disturbed soil samples collected from designated locations at or near anticipated cable burial depths and the results are presented in Section 4.6 of this report.

2.0 PROPOSED CONSTRUCTION

We understand the overall project will consist of the construction of approximately 153 MW of wind power provided by 90-GE 1.7 MW wind turbine generators (WTG's) and associated facilities within the project site. Gravity foundation systems are being considered for support of the turbines with an embedment depth of about 7 to 10 feet below existing site grade.

Private-access roadways will most likely be surfaced with imported road-base materials from nearby quarry pits to support construction and vehicular traffic loads during and after construction.

3.0 SITE EXPLORATION

A subsurface exploration program was conducted at the project site. The subsurface exploration program consisted of drilling a total of 10 borings at selected WTG locations and a boring at a substation location. Figure 2 within Appendix A shows the WTG and substation boring locations plotted on a topographic map.

Figure 3 within Appendix A shows the thermal resistivity sample locations. The thermal resistivity testing results are discussed in Section 4.6 of the report.

Engineering properties of soils and bedrock were assessed through field testing, and laboratory testing on selected samples. The following section describes our overall site exploration program in detail.

3.1 Field Exploration and Testing

As part of the preliminary subsurface exploration program, a total of 11 borings were drilled between the period of August 21 through August 26, 2013. The WTG borings were drilled at or near the centerline of each turbine location included as part of this study and within the footprint of the proposed substation.

A summary of geographic latitude and longitude coordinates and depth of each boring drilled as part of the subsurface exploration program is presented in Table 3.1.1.

Table 3.1.1 Summary of Borings Geographic Coordinates

Boring / WTG No.	Latitude (North)	Longitude (West)	Approximate Total Boring Depth (feet)
Substation	36.956548	-97.064465	34.5
T-012	36.978553	-97.104971	55.5
T-015	36.961501	-97.104337	55.5
T-017	36.990233	-97.100389	55.0
T-019	36.962787	-97.100057	55.5
T-025	36.970728	-97.095886	55.5
T-041	36.997004	-97.086545	55.5
T-063	36.992868	-97.070974	54.5
T-067	36.958553	-97.067550	36.5
T-071	36.968496	-97.063727	54.5
T-086	36.988345	-97.051775	43.5

The borings were staked in the field by a surveyor working directly for Mortenson Construction. The accuracy of the boring locations should only be assumed to the level implied by the method used.

Field logs were prepared for each boring at the time of drilling by RRC's field engineer. The project engineer reviewed the field logs of boring, and soil and bedrock samples, and made appropriate modifications to the logs of boring as necessary.

The field logs of boring contain visual classification of the materials encountered during drilling as well as interpolation of the subsurface conditions between samples. Logs of boring, included in Appendix A represent our interpretation of the field logs of boring and may include modifications based on laboratory testing performed on select samples. The logs of boring describe the materials encountered, their approximate thickness, and the various depths at which the samples were obtained.

Soils were classified in general accordance with the Unified Soil Classification System (USCS); ASTM D 2488: "Standard Practice for Description and Identification of Soils (Visual-Manual Procedure.)" The soil classification symbols appear on the logs of boring and are briefly described in Appendix A.

The borings were advanced with truck-mounted drill rigs utilizing continuous flight hollow stem augers. Relatively undisturbed samples were obtained at selected intervals utilizing hydraulically advanced 3-inch (OD) diameter stainless steel, thin-walled tube (Shelby) samplers. Additionally, relatively undisturbed samples were obtained at selected intervals utilizing 2.5-inch diameter Modified California split-spoon while relatively disturbed samples were obtained using Standard Penetration Test (SPT) samplers. Representative bulk samples of the subgrade materials were also obtained from selected WTG locations for maximum dry density-optimum moisture content relationships, and laboratory thermal resistivity testing.

The field tests were conducted in general accordance with the basic requirements of the following:

- ASTM D 1586: Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils;
- ASTM D 1587: Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes;
- ASTM D3550: Standard Practice for Thick Wall, Ring Lined, Split Barrel, Drive Sampling of soils; and
- Locally accepted practices in this area.

Subsurface materials were collected from the SPT samplers in the field, visually classified, placed in plastic bags, and labeled as to location and depth. Sleeve samples obtained using modified California samplers were capped, visually classified, and labeled as to location and depth. Undisturbed Shelby tube samples are capped in the field and are extruded from the samplers in the laboratory where they were visually classified. The samples were arranged in the field in core boxes, and transported to the laboratory for further analysis.

Penetration resistance values were recorded using methods based on the SPT in accordance with ASTM D 1586. This test consists of driving the sampler into the ground with a 140-pound hammer free-falling a distance of 30 inches. The number of blows required to advance the sampler 12 inches (18-inches for SPT samplers where the final 12-inches are recorded) or the interval indicated, is recorded as the standard penetration resistance value (N-value). Results of the field tests are shown on the logs of boring under the "Field Data" column and are preceded by the letter "N". Shelby tube samples were tested for consistency utilizing a pocket-sized penetrometer. The penetrometer readings are included on logs of boring preceded by the letter "P." Readings in excess of 4.5 tons per square feet (tsf), if any, indicate that the capacity of the devise has been exceeded.

During the field operations, the borings were observed for groundwater. At the completion of the

drilling operations, the borings were backfilled in accordance with the State of Oklahoma requirement for abandonment of geotechnical borings. Groundwater levels are noted at the top of the logs of boring and are discussed in subsequent sections of this report.

Two new auxiliary borings were also drilled near WTG Nos. T-19 and T-31. The shallow auxiliary borings were completed as temporary piezometers by installing 2" perforated and solid PVC pipes to a depth of about 13 feet below the existing ground surface. The perforated portion of the temporary piezometers was placed at depths of about 8 to 13 feet below existing site grade and backfilled with sand. The upper solid portion of the temporary piezometers was placed at depths of about 8 feet to slightly above the ground surface and backfilled with bentonite chips. The temporary piezometers will be monitored periodically by others.

3.2 Laboratory Analysis

The soil samples were returned to the laboratory, examined by the project geotechnical engineer, and applicable laboratory testing was assigned on selected soil samples. The following laboratory methods of analyses were generally utilized, where sample quality allowed:

- Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System): ASTM D 2487;
- Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils: ASTM D 4318;
- Standard Test Method for Particle-Size Analysis of Soils: ASTM D 422;
- Standard Test Methods for Amount of Material in Soils Finer than No. 200 (75-µm) Sieve: ASTM D 1140;
- Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass: ASTM D 2216;
- Standard Test Method for Unconfined Compressive Strength of Cohesive Soil: ASTM D 2166;
- Standard Test Method for Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils: ASTM D 2850;
- Standard Test Methods for One-Dimensional Consolidation Properties of Soils Using Incremental Loading: ASTM D 2435;
- Standard Test Methods for One-Dimensional Swell or Collapse of Cohesive Soils; ASTM D 4546;
- Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort: ASTM D 698;
- Standard Test Method for Measurement of Soil Resistivity using the Two-Electrode Soil Box Method: ASTM G 187;
- Standard Test Method for Measuring pH of Soil for Use in Corrosion Testing: ASTM G 51; and
- Sulfate and Chlorides Content: EPA 300/300.1.

Laboratory testing was performed in general accordance with ASTM and locally accepted practices.

4.0 SUBSURFACE CONDITIONS

4.1 Geology

The geologic interpretations contained herein are based on available geological maps and literature, and review of the logs of boring drilled as part of this study.

The subsurface geology in Kay County is largely comprised of a geologic unit entitled the Wellington Formation which is present at or within the vicinity of the Chilocco Wind project site. The Wellington Formation is described as mostly red brown Shale which grades into a fine grained sandstone and mudstone conglomerate to the south. The formation depth on the order of about 850 feet (Reference 1). According to Figure 4 (Source: Reference 2) within Appendix A, Alluvium deposits and Chase Group deposits are also present at or within the vicinity the project site. Alluvium deposits comprise of clay, silt, sand, and some gravel composed of unconsolidated sediment. The Chase Group consists mostly of multicolored silty clay-shales, claystone and mudstone interlayered with prominent, escarpment forming limestone intervals.

4.2 Subsurface Stratigraphy

As indicated on the logs of boring drilled as part of this study, native soils were encountered at the ground surface and extended to the full depth of the exploration at Boring Nos. T-015 and T-017. For the remaining boring locations, native soils were encountered at the ground surface and extended to top of bedrock surface at depths of about 14 to 54 feet. The bedrock is comprised of Shale. In addition, limestone and sandstone bedrock were encountered at substation location and at WTG No. T-071, respectively.

The native soils generally consisted of:

- Lean to Fat clays with varying amounts of silt, and sand;
- Sand with varying amounts clay and silt.

The clay soils vary from soft to hard in consistency. The sand soils vary from loose to medium dense in relative density. The shale bedrock encountered was firm to very hard. The limestone bedrock encountered at substation location was highly weathered, moderately strong and hard. The sandstone bedrock encountered at Boring No. T-071 was hard.

The above descriptions are general and depth ranges are approximate because boundaries between different strata are seldom clear and abrupt in the field. In addition, the lines separating major strata types on the logs of boring do not necessarily represent distinct lines of demarcation of the various strata. Detailed logs of boring for locations drilled as part of this preliminary study, which present the stratum descriptions, types of sampling used, laboratory test data, and additional field data, are presented in Appendix A. The Boring Log Key, defining the terms and descriptive symbols used on each log of boring, is also presented in Appendix A.

4.3 Field SPT Results

Figure 5 within Appendix A represents the harmonic means for measured Standard Penetration Test (SPT) N-values for soils and bedrock encountered at depths greater than 7 feet below existing site grade for all boring locations drilled at the project site. The measured SPT N-values above 7-foot are not included for these borings in the calculation since the foundation bearing elevation will be at least 7 feet below ground surface for this project.

The equation for the harmonic mean is shown below:

$$\frac{1}{H_y} = \frac{1}{n}\sum\frac{1}{Y_i}$$

Where:

H_y = Harmonic mean;
N = Total number of data points; and
Y_i = Measured SPT N-value.

The harmonic mean N-value calculated were summarized in Table 4.3.1 with the harmonic mean N-value sorted from the lowest to the highest. Table 4.3.1 indicates that the subsurface soils at the project site are relatively stiff or dense at most WTG locations with the harmonic mean value of greater than 25 blows per foot, except for WTG Nos. T-041, T-063 and T-086. Higher mean SPT N-values indicate stronger subgrade soils with higher bearing capacity and lower settlement; while lower mean SPT N-values indicate weaker subgrade soils with lower bearing capacity and larger settlement.

Table 4.3.1 Summary of Harmonic Mean N-value for Soils at Depths Greater Than 7 feet Below Existing Site Grade at WTG Locations (Sorted from Lowest to Highest)

Count	Boring/WTG No.	Harmonic Mean N-Value (blows/foot)*
1	T-086	11
2	T-063	17
3	T-041	17
4	T-067	28
5	T-019	29
6	T-017	30
7	T-012	32
8	T-015	32
9	T-025	47
10	T-071	50

*Harmonic mean N-value has been rounded to the nearest 1 blows/feet.

4.4 Laboratory Test Results

Figure 6 in Appendix A shows graphical representation of measured in-situ moisture contents and calculated average moisture content versus depth at the project site. The in-situ moisture contents range from about 14 to 33% with an average of about 21%.

Laboratory test results indicate that the native soils have Liquid Limit (LL) values ranging from 29 to 70, with corresponding Plasticity Indices (PI) ranging from 16 to 52. The average liquid limit and plasticity index are summarized in Table 4.4.1. The plots of liquid limit and plasticity indices versus depth are shown on Figures 7 and 8, respectively, within Appendix A. Low plasticity clay soils are generally considered to exhibit a low to moderate expansive potential provided their moisture contents are stable. High plasticity clay soils are generally considered to exhibit higher expansive potential if their moisture contents are allowed to change significantly.

Table 4.4.1 Average Liquid Limit and Plasticity Index

Approximate Depth Range (feet)	Average Liquid Limit (%)	Average Plasticity Index (%)
0 – 8	57	39
8 – 20	49	32
20 – 35	34	19

The in-situ total unit weight of the soils at the project site ranges from 113 to 139 pounds per cubic foot (pcf) with an average of 127 pcf. Plot of in-situ total unit weights versus depth is shown on Figure 9 within Appendix A. The in-situ dry unit weight of the soils at the project site ranges from 90 to 115 pounds per cubic foot (pcf) with an average of 104 pcf. Plot of in-situ dry unit weights versus depth is shown on Figure 10 within Appendix A.

Standard Proctor Test was performed to obtain the maximum dry unit weight at optimum moisture content in accordance with ASTM D 698 on several disturbed representative bulk soil samples from selected locations. A summary of these test results is presented in Table 4.4.2.

Table 4.4.2 Summary of Standard Proctor Test Results

Sample Location	Depth (feet)	Material Type	Maximum Dry Unit Weight (pcf)	Optimum Moisture Content (%)
TR-1	2 to 4	CH	102.4	20.5
TR-2	2 to 4	CH	100.8	21.8
TR-3	2 to 4	CH	95.7	25.1
TR-4	2 to 4	CH	100.3	22.7
TR-5	2 to 4	CH	97.9	23.4
TR-6	2 to 4	CH	99.9	22.1
TR-7	2 to 4	CH	102.1	20.9
TR-8	2 to 4	CH	101.5	21.3
TR-9	2 to 4	CH	95.8	23.6
TR-10	2 to 4	CH	97.9	22.7
TR-11	2 to 4	CL	102.5	19.1

Notes: CH = Fat Clay; CL = Lean Clay; pcf = pounds per cubic foot; % = percent.

Results of swell potential testing performed, in accordance with ASTM D 4546, on selected undisturbed soil samples are summarized in Table 4.4.3.

Table 4.4.3 Summary of Swell/Expansion Test Results

Boring No.	Depth (feet)	Material Type	Plasticity Index (%)	Surcharge Load (psf)	Swell Strain (%)	Swell Pressure (psf)
T-012	9	CH	32	1,000	0.6	4,100
T-019	12	CH	35	1,000	4.6	8,400
T-041	9	CH	40	1,000	4.2	15,500
T-067	9	CH	36	1,000	2.2	15,300

Notes: CH = Fat Clay; psf = pounds per square foot; % = percent.

One-dimensional consolidation tests in accordance with ASTM D 2435 on relatively undisturbed soil samples are currently in progress. This section will be updated when laboratory test results become available.

Results of Unconsolidated-Undrained (UU) Triaxial tests performed, in accordance with ASTM D 2850, on undisturbed soil samples are summarized in Table 4.4.4.

Table 4.4.4 Summary of Unconsolidated-Undrained Triaxial Test Results

Boring No.	Depth (feet)	Material Type	Confining Pressure (psi)	In-Situ Dry Unit Weight (pcf)	In-Situ Moisture Content (%)	Undrained Shear Strength, S_u (psf)
T-015	9	CH	7	101.5	24.3	2,880
T-019	12	CH	10	107.2	21.0	3,380
T-041	14	CL	10	103.5	20.7	2,830
T-041	29	CL	20	107.7	21.9	2,930
T-067	9	CH	7	109.5	20.1	5,040
T-067	14	CL	10	108.8	20.7	1,660
T-071	12	CH	10	100.2	24.3	3,220
T-086	19	CL	15	99.4	24.5	2,200

Notes: CH = Fat Clay; CL = Lean Clay; psi = pounds per square inch; pcf = pounds per cubic foot; % = percent; psf = pounds per square foot.

Results of unconfined compression tests performed, in accordance with ASTM D 2166, on undisturbed soil samples are summarized in Table 4.4.5.

Table 4.4.5 Summary of Unconfined Compression Test Results

Boring No.	Depth (feet)	Material Type	In-Situ Dry Unit Weight (pcf)	In-Situ Moisture Content (%)	Unconfined Compressive Strength, q_u (psf)
Substation	4	CL	107.0	19.1	3,410
T-017	9	CL	110.4	19.3	5,410
T-017	19	CL	114.5	17.9	5,400
T-025	4	CH	104.2	20.7	15,550

Boring No.	Depth (feet)	Material Type	In-Situ Dry Unit Weight (pcf)	In-Situ Moisture Content (%)	Unconfined Compressive Strength, q_u (psf)
T-041	9	CH	107.8	18.6	5,330
T-071	4	CL	100.6	16.2	22,280

Notes: CH = Fat Clay; CL = Lean Clay; psi = pounds per square inch; pcf = pounds per cubic foot; % = percent; psf = pounds per square foot.

Results of Minimum Resistivity and pH testing performed on shallow soil samples from selected borings are summarized in Table 4.4.6.

Table 4.4.6 Summary of Minimum Resistivity and pH Test Results

Boring No.	Depth (feet)	Material Type	Minimum Resistivity (ohm-cm)	pH
Substation	1	CH	1,000	7.24
T-025	1	CH	820	6.25
T-041	4	CH	1,800	6.15
T-071	4	CL	1,800	6.21
T-086	1	CH	1,400	5.65

Notes: CL = Lean Clay; CH = Fat Clay.

Results of water-soluble sulfate and chloride testing performed on shallow soil samples from selected borings are summarized in Table 4.4.7.

Table 4.4.7 Summary of Water-Soluble Sulfate and Chloride Test Results

Boring No.	Depth (feet)	Material Type	Sulfate Contents (ppm)	Chloride Contents (ppm)
Substation	4	CL	45.3	BRL
T-025	4	CH	54.1	72.5
T-041	7	CH	21.1	BRL
T-071	7	CL	BRL	BRL
T-086	4	CH	19.3	BRL

Notes: CL = Lean Clay; ppm = parts per million; BRL refers to Below Recordable Limit.

Graphical test results of laboratory testing completed along with summary of laboratory testing conducted as part of this study are presented in Appendix B.

4.5 Groundwater Conditions

Groundwater was encountered in some of the WTG borings at the time of field exploration and immediately after the completion of drilling operations as summarized in Table 4.5.1. Groundwater was not encountered in the remaining borings during drilling operations and immediately after completion of drilling operations. Upon completion of the drilling operations, the borings were backfilled in accordance with applicable state and local regulations; therefore, subsequent groundwater measurements are not available.

Table 4.5.1 Summary of Groundwater Level Encountered During Drilling

Count	Boring/WTG No.	Depth to Groundwater Level (feet)	
		During Drilling	Immediately After Drilling
1	Substation	17.0	10.5
2	T-015	49.0	28.0
3	T-017	29.0	28.5
4	T-019	39.5	Not Recorded
5	T-041	29.0	24.0
6	T-063	29.0	Not Recorded
7	T-067	14.0	7.0
8	T-071	24.0	23.5
9	T-086	19.0	20.5

It is imperative to note that the short-term groundwater level observations performed as part of this study are not an accurate evaluation of groundwater levels at the project site, and should not be interpreted as a comprehensive groundwater study. The observations made during this investigation may also not represent conditions at the time of construction and it should be understood the presence of groundwater may have an effect on certain construction activities and long-term performance of foundations and pavements. Groundwater levels are highly dependent on climatic and hydrologic conditions before and after construction, and site development including irrigation demands, drainage and other factors. If a detailed groundwater study is desired, a groundwater hydrologist should be retained to perform these services.

4.6 Rho Thermal Resistivity Test Results

Thermal resistivity testing was performed on remolded and undisturbed soil samples obtained from the substation and designated locations as shown on Figure 3, Thermal Resistivity Sample Locations, within Appendix A. Disturbed samples were remolded to about 90% of their respective maximum dry densities at their in-place moisture contents prior to thermal resistivity testing. The thermal resistivity testing was performed in accordance with the IEEE 442 standards and results are included in Appendix C. A summary of thermal resistivity test locations is presented in Table 4.8.1.

Table 4.8.1 Thermal Resistivity Testing Locations

Sample Location	Latitude (North)	Longitude (West)	Approximate Sample Depth (feet)
TR-1	36.992868	-97.070974	2 to 4
TR-2	36.988345	-97.051775	2 to 4
TR-3	36.978553	-97.104971	2 to 4
TR-4	36.970728	-97.095886	2 to 4
TR-5	36.969087	-97.077910	2 to 4
TR-6	36.968496	-97.063727	2 to 4
TR-7	36.966138	-97.065645	2 to 4
TR-8	36.964623	-97.070576	2 to 4
TR-9	36.962787	-97.100057	2 to 4
TR-10	36.958553	-97.067550	2 to 4
TR-11	36.956548	-97.064465	2 to 4

The results of the thermal resistivity testing should be used by the designers in the determination of the cable sizes and compaction requirements.

5.0 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

5.1 General

The turbine sites drilled as part of this study appear suitable for the proposed construction provided the following recommendations are followed. A summary of anticipated conditions requiring particular attention in the preliminary planning and development processes and in the design and construction phases of the project is presented below:

I. Each boring log was carefully reviewed for the presence of soft or loose layer(s) below foundation bearing elevation. The following is a summary of anticipated issues and our recommendations:

   a. Based on review of measured N-values documented on the logs of boring, medium stiff clay, and/or loose sand layers were encountered at or below foundation bearing elevation at 3 WTG locations (at Boring Nos. T-041, T-063 and T-086) on the project site as summarized in Table 4.3.2. We recommend limiting the preliminary design net allowable bearing pressure to about 2,000 to 2,500 psf for these sites.

   b. For the remaining 7 WTG locations, we recommend using a preliminary design net allowable bearing pressure of 3,000 to 4,000 psf in the preliminary structural design.

   A summary of the recommended preliminary design net allowable bearing pressures at the 10 WTG locations is provided in Table 5.1.1.

Table 5.1.1 Recommended Preliminary Design Net Allowable Bearing Pressures

Boring No.	Preliminary Design Net Allowable Bearing Pressure (psf)
T-012	3,500
T-015	3,500
T-017	3,500
T-019	3,500
T-025	4,000
T-041	2,000
T-063	2,500
T-067	3,000
T-071	4,000
T-086	2,000

II. It should be noted that limited over-excavation, re-compaction, and/or replacement of unsuitable foundation subgrade soils may be required for some WTG locations in order to

utilize the foundation bearing pressures outlined in this section. For WTG sites where soft or loose subsurface materials were encountered, and in order to improve foundation bearing capacity and to limit excessive settlement of these soils, we recommend these materials be partially removed to a competent soil layer. The removed materials may be re-compacted or replaced with structural fill with sufficient binder or on-site suitable materials, and meeting the compaction efforts and moisture condition outlined in Section 6.3 or Section 6.4 of this report. The over-excavation of unsuitable soils could be terminated prior to excavating the recommended depths provided suitable bearing conditions are uniformly exposed throughout the excavation. Excavations should be observed by a qualified representative of the geotechnical engineer prior to backfilling to assess the suitability of the foundation soils and to verify the over-excavation depths. In some cases, additional over-excavation may be necessary.

III. Fat clay soils with high plasticity indices were encountered at or near foundation bearing elevation at the majority of WTG sites. The high plasticity fat clay soils exhibit a high expansive potential and may exert high swelling pressures on the WTG foundation as indicated in Table 4.4.3. Mitigation of potentially expansive fat clay soils beneath foundations may be required in some areas. The mitigation measures should consist of partial removal of fat clay soils and replacing with low plasticity fine grained soils to a minimum of 2 feet below the foundation bearing elevation. The low plasticity fine grained soils shall meet the material requirements, and meet the compaction efforts and moisture condition outlined in Section 6.4 of this report. The expansive potential of fat clay soils should be further evaluated by performing additional swell/expansion testing, soil classifications, and moisture content testing at the time of final geotechnical engineering study.

IV. Relatively shallow groundwater conditions encountered immediately after the drilling operation in one of the WTG location (WTG No. T-067) will require particular attention in the design and construction of foundations, access roadways, and crane pads in the vicinity area. The stability of the subgrade at foundation bearing elevation may also be affected by the proximity to shallow groundwater levels and/or “Perched” Groundwater conditions which may be encountered when foundation excavations are completed. In order to improve stability and to establish a stable platform for construction, consideration should be given to dewatering the site during construction and/or the use of granular or crushed rock materials with or without geogrid/geotextile at the base of these unstable foundation excavations. Dewatering means and methods are the responsibility of the contractor. Over-excavation of loose, soft and wet soils and replacement with granular materials may be required at some locations. Unstable subgrade conditions may develop if excavations are left exposed for surface run-off after periods of rainfall for an extended period of time, or where perched groundwater is present, and where drying of wet soils is not practical. As a guide, larger sized crushed rock materials less than 6 inches in maximum overall length may be used at the bottom of over-excavated areas and capped off with well-graded fill materials to establish a stable platform prior to mud slab placement. We anticipate about 18 to 24 inches of rock and well-graded materials with sufficient

amount of fines may be needed in areas where stabilization measures are required. The use of chemical stabilizers such as lime (dry or hydrated) and fly ash could also be considered to improve the stability of the subgrade; however, these alternatives must be evaluated and their feasibility assessed prior to use. Provisions to keep the excavations dry during construction and prior to backfill operations should also be implemented for all foundation sites. It is imperative a qualified representative of the geotechnical engineer observe each foundation excavation prior to construction to confirm the bearing surfaces and any need for remedial measures.

V. We recommend that piezometers be installed during the final geotechnical subsurface exploration program. The total number of piezometers should be at about 15 to 20 percent of the total number of WTGs. Foundation design for the WTG sites should be based upon the shallowest groundwater elevation recorded in the piezometers at the completion of the groundwater level monitoring period. Foundations in areas where groundwater was encountered at a depth of 10 feet or shallower in the temporary piezometers may require designing for limited uplift/buoyancy forces. Raising foundations to provide for a minimum vertical separation distance of 2 feet may be considered for sites where groundwater is encountered at depths of less than 10 feet, if feasible. It should be noted groundwater may exhibit "artesian" characteristics and the contractor should be prepared to provide acceptable dewatering methods that may include the installation of well points in order to provide for a stable platform for construction. Other alternatives to remedy shallow groundwater conditions include installation of permanent subsurface and/or trench/interceptor drainage systems day-lighted to suitable outlets, geo-composite drain systems, slurry cut-off walls, or completely abandoning these sites. These alternatives must be investigated and their feasibility assessed prior to implementation.

VI. It is anticipated that excavations may be advanced with conventional earth moving equipment. Excavation contractors and/or underground utility installers should consider performing test pits or probing tests to evaluate proper means and methods for advancing excavations. Potential caving/sloughing of loose/soft dry soils within narrow and shallow utility trenches may require sidewalls of trenches to be sloped in order to install utilities. Excavated trench bottoms should be thoroughly cleaned prior to cable placement and backfilling.

VII. It is highly imperative a qualified representative of RRC observe each foundation excavation at the time of excavation to verify exposed foundation soil bearing conditions and to assess the need and limits of removal and replacement.

Detailed preliminary foundation design and construction recommendations are outlined in subsequent sections of this report.

5.2 Preliminary Turbine Gravity Foundation System

The use of gravity foundation systems for support of the turbines is considered acceptable. Bearing capacity and settlement calculations were performed in general accordance with

methodologies outlined in the 2nd Edition of "Guidelines for Design of Wind Turbines" (Reference 3) and generally accepted standard of care and practice along with experience with similar soil conditions in this type of geological setting.

The preliminary net allowable bearing pressures provided in Section 5.1 can be used in the structural design provided the remedial measures outlined in Section 5.1 are followed. *The outlined net allowable bearing pressures may be increased by 1/3 when considering short duration forces such as seismic and wind. Therefore, the overall factor of safety associated with the increased allowable bearing capacity is 2.25.*

Differential settlement is expected to be on the order of about ½ to ¾ of the total settlement.

Table 5.2.1 presents a summary of design parameters for on-site soil and structural fill materials required for the foundation design.

Table 5.2.1 Recommended Soil and Structural Fill Design Parameters

Material Type	Friction Coefficient**	Modulus of Subgrade Reaction, k_1 (pci)***
Medium Stiff Clay	0.30	40
Stiff to Hard Clay	0.30	100
Unsaturated Medium Dense Sand Soils	0.40	150
Structural Fill Materials*	0.45	200****

* Structural fill should be placed in accordance with the specifications outlined in this report.

** If necessary, lateral passive earth pressures can be considered to develop additional resistance. The coefficient of base friction should be reduced to 0.30 when used in conjunction with passive pressure.

*** For a 1 ft. x 1 ft. Plate.

**** If structural fill is less than 5 feet in thickness, then k_1 value of native soil below the structural fill should be used.

Ground supported structures such as transformers and utilities bearing on native clay soils could experience shrink/swell movements on the order of about 2 inch or more. Therefore, it is imperative proper drainage be maintained during construction and throughout the life of these structures.

The use of on-site sand and clay as backfill against foundations is considered acceptable provided the materials are properly processed and placed.

Based on the results of maximum dry density-optimum moisture content relationships performed as part of this phase (ASTM D 698), anticipated over-burden backfill densities are outlined in Table 5.2.2 below.

Table 5.2.2 Over-burden Backfill Density Design Range Requirement

Backfill Material Type	Dry Backfill Unit Weight Range, γ_d (pcf)	Moist Backfill Unit Weight Range, γ_{total} (pcf)
On-site Soils	85-115	105-135

Backfill over foundations should be compacted to a minimum of 90% of the maximum dry density as determined by ASTM D 698 to reduce the potential of erosion and/or scour events. Clay soils should be moisture conditioned within -3 to +2% of optimum moisture content prior to compaction. Sand soils should be moisture conditioned within 3% of optimum moisture content prior to compaction.

5.3 Substation Shallow Foundation Systems

Soft fat clay soils with high plasticity indices were encountered between about 1 to 4 feet below existing ground surface in Boring No. Substation that may require particular attention in the design and construction of shallow footing. To improve the foundation bearing capacity of the soft clay soils and mitigate potential swelling problem, we recommend the soft clay soils be removed to a minimum depth of 3 feet below foundation bearing elevation and replaced with suitable backfill material. The backfill materials may structural fill or be on-site suitable materials meeting the requirements including the compaction efforts outlined in Sections 6.3 and 6.4 of this report. Excavations should be observed by a qualified representative of the geotechnical engineer prior to backfilling to assess the suitability of the foundation soils and to verify the over-excavation depths. In some cases, additional over-excavation may be necessary. The over-excavation area should extend a minimum lateral distance of about 2 feet beyond the edge of the footings.

Small lightly loaded structures within the substation may utilize continuous or pad footings. For such foundations, a net allowable bearing pressure of 3,000 psf can be used when bearing on compacted clay soils or structural fills, which includes a safety factor of 3. The footing should have a minimum embedment of 2 feet below existing site grade for confinement and frost penetration. Anticipated settlement of the foundations under service loads will be on the order of about 1 inch or less.

It is imperative that a representative of the geotechnical engineer observe foundation excavations and confirm the bearing materials and assess possible needs for partial over-excavation and replacement. The shallow foundations should be adequately reinforced and proportioned to resist swell/uplift forces associated with the near surface clay soils. For structural design of the footings and mat foundations, the parameters outlined in Table 5.3.1 can be used.

Table 5.3.1 Soil Parameters for Structural Design of Footings and Mat Foundations

Parameter	Design Value
Average Unit Weight , pcf	115
Modulus of Subgrade Reaction, pci	100*
Cohesion (undrained), psf	1,500
Friction Coefficient at Foundation Base	0.30

* For a 1 ft. x 1 ft. Plate.

Other design and construction recommendations are outlined in the ACI design Manual should be followed. It is imperative that proper drainage be maintained during construction and throughout the life of the substation structures to provide for adequate shallow foundation performance.

5.4 Substation Deep Foundation System

Substation with heavy axial loads and/or large overturning moments may utilize drilled pier foundations. Pier lengths will likely be dictated by overturning resistance. Allowable end bearing pressures and allowable skin friction values are provided in Table 5.4.1. Both allowable end bearing pressures and allowable skin frictions utilize a factor of safety of 3. Skin friction values should be reduced by 25% when calculating pull-out resistance, where applicable. Settlement associated with drilled piers is anticipated to be on the order of about ½ to 1 inch. Piers should have a minimum diameter of 1½ foot. The length of the drilled piers should be determined by the structural engineer to satisfy axial and lateral loading.

Table 5.4.1 Recommended Allowable Skin Friction Values

Material Type	Depth (feet)	Allowable End Bearing* (psf)	Allowable Skin Friction (psf)
Clay Soils	0 to 5	Neglect	Neglect
Clay Soils	5 to 19	5,000	350
Limestone Bedrock	19 to 24	10,000	1,300
Shale Bedrock	24 to 35	10,000	700

* We recommend the drilled shaft end bearing capacity be neglected unless adequate measures are taken during construction to remove any disturbed soils/bedrocks and loose settlements from the shaft base and only undisturbed soils/bedrocks are exposed.

Based upon swell test results performed as part of this study shown in Table 4.4.3, the in-situ fat clay soils within the top 10 to 12 feet of project site exhibit high swell potential. In order to mitigate potential swelling problem, we recommend removing and replacing the top 5 feet of fat clay soils with suitable backfill materials prior to constructing drilled piers at the substation location. The backfill materials should be low plasticity fine grained soils meeting the requirements including the compaction efforts and moisture condition outlined in Section 6.4 of this report. Uplift forces due to swelling can be neglected if the above recommendation is followed; otherwise uplift forces on drilled piers can be computed using the following equation:

U = 50*d (kips), where d is pier diameter in feet

This equation is based on the assumption that the soils within the upper 10 feet of the clay (the active zone) of the final ground surface contribute to uplift forces on the piers. The 10 feet zone represents the depth to which naturally occurring seasonal changes in soil water content would be expected to occur. The uplift forces could be reduced if potentially expansive clay soils are removed and replaced with structural engineered fill. Additional changes in the moisture content of the soils surrounding drilled piers caused by poor drainage, may cause an increase the active zone depth leading to larger uplift forces. Therefore, it is imperative that the design provides for proper drainage around the structures during construction and throughout the life of the structure. Uplift forces should be resisted by a combination of dead-load and skin friction contribution of the clay soils and limestone and shale bedrocks below a depth of 10 feet.

Lateral load analysis may be performed using the LPILE computer program. LPILE uses a p-y curve finite difference technique for predicting the soil-structure interaction and response. Based on our interpretation of the subsurface strata and the results of the field and laboratory tests, the parameters outlined in Table D-1 within Appendix D may be used to evaluate drilled piers under lateral loads.

Vertical steel reinforcement to resist tensile loads caused by uplift forces should extend the full length of the pier shaft. Additional reinforcement required by structural demands for axial compressive loads, lateral loads, or minimum reinforcement required by design codes should be satisfied.

5.5 Lateral Earth Pressures

Lateral earth pressures will apply in strata where soils are the main constituent. The turbine will be designed to resist all lateral movements; therefore, the "at rest" lateral earth pressure will develop.

Where the design includes restrained elements, the following "at rest" equivalent fluid pressures are recommended as shown in Table 5.5.1:

Table 5.5.1 Recommended Equivalent Fluid Pressures for "At Rest" Lateral Earth Pressures

Material Type	"At Rest" Coefficient of Lateral Earth Pressure	Equivalent Fluid Pressure for "At Rest" Lateral Earth Pressure (psf/ft)
Clay Soils	0.66	82.5
Sand Soils	0.50	65.0

Passive and active earth pressure resistance will only mobilize after significant movement of the foundation. The passive case occurs where a structural element tends to move into the soil mass. The active case occurs when the element tends to move away from the soil mass. Both cases are applicable for unrestrained foundation elements.

For soils above any free water surface, recommended equivalent fluid pressures for unrestrained foundation elements when using on-site soils as backfill are shown on Table 5.5.2 and Table 5.5.3 for active and passive lateral earth pressures, respectively:

Table 5.5.2 Recommended Equivalent Fluid Pressures for Active Lateral Earth Pressures

Material Type	Active Coefficient of Lateral Earth Pressure	Equivalent Fluid Pressure for Active Lateral Earth Pressure (psf/ft)
Clay Soils	0.49	60
Sand Soils	0.33	45

Table 5.5.3 Recommended Equivalent Fluid Pressures for Passive Lateral Earth Pressures

Material Type	Passive Coefficient of Lateral Earth Pressure	Equivalent Fluid Pressure for Passive Lateral Earth Pressure (psf/ft)
Clay Soils	2.03	255
Sand Soils	3.00	390

The values apply only to cases where the ground surface is level. We should be contacted to provide suitable values for cases where the ground surface is sloped. These earth pressure values do not include safety factors or hydrostatic pressure. Surcharge loads should also be considered.

5.6 Seismic Considerations

For structural designs based upon the 2009 International Building Code (IBC), a Site Class D should be used for this project. The Mapped Spectral Response Acceleration at 1-second period (S_1) and at short period (S_S) were computed using the Earthquake Ground Motion Tool Version 5.1.0 developed by United State Geological Survey (USGS) (Reference 4). Table 5.6.1 summarizes recommended seismic parameters to be used in the design:

Table 5.6.1 Recommended Seismic Parameters

Parameter	Recommended Calculated Value
S_s – Mapped Spectral Response Acceleration at Short Period	0.142 g
S_1 – Mapped Spectral Response Acceleration at 1-Second Period	0.055 g
F_a (Site Coefficient)	1.6
F_v (Site Coefficient)	2.4

6.0 FOUNDATION CONSTRUCTION CRITERIA

6.1 Site Preparation

Prior to construction, we recommend adequate positive drainage be provided to maintain a relatively dry condition in the area of proposed construction. This will be very important if any work is attempted during periods of prolonged rainfall. Ponding of water in the areas of construction should be avoided.

Winter conditions can also impact the construction process. Newly placed fill should not be placed on frozen subgrade and frozen material should not be used for fill.

Site preparation should begin by removing surface vegetation, organic topsoil, and major root systems within the foundation areas. Deleterious materials should be placed in non-structural areas or removed from the site. During excavation of the turbine foundations, every effort should

be made to avoid disturbing the subgrade materials at the planned foundation bearing elevation. When the subgrade is disturbed, the resulting surface should be recompacted to achieve a minimum compaction of 97% of the maximum dry density as determined by ASTM D 698 and moisture conditioned within 2% of optimum moisture content. In areas where densification of the subgrade materials is required, proper slopes meeting federal, and state OSHA requirements should be maintained. The base of each foundation excavation should be observed by the geotechnical engineer or a qualified representative prior to foundation installation.

6.2 On-Site Excavated Materials As Overburden Backfill

The use of on-site sand and clay soils is considered acceptable as backfill materials against foundations provided the materials are properly processed and placed. Excavated material may be stockpiled for later use as overburden backfill or structural backfill. These materials should be free of organics, roots, and deleterious materials before the stockpile is allowed for reuse. The backfill materials should be placed in thin, loose lifts not exceeding 12 inches prior to compacting.

Each overburden material lift should be compacted and moisture conditioned properly in order to provide the minimum and maximum dry and wet unit weight values used in the structural design. In areas where structural elements such as transformer pads are located within the backfill zone, these subgrade soils should be compacted to a minimum of 97 percent of the maximum dry density as outlined by ASTM D 698 and moisture conditioned within 2% (sand soils) or within -2 to +3% (clay soils) of optimum moisture content.

6.3 Structural Fill Specifications

Structural fill material beneath foundations and in areas where over-excavation is performed should consist of a non-expansive, well-graded material with sufficient binder for compaction purposes and must meet the Oklahoma Department of Transportation Aggregate Gradation Type "B" or better. As a guide structural fill must meet the following:

	Percent finer by weight
3"	100 (max)
1-1/2"	40-100
3/4"	30-75
3/8"	25-60
No. 4 Sieve	20-50
No. 10 Sieve	15-35
No. 40 Sieve	7-22
No. 200 Sieve	3-10

- Liquid Limit ..... 25 (max)
- Plastic Index ..... 6 (max)

Structural fill should be placed in lifts having a maximum loose lift thickness of 12 inches and should be compacted to a minimum of 95% of ASTM D 1557. The structural fill should be moisture conditioned within 2% of optimum moisture content.

6.4 On-site Materials Foundation Fill Specifications

On-site lean clay and sand soils could be reused beneath foundations where over-excavation and replacement of unsuitable materials is performed. These reused materials should have a maximum Plasticity Index of 12 and a maximum Liquid Limit of 40. On-site approved fill materials placed beneath foundations should be placed in lifts having a maximum loose lift thickness of 12 inches and should be compacted to a minimum of 97% as determined by ASTM D 698, or 95% as determined by ASTM D 1557. The on-site approved fill materials should be moisture conditioned with 2% of optimum moisture content. If gapping is a concern, the use of well graded granular materials or structural fill meeting the specifications outlined in Section 6.3 will be required.

6.5 Shallow Foundation Construction

The following construction criteria and general guidance should be observed during foundation construction:

1. All foundation excavations should be observed by the Geotechnical Engineer or a qualified representative to assess proper bearing materials are present at foundation bearing elevation in accordance with the recommendations given herein, and to assess the need for densification of the subgrade materials.
2. Special care should be taken to protect the exposed soils from being disturbed, freezing or drying out prior to placement of the structural fill pad.
3. The foundation contactor should determine proper excavation means and methods. The foundation excavation should be sloped sufficiently to create internal sumps for runoff collection and removal. Foundation excavations subject to rainfall and possible deterioration from accumulated water should be protected using a protective “mud-slab” (concrete) not less than 2 inches in thickness. If surface runoff water or groundwater seepage accumulates at the bottom of the foundation excavation, it should be collected and removed and not allowed to adversely affect the quality of the bearing surface.
4. The foundation excavations should be checked for size and cleaned of loose material and debris prior to the placement of reinforcing steel. Precautions should be taken during the placement of reinforcement and concrete to prevent the loose excavated material from falling into the excavation. A proof-roll of the excavation subgrade should be performed with a fully-loaded front-end loader or a similar equipment to assess the need for any shallow remedial measures. If excessive deflection or soft areas are observed while performing the proof-roll operations, the remedial measures outlined in previous sections of this report should be followed. The proof-roll operations should be observed by a qualified representative of the geotechnical engineer. In addition, consideration should be given to the use of either Static or Dynamic Cone Penetrometer (depending on the subgrade materials exposed at foundation bearing elevation) as an added measure to verify design bearing pressures and the need for any remedial measures. Target Static and Dynamic Cone Penetrometer values and minimum number of tests will be provided in a separate document following completion of the final geotechnical engineering study and prior to the start of construction activities.
5. Prior to the placement of concrete, water or frozen ground if present must be removed

from the foundation excavation.

6. Foundation concrete should be air entrained with about 3 to 5% air, or as required by design codes and local practices.
7. Prompt placement of concrete in the excavation as it is completed, cleaned, and observed is strongly recommended.

6.6 Drilled Pier Construction

The following items are important for the successful completion of drilled pier foundations:

1. The Geotechnical Engineer or his representative should observe all pier excavations. This pier inspection is to verify proper depth, bearing stratum and to record other observations regarding the pier construction.
2. The pier excavations should be checked for size and to document that all loose material and free water has been removed prior to the placement of concrete. Precautions should be taken during the placement of the pier reinforcement and concrete to prevent loose excavated material from falling into the excavation.
3. Prompt placement of concrete in the excavation as it is completed, cleaned, and inspected is strongly recommended. Under no circumstances should a pier shaft be drilled that cannot be filled with concrete before the end of the workday.
4. The reinforcement steel cage placed in the shaft should be designed to be stable and centered during the placement of concrete.
5. We recommend that the drilled pier construction contract include a budget for temporary steel casing, in case the sloughing of soils or entry of water prevents proper construction of the piers.

6.7 Open Excavations

Temporary construction slopes and/or permanent embankment slopes should be protected from surface runoff water. Site grading should be designed to allow drainage at planned areas where erosion protection is provided, instead of allowing surface water to flow down unprotected slopes. Surcharge loads, either static or dynamic, should not be applied to an excavation slope. Construction equipment should be prevented from traveling along or near the top of the excavation slope. Monitoring of temporary slopes, trenches, and dewatering during construction should be undertaken by the contractor to detect early warnings of movement within slopes, structures, pavements, etc.

In all cases of excavations, sloped excavations and trench shields are recommended for excavations greater than 4 feet in depth. OSHA and applicable state and local standards should be observed and followed. Site safety is the responsibility of the contractor.

6.8 Corrosivity

Water-soluble sulfate and chloride testing indicated Negligible sulfate contents. The use of Type I or II cement can be considered for all at grade and below ground concrete. If there is no or minimal cost differential, the use of Type II cement should be considered for higher sulfate resistance. Foundation concrete should be designed in accordance with Chapter 4 of Section 318

of the ACI Design Manual.

Minimum resistivity and pH testing indicated the surficial soils exhibit "Corrosive" characteristics. Cathodic protection for buried metal pipe should be designed by a qualified corrosion engineer, if required.

6.9 Drainage

Proper drainage should be provided away from the foundation elements during all phases of construction and post-construction grading. Proper drainage is essential to the long-term stability of the structure. Ponding of water near the foundation elements from improper drainage should not be permitted.

6.10 Access Roadways and Crane Pads Design and Construction Recommendations

It is our understanding that private access roadways will be built for construction and maintenance purposes. Traffic volumes during construction are anticipated to be frequent with heavy equipment utilizing the access roadways. Following the construction period, the traffic volumes will be light and vehicles accessing the roadways will generally consist of pickup trucks and occasional single and multi- unit truck traffic. The section thickness design should be based upon the methodology outlined by the American Association of State Highways and Transportation Officials (AASHTO) for design of aggregate-surfaced roadways (Reference 5).

The surficial materials encountered within a majority of the borings consisted of clays with varying amounts of sand and silt, and sands with varying amounts of clay and silt. These materials are generally considered to be poor to fair in terms of supporting vehicular and construction traffic. Prior to the placement of the aggregate base materials, stripping and removal of existing vegetation and other deleterious materials from the proposed roadway alignment should be performed. Topsoil and organics could be up to about 12 to 24 inches or more in thickness in some areas and should not be allowed for use in structural areas or along roadway alignments.

The exposed subgrade should then be proof-rolled prior to the placement of the aggregate road base materials to assess the presence of loose or soft areas and the need for remedial measures. The proof-roll operations should be conducted with a fully loaded 4,800-gallon water truck or similar equipment. In areas where excessive "pumping" of the subgrade is encountered, partial removal of soils in these areas and re-compaction and/or replacement with granular soils will be required. These subgrade areas should be scarified to a minimum depth of about 12 inches, moisture conditioned within 2 percent of the optimum moisture content and re-compacted. The use of geotextile or geogrids may be required within some areas along the roadway alignments where excessive "pumping" is encountered.

As a minimum, we recommend a total aggregate base course material thickness of 8 inches should be specified for the private access roadways within the project. As a guide, the aggregate road base materials used along the access roadways should meet the requirements outlined in previous sections of this report. The aggregate road base materials should be compacted to a minimum of 95% of the maximum dry density and within 2% of the optimum moisture content as

determined in accordance with ASTM D 1557.

As an alternative to the recommendations outlined above, the use of 6 inches of aggregate base course materials overlying georids such as Tensar TX 140/TX 160 or equivalent, or cement treatment of 8 inches of the subgrade soils could be considered.

The actual pavement thickness should be determined by the design/build contractor, keeping in mind the frequency, duration and requirements of the turbine manufacturer.

For the crane pad, consideration could be given to the use of composite mats that are capable of widely distributing the crane loads to the underlying soils. The type and number of layers of these composite mats should be determined by the contractor to assure proper performance of the crane pads. We recommend scarifying the upper 3 to 4 feet of subgrade materials as a minimum, moisture conditioning within -1 to +2% of optimum moisture content and re-compaction to a minimum of 97% of the maximum dry density as determined by ASTM D 698 along with placement of a minimum of 18 inches of structural fill meeting the requirements outlined in this report. The reworked area should extend a minimum horizontal distance of 4 feet beyond the edges of the crane pads. The structural fill materials should be compacted to a minimum of 98% of the maximum dry density and moisture conditioned within 2% of optimum moisture content as determined by ASTM D 698. Crane pads reworked as above are anticipated to have an allowable bearing capacity of about 4,000 psf. For bearing loads in excess of this amount, load distribution mats should be utilized so that the bearing capacity is not exceeded. Other alternatives such as using soil reinforced subgrade could also be considered.

It is imperative proper drainage of the subgrade be provided in the construction of the roadways and crane pads to enhance their performance. Post-construction proof rolling of the subgrade materials should be performed prior to re-opening the roadways for traffic after periods of heavy rainfall/snow melt to assess stability of the roadway and the need for remedial measures. The proof-roll should be accomplished with a fully loaded water truck or similar heavy equipment. Areas where remedial measures are required should be re-worked and corrected prior to acceptance. It is also imperative that periodic inspection of the access roadways be performed following periods of rainfall or snowmelt to assess the condition of the roads and the need for remedial measures.

7.0 LIMITATIONS

Recommendations contained in this report are based on our field observations and subsurface explorations, limited laboratory tests, and our present knowledge of the proposed construction. It is likely soil and/or bedrock conditions will vary between or beyond the points explored. If soil and bedrock conditions are encountered during construction that differ from those described herein, we should be notified immediately in order to provide supplemental recommendations (if needed). If the scope of the proposed construction, including the proposed loads or structural locations, changes from those described in this report, our data should also be reviewed.

We have prepared this report in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the site area at the time of our study. No warranty is expressed or implied. The recommendations provided in this report are based on the assumption RRC will conduct an adequate program of tests and observations during the construction phase in order to evaluate compliance with our recommendations.

This report may be used only by the client and only for the purposes stated, within three years from its issuance. Land use, site conditions (both on site and off site) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client, or the client's design team members for this particular project, who wishes to use this report shall notify RRC of such intended use. Based on the intended use of the report, RRC may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release RRC from any liability resulting from the use of this report by any unauthorized party.

Other standards or documents referenced in any given standard cited in this report, or otherwise relied upon by the authors of this report, are only mentioned in the given standard; they are not incorporated into it or "included by reference," as that latter term is used relative to contracts or other matters of law.

8.0 REFERENCES

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2. http://www.ogs.ou.edu/StatemapOGQ/OGQ-69_Ponca_City_100K.pdf
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APPENDIX A

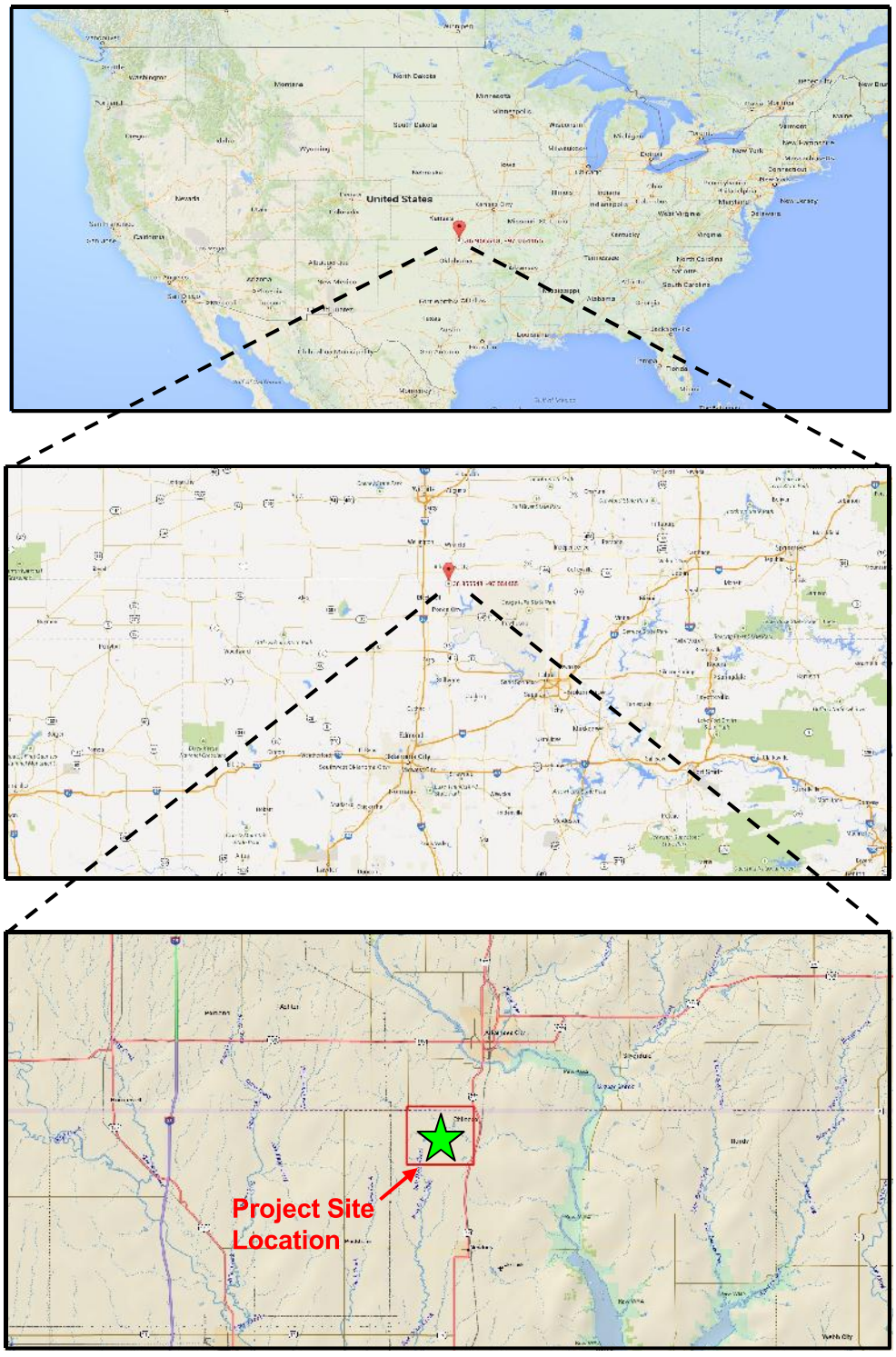

Figure 1 – Site Location Map

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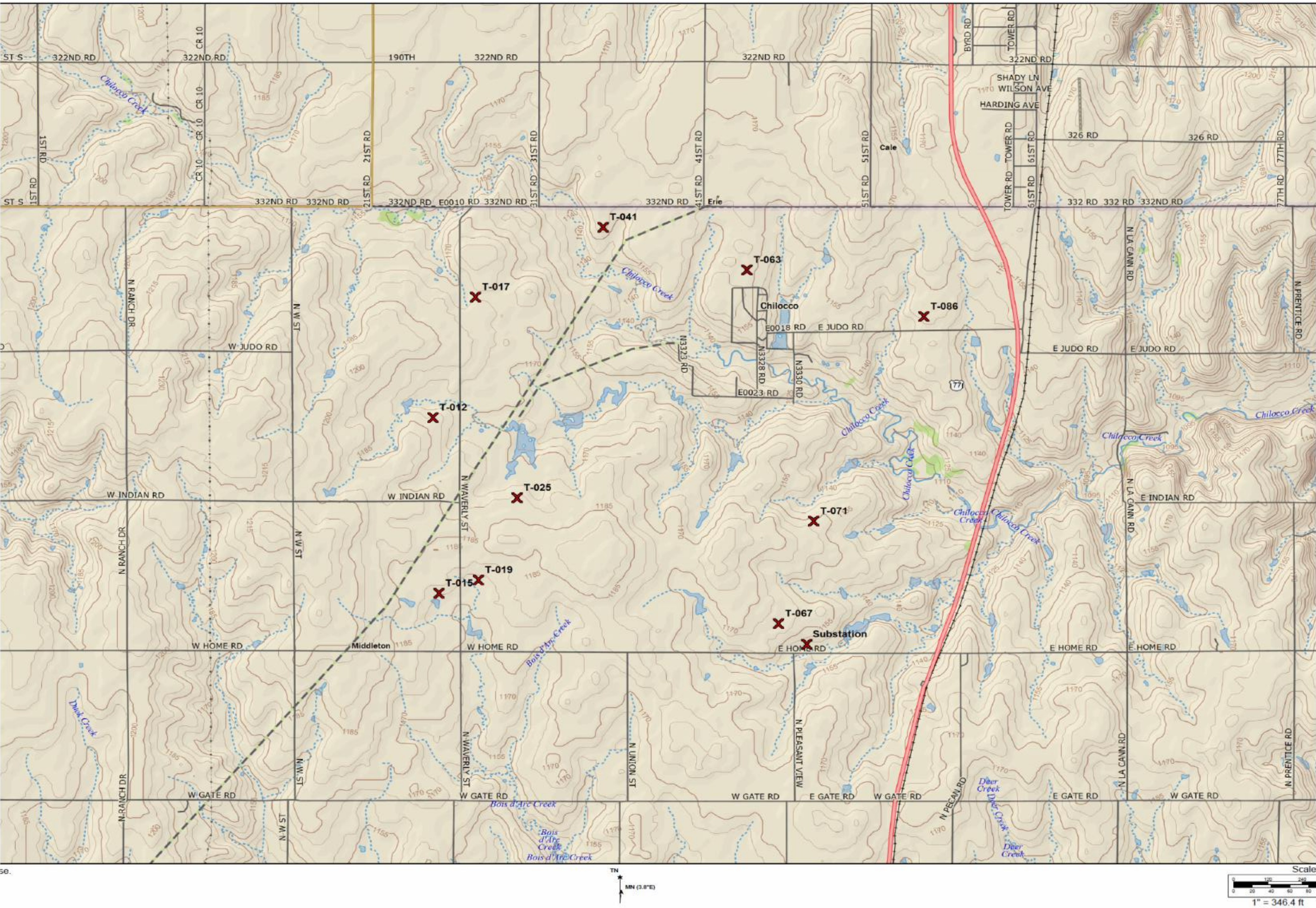
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Deer Creek
Duck Creek
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N PLEASANT VIEW
N PECAN RD
N LA CANN RD
N PRENTICE RD
N RANCH DR
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MN (3.8°E)
Scale
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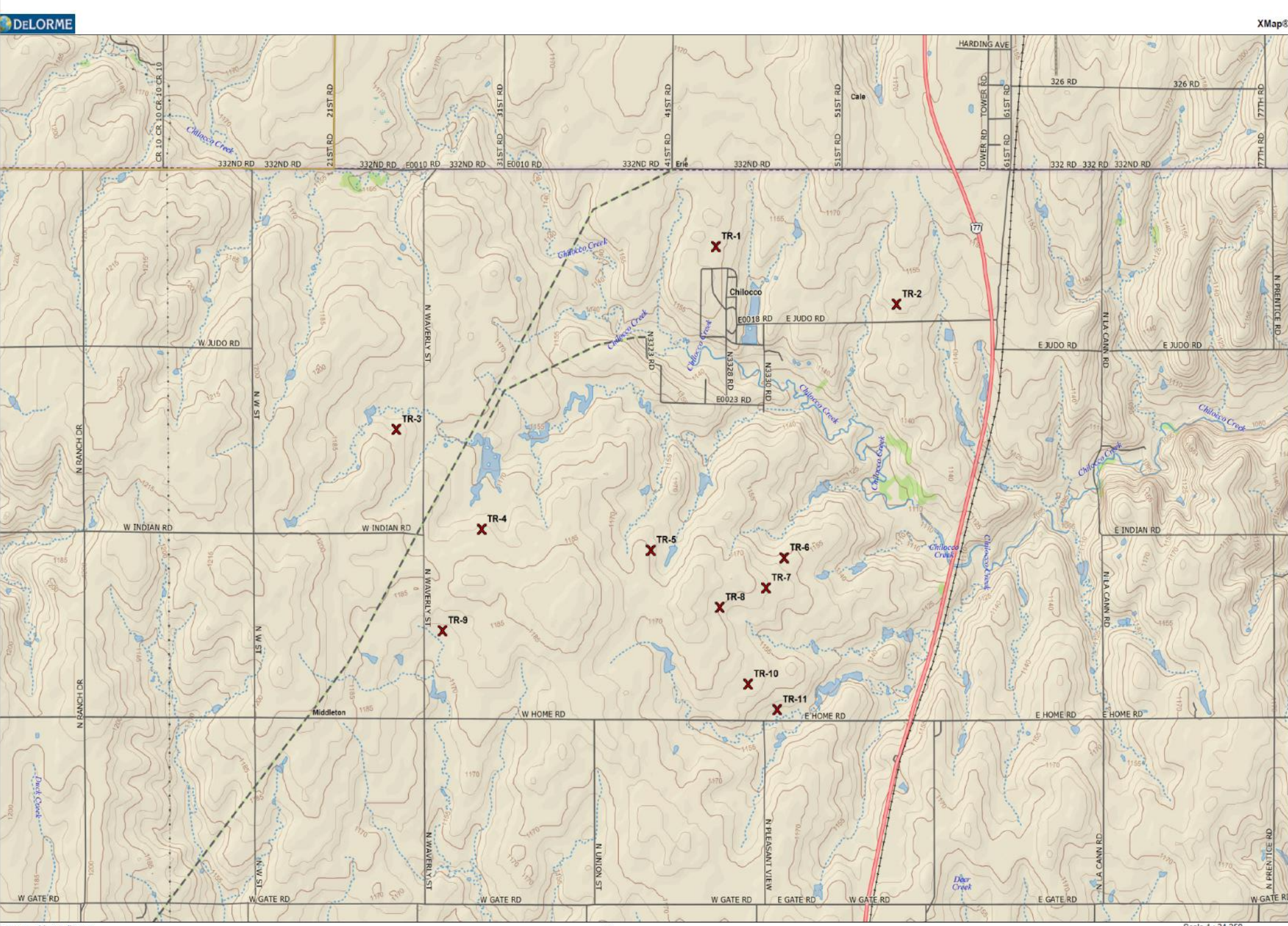
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Cale
Erie
Middleton
HARDING AVE
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332ND RD
E0010 RD
E0018 RD
E0023 RD
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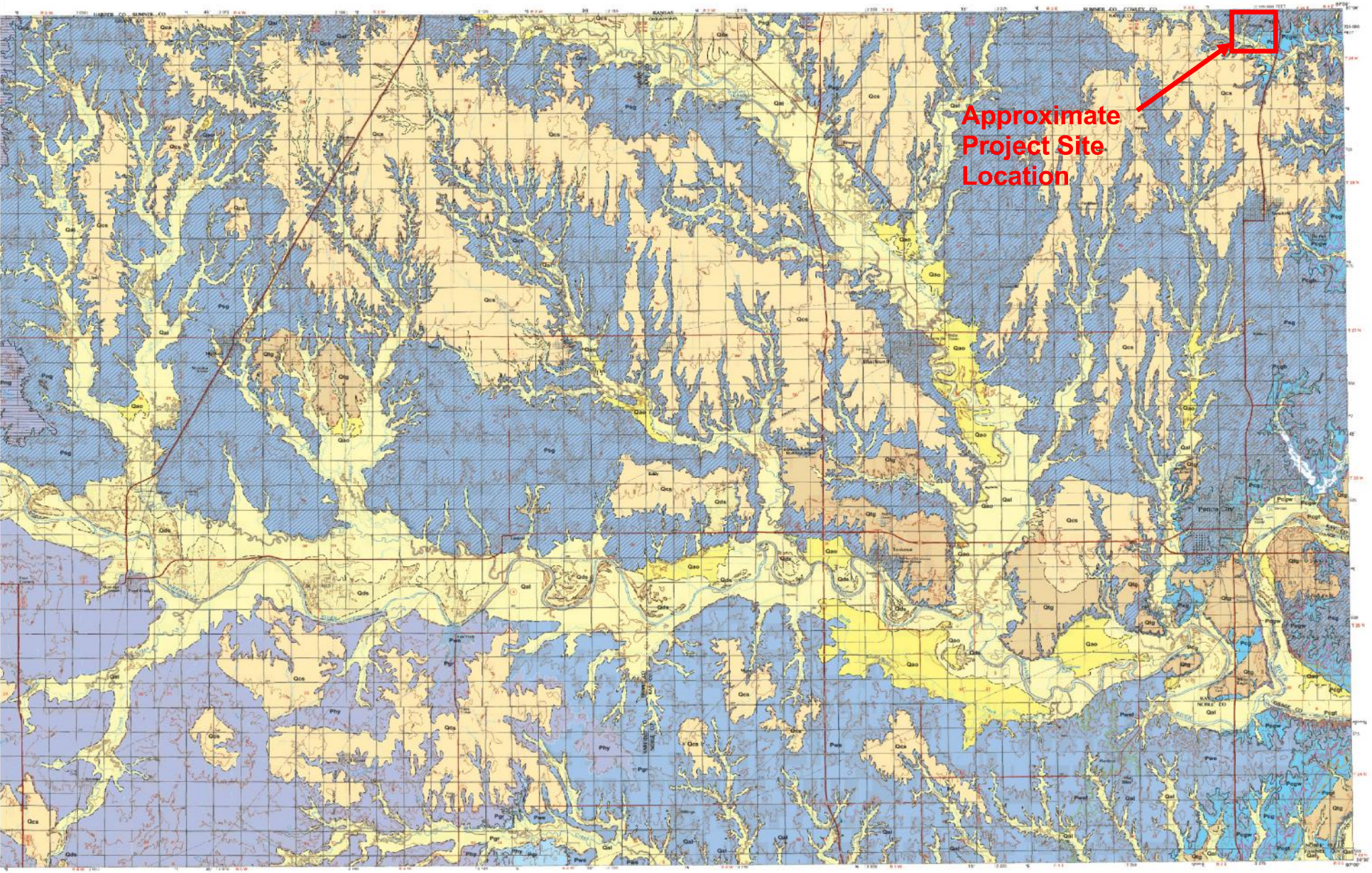

GEOLOGIC MAP OF THE THE PONCA CITY 30′ X 60′ QUADRANGLE, GARFIELD, GRANT, KAY, NOBLE, OSAGE, AND PAWNEE COUNTIES, OKLAHOMA

Compiled by Thomas M. Stanley and Galen W. Miller
Cartography by G. Russell Standridge

2007

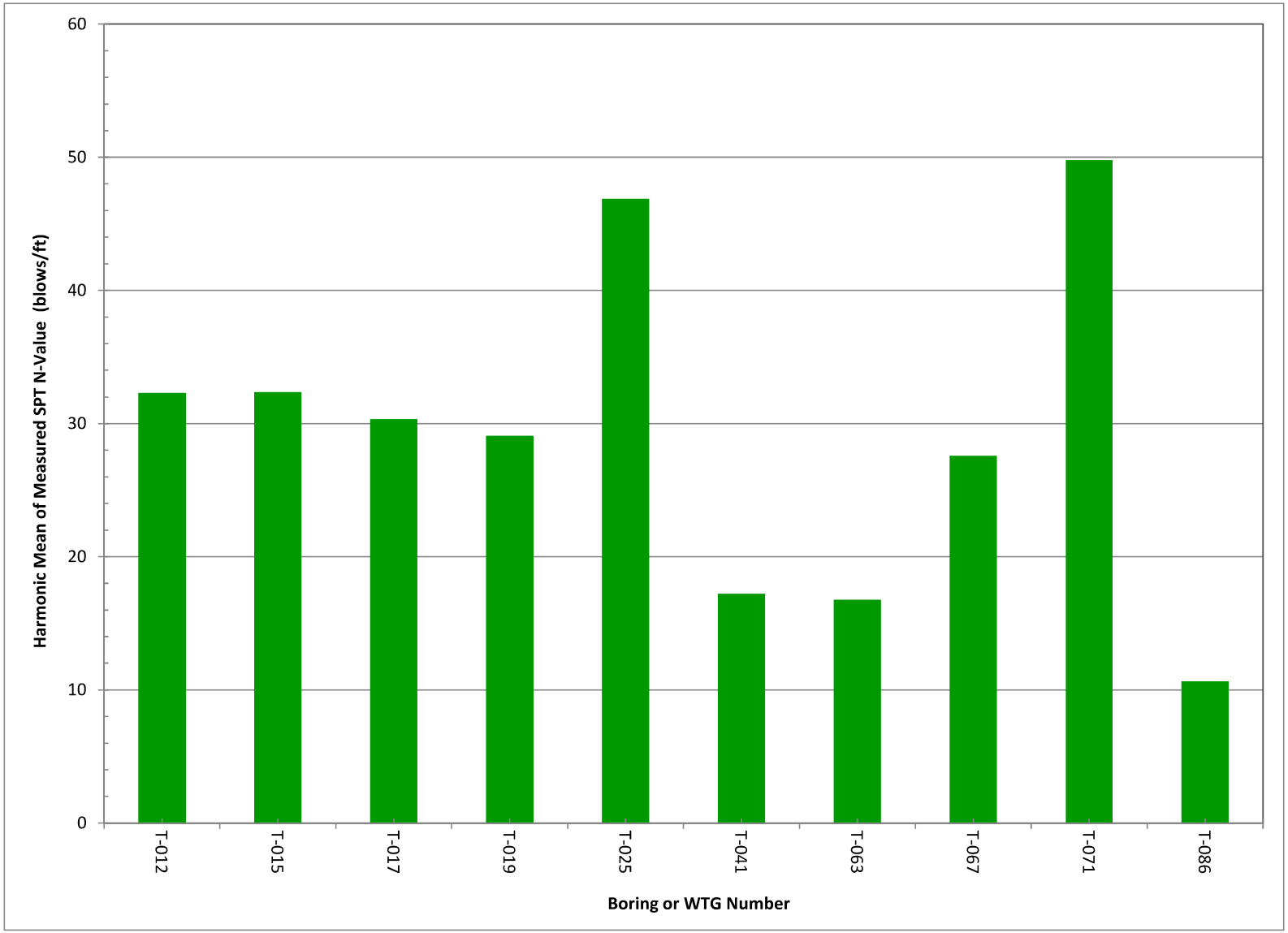

Figure 5 – Harmonic Mean of SPT N-values below 7 Feet from the Ground Surface

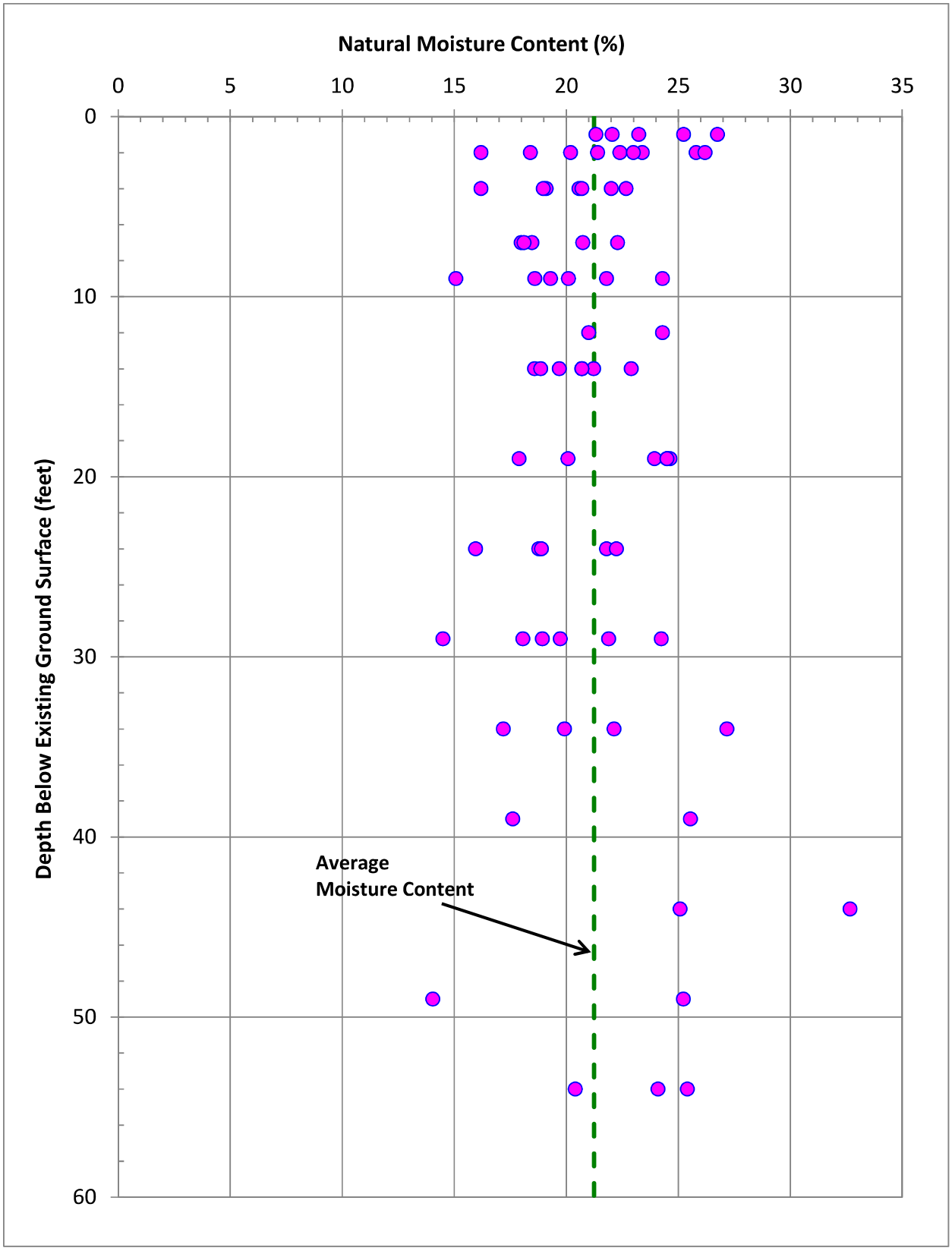

Figure 6 – Moisture Content versus Depth

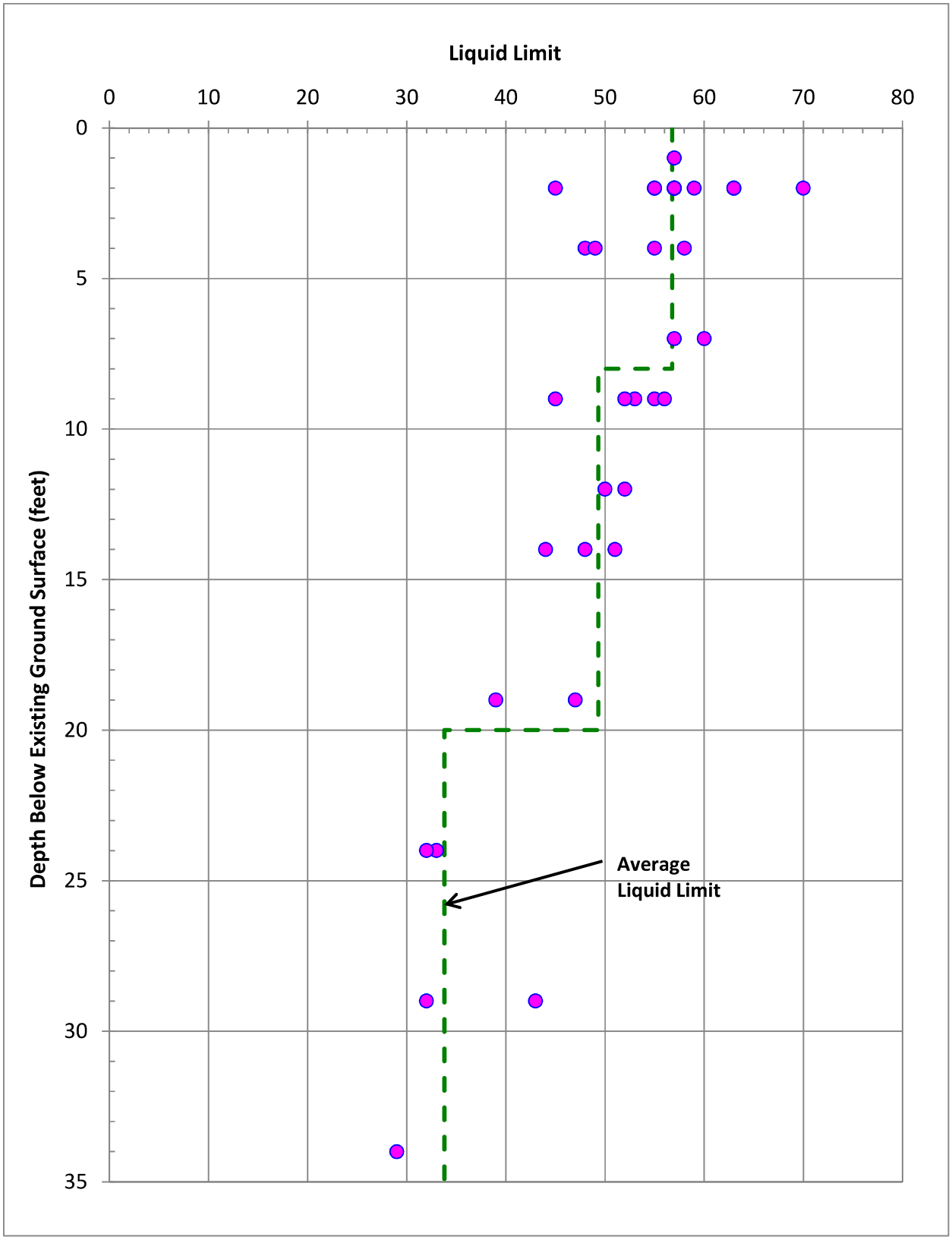

Figure 7 – Liquid Limit versus Depth

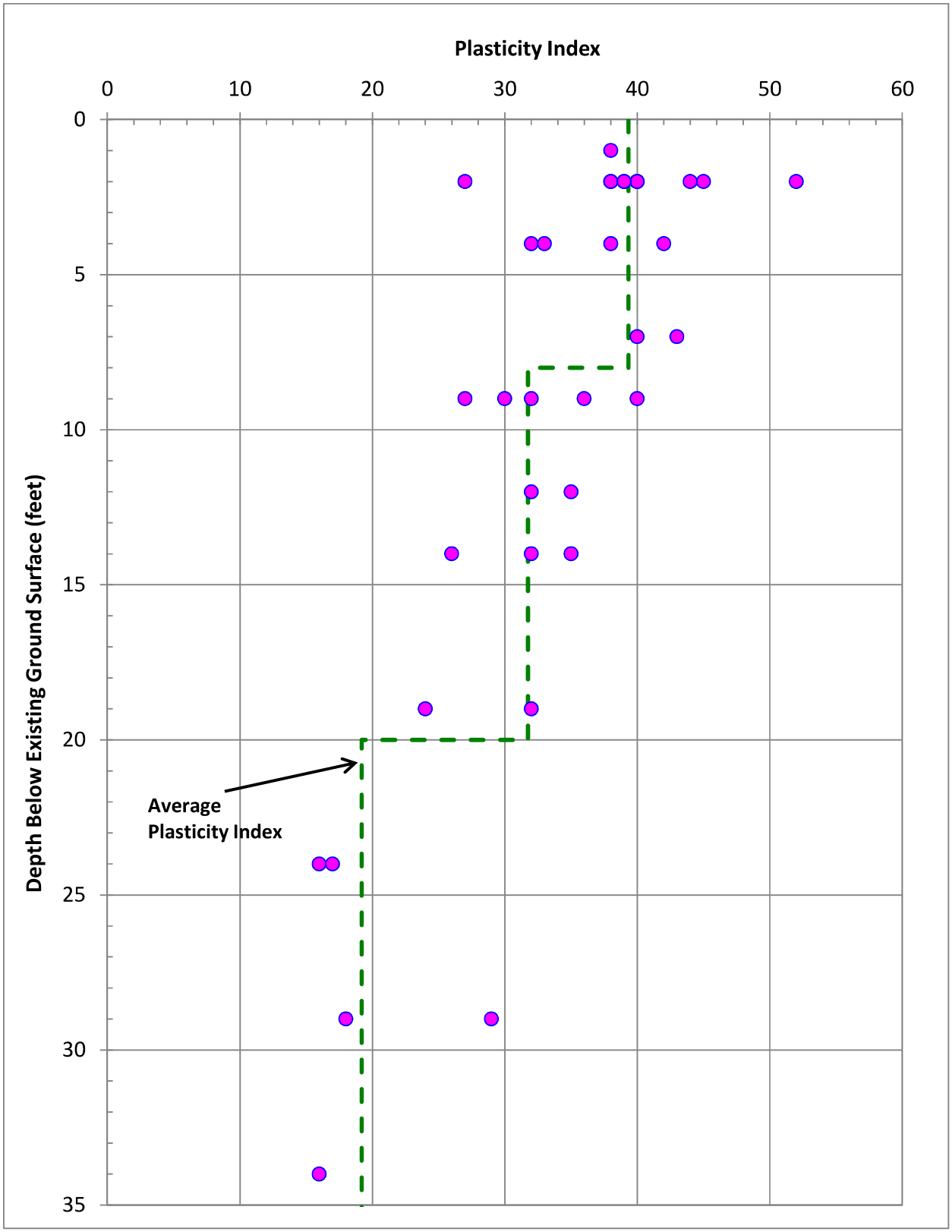

Figure 8 – Plasticity Index versus Depth