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December 12, 2014

Maurice Cordell  
City of St Marys  
200 S. 7<sup>th</sup> Street  
St Marys, KS 66536

Dear Mr. Cordell,

Thank you for the opportunity for Utility HelpNet, Inc. to provide engineering services for your community.

We have reviewed the various outages experienced by the City of St Marys over the last year. Our review and analysis is attached.

Please feel free to call me at **(316) 946-1144** if you would like additional information. We look forward to hearing from you.

Sincerely,

A handwritten signature in cursive script that reads "Cris Naegele".

Cris Naegele P.E. (KS,TX,OK,NE,MO,MN,WI,IN)

PO Box 9286, Wichita, KS, 67277  
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**City of St Marys, KS  
Distribution System Outage Analysis**

**Background Information**

The City of St Marys has experienced several outages and power system “blinks” over the last year. Some of these disturbances have had an adverse effect on customer operations.

Utility HelpNet, Inc. (UHN) has been involved with several projects for the City over the last several years and was asked to review the outages and give an opinion regarding the overall power quality in the City.

For this review process we performed the following tasks:

**1. Review the list of outages provided by the City.**

We discussed the outages with the Don Colson, City Superintendent. Several of the outages were a result of Westar Energy disruptions. These disturbances affected both the City of St Marys and other Westar customers.

Some of the “blinks” were directly correlated with outages on transformer stations where squirrels caused a fault on the system. A fuse blew to clear the fault, but a blink was seen by customers on an adjacent circuit. This caused a momentary dip in voltage but not an outage.

Some of the “blinks” correlated with weather events and were likely caused by lightning. A lightning strike can look like a temporary fault to an electric system. You will get an arc which can cause an increase in current which causes a dip in voltage. It usually lasts less than a second. Sometimes the magnitude of these faults is high enough to cause the breaker at the substation to trip to clear this fault. It will then reclose automatically after a short delay to restore power. This protection scheme is to minimize the amount of time a customer is without power. All circuits in St Marys have this reclosing option in place to improve reliability.

**2. Review the power quality investigation performed by Electricomm Inc. at Custom Wood Products.**

Bruce Kayser from Electricomm, Inc. was retained by Custom Wood Products to install a power quality recording meter at the customer transformer secondary location. By monitoring the current and voltage simultaneously it can be determined if the system disturbances were being generated by internal or external causes. For the time period the recorder was installed, the major dips in voltage were not a result of a large increase in measured current. This is typical of a situation where the cause of the voltage dip is on the utility side of the transformer, not a result of faults or major operation inside the customer facility.

**3. Review the protective relay settings and configuration at the City substation.**

The relay settings were reviewed after the UHN site visit in January, 2014. The relay settings were reviewed again in November, 2014, after the latest round of outages were



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reported to UHN by the City. The settings continue to be appropriate for the circuit configuration and the loads on the distribution system circuits.

**4. Review notes from a field analysis performed by UHN in January, 2014.**

On January 31, 2014, Cris Naegele of UHN visually inspected the south and industrial circuits to look for possible causes of power interruptions. There were 8 locations noted that had tree branches close to power lines that had the potential to cause an outage. These location were provided to the City and all locations were trimmed later in the spring. No locations appeared to have substandard construction that needed to be repaired or upgraded. Both of these circuits are relatively new, having been converted from 4kV to 12kV within the last 5 years.

**5. Review utility performance data where available.**

APPA prepared a report on reliability of member utilities for 2013. The number one cause of outages was attributed to wildlife. The number two cause was weather. This is across the whole of the US.

**Conclusion**

The South and Industrial feeder circuits for the City of St Marys appear to be in proper working order and are constructed to accepted industry practices. We did not identify any immediate system repairs or enhancements the City should install on the south and industrial circuits.

The NE and NW feeders are being upgraded by the City over time to improve their construction standards and reliability. This construction upgrade should continue as funds are available.

The various causes of intermittent outages is consistent with the causes of other utility outages in the region. The protection scheme at the city substation and on the feeder circuits is consistent with industry practices.

There is no 100% reliable electric distribution system, and distribution systems are designed to achieve a balance between protecting utility equipment from major damage while also providing customers with a reliable distribution system.