



## APPENDIX D

### **Multi-Year WPC Analysis and Remedial Action Report**

**Circuit Number** – 215053

**Division** – Gateway

**Area Served** – Black Jack, MO

**SAIFI Value** – 1.45

#### **Analysis Results:**

This circuit is a Multi-Year Worst Performing Circuit (MWPC) based on its performance in 2010 and 2011. This circuit was not a WPC in 2012. The SAIFI values for this circuit in the most recent three year period were: 2.09 in 2010, 3.43 in 2011, and 1.45 in 2012. This shows that reliability has greatly improved in 2012. This circuit serves 1,336 customers. The customer interruptions (CI) experienced on this circuit in 2012 were caused by overhead equipment malfunctions, underground cable failures, public vehicle accidents, trees, unknown causes, and underground cable failures which resulted in 1,942 CI. Circuit 215053 experienced one significant outage in 2012 which resulted in 308 (16%) of the total CI. The outage occurred due to an overhead equipment malfunction. Smaller outages occurred to do overhead equipment failures, underground cable failures, tree contacts, and unknown causes which resulted in the remaining 1,631 (84%) of the total CI.

#### **Corrective Actions:**

Tree trimming was last performed on this circuit in 2009.

Engineering personnel patrolled the circuit in 2010. This patrol identified the need for fusing and animal guarding. This work was performed under DOJM Work Request number 21MT523706 which was completed in April 2011.

An overhead visual inspection was performed on this circuit in 2011. The repair work identified as a result of the inspection was completed in accordance with Ameren Missouri's infrastructure inspection policy.

Division engineering personnel performed an overhead inspection of the circuit and several improvement opportunities were identified. These included replacement of insulators, lightning arrestors, and deteriorated poles, as well as the installation of animal guards and the coordination and relocation of fuses. The need for additional tree trimming was identified and coordinated with the Vegetation Management Department. The repair work identified as a result of this inspection was performed under DOJM Work Request number 21MT553497 which was completed in July 2012.

Tree trimming will be performed on this circuit in 2013.



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### **Multi-Year WPC Analysis and Remedial Action Report**

**Circuit Number** – 690057

**Division** – SEMO

**Area Served** – Richland, MO

**SAIFI Value** – 1.34

#### **Analysis Results:**

This circuit is a Multi-Year Worst Performing Circuit (MWPC) based on its performance in 2010 and 2011. This circuit was not a WPC in 2012. The SAIFI values for this circuit in the most recent three year period were: 5.11 in 2010, 3.80 in 2011, and 1.34 in 2012. This shows that reliability has greatly improved in 2012. This circuit serves 626 customers. The customer interruptions (CI) experienced on this circuit in 2012 were caused by tree contacts and overhead equipment which resulted in 836 CI. Circuit 690057 experienced two significant outages in 2012 which resulted in 746 (89%) of the total CI. The first outage occurred when a tree broke and fell on the primary. The second outage occurred when a cross-arm broke.

#### **Corrective Actions:**

A special overhead visual inspection was performed on this circuit in 2010. The inspection identified needed animal guarding, tap-fusing, and other maintenance items. Tap fusing was performed under DOJM Work Request number 2TSE092583 which was completed in December 2010. The remaining circuit inspection work was performed under DOJM Work Request number 2TSE093548 which was completed in November 2010.

Three sets of reclosers were installed to sectionalize the circuit. This work was performed under DOJM Work Request number 2TSE092584 which was completed in December 2010.

The substation underground feeder exit cable was replaced under DOJM Work Request number 2TSE097309 in August 2011.

An overhead visual inspection was performed on this circuit in 2011. The repair work identified as a result of this inspection was completed in accordance with Ameren Missouri's infrastructure inspection policy. This work was performed under DOJM Work Request numbers 2TSE097992 and 2TSE097095 which were completed in October 2011 and December 2011 respectively.

An underground detailed inspection was performed on this circuit in 2012. The repair work identified as a result of this inspection was completed in accordance with Ameren Missouri's infrastructure inspection policy.

An overhead visual and ground line inspection will be performed on this circuit in 2013. The repair work identified as a result of this inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



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### **Multi-Year WPC Analysis and Remedial Action Report**

**Circuit Number** – 466055

**Division** – SEMO

**Area Served** – Wardell, MO

**SAIFI Value** – 1.22

#### **Analysis Results:**

This circuit is a Multi-Year Worst Performing Circuit (MWPC) based on its performance in 2010 and 2011. This circuit was not a WPC in 2012. The SAIFI values for this circuit in the most recent three year period were: 2.48 in 2010, 3.60 in 2011, and 1.22 in 2012. This shows that reliability has greatly improved in 2012. This circuit serves 152 customers. The customer interruptions (CI) experienced on this circuit in 2011 were caused by a 34kV outage and other small outages which resulted in 185 CI. Circuit 466055 experienced one significant outage in 2012 which resulted in 121 (65%) of the total CI. This outage occurred when the Hayti-71 34kV circuit tap to Loxcreen tripped, which caused an outage on the 34kV circuit to the Wardell Substation.

#### **Corrective Actions:**

The Vegetation Management Department performed mid-cycle maintenance tree trimming in 2010.

A special overhead visual inspection was performed on this circuit in 2011. The inspection identified needed animal guarding, tap-fusing, and other maintenance items. Repairs were performed under DOJM Work Request number 2TSE097100 which was completed in August 2011. Additional work to install reclosers, replace poles, and replace cross arms was performed under DOJM Work Request number 2TSE097706 which was completed in August 2011.

Tree trimming will be performed on this circuit in 2013.

A Viper recloser will be installed on the Loxcreen tap under DOJM Work Request number 2TSE103173 which will be completed in December 2013.

Two 34kV Viper reclosers will be installed on both sides of the Wardell substation under DOJM Work Request numbers 2TSE103237 and 2TSE103238 which will be completed in December 2013.



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### **Multi-Year WPC Analysis and Remedial Action Report**

**Circuit Number** – 835002

**Division** – SEMO

**Area Served** – Chaffee, MO

**SAIFI Value** – 0.96

#### **Analysis Results:**

This circuit is a Multi-Year Worst Performing Circuit (MWPC) based on its performance in 2010 and 2011. This circuit was not a WPC in 2012. The SAIFI values for this circuit in the most recent three year period were: 2.58 in 2010, 4.78 in 2011, and 0.96 in 2012. This shows that reliability has greatly improved in 2012. This circuit serves 143 customers. The customer interruptions (CI) experienced on this circuit in 2012 were caused by an overhead equipment failure which resulted in 137 CI. Circuit 835002 experienced one significant outage in 2012 which resulted in 137 (100%) of the total CI. This outage occurred when a primary wire failed.

#### **Corrective Actions:**

The Vegetation Management Department performed a mid-cycle patrol of this circuit in 2011.

A major substation project to replace the existing substation and switchgear was completed in 2011.

New 34kV and 3-4160V feeder exits were installed on this circuit along with regaining the third feeder position lost in 2007 when the existing switchgear failed. This work was performed under DOJM Work Request numbers 2TSE095580, 2TSE095461, 2TSE095460, and 2TSE095456, which were completed in September and October 2011.

A special visual inspection was performed on this circuit in 2011 which inspected for animal guarding, tap fusing, and maintenance issues. Repairs were performed under DOJM Work Request number 2TSE097993 which was completed in September 2011.

Tree trimming was performed on this circuit in 2012.

An underground visual inspection will be performed on this circuit in 2013. The repair work identified as a result of this inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



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### **Multi-Year WPC Analysis and Remedial Action Report**

**Circuit Number** – 456057

**Division** – SEMO

**Area Served** – Deering, MO

**SAIFI Value** – 0.53

#### **Analysis Results:**

This circuit is a Multi-Year Worst Performing Circuit (MWPC) based on its performance in 2010 and 2011. This circuit was not a WPC in 2012. The SAIFI values for this circuit in the most recent three year period were: 3.17 in 2010, 3.78 in 2011, and 0.53 in 2012. This shows that reliability has greatly improved in 2012. This circuit serves 133 customers. The customer interruptions (CI) experienced on this circuit in 2012 were caused by weather which resulted in 70 CI. Circuit 456057 experienced no significant outages in 2012. Seven small outages occurred in 2012. All of these small outages were caused by lightning strikes and resulted in all of the CI experienced on this circuit.

#### **Corrective Actions:**

The Vegetation Management Department performed mid-cycle maintenance tree trimming on this circuit in 2010.

An overhead visual inspection was done on this circuit in 2010. The repair work identified as a result of this inspection was completed in accordance with Ameren Missouri's infrastructure inspection policy. This work was performed under DOJM Work Request number 2TSE093555 which was completed in October 2010.

A special overhead visual inspection was performed on this circuit in 2011 which inspected for animal guarding, tap fusing, maintenance issues, and performed an infrared scan of the circuit. Repairs were performed under DOJM Work Request numbers 2TSE097298, 2TSE097705, and 2TSE097099 which were completed in July 2011, August 2011, and September 2011 respectively.

A 34kV Viper recloser was installed at the Hayti West substation to replace the old OCB. This 34kV substation serves the 12kV Deering substation. This work was performed under DOJM Work Request number 2TSE093963 which was completed in October 2011.

Tree trimming will be performed on this circuit in 2013.

An overhead visual and ground line inspection will be performed on this circuit in 2013. The repair work identified as a result of this inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



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### **Multi-Year WPC Analysis and Remedial Action Report**

**Circuit Number** – 879006

**Division** – SEMO

**Area Served** – Lilbourn, MO

**SAIFI Value** – 0.44

#### **Analysis Results:**

This circuit is a Multi-Year Worst Performing Circuit (MWPC) based on its performance in 2010 and 2011. This circuit was not a WPC in 2012. The SAIFI values for this circuit in the most recent three year period were: 3.18 in 2010, 8.31 in 2011, and 0.44 in 2012. This shows that reliability has greatly improved in 2012. This circuit serves 285 customers. The customer interruptions (CI) experienced on this circuit in 2012 were caused by weather, underground equipment failures, animal intrusions, and transformer failures which resulted in 125 CI. Circuit 879006 experienced no significant outages in 2012. Ten smaller outages occurred in 2012. Five of these outages were caused by storms. Two small outages were caused by underground equipment failures. One small outage was caused by an animal intrusion. These small outages resulted in 102 (82%) of the total CI. The remaining CI experienced on this circuit were due to transformer failures.

#### **Corrective Actions:**

The Vegetation Management Department performed mid-cycle maintenance tree trimming on this circuit in 2010.

A project to re-conductor and add lightning arrestors to a portion of the circuit running towards Ristine was performed under DOJM Work Request numbers 2TSE095450 and 2TSE095451. This work was completed in August 2011 and November 2011 respectively.

An overhead visual inspection was performed on this circuit in 2011. The repair work identified as a result of this inspection was performed under DOJM Work Request numbers 2TSE097308, 2TSE097708, and 2TSE098621 which were completed in July 2011, October 2011, and November 2011 respectively.

A new substation was built with a capacity of 7MVA, SCADA switchgear, and a third circuit which serves the new Pioneer Plant load. The feeder exits were undergrounded which eliminated the primary phase contact problem. This project was completed in June 2012.

An overhead visual inspections and an underground detailed inspection will be performed on this circuit in 2013. The repair work identified as a result of this inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



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### **Multi-Year WPC Analysis and Remedial Action Report**

**Circuit Number** – 674052

**Division** – Boone Trails

**Area Served** – Wentzville, MO

**SAIFI Value** – 0.08

#### **Analysis Results:**

This circuit is a Multi-Year Worst Performing Circuit (MWPC) based on its performance in 2010 and 2011. This circuit was not a WPC in 2012. The SAIFI values for this circuit in the most recent three year period were: 3.53 in 2010, 2.43 in 2011, and 0.08 in 2012. This shows that reliability has greatly improved in 2012. This circuit serves 426 customers. The customer interruptions (CI) experienced on this circuit in 2012 were caused by weather which resulted in 33 CI. Circuit 674052 experienced one significant outage in 2012. This outage occurred due to a lightning strike during a thunderstorm.

#### **Corrective Actions:**

Fuses and animal guards were added to the circuit under DOJM Work Request number 2WWZ137084. This work was completed in March 2010.

The overhead circuits on Highway BB, Mackville Road, and Paris Branch Road were improved under DOJM Work Request number 2WWZ134867 which was completed in August 2010.

A circuit tie was built along Hwy K to tie circuit 674052 with circuit 691052. This work was performed under DOJM Work Request numbers 2WWZ137265 and 2WWZ141067 which were completed in July 2011 and October 2011 respectively.

A special overhead visual inspection was performed on this circuit in 2011. Defective cross arms, insulators, and broken down guys were repaired or replaced. Animal guards and fuses were installed and some poles were replaced. This work was performed under DOJM Work Request numbers 2WWZ143423, 2WWZ145477, and 2WWZ146226 which were completed in May 2011, August 2011, and November 2011 respectively.

A section of 2400V was converted to 7200V and a step down transformer was eliminated under DOJM Work Request number 2WWZ146227 which was completed in September 2011.

Tree trimming was performed on this circuit in 2012.



An extensive overhaul of this circuit was performed in 2012. A number of poles were replaced and additional fusing was installed. In addition, an inaccessible section of this circuit was relocated to a truck accessible area. This work was performed under DOJM Work Request numbers 2WWZ149517, 2WWZ150758, 2WWZ150691, 2WWZ152280, and 2WWZ147268 which were completed in June 2012, September 2012, October 2012, November 2012, and December 2012 respectively.





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### **Multi-Year WPC Analysis and Remedial Action Report**

**Circuit Number** – 546054

**Division** – Meramec Valley

**Area Served** – House Springs, MO

**SAIFI Value** – 0.06

#### **Analysis Results:**

This circuit is a Multi-Year Worst Performing Circuit (MWPC) based on its performance in 2010 and 2011. This circuit was not a WPC in 2012. The SAIFI values for this circuit in the most recent three year period were: 2.80 in 2010, 3.17 in 2011, and 0.06 in 2012. This shows that reliability has greatly improved in 2012. This circuit serves 157 customers. The customer interruptions (CI) experienced on this circuit in 2012 were caused by storms, resulting in 9 CI.

#### **Corrective Actions:**

A recloser which caused an outage due to a cold load pickup failure was replaced under DOJM Work Request number 26JF110855. This work was completed in February 2010.

The Vegetation Management Department performed spot tree trimming on the circuit in 2011.

An overhead visual inspection was performed on this circuit in 2011. The repair work identified as a result of the inspection was completed in accordance with Ameren Missouri's infrastructure inspection policy.

Two DOJM jobs were created to address problems identified in 2011. Animal guards were installed on the circuit under DOJM Work Request number 26JF119050 and fuses were installed on un-fused taps along the circuit backbone under DOJM Work Request number 26JF119359. These jobs were completed in March 2012 and September 2012 respectively.

An underground detailed inspection was performed on this circuit in 2012. The repair work identified as a result of this inspection was completed in accordance with Ameren Missouri's infrastructure inspection policy.

No work is planned for this circuit in 2013.