



Ameren Missouri 4 CSR 240-23.010 Electric Utility System Reliability Monitoring and Reporting Submission Requirements – Annual Reliability Report

Introduction

This report details Union Electric (dba Ameren Missouri) Company's annual reliability metrics and worst performing circuits for calendar year 2019 as required by Missouri Public Service Commission Rule 4 CSR 240-23.010, Electric Utility System Reliability Monitoring and Reporting Submission Requirements (referred to in the remainder of this document as "the Rule"). This report is required by Sections (2), (7), and (8) of the Rule which state, *"The information required by section (1) shall be filed annually by the last business day of April of the calendar year following the calendar year for which the information was accumulated.... The information developed in accordance with section (6) shall be reported as part of the annual report required by section (2).... If on or after the time the annual report required by section (7) for calendar year 2011 is filed, a circuit has been on the worst performing circuit list for two (2) of the three (3) most recent consecutive calendar years the electrical corporation shall include detailed plans and schedules for improving the performance of that circuit in addition to the other information required by section (7)."* This report will provide the reliability measures requested by the Rule, the list of Worst Performing Circuits (WPCs), including Multi-Year Worst Performing Circuits (MWPCs), and the actions taken or planned to improve the performance of these circuits.

Definitions

For the purposes of this report, the following definitions shall apply:

1. System Average Interruption Frequency Index (SAIFI) – The average frequency of service interruptions in number of occurrences per customer (total number of customer interruptions divided by the total number of customers served).
2. Customer Average Interruption Frequency Index (CAIFI) – The average number of interruptions per customer interrupted (total number of customer interruptions divided by the total number of customers affected).
3. System Average Interruption Duration Index (SAIDI) – The average interruption in minutes per customer served (sum of all customer interruption durations divided by the total number of customers served).
4. Customer Average Interruption Duration Index (CAIDI) – The average interruption duration (sum of all customer interruption durations divided by the total number of customers interrupted).



5. Worst Performing Circuit (WPC) – A distribution circuit whose SAIFI value, adjusted to exclude major storm events per IEEE Standard 1366-2012, when compared to the SAIFI values for the other circuits in the Ameren Missouri system places it among the 5% of circuits with the highest SAIFI values in the Ameren Missouri system.
6. Multi-Year Worst Performing Circuit (MWPC) – A distribution circuit whose SAIFI value has ranked it as a Worst Performing Circuit for any two (2) of the three (3) most recent consecutive calendar years.

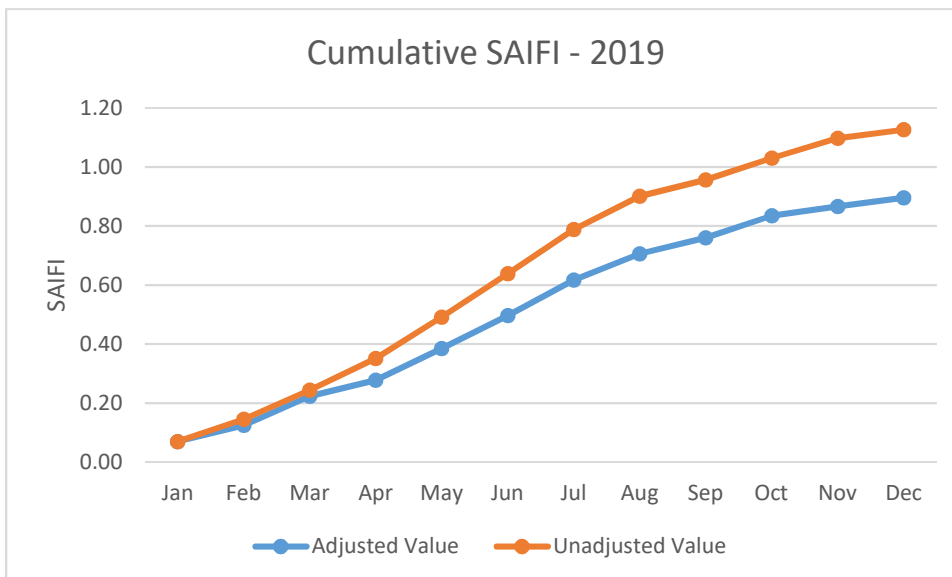


Reliability Metrics

4 CSR 240-23.010, section 3 states “The information required by section (1) shall be filed both unadjusted and adjusted to exclude major storm events per IEEE Standard 1366-2012, Guide for Electric Power Distribution Reliability Indices.” The following tables and graphs show Ameren Missouri’s unadjusted and adjusted reliability metrics for calendar year 2019:

SAIFI:

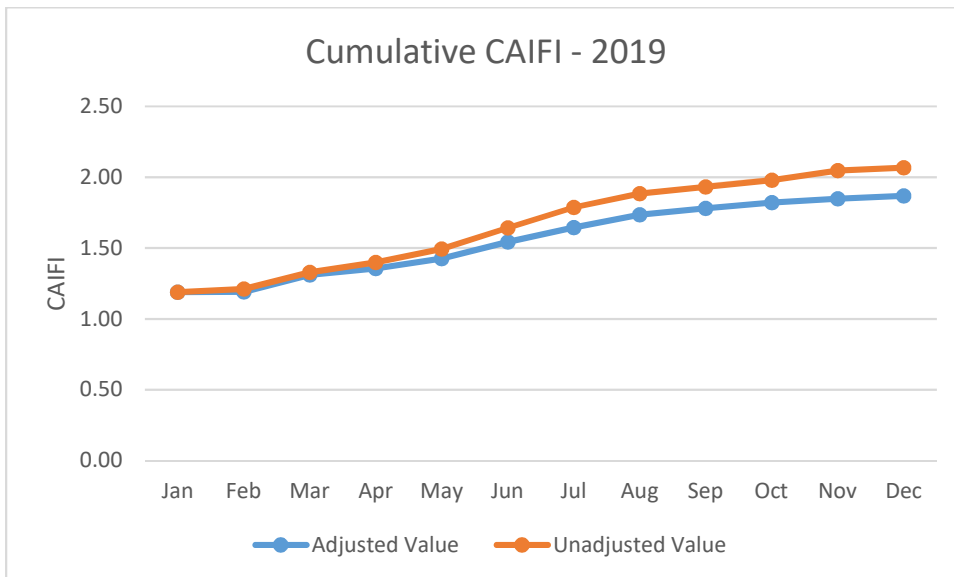
MONTH	Adjusted Value	Unadjusted Value
Jan	0.07	0.07
Feb	0.13	0.15
Mar	0.22	0.24
Apr	0.28	0.35
May	0.39	0.49
Jun	0.50	0.64
Jul	0.62	0.79
Aug	0.71	0.90
Sep	0.76	0.96
Oct	0.84	1.03
Nov	0.87	1.10
Dec	0.90	1.13





CAIFI:

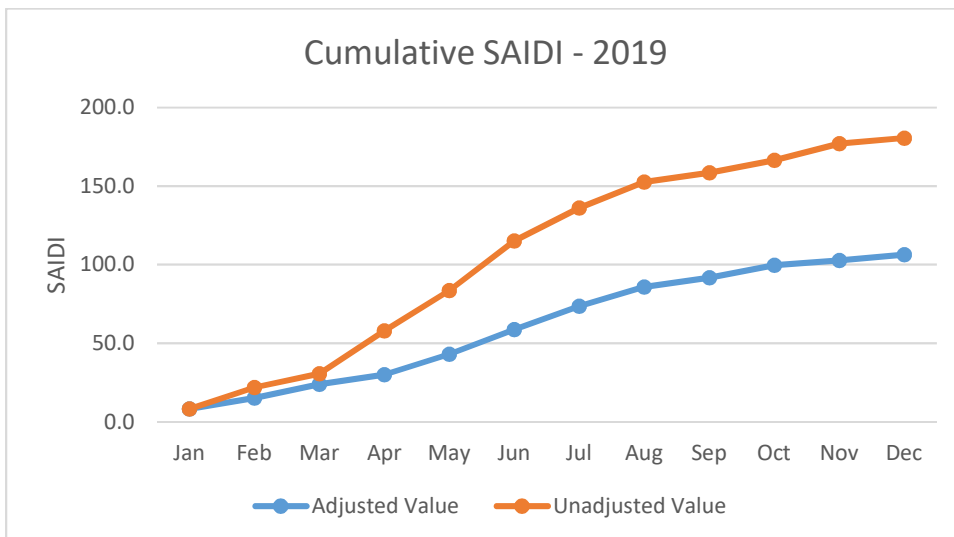
MONTH	Adjusted Value	Unadjusted Value
Jan	1.19	1.19
Feb	1.19	1.21
Mar	1.31	1.33
Apr	1.36	1.40
May	1.43	1.49
Jun	1.54	1.64
Jul	1.65	1.79
Aug	1.74	1.88
Sep	1.78	1.93
Oct	1.82	1.98
Nov	1.85	2.05
Dec	1.87	2.07





SAIDI:

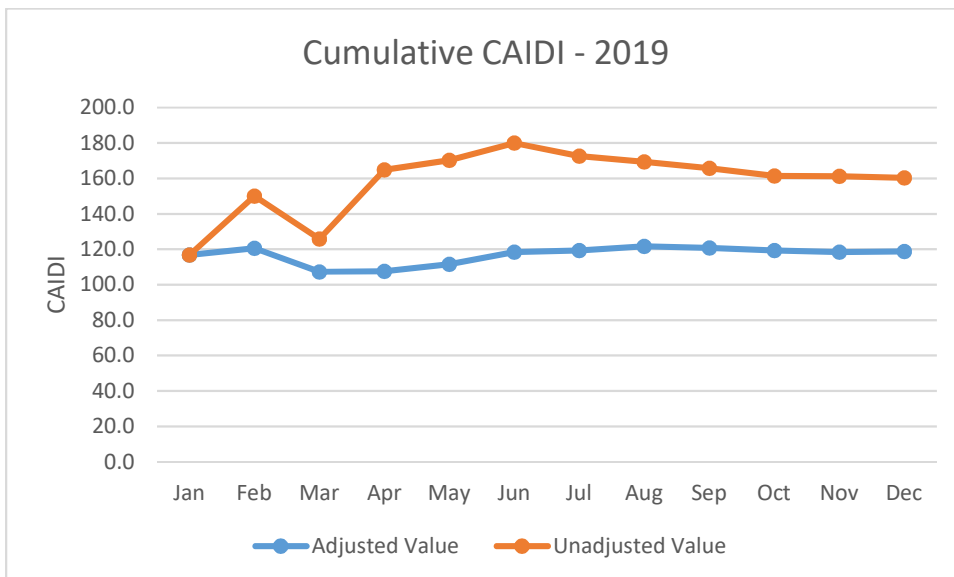
MONTH	Adjusted Value	Unadjusted Value
Jan	8.2	8.2
Feb	15.2	21.9
Mar	24.0	30.7
Apr	30.0	57.9
May	43.0	83.6
Jun	58.8	115.1
Jul	73.7	136.1
Aug	85.9	152.6
Sep	91.8	158.6
Oct	99.7	166.5
Nov	102.7	177.0
Dec	106.4	180.6





CAIDI:

MONTH	Adjusted Value	Unadjusted Value
Jan	116.8	116.8
Feb	120.7	150.0
Mar	107.3	125.9
Apr	107.6	164.9
May	111.6	170.2
Jun	118.4	180.0
Jul	119.3	172.6
Aug	121.6	169.3
Sep	120.7	165.8
Oct	119.4	161.5
Nov	118.5	161.3
Dec	118.7	160.4





Ameren Missouri 2019 Worst Performing Circuits

Ameren Missouri has performed SAIFI calculations on all of its distribution circuits in accordance with section (6) of the Rule. The circuits have been ranked in order of descending 2019 SAIFI and the 5 percent of the circuits with the highest SAIFI values have been designated as Worst Performing Circuits (WPCs). Multi-Year Worst Performing Circuits (MWPCs) have also been identified. The 2019 WPCs, including those designated as MWPCs are listed in Appendix A.

Ameren Missouri has analyzed each of the WPCs for the reasons the circuit qualifies as a WPC and the actions planned or taken to improve the WPC's performance have been included in Appendix B. Each of the WPCs in Appendix B is identified with the title "Single-Year or Multi-Year WPC Analysis and Remedial Action Report". The MWPC reports contain detailed information regarding work completed or planned to improve the performance of each of the MWPCs as required by the Rule.

Multi-Year Worst Performing Circuits not on the 2019 WPC list

The MWPCs not identified as WPCs in 2019 but which were WPCs in 2017 and 2018 are listed in Appendix C. Appendix D details the actions taken and/or planned to improve the performance of these circuits.

Conclusion

This report satisfies the reporting requirements of 4 CSR 240-23.010 for the calendar year 2019. The reported reliability metrics demonstrate continued reliable operation of Ameren Missouri's electric distribution system. With an adjusted SAIFI value of 0.90, Ameren Missouri's customers experienced, on average, less than one extended outage per year. The reported analyses and corrective actions for the Worst Performing Circuits also demonstrate Ameren Missouri's high level of focus on improving reliability and our full commitment to satisfying both the intent and the requirements of this rule.



APPENDIX A

Division	Operating Area	Circuit	Volt	Cust	CI	CMI	SAIDI	SAIFI	2017	2018	2019	Years WPC
NORTHEAST MO	LOUISIANA	672052	12	112	906	427666	3818	8.09			WPC	1
NORTHEAST MO	LOUISIANA	629053	12	257	1532	222858	867	5.96		WPC	WPC	2
ARCHVIEW	UNDERGROUND	287056	13	24	124	21015	876	5.17			WPC	1
NORTHEAST MO	KIRKSVILLE	754051	4	77	388	69482	902	5.04	WPC		WPC	2
SEMO	POTOSI	451054	13	363	1728	385134	1061	4.76	WPC		WPC	2
SEMO	DEXTER	628056	12	986	4173	397438	403	4.23			WPC	1
MERAMEC VALLEY	ELLISVILLE	279053	12	486	1993	377702	777	4.10		WPC	WPC	2
SEMO	DEXTER	690057	12	624	2436	218595	350	3.90	WPC		WPC	2
ARCHVIEW	MACKENZIE	253056	12	2230	8346	477177	214	3.74			WPC	1
ARCHVIEW	MACKENZIE	146009	4	1048	3858	270499	258	3.68		WPC	WPC	2
SEMO	DEXTER	656053	12	988	3393	236324	239	3.43			WPC	1
GATEWAY	DORSETT	235054	12	14	48	20797	1486	3.43		WPC	WPC	2
CENTRAL MO	LAKESIDE	170051	12	807	2763	323025	400	3.42	WPC		WPC	2
MERAMEC VALLEY	JEFFERSON	587055	12	2131	7053	565895	266	3.31	WPC		WPC	2
MERAMEC VALLEY	FRANKLIN	179052	12	714	2358	136747	192	3.30			WPC	1
CENTRAL MO	LAKESIDE	570057	12	1372	4515	395604	288	3.29			WPC	1
ARCHVIEW	GERALDINE	208002	4	633	2070	579973	916	3.27			WPC	1
MERAMEC VALLEY	ELLISVILLE	217051	12	308	1002	152951	497	3.25	WPC		WPC	2
SEMO	HAYTI	459051	12	667	2124	126529	190	3.18		WPC	WPC	2
ARCHVIEW	GERALDINE	104008	4	735	2334	322178	438	3.18			WPC	1
MERAMEC VALLEY	JEFFERSON	553057	12	591	1859	305685	517	3.15	WPC	WPC	WPC	3
ARCHVIEW	MACKENZIE	122001	4	511	1562	228938	448	3.06			WPC	1
GATEWAY	DORSETT	284052	12	1448	4425	331325	229	3.06			WPC	1
CENTRAL MO	EXCELSIOR SPRINGS	980052	13	277	842	65692	237	3.04			WPC	1
ARCHVIEW	MACKENZIE	116001	4	680	2048	65455	96	3.01			WPC	1
NORTHEAST MO	WENTZVILLE	386053	12	679	2040	214945	317	3.00			WPC	1
ARCHVIEW	MACKENZIE	015005	4	535	1594	184948	346	2.98			WPC	1
CENTRAL MO	JEFFERSON CITY	978053	12	348	1035	112824	324	2.97	WPC		WPC	2
NORTHEAST MO	WENTZVILLE	652055	12	1003	2974	466762	465	2.97			WPC	1
GATEWAY	BERKELEY	215053	12	1350	3979	460959	341	2.95			WPC	1
SEMO	POTOSI	473051	12	320	939	168039	525	2.93			WPC	1
NORTHEAST MO	WENTZVILLE	386051	12	679	1970	227097	334	2.90			WPC	1
MERAMEC VALLEY	FRANKLIN	132051	12	621	1758	353844	570	2.83			WPC	1
SEMO	HAYTI	457055	12	439	1234	201261	458	2.81	WPC		WPC	2
NORTHEAST MO	WENTZVILLE	386052	12	482	1338	112114	233	2.78			WPC	1
ARCHVIEW	UNDERGROUND	294056	13	13	36	11340	872	2.77	WPC		WPC	2
GATEWAY	DORSETT	123057	12	1581	4365	745865	472	2.76			WPC	1
GATEWAY	BERKELEY	214052	12	1485	4050	603881	407	2.73			WPC	1
CENTRAL MO	JEFFERSON CITY	845051	12	494	1345	236852	479	2.72			WPC	1
NORTHEAST MO	LOUISIANA	783053	12	1156	3143	286299	248	2.72		WPC	WPC	2
GATEWAY	DORSETT	145054	12	646	1755	246266	381	2.72			WPC	1



APPENDIX A

Division	Operating Area	Circuit	Volt	Cust	CI	CMI	SAIDI	SAIFI	2017	2018	2019	Years WPC
ARCHVIEW	GERALDINE	171001	4	428	1156	199689	467	2.70			WPC	1
MERAMEC VALLEY	JEFFERSON	168055	12	894	2389	298648	334	2.67		WPC	WPC	2
GATEWAY	BERKELEY	163006	4	800	2093	344221	430	2.62			WPC	1
MERAMEC VALLEY	FRANKLIN	556051	12	666	1738	163489	245	2.61			WPC	1
ARCHVIEW	MACKENZIE	150008	4	922	2380	301820	327	2.58		WPC	WPC	2
ARCHVIEW	GERALDINE	108006	4	547	1409	78956	144	2.58			WPC	1
ARCHVIEW	GERALDINE	102001	4	678	1742	207672	306	2.57			WPC	1
GATEWAY	DORSETT	262052	12	1278	3229	457530	358	2.53			WPC	1
NORTHEAST MO	BROOKFIELD	984052	12	274	690	87600	320	2.52			WPC	1
CENTRAL MO	JEFFERSON CITY	845052	12	133	334	100591	756	2.51			WPC	1
MERAMEC VALLEY	ELLISVILLE	295056	12	597	1494	285267	478	2.50	WPC		WPC	2
SEMO	DEXTER	620056	12	2	5	935	468	2.50			WPC	1
ARCHVIEW	GERALDINE	138004	4	368	917	95219	259	2.49			WPC	1
GATEWAY	BERKELEY	131004	4	343	844	316352	922	2.46			WPC	1
CENTRAL MO	JEFFERSON CITY	392053	12	198	481	223579	1129	2.43			WPC	1
ARCHVIEW	MACKENZIE	276052	12	898	2180	140955	157	2.43			WPC	1
ARCHVIEW	MACKENZIE	136052	12	687	1653	369276	538	2.41	WPC		WPC	2
MERAMEC VALLEY	JEFFERSON	185056	12	473	1126	117999	249	2.38			WPC	1
ARCHVIEW	GERALDINE	225002	4	566	1346	561270	992	2.38			WPC	1
MERAMEC VALLEY	JEFFERSON	549052	12	667	1585	76717	115	2.38			WPC	1
SEMO	HAYTI	466055	12	139	329	47562	342	2.37			WPC	1
MERAMEC VALLEY	JEFFERSON	576051	12	502	1184	127230	253	2.36			WPC	1
MERAMEC VALLEY	JEFFERSON	195054	12	1044	2443	168598	161	2.34			WPC	1
CENTRAL MO	BOONVILLE	949053	12	1907	4458	583225	306	2.34			WPC	1
GATEWAY	DORSETT	178054	12	1405	3249	289874	206	2.31			WPC	1
CENTRAL MO	EXCELSIOR SPRINGS	717052	12	758	1738	171279	226	2.29			WPC	1
CENTRAL MO	ELDON	686052	12	286	654	115917	405	2.29			WPC	1
GATEWAY	DORSETT	297052	12	492	1125	143180	291	2.29			WPC	1
ARCHVIEW	GERALDINE	086005	4	139	316	4420	32	2.27			WPC	1
ARCHVIEW	MACKENZIE	034007	4	473	1073	208183	440	2.27			WPC	1
MERAMEC VALLEY	JEFFERSON	190054	12	1354	3062	371628	274	2.26			WPC	1
MERAMEC VALLEY	ELLISVILLE	115059	12	720	1620	241854	336	2.25			WPC	1
GATEWAY	BERKELEY	214054	12	362	812	74612	206	2.24			WPC	1
NORTHEAST MO	WENTZVILLE	679052	12	557	1248	142335	256	2.24			WPC	1
ARCHVIEW	GERALDINE	044001	4	498	1112	178978	359	2.23			WPC	1
SEMO	CAPE GIRARDEAU	603005	4	98	218	21579	220	2.22		WPC	WPC	2
MERAMEC VALLEY	FRANKLIN	507051	12	512	1138	420801	822	2.22			WPC	1
CENTRAL MO	LAKESIDE	570051	12	1321	2918	418006	316	2.21			WPC	1
GATEWAY	DORSETT	182001	4	366	807	291718	797	2.20	WPC		WPC	2



APPENDIX A

Division	Operating Area	Circuit	Volt	Cust	CI	CMI	SAIDI	SAIFI	2017	2018	2019	Years WPC
GATEWAY	BERKELEY	167056	12	728	1598	218938	301	2.20			WPC	1
GATEWAY	BERKELEY	039002	4	667	1459	103769	156	2.19			WPC	1
ARCHVIEW	MACKENZIE	020004	4	380	830	51541	136	2.18			WPC	1
ARCHVIEW	MACKENZIE	110057	12	33	72	77677	2354	2.18			WPC	1
MERAMEC VALLEY	FRANKLIN	505051	12	469	1023	51333	109	2.18			WPC	1
ARCHVIEW	MACKENZIE	166002	4	344	749	62098	181	2.18			WPC	1
MERAMEC VALLEY	ELLISVILLE	295052	12	874	1900	278490	319	2.17	WPC		WPC	2
ARCHVIEW	GERALDINE	238004	4	748	1615	186241	249	2.16		WPC	WPC	2
NORTHEAST MO	WENTZVILLE	655058	12	1162	2506	197804	170	2.16			WPC	1
ARCHVIEW	MACKENZIE	137057	12	1973	4231	594122	301	2.14			WPC	1
MERAMEC VALLEY	JEFFERSON	211056	12	1123	2385	234612	209	2.12			WPC	1
SEMO	HAYTI	456055	12	88	186	32144	365	2.11	WPC		WPC	2
GATEWAY	DORSETT	266055	12	89	188	8177	92	2.11		WPC	WPC	2
MERAMEC VALLEY	FRANKLIN	132056	12	1134	2368	249943	220	2.09			WPC	1
NORTHEAST MO	KIRKSVILLE	855052	13	278	579	158304	569	2.08			WPC	1
ARCHVIEW	GERALDINE	138002	4	510	1062	87342	171	2.08			WPC	1
GATEWAY	BERKELEY	162059	12	1256	2615	314808	251	2.08			WPC	1
SEMO	CAPE GIRARDEAU	864005	4	345	718	83310	241	2.08			WPC	1
NORTHEAST MO	WENTZVILLE	666051	12	317	659	235539	743	2.08			WPC	1
SEMO	DEXTER	678003	4	387	802	82159	212	2.07			WPC	1
GATEWAY	DORSETT	147051	12	391	808	99444	254	2.07		WPC	WPC	2
SEMO	DEXTER	685053	12	478	987	137448	288	2.06		WPC	WPC	2
ARCHVIEW	GERALDINE	159002	4	56	115	20010	357	2.05			WPC	1
SEMO	HAYTI	464054	12	875	1794	92731	106	2.05	WPC		WPC	2
CENTRAL MO	MEXICO	888001	2	62	127	17348	280	2.05			WPC	1
ARCHVIEW	GERALDINE	148002	4	97	198	16470	170	2.04			WPC	1
SEMO	HAYTI	454055	12	1044	2124	262573	252	2.03			WPC	1
ARCHVIEW	MACKENZIE	273053	12	1812	3670	155726	86	2.03			WPC	1
GATEWAY	BERKELEY	154003	4	395	799	91940	233	2.02			WPC	1
ARCHVIEW	GERALDINE	025005	4	284	572	197380	695	2.01			WPC	1
ARCHVIEW	GERALDINE	251008	4	365	735	87971	241	2.01			WPC	1
CENTRAL MO	JEFFERSON CITY	847001	2	107	215	36793	344	2.01			WPC	1
ARCHVIEW	GERALDINE	017010	4	245	491	24606	100	2.00		WPC	WPC	2
ARCHVIEW	MACKENZIE	020011	4	490	980	72226	147	2.00			WPC	1



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 015005
Division: ARCHVIEW
ZIP Codes(s) Served: 63111, 63116
Customers Served: 535
Customer Interruptions (CI): 1594
SAIFI Value: 2.98
SAIDI Value: 346

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	1593	99.94	4
UNKNOWN	1	0.06	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents account for 99% of the customer interruptions in 2019. The first was due to a switch failure that was replaced on work request 21MT717705. The second was due to an underground dip cable failure that was repaired on OAS 191143146. A full cycle tree trim was completed in 2019. The outages were unrelated, no further circuit work is planned at this time.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 017010
Division: ARCHVIEW
ZIP Codes(s) Served: 63104
Customers Served: 245
Customer Interruptions (CI): 491
SAIFI Value: Y2017 - 0.00; Y2018 - 1.96; Y2019 - 2.00
SAIDI Value: 100

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	1	490	0	0.00	0
EQUIPMENT/UG	0	0	245	49.90	1
PUBLIC	0	0	0	0.00	0
TREE	0	0	1	0.20	1
UNKNOWN	0	0	245	49.90	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) The primary conductor was blown off the insulator pins on pole 104589 and repaired on OAS 183053917. On another section of the circuit the primary was loose and was tightened on OAS 183053088. An infrared inspection was completed in February with no issues found. A drone inspection has been requested for this circuit. Engineering will also check all taps on this circuit to ensure they are fused properly.

Corrective Actions Planned

Two underground malfunction incidents caused nearly 100% of the customer interruptions on this circuit in 2019. The cause could not be determined for the first incident, with the second being caused by a cable failure which was replaced on work request 21MT714218. A mid-cycle tree trim and underground visual inspection were completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 020004
Division: ARCHVIEW
ZIP Codes(s) Served: 63102, 63104
Customers Served: 380
Customer Interruptions (CI): 830
SAIFI Value: 2.18
SAIDI Value: 136

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	43	5.18	4
PUBLIC	1	0.12	1
UNKNOWN	786	94.70	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents in one day account for 94% of the customer interruptions in 2019. The incidents caused circuit outages during a thunderstorm. The circuit was patrolled at the time of the incidents on OAS 191913743 and 191914289 and no issue was found. The circuit was re-energized and no further issues occurred. A mid-cycle tree trim was completed in 2019. An underground detailed inspection was performed in 2019 and an overhead groundline inspection is planned for 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 020011
Division: ARCHVIEW
ZIP Codes(s) Served: 63104, 63118, 63119
Customers Served: 490
Customer Interruptions (CI): 980
SAIFI Value: 2.00
SAIDI Value: 147

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	493	50.31	5
EQUIPMENT/UG	486	49.59	1
UNKNOWN	1	0.10	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents account for 99% of the customer interruptions in 2019. One was due to a primary conductor failing on a windy day. The conductor was repaired on OAS 190732567. The second was due to an underground cable failure that was repaired on work request 21MT724563. A mid-cycle tree trim was completed in 2019. Underground visual and overhead groundline inspections will be performed in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 025005
Division: ARCHVIEW
ZIP Codes(s) Served: 63108, 63113
Customers Served: 284
Customer Interruptions (CI): 572
SAIFI Value: 2.01
SAIDI Value: 695

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	258	45.10	6
OTHER	13	2.27	3
TREE	301	52.62	7

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents caused 89% of the customer interruptions on this circuit in 2019. The first was an overhead malfunction resulting in broken overhead primary. Repairs were completed on work request 21MT719021. The second was a broken tree during a thunderstorm which took down the primary and secondary conductors. Repairs were completed on OAS 191775344. A full cycle tree trim was completed in 2019. No additional work is planned in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 034007
Division: ARCHVIEW
ZIP Codes(s) Served: 63119, 63122
Customers Served: 473
Customer Interruptions (CI): 1073
SAIFI Value: 2.27
SAIDI Value: 440

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	39	3.63	7
OTHER	1	0.09	1
PUBLIC	438	40.82	1
TREE	586	54.61	7
UNKNOWN	9	0.84	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents caused 82% of the customer interruptions in 2019. The first resulted from a public vehicle hitting and breaking a pole, repairs were made on work request 21MT722186. The second occurred during a thunderstorm when a tree fell and broke several crossarms and the primary conductor. Repairs were made on OAS 191566047. There are no recurring problems on the circuit and no other work is required at this time. A mid-cycle tree trim, an overhead groundline and an underground visual inspection were performed in 2019. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 039002
Division: GATEWAY
ZIP Codes(s) Served: 63031, 63042, 63134, 63135
Customers Served: 667
Customer Interruptions (CI): 1459
SAIFI Value: 2.19
SAIDI Value: 156

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	711	48.73	6
LIGHTNING	52	3.56	1
TREE	84	5.76	3
UNKNOWN	612	41.95	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Failed overhead connectors and lightning caused 90% of the customer interruptions in 2019. This circuit will be upgraded to 12kV construction standards and transferred to the new 138-12kV Pershall Substation in 2021. The work will include replacing all 4kV transformers with dual voltage transformers, installing 12kV rated insulators and lightning arrestors and converting some 3-phase backbone from overhead to underground. No other work is recommended at this time. A full cycle tree trim was completed in 2019. An underground detailed inspection was completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 044001
Division: ARCHVIEW
ZIP Codes(s) Served: 63124, 63125
Customers Served: 498
Customer Interruptions (CI): 1112
SAIFI Value: 2.23
SAIDI Value: 359

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EMPLOYEES	6	0.54	1
EQUIPMENT/OH	1000	89.93	3
LIGHTNING	4	0.36	1
TREE	102	9.17	9

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

The substation breaker tripped on 6/21/2019 accounting for 89% of the circuit's customer interruptions (994 out of 1112). The circuit was patrolled and no issues were found. Several fused tap and transformer outages account for the remaining customer interruptions. There are no recurring problems on the circuit and no other work is required at this time. A full cycle trim is scheduled in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 086005
Division: ARCHVIEW
ZIP Codes(s) Served: 63106, 63107
Customers Served: 139
Customer Interruptions (CI): 316
SAIFI Value: 2.27
SAIDI Value: 32

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/UG	278	87.97	2
OTHER	1	0.32	1
TREE	37	11.71	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

An underground malfunction incident caused 89% of the customer interruptions in 2019. Primary cable failed and was replaced on work request 21MT718804. Overhead visual and underground visual inspections are scheduled in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 102001
Division: ARCHVIEW
ZIP Codes(s) Served: 63130
Customers Served: 678
Customer Interruptions (CI): 1742
SAIFI Value: 2.57
SAIDI Value: 306

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	120	6.89	12
EQUIPMENT/UG	30	1.72	3
TREE	1533	88.00	5
UNKNOWN	59	3.39	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

One incident caused 88% of the customer interruptions in 2019. This incident was due to a tree uprooting and taking down a span of primary. The primary was repaired on work request 21MT722070. A full cycle tree trim is scheduled in 2020. No further circuit work is planned at this time.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 104008
Division: ARCHVIEW
ZIP Codes(s) Served: 63121, 63136
Customers Served: 735
Customer Interruptions (CI): 2334
SAIFI Value: 3.18
SAIDI Value: 438

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	1580	67.72	10
PUBLIC	740	31.72	1
TREE	5	0.21	5
UNKNOWN	8	0.34	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Three incidents caused 96% of the customer interruptions in 2019. The first two incidents were due to overhead malfunctions. The third was a public vehicle hitting a pole and breaking the primary conductor. The circuit was inspected and no other problems were found. A mid-cycle tree trim is scheduled in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 108006
Division: ARCHVIEW
ZIP Codes(s) Served: 63137, 63141
Customers Served: 547
Customer Interruptions (CI): 1409
SAIFI Value: 2.58
SAIDI Value: 144

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	18	1.28	3
LIGHTNING	23	1.64	2
PUBLIC	813	57.86	8
TREE	551	39.22	7

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents caused 74% of the customer interruptions on this circuit in 2019. The first was a public vehicle accident which broke a pole, repairs were made on work request 21MT713749. The second occurred when a tree branch broke and fell into the primary conductors. A full cycle tree trim was completed in 2019.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 110057
Division: ARCHVIEW
ZIP Codes(s) Served: 63026
Customers Served: 33
Customer Interruptions (CI): 72
SAIFI Value: 2.18
SAIDI Value: 2354

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	1	1.39	1
EQUIPMENT/OH	67	93.06	3
LIGHTNING	1	1.39	1
PUBLIC	1	1.39	1
TREE	2	2.78	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

The circuit breaker at the substation tripped on 12/26/2019. The circuit was patrolled and no issues were found. A tree took down a span of 4ACSR and caused a recloser lockout on a section of circuit 560-53 while temporarily tied to 110-57 on 2/2/2019. Repairs were made on work request 26JF146890. It is important to note that no customers normally served by 110-57 were affected by this outage. These two outages represented the majority of the customer interruptions on this circuit. There are no recurring problems on the circuit and no other work is required at this time. A mid-cycle tree trim, overhead groundline and underground visual inspections were performed in 2019. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 115059
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63011
Customers Served: 720
Customer Interruptions (CI): 1620
SAIFI Value: 2.25
SAIDI Value: 336

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	2	0.12	1
EQUIPMENT/UG	137	8.46	8
LIGHTNING	5	0.31	1
TREE	1475	91.05	3
UNKNOWN	1	0.06	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Trees on private property caused 79% of the customer interruptions in 2019. A full cycle tree trim is scheduled in 2020. No other work is planned.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 116001
Division: ARCHVIEW
ZIP Codes(s) Served: 63104, 63110, 63118
Customers Served: 680
Customer Interruptions (CI): 2048
SAIFI Value: 3.01
SAIDI Value: 96

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	690	33.69	3
EQUIPMENT/UG	1349	65.87	2
LIGHTNING	2	0.10	2
OTHER	1	0.05	1
PUBLIC	1	0.05	1
TREE	5	0.24	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents caused 99% of the customer interruptions in 2019. The first was a circuit outage which was patrolled at the time of the incident on OAS 190782719 and OAS 190782817 and no issues were found. The circuit was re-energized without incident. The second incident was an underground exit cable failure which was repaired on work request 21MT720268. A mid-cycle trim is scheduled for 2020. An underground detailed inspection was performed in 2019 and an overhead visual inspection is planned for 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 122001
Division: ARCHVIEW
ZIP Codes(s) Served: 63111, 63125
Customers Served: 511
Customer Interruptions (CI): 1562
SAIFI Value: 3.06
SAIDI Value: 448

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	543	34.76	5
LIGHTNING	1	0.06	1
PUBLIC	507	32.46	1
TREE	509	32.59	1
UNKNOWN	2	0.13	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Three incidents caused 98% of the customer interruptions in 2019. The first was due to a tree clearance issue during snowy conditions. The tree was trimmed away from the primary on OAS 190190842. The second issue was a pole burning in rainy conditions resulting in downed primary which was repaired on OAS 191030695. The third issue was due to a public vehicle hitting and breaking a pole. A full cycle tree trim was completed in 2019. The outages were unrelated, no further circuit work is planned at this time.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 123057
Division: GATEWAY
ZIP Codes(s) Served: 63088, 63122
Customers Served: 1581
Customer Interruptions (CI): 4365
SAIFI Value: 2.76
SAIDI Value: 472

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	1	0.02	1
EQUIPMENT/OH	2064	47.29	31
EQUIPMENT/UG	104	2.38	4
OTHER	1	0.02	1
PUBLIC	6	0.14	1
TREE	1611	36.91	6
UNKNOWN	578	13.24	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

There were two circuit outages that accounted for 58% of the customer interruptions in 2019. The first was due to a tree that fell onto the overhead lines along Marshall Road causing an overhead equipment malfunction. Repairs to the overhead lines and equipment were made under work request 21MT720228. The second was due to an overhead equipment malfunction and a broken switch along North Ballas Road. Repairs to the overhead facilities were made under work request 21MT729335. A mid-cycle tree trim was completed in 2019. Overhead groundline and underground visual inspections are scheduled in 2020. Any repair work identified as a result of the circuit inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 131004
Division: GATEWAY
ZIP Codes(s) Served: 63135, 63136
Customers Served: 343
Customer Interruptions (CI): 844
SAIFI Value: 2.46
SAIDI Value: 922

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	352	41.71	5
PUBLIC	343	40.64	1
TREE	149	17.65	4

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

There were 2 circuit outages that accounted for 81% of the customer interruptions in 2019. The first circuit outage was caused by a public vehicle accident that damaged a pole and caused overhead lines to fall on a car. Repairs were completed on work request 21MT714262. The second circuit outage was caused by one phase of a 34kV line falling on circuit 131-4. Repairs were completed on work request 21MT729633. A full cycle tree trim is scheduled for 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 132051
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63039, 63055, 63089
Customers Served: 621
Customer Interruptions (CI): 1758
SAIFI Value: 2.83
SAIDI Value: 570

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	4	0.23	2
EQUIPMENT/OH	831	47.27	6
PUBLIC	18	1.02	1
TREE	905	51.48	12

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two tree related incidents during thunderstorms resulted in 51% of the 2019 customer interruptions. Another 47% of customer interruptions were due to equipment malfunctions. A review of the circuit identified several direct tapped transformers on the three-phase backbone. Fuse installations are planned for these transformers on work request 23FR066740. A mid-cycle tree trim was completed in 2019.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 132056
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63055, 63084, 63089
Customers Served: 1134
Customer Interruptions (CI): 2368
SAIFI Value: 2.09
SAIDI Value: 220

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	3	0.13	3
EQUIPMENT/OH	1387	58.57	12
EQUIPMENT/UG	123	5.19	3
LIGHTNING	9	0.38	6
OTHER	1	0.04	1
PUBLIC	320	13.51	5
TREE	143	6.04	10
UNKNOWN	382	16.13	4

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

A direct tapped transformer failure on the three-phase backbone caused 59% of the customer interruptions in late 2019. Work request 23FR065964 was completed to install a fuse and replace the failed equipment. Another 14% of the customer interruptions were caused by a public vehicle hitting a pole and required a pole replacement. No further actions are planned at this time.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 136052
Division: ARCHVIEW
ZIP Codes(s) Served: 63123, 63129
Customers Served: 687
Customer Interruptions (CI): 1653
SAIFI Value: Y2017 - 2.05; Y2018 - 0.23; Y2019 - 2.41
SAIDI Value: 538

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/UG	0	0	38	2.30	5
PUBLIC	0	0	575	34.79	6
TREE	0	0	1038	62.79	3
UNKNOWN	0	0	2	0.12	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2017) Three incidents accounted for 88% of the customer interruptions in 2017. The first was due to a tree breaking in high winds resulting in a broken crossarm that was repaired on work request 21MT672947. The second was due to the circuit breaker tripping during a thunderstorm, possibly due to trees but could not be verified. The third issue was a primary down that was repaired on OAS 173611573. A mid-cycle tree trim was completed in 2018 as well as overhead and underground visual inspections. Any repair work identified as a result of the inspections was completed in accordance with Ameren Missouri's infrastructure inspection policy. Division engineering patrolled the circuit in 2018 to determine if any additional protection devices were needed. In 2018 automated Intellirupter switches were installed at the midpoint and tie point of this circuit on work requests 21MT694947 and 21MT694949. This circuit was not on the Worst Performing Circuit list in 2018.

Corrective Actions Planned

Three incidents account for 94% of the customer interruptions in 2019. The first was a tree leaning on the primary. The tree was cut back on OAS 191401574. The second issue occurred one day later when the same tree came back over into the line before it could be removed. The tree was removed on OAS 191411862. The third issue was due to a customer having a tree removed and their tree removal fell into the primary. Operating and Relay are verifying coordination between the automated switches installed in 2018 and the circuit breaker. A full cycle tree trim is planned for 2020. No further work is planned at this time.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 137057
Division: ARCHVIEW
ZIP Codes(s) Served: 63123, 63125
Customers Served: 1973
Customer Interruptions (CI): 4231
SAIFI Value: 2.14
SAIDI Value: 301

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	49	1.16	3
EQUIPMENT/OH	2094	49.49	7
EQUIPMENT/UG	12	0.28	1
LIGHTNING	7	0.17	1
OTHER	1	0.02	1
TREE	2068	48.88	6

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents account for 93% of the customer interruptions in 2019. The first was due to a primary conductor broken by a fallen tree on a windy day. Repairs were completed on OAS 190738068. The second was due to a broken primary conductor during a thunderstorm that was repaired on work request 21MT722421. Engineering is evaluating the tap fuse near this location to determine if it can be moved upstream of where this incident occurred. A mid-cycle tree trim was completed in 2019. Underground visual and overhead visual inspections were performed in 2019. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 138002
Division: ARCHVIEW
ZIP Codes(s) Served: 63107, 63113, 63115
Customers Served: 510
Customer Interruptions (CI): 1062
SAIFI Value: 2.08
SAIDI Value: 171

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EMPLOYEES	1	0.09	1
EQUIPMENT/OH	36	3.40	11
EQUIPMENT/UG	976	92.08	2
OTHER	13	1.23	2
TREE	17	1.60	3
UNKNOWN	17	1.60	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

One underground cable incident caused nearly 100% of the customer interruptions in 2019. The failed cable was replaced on work request 21MT722958. A full cycle tree trim was completed in 2019. Overhead visual and underground visual inspections are scheduled in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 138004
Division: ARCHVIEW
ZIP Codes(s) Served: 63113, 63115
Customers Served: 368
Customer Interruptions (CI): 917
SAIFI Value: 2.49
SAIDI Value: 259

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	516	56.21	4
EQUIPMENT/UG	385	41.94	2
LIGHTNING	14	1.53	1
OTHER	1	0.11	1
PUBLIC	1	0.11	1
TREE	1	0.11	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two overhead malfunctions and an underground malfunction caused 98% of the customer interruptions on this circuit in 2019. An overhead transformer failed and caused the first incident. The second was an underground cable fault on 138002 while it was tied to this circuit. Broken primary (#6Cu) caused the third incident. An underground visual inspection is scheduled in 2020. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 145054
Division: GATEWAY
ZIP Codes(s) Served: 63124, 63131, 63146
Customers Served: 646
Customer Interruptions (CI): 1755
SAIFI Value: 2.72
SAIDI Value: 381

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	18	1.03	4
EQUIPMENT/OH	4	0.23	2
EQUIPMENT/UG	18	1.03	2
LIGHTNING	4	0.23	3
OTHER	10	0.57	2
PUBLIC	1273	72.54	4
TREE	115	6.55	9
UNKNOWN	313	17.83	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

A single incident caused approximately 73% of the customer interruptions on this circuit in 2019 when a public vehicle struck and broke a pole. The pole and equipment were repaired on work request 21MT719638. An additional engineering review will be performed in 2020. An overhead groundline inspection and mid-cycle tree trim were completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 146009
Division: ARCHVIEW
ZIP Codes(s) Served: 63111, 63116, 63118
Customers Served: 1048
Customer Interruptions (CI): 3858
SAIFI Value: Y2017 - 0.06; Y2018 - 1.99; Y2019 - 3.68
SAIDI Value: 258

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
CUSTOMER	25	0	0	0.00	0
EMPLOYEES	0	0	0	0.00	0
EQUIPMENT/OH	2	47	3428	88.85	6
EQUIPMENT/UG	0	2037	0	0.00	0
LIGHTNING	0	0	22	0.57	1
OTHER	1	0	1	0.03	1
PUBLIC	22	0	51	1.32	1
TREE	11	1	0	0.00	0
UNKNOWN	1	0	356	9.23	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Two incidents caused 98% of the customer interruptions in 2018. One was an underground cable failure in a dip between two overhead sections. Repairs were completed under work request 21MT689606. The second was an underground cable failure in the circuit exit cable repaired under work request 21MT708434. A full cycle tree trim was performed in 2018. The cable failures were in completely unrelated sections of cable and both failed sections have been repaired. No further work is planned.

Corrective Actions Planned

Three incidents caused 88% of the customer interruptions in 2019. All three incidents were related and occurred between 2/2/19-2/6/19. The incidents were due to an intermittent failure on the exit cable. All 4,200 feet of existing lead cable from the substation to the terminal pole have been replaced with new 3-750Cu cable on work request 21MT715670. Special drone and infrared inspections were performed and work identified as a result of the inspections was completed on work request 21MT715439. A mid-cycle tree trim, underground detailed and overhead visual inspections will be performed in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 147051
Division: GATEWAY
ZIP Codes(s) Served: 63122, 63141
Customers Served: 391
Customer Interruptions (CI): 808
SAIFI Value: Y2017 - 0.01; Y2018 - 1.78; Y2019 - 2.07
SAIDI Value: 254

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	0	20	2	0.25	2
CUSTOMER	1	25	0	0.00	0
EQUIPMENT/OH	2	76	800	99.01	5
EQUIPMENT/UG	1	288	3	0.37	2
LIGHTNING	0	0	0	0.00	0
TREE	0	1	0	0.00	0
UNKNOWN	1	288	3	0.37	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) The largest outage in 2018 for this circuit was caused by a 34kV circuit outage due to two burned sleeves on the 34kV cable at pole 21333. This outage, in turn, caused the distribution circuit's breaker to trip at the substation. The 34kV cable was repaired under OAS 182263020. Other outages included a customer-requested planned outage and a burnt jumper on a single phase conductor, which was repaired under work request 21MT690653. No further corrective actions are recommended at this time.

Corrective Actions Planned

A suspected lightning strike caused 84% of the customer interruptions in 2019. Two spans of primary were down near the intersection of New Ballas Rd and Magna Carta Dr. with a large burn mark at the middle of one span. The wire was replaced under work request 21MT720164. A full cycle tree trim was completed in 2019, with additional tree trimming in the Magna Carta area in late May/early June. Engineering will review the area in 2020 to determine if an overhead to underground conversion project would be beneficial.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 148002
Division: ARCHVIEW
ZIP Codes(s) Served: 63102, 63103, 63104
Customers Served: 97
Customer Interruptions (CI): 198
SAIFI Value: 2.04
SAIDI Value: 170

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	196	98.99	4
EQUIPMENT/UG	2	1.01	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

One incident caused nearly 99% of the customer interruptions on this circuit in 2019. An overhead transformer failed and was replaced on OAS 192464889. A mid-cycle tree trim and underground visual inspection were completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 150008
Division: ARCHVIEW
ZIP Codes(s) Served: 63111, 63116
Customers Served: 922
Customer Interruptions (CI): 2380
SAIFI Value: Y2017 - 0.11; Y2018 - 2.03; Y2019 - 2.58
SAIDI Value: 327

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
EMPLOYEES	0	1	0	0.00	0
EQUIPMENT/OH	67	42	977	41.05	10
LIGHTNING	0	5	0	0.00	0
OTHER	14	16	4	0.17	4
PUBLIC	16	0	0	0.00	0
TREE	1	1805	1399	58.78	2
UNKNOWN	1	0	0	0.00	0

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Two incidents caused 96% of the customer interruptions in 2018. Both incidents were related to downed primary conductors caused by tree issues in a storm. One was repaired under OAS 181346192 and the other under work request 21MT697947. A full cycle tree trim was completed in Fall 2018. Engineering field checked the site where the 2018 tree issues occurred and verified the tree condition has been cleared.

Corrective Actions Planned

Two incidents caused 97% of the customer interruptions in 2019. The first outage occurred on a calm day. The circuit was inspected and no cause was found allowing the circuit to be restored without further incident. The second incident was due to a tree breaking on a windy day and falling into the primary lines breaking a pole and causing the lines to come down. Repairs were made on OAS 190734497. The outages do not appear to be related. A mid-cycle tree trim will be completed in 2020. Underground detailed and overhead visual inspections are scheduled in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 154003
Division: GATEWAY
ZIP Codes(s) Served: 63011, 63033
Customers Served: 395
Customer Interruptions (CI): 799
SAIFI Value: 2.02
SAIDI Value: 233

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	391	48.94	1
EQUIPMENT/UG	395	49.44	1
TREE	13	1.63	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

There were two circuit outages that accounted for 98% of the customer interruptions in 2019. The first circuit outage was caused by a failed disconnect switch which was replaced on work request 21MT720172. The second circuit outage was caused by failed underground cable at the substation which was repaired on work request 21MT735417. A full cycle tree trim was completed in 2019. No additional work is required at this time.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 159002
Division: ARCHVIEW
ZIP Codes(s) Served: 63147
Customers Served: 56
Customer Interruptions (CI): 115
SAIFI Value: 2.05
SAIDI Value: 357

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	115	100.00	5

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents caused nearly 100% of the customer interruptions on this circuit in 2019. The first occurred when a jumper failed on pole 150064. Repairs were completed on work request 21MT714666. The second incident was due to two spans of damaged primary on phases B & C. Repairs were completed on work request 21MT728731. A mid-cycle tree trim and underground visual inspection were completed in 2019. An overhead visual inspection is scheduled for 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 162059
Division: GATEWAY
ZIP Codes(s) Served: 63031, 63033, 63034
Customers Served: 1256
Customer Interruptions (CI): 2615
SAIFI Value: 2.08
SAIDI Value: 251

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	254	9.70	7
CUSTOMER	18	0.69	1
EQUIPMENT/OH	316	12.07	9
EQUIPMENT/UG	7	0.27	2
LIGHTNING	87	3.32	2
OTHER	1259	48.09	1
TREE	508	19.40	7
UNKNOWN	169	6.46	5

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

A substation malfunction caused 48% of the customer interruptions in 2019 and another 19% were caused by tree issues. Cross Keys Substation will be upgraded with 2 new transformers and 2 new switchgear in 2021. Division engineering plans to install Trip Savers on this circuit to reduce circuit outages. A full cycle tree trim and an underground visual inspection are scheduled in 2020. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 163006
Division: GATEWAY
ZIP Codes(s) Served: 63136
Customers Served: 800
Customer Interruptions (CI): 2093
SAIFI Value: 2.62
SAIDI Value: 430

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	1074	51.44	6
OVERLOAD	33	1.58	2
TREE	981	46.98	13

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Broken trees which caused damage to poles and overhead primary in multiple locations during a windstorm caused 46% of the customer interruptions during 2019. Another incident on a rainy day caused 42% of the customer interruptions due to an overhead malfunction and broken primary. A mid-cycle tree trim and an overhead visual inspection are scheduled in 2020. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy. No additional work is required at this time.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 166002
Division: ARCHVIEW
ZIP Codes(s) Served: 63119, 63122
Customers Served: 344
Customer Interruptions (CI): 749
SAIFI Value: 2.18
SAIDI Value: 181

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	2	0.27	1
EQUIPMENT/UG	704	93.87	7
OTHER	1	0.13	1
TREE	43	5.73	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two sections of the underground exit cable failed on two separate occasions on 6/27/2019 and 7/9/2019. The cable was isolated and the sections were replaced on work requests 21MT724061 and 21MT724731. These two outages caused 92% of the customer interruptions (689 out of 749). Several other fused tap and transformer outages caused the bulk of the remaining outages. There are no recurring problems on the circuit and no other work is required at this time. A full cycle tree trim is scheduled in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 167056
Division: GATEWAY
ZIP Codes(s) Served: 63136, 63137, 63138
Customers Served: 728
Customer Interruptions (CI): 1598
SAIFI Value: 2.20
SAIDI Value: 301

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	1	0.06	1
EQUIPMENT/OH	27	1.69	4
EQUIPMENT/UG	1	0.06	1
LIGHTNING	720	45.06	1
PUBLIC	1	0.06	1
TREE	822	51.44	9
UNKNOWN	26	1.63	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Broken tree limbs and lightning caused 96% of the customer interruptions on this circuit in 2019. A field review identified two additional isolation points where distribution automation switches will be installed on this circuit in 2020. A mid-cycle tree trim, underground visual and overhead groundline inspections were performed in 2019. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 168055
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63028, 63050, 63070
Customers Served: 894
Customer Interruptions (CI): 2389
SAIFI Value: Y2017 - 0.25; Y2018 - 2.06; Y2019 - 2.67
SAIDI Value: 334

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	1	2	5	0.21	2
CUSTOMER	27	0	0	0.00	0
EQUIPMENT/OH	39	4	1810	75.76	11
EQUIPMENT/UG	3	15	14	0.59	2
OTHER	0	0	2	0.08	1
OVERLOAD	144	0	0	0.00	0
PUBLIC	0	12	0	0.00	0
TREE	10	12	318	13.31	16
UNKNOWN	0	1780	240	10.05	6

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) The circuit experienced two outages with no causes found, one in March in calm weather and one in December in windy conditions. These two outages resulted in 97% of the customer interruptions in 2018. In 2019 another circuit outage occurred due to failure of a 3-phase capacitor bank installed near the end of the circuit. There are several layers of system protection between the capacitor and the circuit's breaker. A coordination study determined that protection coordination was well within tolerances. A drone thermal scan of the circuit backbone will be scheduled to find possible causes for the circuit outages.

Corrective Actions Planned

In 2019, two incidents accounted for 74% of the customer interruptions on this circuit. One was due to a lightning strike and subsequent capacitor damage causing the unit to malfunction. The equipment will be replaced on work request 26JF147157. The other was during rainy conditions and attributed to a tree contacting two phases and tripping the circuit breaker. Tree contact on a transformer caused another 6% of the customer interruptions causing a recloser (#2098) lock out during rainy conditions. A mid-cycle tree trim was performed in 2019. An engineering inspection is planned for 2020 to ensure no further action is required.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 170051
Division: CENTRAL MO
ZIP Codes(s) Served: 65026, 65049, 65065, 65072,
Customers Served: 807
Customer Interruptions (CI): 2763
SAIFI Value: Y2017 - 2.03; Y2018 - 0.37; Y2019 - 3.42
SAIDI Value: 400

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	0	0	19	0.69	1
EQUIPMENT/OH	0	0	2541	91.97	10
EQUIPMENT/UG	0	0	1	0.04	1
LIGHTNING	0	0	43	1.56	1
TREE	0	0	159	5.75	8

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Additional switches and fault indicators were installed on the circuit just outside the substation under work request 27LE038922 to help with isolation of faulted lines.

(2017) Two circuit outages accounted for most of the interruptions, the breaker was replaced with a SCADA controlled electronic recloser which provides remote indication and control as well as more data on what caused the outage. Additional switches were also installed to provide sectionalizing of the circuit.

Corrective Actions Planned

Two incidents caused 85% of the customer interruptions in 2019. The first was an overhead malfunction resulting from failed primary, the second from a broken tree. A federal major disaster declaration was issued for Missouri in 2019 for a number of counties in the state affected by flooding, tornadoes, and severe storms. The Lake Ozark area, served by the North Shore substation, experienced a number of straight wind and thunderstorm events during 2019 resulting in outages from power line, tree and property damage. A coordination study and field review identified a need for fuse and aluminum bell insulator replacements as well as installation of additional fuses and animal guarding that will be addressed under work request 27LE040837. A mid-cycle tree trim was completed in late 2019.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 171001
Division: ARCHVIEW
ZIP Codes(s) Served: 63144
Customers Served: 428
Customer Interruptions (CI): 1156
SAIFI Value: 2.70
SAIDI Value: 467

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	484	41.87	8
LIGHTNING	5	0.43	1
OTHER	1	0.09	1
TREE	666	57.61	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

A tree broke the WRSN-FOX-T2 34kV supply to the substation during a windstorm on 1/19/2019 accounting for 92% of the circuit's customer interruptions (1062 out of 1156). Several fused tap and transformer outages account for the remaining customer interruptions. There are no recurring problems on the circuit and no other work is required at this time. A full cycle tree trim is scheduled in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 178054
Division: GATEWAY
ZIP Codes(s) Served: 63011, 63021, 63118
Customers Served: 1405
Customer Interruptions (CI): 3249
SAIFI Value: 2.31
SAIDI Value: 206

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	46	1.42	4
CUSTOMER	3	0.09	1
EQUIPMENT/OH	1409	43.37	3
EQUIPMENT/UG	1704	52.45	15
LIGHTNING	9	0.28	1
PUBLIC	61	1.88	1
TREE	17	0.52	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

There were two circuit outages that accounted for 86% of the customer interruptions in 2019 which were due to an underground cable failure at a terminal pole along Hanna Road. The underground cable was replaced under work request 21MT731289. The remaining device and transformer outages due to equipment malfunctions, tree contacts, and animals will be reviewed to determine if any additional actions are required. An underground visual inspection was completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy. A mid-cycle tree trim is scheduled in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 179052
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63077, 63084, 63303
Customers Served: 714
Customer Interruptions (CI): 2358
SAIFI Value: 3.30
SAIDI Value: 192

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	45	1.91	5
EQUIPMENT/OH	19	0.81	4
LIGHTNING	17	0.72	9
PUBLIC	712	30.20	1
TREE	1556	65.99	5
UNKNOWN	9	0.38	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Tree related issues resulted in 66% of the customer interruptions in 2019. A public vehicle incident caused another 30% of the customer interruptions. No further corrective actions are planned. A mid-cycle trim is scheduled in 2020.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 182001
Division: GATEWAY
ZIP Codes(s) Served: 63119, 63122, 63124
Customers Served: 366
Customer Interruptions (CI): 807
SAIFI Value: Y2017 - 3.16; Y2018 - 0.39; Y2019 - 2.20
SAIDI Value: 797

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	0	0	742	91.95	7
EQUIPMENT/UG	0	0	3	0.37	1
LIGHTNING	0	0	5	0.62	1
TREE	0	0	53	6.57	6
UNKNOWN	0	0	4	0.50	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2017) There was one circuit outage which accounted for the majority of customer interruptions in 2017. This circuit outage occurred during abnormally switched conditions while being tied to a neighboring circuit at the time of the circuit outage. The outage that occurred was due to a tree branch that made contact with the overhead lines on the neighboring circuit. Division Engineering will review the remaining device outages and transformer outages on this circuit to determine if any additional action is needed.

Corrective Actions Planned

The outages on 6/21/19 accounted for 88% of customer interruptions in 2019 and were the result of an overhead equipment malfunction near Jamaica Court during a thunderstorm. A full cycle tree trim was completed in 2019.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 185056
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63010, 63012, 63052, 63053
Customers Served: 473
Customer Interruptions (CI): 1126
SAIFI Value: 2.38
SAIDI Value: 249

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	26	2.31	4
EQUIPMENT/OH	2	0.18	2
PUBLIC	472	41.92	2
TREE	618	54.88	3
UNKNOWN	8	0.71	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents caused 84% of the customer interruptions in 2019. The first was a broken tree damaging a transformer and knocking down conductors. The second was a public vehicle accident which caused a circuit outage. Work request 26JF151877 will install faulted circuit indicators to aid in restoration time. A mid-cycle tree trim, overhead visual and underground visual inspections were completed in 2019. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 190054
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63025, 63049, 63051
Customers Served: 1354
Customer Interruptions (CI): 3062
SAIFI Value: 2.26
SAIDI Value: 274

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	77	2.51	10
EQUIPMENT/OH	16	0.52	5
EQUIPMENT/UG	95	3.10	7
OTHER	6	0.20	1
PUBLIC	69	2.25	1
TREE	2771	90.50	6
UNKNOWN	28	0.91	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Incidents causing 90% of the customer interruptions in 2019 were due to trees outside the Right-of-Way/easements. No additional work is planned.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 195054
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63028, 63050, 63065, 63070
Customers Served: 1044
Customer Interruptions (CI): 2443
SAIFI Value: 2.34
SAIDI Value: 161

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	8	0.33	2
EQUIPMENT/OH	77	3.15	4
LIGHTNING	1	0.04	1
PUBLIC	1133	46.38	3
TREE	1213	49.65	8
UNKNOWN	11	0.45	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two circuit outages occurred in 2019 which accounted for 85% of the customer interruptions on this circuit. One was caused by tree contact and the other by a public vehicle accident requiring replacement of a broken pole. A mid-cycle tree trim was performed in 2019. No further action is planned.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 208002
Division: ARCHVIEW
ZIP Codes(s) Served: 63106, 63137
Customers Served: 633
Customer Interruptions (CI): 2070
SAIFI Value: 3.27
SAIDI Value: 916

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EMPLOYEES	10	0.48	1
EQUIPMENT/OH	183	8.84	11
EQUIPMENT/UG	9	0.43	2
PUBLIC	1799	86.91	4
TREE	68	3.29	4
UNKNOWN	1	0.05	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Three public vehicle incidents caused nearly 87% of the customer interruptions on this circuit in 2019. A full cycle tree trim was completed in 2019. No further actions are planned in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 211056
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63010, 63052
Customers Served: 1123
Customer Interruptions (CI): 2385
SAIFI Value: 2.12
SAIDI Value: 209

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	20	0.84	4
EQUIPMENT/OH	2347	98.41	13
LIGHTNING	17	0.71	1
UNKNOWN	1	0.04	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

The circuit experienced five incidents that contributed 96% of the customer interruptions. A field review determined that three of those incidents were caused by a transformer directly tapped on the primary. Work request 26JF151936 will install a fuse for this transformer. The fourth incident resulted from excess slack between two phases and was corrected by work request 26JF148478. The final incident was due to a failed switch that was replaced on work request 26JF150706. A full cycle tree trim was completed in 2019. No further action is required.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 214052
Division: GATEWAY
ZIP Codes(s) Served: 63031, 63033, 63137, 63138
Customers Served: 1485
Customer Interruptions (CI): 4050
SAIFI Value: 2.73
SAIDI Value: 407

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	134	3.31	2
EQUIPMENT/OH	1748	43.15	10
EQUIPMENT/UG	10	0.25	3
LIGHTNING	1	0.02	1
OTHER	1	0.02	1
PUBLIC	2015	49.74	5
TREE	140	3.46	6
UNKNOWN	2	0.05	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Incidents caused by public vehicle and excavation caused 50% of the customer interruptions in 2019. An overhead malfunction due to a burnt jumper caused another 40% of the customer interruptions. Underground visual and overhead visual inspections were completed in 2019. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy. A mid-cycle tree trim is scheduled in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 214054
Division: GATEWAY
ZIP Codes(s) Served: 63138
Customers Served: 362
Customer Interruptions (CI): 812
SAIFI Value: 2.24
SAIDI Value: 206

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/UG	452	55.67	6
TREE	360	44.33	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Underground primary cable failures occurring in the Spanish Gardens Apartments complex accounted for 56% of the customer interruptions in 2019. The underground primary was replaced/repared on work requests 21MT722417, 21MT723779, 21MT730981 and 21MT731304. The other 44% of the customer interruptions were caused by tree contact resulting in a circuit outage. No additional work is recommended at this time. A mid-cycle tree trim, underground visual and overhead visual inspections were completed in 2019. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 215053
Division: GATEWAY
ZIP Codes(s) Served: 63031, 63033, 63136
Customers Served: 1350
Customer Interruptions (CI): 3979
SAIFI Value: 2.95
SAIDI Value: 341

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	12	0.30	2
EQUIPMENT/OH	2527	63.51	11
EQUIPMENT/UG	83	2.09	9
OTHER	7	0.18	1
PUBLIC	11	0.28	2
TREE	1339	33.65	22

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

The 2019 customer interruptions were caused by various overhead malfunctions and broken trees. A portion of this circuit is planned to be converted from overhead to underground in 2021 on work request 21MT739560. A mid-cycle tree trim and an overhead visual inspection were completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 217051
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63005, 63017, 63038
Customers Served: 308
Customer Interruptions (CI): 1002
SAIFI Value: Y2017 - 3.05; Y2018 - 0.62; Y2019 - 3.25
SAIDI Value: 497

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	0	0	2	0.20	2
EQUIPMENT/OH	0	0	18	1.80	3
EQUIPMENT/UG	0	0	17	1.70	6
LIGHTNING	0	0	9	0.90	2
PUBLIC	0	0	173	17.27	2
TREE	0	0	774	77.25	10
UNKNOWN	0	0	9	0.90	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2017) Over half of the customer interruptions were caused by trees. Full cycle tree trimming was completed in 2018. Another 42% of the 2017 customer interruptions occurred past recloser RSL32053732 on Wildhorse Creek Rd. This covers a long section of circuit that is along roads and through fields without much sectionalizing. Additional sectionalizing will be added upstream of private-property sections to aid restoration and limit customer interruptions. The work was completed on work request 21MT694389.

Corrective Actions Planned

Three incidents with trees caused approximately 57% of the customer interruptions in 2019. One public vehicle hitting a pole caused 39% of the customer interruptions for the year. Engineering reviewed the pole locations hit and found no improvement opportunities. Several transformers that are directly tapped to the primary will be fused on work request 21MT740027. A mid-cycle tree trim is scheduled for 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 225002
Division: ARCHVIEW
ZIP Codes(s) Served: 63112, 63115, 63120, 63147
Customers Served: 566
Customer Interruptions (CI): 1346
SAIFI Value: 2.38
SAIDI Value: 992

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	1205	89.39	6
OTHER	3	0.22	3
OVERLOAD	47	3.49	1
TREE	56	4.15	2
UNKNOWN	37	2.74	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

One incident caused 87% of the customer interruptions on this circuit in 2019 when a connector failed and the primary burned and fell. A full cycle tree trim was completed in 2019. An overhead visual inspection is scheduled in 2020. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 235054
Division: GATEWAY
ZIP Codes(s) Served: 63026, 63088
Customers Served: 14
Customer Interruptions (CI): 48
SAIFI Value: Y2017 - 0.46; Y2018 - 11.38; Y2019 - 3.43
SAIDI Value: 1486

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	0	0	7	14.58	1
EQUIPMENT/OH	6	148	1	2.08	1
TREE	0	0	28	58.33	2
UNKNOWN	0	0	12	25.00	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) There was one circuit outage in 2018 caused by a broken crossarm which occurred during abnormally switched conditions. The crossarm was replaced under work request 21MT692455 in 2018. No further action is planned at this time.

Corrective Actions Planned

The majority of customer interruptions on this circuit in 2019 were caused by a device outage during abnormally switched conditions. The device outage was due to a large tree that fell and made contact with the overhead lines and broke a pole near Pincian Drive and Chariot Drive. The pole and overhead lines were repaired under work request 21MT735705. A mid-cycle tree trim was completed in 2019. Division Engineering will review the remaining device and transformer outages on this circuit to determine if any additional action is needed.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 238004
Division: ARCHVIEW
ZIP Codes(s) Served: 63130, 63133
Customers Served: 748
Customer Interruptions (CI): 1615
SAIFI Value: Y2017 - 1.28; Y2018 - 2.28; Y2019 - 2.16
SAIDI Value: 249

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	0	0	0	0.00	0
EMPLOYEES	0	0	0	0.00	0
EQUIPMENT/OH	23	840	1391	86.13	5
EQUIPMENT/UG	749	0	1	0.06	1
LIGHTNING	0	13	0	0.00	0
OTHER	1	8	0	0.00	0
OVERLOAD	0	0	10	0.62	1
PUBLIC	0	751	0	0.00	0
TREE	184	103	194	12.01	12
UNKNOWN	1	0	19	1.18	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Two incidents caused 92% of the customer interruptions in 2018. One was due to a public vehicle incident resulting in two broken poles and downed primary that was repaired under work request 21MT707936. The second was due to a failed transformer. The transformer was replaced and customers were restored under work request 21MT699724. No further work is planned.

Corrective Actions Planned

One incident accounted for 81% of the customer interruptions on this circuit in 2019. Two spans of #6 Cu primary had broken and a switch was damaged. Repairs were completed and power restored on OAS 191800678. No additional work is required at this time. A full cycle tree trim is scheduled in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 251008
Division: ARCHVIEW
ZIP Codes(s) Served: 63103, 63106, 63108, 63113,
Customers Served: 365
Customer Interruptions (CI): 735
SAIFI Value: 2.01
SAIDI Value: 241

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	1	0.14	1
PUBLIC	734	99.86	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Three incidents caused 99% of the customer interruptions in 2019. Each of these incidents was caused by the public. The first incident involved a dig-in to underground primary cable. Cable repairs were completed on work request 21MT723118. The second incident occurred when a sub-contractor bored into underground primary. Repairs were completed on work request 21MT725245. The third incident involved a public vehicle striking and breaking a 3-phase primary pole. The pole and a span of primary were replaced on work request 21MT729642. No additional work is planned at this time. A mid-cycle tree trim, overhead visual and underground detailed inspections were completed in 2019. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 253056
Division: ARCHVIEW
ZIP Codes(s) Served: 63128, 63129
Customers Served: 2230
Customer Interruptions (CI): 8346
SAIFI Value: 3.74
SAIDI Value: 214

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	49	0.59	3
EQUIPMENT/OH	3323	39.82	8
EQUIPMENT/UG	186	2.23	6
PUBLIC	5	0.06	1
TREE	1558	18.67	11
UNKNOWN	3225	38.64	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Four incidents caused 93% of the customer interruptions in 2019. The first was a pole to arm guy wire which broke during a storm and tangled in the primary. Repairs were completed on OAS 191053827. Two more circuit outages occurred and it was found that the guy wire had loosened at the location of the previous repair. A prearranged outage was taken to complete a more effective repair on work request 21MT729343. No further outages have occurred. Engineering is reviewing the span to determine if conductor spacing can be increased. A mid-cycle tree trim, underground visual and overhead visual inspections are scheduled in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 262052
Division: GATEWAY
ZIP Codes(s) Served: 63122, 63131
Customers Served: 1278
Customer Interruptions (CI): 3229
SAIFI Value: 2.53
SAIDI Value: 358

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	36	1.11	10
EQUIPMENT/OH	228	7.06	14
EQUIPMENT/UG	1276	39.52	2
LIGHTNING	1	0.03	1
TREE	303	9.38	10
UNKNOWN	1385	42.89	5

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

There were two circuit outages that accounted for 81% of customer interruptions in 2019. One circuit outage was due to an overhead equipment malfunction along Manchester Rd. The second circuit outage was due to an underground exit cable failure near the substation which was repaired under work request 21MT726266. A mid-cycle tree trim and an underground visual inspection were completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 266055
Division: GATEWAY
ZIP Codes(s) Served: 63044, 63045
Customers Served: 89
Customer Interruptions (CI): 188
SAIFI Value: Y2017 - 0.10; Y2018 - 1.99; Y2019 - 2.11
SAIDI Value: 92

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	1	0	0	0.00	0
CUSTOMER	1	0	0	0.00	0
EMPLOYEES	0	0	50	26.60	3
EQUIPMENT/OH	2	2	138	73.40	5
EQUIPMENT/UG	3	152	0	0.00	0
PUBLIC	1	0	0	0.00	0
UNKNOWN	1	1	0	0.00	0

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) The largest outage occurred in December due to a switching error that damaged underground cable and a switchgear. The cable and switchgear were repaired under OAS 183392272. The second largest outage occurred in June when an underground switchgear and an underground lateral failed simultaneously. The switchgear and cable were replaced under work request 21MT699423. No further corrective actions are recommended at this time.

Corrective Actions Planned

Two incidents caused 73% of the customer interruptions in 2019 and were caused by overhead malfunctions. Another incident caused 25% of the customer interruptions and was due to an operating error during planned switching. An engineering review and patrol of the circuit is planned for 2020 to ensure all switch labels in the field are accurate compared to the circuit map. A mid-cycle tree trim is scheduled in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 273053
Division: ARCHVIEW
ZIP Codes(s) Served: 63128
Customers Served: 1812
Customer Interruptions (CI): 3670
SAIFI Value: 2.03
SAIDI Value: 86

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/UG	31	0.84	4
OTHER	1	0.03	1
PUBLIC	1823	49.67	3
TREE	1815	49.46	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents accounted for 99% of the customer interruptions in 2019. The first occurred when a tree fell on private property breaking two poles and knocking down four spans of primary conductor. Repairs were made on work request 21MT713174. The second resulted from a public vehicle hitting and breaking a pole which was repaired on work request 21MT714222. There are no recurring problems on the circuit and no other work is required at this time. A mid-cycle tree trim, overhead groundline and underground detailed inspections are scheduled in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 276052
Division: ARCHVIEW
ZIP Codes(s) Served: 63123, 63125
Customers Served: 898
Customer Interruptions (CI): 2180
SAIFI Value: 2.43
SAIDI Value: 157

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	1	0.05	1
EQUIPMENT/OH	1106	50.73	6
EQUIPMENT/UG	137	6.28	2
PUBLIC	898	41.19	1
TREE	38	1.74	4

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Four incidents caused 94% of the customer interruptions in 2019. The first was due to an underground cable failure feeding an apartment complex which was repaired on work request 21MT713654. The second was due to a pole breaking which was repaired on OAS 190282635. The third incident was due to balloons getting tangled in the primary conductor which was repaired on work request 21MT717032. The fourth was due to primary conductor breaking in a storm which was repaired on work request 21MT733742. A full cycle tree trim is scheduled in 2020. The outages were unrelated, no further circuit work is planned at this time.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 279053
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63005, 63017, 63141
Customers Served: 486
Customer Interruptions (CI): 1993
SAIFI Value: Y2017 - 1.19; Y2018 - 2.12; Y2019 - 4.10
SAIDI Value: 777

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	12	4	22	1.10	3
EQUIPMENT/OH	195	26	129	6.47	6
EQUIPMENT/UG	6	488	54	2.71	7
LIGHTNING	0	0	7	0.35	4
OTHER	0	0	3	0.15	3
PUBLIC	0	487	2	0.10	1
TREE	6	0	1749	87.76	9
UNKNOWN	0	6	27	1.35	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Approximately 55% of customer interruptions were due to a private contractor dropping a tree into the circuit backbone. Additional faulted circuit indicators will be added to the circuit backbone to aid restoration under work request 21MT716020.

Corrective Actions Planned

Two broken tree incidents account for 81% of the customer interruptions in 2019. SCADA reclosers were installed in December 2019 on work request 21MT729803 for a section the circuit on private property in a wooded area West of Conway Village Drive. A SMART Energy project is planned for 2021 to relocate this section of overhead to underground. Fuses will be installed at several directly tapped transformers on the circuit backbone on work request 21MT739937. A full cycle tree trim was completed in 2019.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 284052
Division: GATEWAY
ZIP Codes(s) Served: 63074, 63114
Customers Served: 1448
Customer Interruptions (CI): 4425
SAIFI Value: 3.06
SAIDI Value: 229

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	3843	86.85	14
TREE	463	10.46	7
UNKNOWN	119	2.69	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

One incident caused 63% of the customer interruptions in 2019. A pole broke causing a jumper to burn open behind recloser <9983>. Repairs were completed under OAS 191850585. Another 9% of the customer interruptions occurred when a tree branch broke and fell onto the overhead circuit, the upstream fuse tripped with no other damage to the circuit. The tree removal work and fuse work were completed on OAS 191723643. A full cycle tree trim and an overhead visual inspection are scheduled in 2020. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 287056
Division: ARCHVIEW
ZIP Codes(s) Served: 63101, 63102, 63180
Customers Served: 24
Customer Interruptions (CI): 124
SAIFI Value: 5.17
SAIDI Value: 876

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/UG	61	49.19	1
PUBLIC	63	50.81	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents caused by the City of St. Louis Water Division digging into underground facilities account for 51% of the customer interruptions in 2019. The third incident caused by underground equipment failure at Carr & 3rd Street accounts for the other 49%. There were no recurring problems on the circuit and no corrective actions are recommended at this time.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 294056
Division: ARCHVIEW
ZIP Codes(s) Served: 63101, 63102
Customers Served: 13
Customer Interruptions (CI): 36
SAIFI Value: Y2017 - 9.31; Y2018 - 0.00; Y2019 - 2.77
SAIDI Value: 872

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/UG	121	0	36	100.00	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) This circuit is included as part of the downtown St. Louis revitalization efforts. It will be rebuilt, replacing all of the PILC cable on the circuit with EPR cable over the life of the Smart Energy Plan. Projects are currently in design and construction to prepare for the cable replacements during the later years. The circuit should have all PILC cable removed and replaced by 2022.

Corrective Actions Planned

This circuit is included as part of the downtown St. Louis revitalization efforts. It will be rebuilt, replacing all of the PILC cable on the circuit with EPR cable over the life of the Smart Energy Plan. Projects are currently in design and construction to prepare for the cable replacements during the later years. Based on current funding plans the circuit should have all PILC cable removed and replaced by 2024.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 295052
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63005, 63011, 63038
Customers Served: 874
Customer Interruptions (CI): 1900
SAIFI Value: Y2017 - 1.94; Y2018 - 0.80; Y2019 - 2.17
SAIDI Value: 319

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	29	2	1	0.05	1
EQUIPMENT/OH	869	75	89	4.68	5
EQUIPMENT/UG	1	16	11	0.58	5
LIGHTNING	276	0	11	0.58	1
OTHER	1	0	0	0.00	0
PUBLIC	214	459	1747	91.95	3
TREE	289	146	39	2.05	5
UNKNOWN	2	0	2	0.11	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) No additional work was planned as this circuit was not a 2018 Worst Performing Circuit.

(2017) Additional faulted circuit indicators were installed at the northern portion of the circuit, switch D14495 on Orville Rd, where the circuit has road access under work request 21MT694401. A mid-cycle tree trim was completed in 2018.

Corrective Actions Planned

Two circuit outages in 2019 were caused by public vehicles hitting poles accounting for 87% of the customer interruptions. Engineering reviewed the pole locations and determined they could not be improved. Two directly tapped transformers will be fused and faulted circuit indicators upgraded on work request 21MT739928. A full cycle tree trim is scheduled in 2020.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 295056
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63005, 63017, 63038
Customers Served: 597
Customer Interruptions (CI): 1494
SAIFI Value: Y2017 - 2.28; Y2018 - 0.52; Y2019 - 2.50
SAIDI Value: 478

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
EMPLOYEES	0	0	3	0.20	1
EQUIPMENT/OH	0	0	84	5.62	4
EQUIPMENT/UG	0	0	2	0.13	2
LIGHTNING	0	0	1	0.07	1
PUBLIC	0	0	281	18.81	8
TREE	0	0	786	52.61	4
UNKNOWN	0	0	337	22.56	5

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2017) Most outages occurred past a recloser on Rieger Rd near Babler Park Drive. A recloser, several sectionalizing switches and faulted circuit indicators will be added to aid with outage analysis and restoration. Work was completed on work request 21MT694408.

Corrective Actions Planned

In 2019, 39% of customer interruptions were due to trees, another 24% due to public vehicles hitting poles. Engineering patrolled the circuit at pole locations hit by public vehicles and determined locations cannot be improved. Several transformers directly tapped on the circuit backbone will have fuses installed on work request 21MT739935. A mid-cycle tree trim was completed in 2019.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 297052
Division: GATEWAY
ZIP Codes(s) Served: 63146
Customers Served: 492
Customer Interruptions (CI): 1125
SAIFI Value: 2.29
SAIDI Value: 291

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	70	6.22	4
EQUIPMENT/OH	33	2.93	5
EQUIPMENT/UG	33	2.93	3
PUBLIC	490	43.56	1
TREE	499	44.36	6

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

There were two circuit outages that accounted for 87% of the customer interruptions in 2019. The first was caused by a tree branch that broke and made contact with overhead lines along Schulte Road. The second was due to a public vehicle accident that damaged multiple utility poles along Borman Drive. Repairs to overhead facilities were made under work request 21MT719584. A full cycle tree trim is scheduled in 2020. An underground detailed inspection was completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy. Division engineering will review the remaining device and transformer outages to determine if any additional actions are required.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 386051
Division: NORTHEAST MO
ZIP Codes(s) Served: 63342, 63357, 63366, 63378
Customers Served: 679
Customer Interruptions (CI): 1970
SAIFI Value: 2.90
SAIDI Value: 334

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	47	2.39	12
EQUIPMENT/UG	1	0.05	1
LIGHTNING	648	32.89	4
OTHER	2	0.10	1
OVERLOAD	644	32.69	1
PUBLIC	422	21.42	1
TREE	192	9.75	12
UNKNOWN	14	0.71	7

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents caused 65% of the customer interruptions in 2019. The first was the result of abnormal switching and an overload on a recloser causing it to trip. This recloser has been replaced with an Intellirupter DA device. The second was caused by lightning. Lightning arrestors will be added at four locations on the circuit along Hwy 94 and Bouef Island Rd under work request 2WWZ196352.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 386052
Division: NORTHEAST MO
ZIP Codes(s) Served: 63342, 63357
Customers Served: 482
Customer Interruptions (CI): 1338
SAIFI Value: 2.78
SAIDI Value: 233

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	3	0.22	3
EQUIPMENT/OH	4	0.30	4
LIGHTNING	439	32.81	3
OVERLOAD	434	32.44	1
PUBLIC	433	32.36	1
TREE	25	1.87	6

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Three incidents resulted in 97% of the customer interruptions in 2019. The first was a lightning strike. The second was the result of abnormal switching and an overload on a recloser causing it to trip. This recloser has been replaced with an Intellirupter DA device. The third was a public vehicle accident which broke a pole. No further work is planned in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 386053
Division: NORTHEAST MO
ZIP Codes(s) Served: 63332, 63341, 63342, 63357
Customers Served: 679
Customer Interruptions (CI): 2040
SAIFI Value: 3.00
SAIDI Value: 317

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	7	0.34	3
EQUIPMENT/UG	3	0.15	2
LIGHTNING	2	0.10	2
OVERLOAD	856	41.96	4
TREE	1141	55.93	15
UNKNOWN	31	1.52	7

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Three incidents caused 97% of the customer interruptions in 2019. The first was a lightning strike. The second was the result of abnormal switching and an overload on a recloser causing it to trip. This recloser has been replaced with an Intellirupter DA device. The third was a public vehicle accident which broke a pole. The pole was replaced on work request 2WWZ192437. Another work request 2WWZ191944, will relocate 0.6 miles of cross-country overhead circuit that is difficult to access near Klondike Park to underground along the Katy Trail.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 392053
Division: CENTRAL MO
ZIP Codes(s) Served: 65101
Customers Served: 198
Customer Interruptions (CI): 481
SAIFI Value: 2.43
SAIDI Value: 1129

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	61	12.68	4
EQUIPMENT/OH	261	54.26	8
LIGHTNING	2	0.42	2
OTHER	42	8.73	2
TREE	115	23.91	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

There were nineteen incidents on this circuit in 2019 and many were caused by overhead equipment and animal issues. A federal major disaster declaration was issued for Missouri in 2019 for a number of counties in the state affected by flooding, tornadoes, and severe storms. The Osage City area, served by the Moreau substation, was affected by flooding of the Osage River from May through August increasing durations of outages from power line, tree and property damage requiring major repairs. A coordination study and field review identified a need for fuse and lightning arrestor replacements as well as installation of additional fuses and animal guarding that will be addressed under work request 2JCP110380. Fuse 6J38928305, which actuated six times in 2019, will be replaced with a Trip Saver switch under a separate Smart Energy work request 2JCP110402. A mid-cycle tree trim was completed in 2019. An overhead groundline inspection is scheduled in 2020. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 451054
Division: SEMO
ZIP Codes(s) Served: 63622, 63623, 63625, 63650,,
Customers Served: 363
Customer Interruptions (CI): 1728
SAIFI Value: Y2017 - 1.89; Y2018 - 0.96; Y2019 - 4.76
SAIDI Value: 1061

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	0	0	36	2.08	6
CUSTOMER	0	0	11	0.64	1
EQUIPMENT/OH	0	0	1207	69.85	43
LIGHTNING	0	0	10	0.58	5
OTHER	0	0	6	0.35	1
TREE	0	0	270	15.63	9
UNKNOWN	0	0	188	10.88	6

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2019) Three new Intellirupters were installed at various locations on the South Viburnum 451-054 circuit to provide automated sectionalizing and switching capabilities with existing circuit ties to minimize the amount of customers out. This work was completed in 2019 under Work Order J0KND / work request 28IR043607.

(2018) A new Automated Intellirupter was installed in place of the three 140-V4L reclosers at Switch 2343 to provide automated sectionalizing and switching capabilities with existing circuit ties to minimize customer outage time and the number of customers out. This work was completed in December of 2018 under work request 28IR042867.

(2017) A mid-cycle tree trim and an overhead visual Inspection were completed in 2017. An underground detailed inspection is scheduled to be completed in 2018. Planned actions at this time include the installation of additional reclosers to help reduce outages for tree issues, install additional fuses and switches to minimize the number of customers impacted by an outage, and the installation of additional animal guards wherever deemed necessary. Planned work will be completed by the end of 2018 under work request 28IR042867.

Corrective Actions Planned

A full cycle tree trim is scheduled in 2020. Multiple new reclosers will be installed on single phase taps at various locations in 2020 under work request 28IR044746.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 454055
Division: SEMO
ZIP Codes(s) Served: 63830
Customers Served: 1044
Customer Interruptions (CI): 2124
SAIFI Value: 2.03
SAIDI Value: 252

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	1	0.05	1
EQUIPMENT/OH	1007	47.41	6
EQUIPMENT/UG	1	0.05	1
LIGHTNING	49	2.31	1
OTHER	2	0.09	2
PUBLIC	18	0.85	1
TREE	1046	49.25	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents caused 97% of the customer interruptions in 2019 and were due to broken primary conductor caused by winds and a broken tree during a rain storm. No other work is planned in 2020. A full cycle tree trim is scheduled in 2020.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 456055
Division: SEMO
ZIP Codes(s) Served: 63827, 63840, 63851, 63857
Customers Served: 88
Customer Interruptions (CI): 186
SAIFI Value: Y2017 - 2.58; Y2018 - 0.04; Y2019 - 2.11
SAIDI Value: 365

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	0	0	34	18.28	5
LIGHTNING	0	0	30	16.13	2
PUBLIC	0	0	29	15.59	1
TREE	0	0	93	50.00	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2017) This circuit was exposed to an Entergy 161kV transmission line laying on top of the circuit due to strong storm damage in 2017. No additional work is planned for 2018.

Corrective Actions Planned

A broken tree incident caused 50% of the customer interruptions in 2019. Trip Savers were installed on work request 2TSE123679 in 2019. No other work is planned for 2020. A full cycle tree trim and an overhead visual inspection were completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 457055
Division: SEMO
ZIP Codes(s) Served: 63837, 63847, 63852, 63862,
Customers Served: 439
Customer Interruptions (CI): 1234
SAIFI Value: Y2017 - 4.40; Y2018 - 0.13; Y2019 - 2.81
SAIDI Value: 458

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	463	3	59	4.79	2
CUSTOMER	2	0	0	0.00	0
EMPLOYEES	0	0	0	0.00	0
EQUIPMENT/OH	122	0	668	54.22	11
LIGHTNING	893	0	1	0.08	1
OTHER	20	47	67	5.44	2
PUBLIC	0	7	0	0.00	0
TREE	463	0	0	0.00	0
UNKNOWN	0	1	437	35.47	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Additional storm hardening and lightning protection will be installed under work requests 2TSE123853, 2TSE123854, 2TSE123855, 2TSE123856 and 2TSE123857 in 2019.

(2017) There were three incidents where lightning took out the 34kV line and one incident where animal contact took out Gibson substation in 2017. There is no planned work on this circuit in 2018.

Corrective Actions Planned

Two incidents caused 71% of the customer interruptions in 2019. The first was a circuit outage where no cause could be determined during the patrol. The second occurred when the primary conductor burned. Trip savers were installed on work request 2TSE123910 in 2019. No other work is planned for 2020. An overhead visual inspection is scheduled for 2020. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 459051
Division: SEMO
ZIP Codes(s) Served: 63841, 63851
Customers Served: 667
Customer Interruptions (CI): 2124
SAIFI Value: Y2017 - 0.38; Y2018 - 2.09; Y2019 - 3.18
SAIDI Value: 190

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	38	37	4	0.19	2
EMPLOYEES	1	0	0	0.00	0
EQUIPMENT/OH	58	18	2020	94.97	11
EQUIPMENT/UG	60	0	0	0.00	0
LIGHTNING	60	0	1	0.05	1
OTHER	1	2	0	0.00	0
OVERLOAD	0	0	0	0.00	0
PUBLIC	0	2	0	0.00	0
TREE	9	676	102	4.80	4
UNKNOWN	31	671	0	0.00	0

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Additional reclosers will be installed to isolate outages and also re-coordinate fuse sizes to improve circuit operation under work request 2TSE123847 in 2019.

Corrective Actions Planned

Four incidents, two each on two separate days, caused 94% of the customer interruptions in 2019. The first two resulted from the primary conductor burning down at two different hot line clamps during cold and icy weather. The second two resulted from a burnt jumper and failed switches. A full cycle trim is scheduled in 2020. No other work is planned in 2020.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 464054
Division: SEMO
ZIP Codes(s) Served: 63838, 63862, 63866, 63869,,
Customers Served: 875
Customer Interruptions (CI): 1794
SAIFI Value: Y2017 - 3.25; Y2018 - 1.01; Y2019 - 2.05
SAIDI Value: 106

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	18	12	7	0.39	2
CUSTOMER	0	0	0	0.00	0
EQUIPMENT/OH	12	354	532	29.65	13
LIGHTNING	1813	65	2	0.11	2
OTHER	4	39	10	0.56	5
PUBLIC	0	390	873	48.66	1
TREE	924	27	370	20.62	3
UNKNOWN	114	0	0	0.00	0

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) No other work is planned for 2019.

(2017) Additional reclosers were installed on this circuit to isolate outages under work request 2TSE120486 in 2018. Three miles of #6Cu 12kV line were rebuilt and re-conducted on work requests 2TSE 123295, 123297 & 123298 under the Smart Energy Plan in 2019 to improve reliability and correct voltage issues.

Corrective Actions Planned

A full cycle tree trim was completed in 2019. No additional work is planned in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 466055
Division: SEMO
ZIP Codes(s) Served: 63851, 63873, 63879
Customers Served: 139
Customer Interruptions (CI): 329
SAIFI Value: 2.37
SAIDI Value: 342

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	5	1.52	2
EQUIPMENT/OH	6	1.82	4
LIGHTNING	1	0.30	1
OTHER	1	0.30	1
TREE	177	53.80	4
UNKNOWN	139	42.25	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Broken trees caused 53% of the customer interruptions in 2019. Another circuit outage incident representing 42% of the customer interruptions occurred on a calm day and no cause could be identified. A field review identified a bad gang operated switch and it was replaced on work request 2TSE126051. No other work is planned in 2020. A mid-cycle tree trim, underground visual and overhead groundline inspections were completed in 2019. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 473051
Division: SEMO
ZIP Codes(s) Served: 63624
Customers Served: 320
Customer Interruptions (CI): 939
SAIFI Value: 2.93
SAIDI Value: 525

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	84	8.95	3
EQUIPMENT/OH	408	43.45	10
LIGHTNING	87	9.27	5
TREE	359	38.23	4
UNKNOWN	1	0.11	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

A broken tree caused 38% of the customer interruptions and an overhead equipment malfunction another 35% in 2019. A field review identified several locations where isolation will be improved by installation of reclosers and fuses along with additional animal guards under work request 28IR044760. Another project was identified to establish a new single phase tie point between the Bismarck 473-051 and Bismarck 473-053 circuits along Grider and McGeorge roads under work request 28IR044761. Undergrounded detailed and overhead groundline inspections have already been completed in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 505051
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63041, 63060, 63061
Customers Served: 469
Customer Interruptions (CI): 1023
SAIFI Value: 2.18
SAIDI Value: 109

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	63	6.16	3
EQUIPMENT/OH	1	0.10	1
EQUIPMENT/UG	926	90.52	2
TREE	32	3.13	3
UNKNOWN	1	0.10	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

An underground substation exit cable failure resulted in 91% of the 2019 customer interruptions. The direct buried cable was replaced with cable in conduit on work request 23FR065969. No further corrective actions are planned.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 507051
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63015, 63055, 63069, 63072
Customers Served: 512
Customer Interruptions (CI): 1138
SAIFI Value: 2.22
SAIDI Value: 822

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EMPLOYEES	1	0.09	1
EQUIPMENT/OH	514	45.17	4
EQUIPMENT/UG	2	0.18	1
LIGHTNING	7	0.62	1
TREE	608	53.43	7
UNKNOWN	6	0.53	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two tree incidents caused 53% of the customer interruptions in 2019. The first occurred when a tree fell onto the three-phase backbone during calm weather. The other occurred during a thunderstorm causing wire damage and a circuit outage. Another 45% of the customer interruptions were caused by overhead equipment incidents during thunderstorms. Much of the circuit exists in heavily wooded countryside. A mid-cycle tree trim will be performed in 2020. No further action is planned at this time.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 549052
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63020, 63028, 63087
Customers Served: 667
Customer Interruptions (CI): 1585
SAIFI Value: 2.38
SAIDI Value: 115

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	66	4.16	7
EQUIPMENT/OH	1456	91.86	12
LIGHTNING	1	0.06	1
TREE	1	0.06	1
UNKNOWN	61	3.85	6

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

In 2019, two incidents accounted for 84% of the customer interruptions on this circuit. Both were attributed to damage on the 34kV system – the first was conductor damage during a major storm and the other was an overhead equipment malfunction. Another 14% of the customer interruptions resulted from repeat blown fuses at two locations. Engineering will review these locations in 2020 to determine if the fuses should be replaced with Trip Savers. A mid-cycle tree trim and an overhead visual inspection are scheduled in 2020.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 553057
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63016, 63050, 63066
Customers Served: 591
Customer Interruptions (CI): 1859
SAIFI Value: Y2017 - 2.90; Y2018 - 2.79; Y2019 - 3.15
SAIDI Value: 517

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	3	27	5	0.27	2
CUSTOMER	0	0	0	0.00	0
EQUIPMENT/OH	205	710	10	0.54	3
EQUIPMENT/UG	0	2	0	0.00	0
LIGHTNING	1	1	0	0.00	0
PUBLIC	653	0	1183	63.64	3
TREE	235	888	643	34.59	4
UNKNOWN	586	13	18	0.97	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) In 2018 two major outages resulted in a large majority of the customer outages. In January a 34kV insulator broke during a period of freezing rain which caused the 34kV conductor to fall onto the underbuilt 12kV circuit. In June a public vehicle accident caused another circuit outage. This circuit runs along a section of the Big River and is subject to continual flooding. To improve reliability, installation of additional backbone switches will be investigated under work request 26JF147093.

(2017) The majority of customer interruptions on the circuit in 2017 were caused by two separate circuit outages. The first was on May 1, 2017 when trees came down along Highway BB, which was flooded at the time. The circuit outage cause was erroneously coded as Unknown. The other circuit outage occurred in November of 2017 caused by a public vehicle accident. The circuit was trimmed in 2018. There are no specific reliability improvements scheduled for this circuit.

Corrective Actions Planned

In 2019 there were two significant public vehicle accidents that accounted for 64% of the customer interruptions. The other large contributor (32%) was caused by a tree that fell resulting in a circuit outage with significant damage. These three incidents account for 96% of the total customer interruptions. A tap on Shelle Estates Drive experienced two outages caused by tree contact. A TripSaver or a recloser will be installed on this tap. Overhead visual and underground visual inspections are scheduled in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 556051
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63069
Customers Served: 666
Customer Interruptions (CI): 1738
SAIFI Value: 2.61
SAIDI Value: 245

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	38	2.19	3
CUSTOMER	17	0.98	1
EQUIPMENT/UG	257	14.79	4
LIGHTNING	761	43.79	2
OTHER	1	0.06	1
UNKNOWN	664	38.20	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

A lightning arrestor failed during a lightning strike at the the circuit terminal pole causing 44% of the customer interruptions. An additional 38% of the interruptions occurred during thunderstorms but causes could not be determined. Much of the circuit exists in heavily wooded countryside. A mid-cycle tree trim will be performed in 2020. No further action is planned at this time.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 570051
Division: CENTRAL MO
ZIP Codes(s) Served: 65026, 65049, 65065, 65072
Customers Served: 1321
Customer Interruptions (CI): 2918
SAIFI Value: 2.21
SAIDI Value: 316

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	49	1.68	2
EQUIPMENT/OH	366	12.54	6
LIGHTNING	58	1.99	1
PUBLIC	66	2.26	3
TREE	2348	80.47	4
UNKNOWN	31	1.06	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Tree related issues caused over 80% of the customer interruptions in 2019. A field review identified a need for crossarm repairs, pole replacements and repairs, fuse and aluminum bell insulator replacements as well as installation of additional fuses and animal guarding that will be addressed under work request 27LE040836. A full cycle tree trim was completed in late 2019. An underground detailed inspection is scheduled in 2020. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 570057
Division: CENTRAL MO
ZIP Codes(s) Served: 65011, 65026, 65049, 65072
Customers Served: 1372
Customer Interruptions (CI): 4515
SAIFI Value: 3.29
SAIDI Value: 288

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	42	0.93	5
EQUIPMENT/OH	19	0.42	11
LIGHTNING	6	0.13	6
OTHER	1	0.02	1
PUBLIC	1	0.02	1
TREE	4261	94.37	16
UNKNOWN	185	4.10	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Tree issues caused over 94% of the customer Interruptions in 2019. A coordination study and drone inspection completed as part of the field review identified a need for additional animal guarding as well as fuse, pole, transformer, lightning arrestor, and insulator replacements that will be addressed under work request 27LE040832. Some limited phase balancing work will also be completed. A full cycle tree trim is scheduled in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 576051
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63050, 63051, 63052
Customers Served: 502
Customer Interruptions (CI): 1184
SAIFI Value: 2.36
SAIDI Value: 253

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	46	3.89	5
EQUIPMENT/OH	62	5.24	3
EQUIPMENT/UG	35	2.96	2
TREE	1039	87.75	9
UNKNOWN	2	0.17	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents accounted for 85% of the customer interruptions on this circuit in 2019. The first was caused by a broken tree during windy conditions that broke a pole and knocked down three spans of primary. Repairs were completed on work request 26JF147520. The other was caused by tree contact during a storm causing a circuit outage. An interim patrol in 2020 will be performed to determine if any urgent trimming is needed.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 587055
Division: MERAMEC VALLEY
ZIP Codes(s) Served: 63010, 63026, 63052
Customers Served: 2131
Customer Interruptions (CI): 7053
SAIFI Value: Y2017 - 2.08; Y2018 - 0.20; Y2019 - 3.31
SAIDI Value: 266

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	0	0	93	1.32	7
EQUIPMENT/OH	0	0	2539	36.00	4
EQUIPMENT/UG	0	0	64	0.91	9
PUBLIC	0	0	2232	31.65	5
TREE	0	0	2123	30.10	2
UNKNOWN	0	0	2	0.03	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2017) The majority of the customer interruptions on the 587-55 circuit can be attributed to two separate outages. The first occurred on June 14, 2017 when a disconnect switch on the backbone failed resulting in 2,114 customer interruptions. The second outage occurred on July 24, 2017. Although it was raining at the time, no cause was found and the circuit was successfully placed back into service, resulting in 2,117 customer interruptions. A full cycle tree trim was completed in 2017. No additional specific reliability improvements are planned at this time.

Corrective Actions Planned

Six (6) incidents caused 97% of the customer interruptions on this circuit in 2019. A public vehicle caused two (2) of the outages and the repairs occurred on work requests 26JF147937 and 26JF149437. Next, equipment failures caused two outages and for one of the incidents the repairs were completed on work request 26JF147483. The last two incidents were caused by a tree and an underground service. The underground service was repaired on work request 26JF146759. One tap location and several transformers directly tapped on the backbone will have fuses installed on work requests 26JF151970 and 26JF151972. A mid-cycle tree trim and an underground detailed inspection were completed in 2019. An overhead visual inspection is scheduled in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 603005
Division: SEMO
ZIP Codes(s) Served: 63701
Customers Served: 98
Customer Interruptions (CI): 218
SAIFI Value: Y2017 - 0.00; Y2018 - 2.20; Y2019 - 2.22
SAIDI Value: 220

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	0	1	22	10.09	5
LIGHTNING	0	116	96	44.04	1
OTHER	0	89	0	0.00	0
TREE	0	10	3	1.38	1
UNKNOWN	0	0	97	44.50	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Insulators on steel crossarms were replaced with 69kV poly post insulators to prevent flashover under work request 2TSE122161 in 2018. No other work is planned for 2019.

Corrective Actions Planned

Two incidents caused 88% of the customer interruptions in 2019. The circuit was patrolled for the first incident and no cause could be determined. The second was during a thunderstorm and believed to have been caused by lightning. Additional reclosers will be installed on this circuit to isolate outages on work request 2TSE127240 in 2020. A full cycle tree trim was completed in 2019. Underground detailed and overhead groundline inspections were completed in 2019. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 620056
Division: SEMO
ZIP Codes(s) Served: 63870
Customers Served: 2
Customer Interruptions (CI): 5
SAIFI Value: 2.50
SAIDI Value: 468

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	2	40.00	1
EQUIPMENT/UG	2	40.00	1
LIGHTNING	1	20.00	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Four broken tree incidents caused 93% of the customer interruptions in 2019. A bad underground cable causing outages was replaced on work request 2TSE125175 in 2019. No other work is planned 2020. A mid-cycle tree trim was completed in 2019. An overhead visual inspection is scheduled for 2020. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 628056
Division: SEMO
ZIP Codes(s) Served: 63841
Customers Served: 986
Customer Interruptions (CI): 4173
SAIFI Value: 4.23
SAIDI Value: 403

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	219	5.25	6
EQUIPMENT/OH	18	0.43	4
EQUIPMENT/UG	14	0.34	1
LIGHTNING	1	0.02	1
TREE	3921	93.96	7

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Four incidents caused by broken trees resulted in 93% of the customer interruptions in 2019. A bad underground cable causing outages was replaced on work request 2TSE125800 in 2019. An additional single phase recloser will be installed on work request 2TSE127241 in 2020. An overhead visual inspection was completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy. A full cycle trim is scheduled in 2020.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 629053
Division: NORTHEAST MO
ZIP Codes(s) Served: 63330, 63336, 63343, 63344
Customers Served: 257
Customer Interruptions (CI): 1532
SAIFI Value: Y2017 - 1.30; Y2018 - 2.30; Y2019 - 5.96
SAIDI Value: 867

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	1	0	2	0.13	2
CUSTOMER	0	0	6	0.39	1
EMPLOYEES	0	0	1	0.07	1
EQUIPMENT/OH	306	409	1134	74.02	15
LIGHTNING	20	69	57	3.72	3
OTHER	1	0	0	0.00	0
PUBLIC	3	0	0	0.00	0
TREE	4	118	322	21.02	14
UNKNOWN	0	0	10	0.65	10

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

Fused switches were added to 18 single-phase transformers and one single-phase tap under work request 2WWZ190388 in 2019. An underground circuit inspection was completed in 2017. An Overhead circuit inspection was completed in 2019. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy. A mid-cycle tree trim was completed in 2017.

Corrective Actions Planned

There were four overhead malfunction incidents that account for 73% of the customer interruptions in 2019. A field review of the circuit identified three projects. The first will install additional lightning arrestors at three locations along Hwy H under work request 2WWZ196166. The second will install fuses for directly tapped transformers and repair a V-brace along Hwy W under work request 2WWZ196168. The third project will install three reclosers on the circuit along Hwy W north of Hwy WW under work request 2WWZ190490. A full cycle trim is scheduled in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 652055
Division: NORTHEAST MO
ZIP Codes(s) Served: 63383, 63390
Customers Served: 1003
Customer Interruptions (CI): 2974
SAIFI Value: 2.97
SAIDI Value: 465

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	3	0.10	3
EQUIPMENT/OH	989	33.25	6
LIGHTNING	8	0.27	3
TREE	976	32.82	2
UNKNOWN	998	33.56	6

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Three incidents in August 2019 caused 98% of the customer interruptions. These incidents were caused by a broken tree, an overhead malfunction, and the third cause could not be determined. Trip Savers will be installed along Hwy H just south of the railroad tracks under work request 2WWZ196347. Trip Savers will also be installed on one tap, and 3-100 amp reclosers on another tap at Bell Rd and N Service Rd under work request 2WWZ196346. Overhead visual and underground detailed inspections were completed in 2019. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy. A mid-cycle tree trim was completed in 2019.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 655058
Division: NORTHEAST MO
ZIP Codes(s) Served: 63376
Customers Served: 1162
Customer Interruptions (CI): 2506
SAIFI Value: 2.16
SAIDI Value: 170

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	12	0.48	3
CUSTOMER	4	0.16	1
EQUIPMENT/OH	1154	46.05	3
EQUIPMENT/UG	18	0.72	1
PUBLIC	29	1.16	1
TREE	1279	51.04	6
UNKNOWN	10	0.40	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Broken trees during two thunderstorms and an overhead equipment malfunction accounted for 96% of the customer interruptions in 2019. A field review identified reliability issues that will be addressed under work request 2WWZ196913. An additional field review is planned for 2020 to identify unfused transformers and taps on the backbone and locations requiring animal guarding.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 656053
Division: SEMO
ZIP Codes(s) Served: 63830, 63841
Customers Served: 988
Customer Interruptions (CI): 3393
SAIFI Value: 3.43
SAIDI Value: 239

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	202	5.96	4
EQUIPMENT/OH	2989	88.15	14
EQUIPMENT/UG	21	0.62	3
LIGHTNING	4	0.12	2
PUBLIC	3	0.09	1
TREE	172	5.07	11

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Three incidents involving overhead equipment malfunctions caused 87% of the customer interruptions in 2019. An additional recloser will be installed to isolate outages on work request 2TSE127242 in 2020. A full cycle tree trim is scheduled in 2020. Overhead visual and underground detailed inspections are scheduled in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 666051
Division: NORTHEAST MO
ZIP Codes(s) Served: 63333, 63349, 63381
Customers Served: 317
Customer Interruptions (CI): 659
SAIFI Value: 2.08
SAIDI Value: 743

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	14	2.12	5
EQUIPMENT/OH	197	29.89	3
LIGHTNING	1	0.15	1
TREE	442	67.07	3
UNKNOWN	5	0.76	5

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Broken trees caused 67% of the customer interruptions in 2019. A field review identified four projects to install fuses on two taps off of the 3-phase circuit backbone, add three sets of lightning arrestors, repair broken V-braces at 4 locations, replace a crossarm, and replace a 3-phase recloser with 3 single-phase reclosers along Hwy A, Lichtenberg Rd, and Bellflower Street under work requests 2WWZ196830, 196845, 196857, & 196864.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 672052
Division: NORTHEAST MO
ZIP Codes(s) Served: 63336, 63353
Customers Served: 112
Customer Interruptions (CI): 906
SAIFI Value: 8.09
SAIDI Value: 3818

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EMPLOYEES	3	0.33	3
EQUIPMENT/OH	8	0.88	2
EQUIPMENT/UG	11	1.21	2
LIGHTNING	7	0.77	3
TREE	872	96.25	26
UNKNOWN	5	0.55	5

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Several broken tree and tree contact incidents caused 96% of the customer interruptions in 2019. A project to replace pole #65108 and a portion of 3-phase circuit along Hwy 79 is planned under work request 2WWZ196890. Another project to isolate an unused 3-phase tap across Hwy 79 is planned under work request 2WWZ196888.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 678003
Division: SEMO
ZIP Codes(s) Served: 63845
Customers Served: 387
Customer Interruptions (CI): 802
SAIFI Value: 2.07
SAIDI Value: 212

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	794	99.00	7
LIGHTNING	1	0.12	1
PUBLIC	5	0.62	1
TREE	2	0.25	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two overhead equipment malfunctions caused 95% of the customer interruptions in 2019. The first was due to a failed lightning arrestor, the second due to failed primary conductor. An additional single phase recloser will be installed to isolate outages on work request 2TSE127244 in 2020. A full cycle tree trim and an overhead visual inspection are scheduled for 2020. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 679052
Division: NORTHEAST MO
ZIP Codes(s) Served: 63301, 63332, 63348, 63357,,
Customers Served: 557
Customer Interruptions (CI): 1248
SAIFI Value: 2.24
SAIDI Value: 256

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	6	0.48	4
EQUIPMENT/OH	280	22.44	8
EQUIPMENT/UG	1	0.08	1
OVERLOAD	794	63.62	2
TREE	162	12.98	7
UNKNOWN	5	0.40	5

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents representing 64% of the 2019 customer interruptions occurred on the same day when the circuit overloaded on a very hot day. New 12.5kV Intellirupter reclosers were installed at two locations (one along Hwy T north of Hwy D and one along Hwy T at Brandt Rd) on the circuit in 2019. In addition, two 12.5kV Intellirupter reclosers were installed at tie points, one along Hwy T in Foristell and one along Hwy TT south of Hwy T) in 2019. An underground detailed inspection was completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 685053
Division: SEMO
ZIP Codes(s) Served: 63801, 63867, 63868
Customers Served: 478
Customer Interruptions (CI): 987
SAIFI Value: Y2017 - 1.68; Y2018 - 1.93; Y2019 - 2.06
SAIDI Value: 288

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	64	56	66	6.69	5
CUSTOMER	1	0	0	0.00	0
EQUIPMENT/OH	247	349	862	87.34	18
EQUIPMENT/UG	1	33	20	2.03	3
LIGHTNING	2	0	2	0.20	2
OTHER	511	0	1	0.10	1
PUBLIC	8	503	0	0.00	0
TREE	3	0	36	3.65	2
UNKNOWN	3	1	0	0.00	0

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Circuit storm hardening was performed under work request 2TSE118506 in 2018. No other work was planned for 2019.

Corrective Actions Planned

A circuit outage due to failed primary conductor caused 48% of the customer interruptions in 2019. A project to install additional three phase reclosers to better isolate outages will be completed on work requests 2TSE 127245, 127249 & 127250 in 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 686052
Division: CENTRAL MO
ZIP Codes(s) Served: 65026, 65064, 65074
Customers Served: 286
Customer Interruptions (CI): 654
SAIFI Value: 2.29
SAIDI Value: 405

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	33	5.05	27
EQUIPMENT/OH	90	13.76	3
LIGHTNING	9	1.38	5
OTHER	7	1.07	2
PUBLIC	232	35.47	2
TREE	283	43.27	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents account for 78% of the customer interruptions in 2019. The first was a public vehicle accident which broke a pole during a snow storm. The second was the result of a tree falling into the circuit and breaking a pole. Repairs were completed on work request 2JCP107490. In addition, a federal major disaster declaration was issued for Missouri in 2019 for a number of counties in the state affected by flooding, tornadoes, and severe storms. The southeast area of Eldon, served by the Eldon-Jackson substation, was affected by an EF3 tornado in May, 2019 with power line, tree and property damage requiring major repairs. A field review identified pole replacement work that will be performed under work request 2JCP110361. An underground detailed inspection was completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 690057
Division: SEMO
ZIP Codes(s) Served: 63841, 63846, 63873
Customers Served: 624
Customer Interruptions (CI): 2436
SAIFI Value: Y2017 - 2.34; Y2018 - 0.24; Y2019 - 3.90
SAIDI Value: 350

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	0	0	9	0.37	4
EQUIPMENT/OH	0	0	696	28.57	9
EQUIPMENT/UG	0	0	9	0.37	3
LIGHTNING	0	0	618	25.37	4
PUBLIC	0	0	622	25.53	1
TREE	0	0	482	19.79	11

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2017) Additional smart switches will be installed to isolate circuit outages on work requests 2TSE120462, 2TSE120463, 2TSE120464, 2TSE120490 and 2TSE120491 in 2018.

Corrective Actions Planned

Three incidents caused 76% of the customer interruptions in 2019. The first a lightning strike, second an overhead equipment malfunction, and third a public vehicle accident. Additional three phase relays will be installed to isolate outages on work request 2TSE127246 in 2020. A full cycle tree trim is scheduled in 2020. An overhead visual inspection was completed in 2019 and an underground detailed inspection is scheduled in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 717052
Division: CENTRAL MO
ZIP Codes(s) Served: 64024, 64062, 64084, 64085
Customers Served: 758
Customer Interruptions (CI): 1738
SAIFI Value: 2.29
SAIDI Value: 226

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	38	2.19	4
EQUIPMENT/OH	90	5.18	9
EQUIPMENT/UG	50	2.88	7
LIGHTNING	12	0.69	1
OTHER	1	0.06	1
PUBLIC	1513	87.15	2
TREE	32	1.84	5

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents caused by the public (vehicle, other damage) caused 87% of the customer interruptions on this circuit in 2019. A field review identified several transformers directly tapped on the circuit backbone which will have fuses installed on work request 2HGH056058. A few locations with rapid vegetation growth were also identified for trimming in 2020.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 754051
Division: NORTHEAST MO
ZIP Codes(s) Served: 63440, 63452
Customers Served: 77
Customer Interruptions (CI): 388
SAIFI Value: Y2017 - 2.03; Y2018 - 0.04; Y2019 - 5.04
SAIDI Value: 902

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	0	0	171	44.07	5
LIGHTNING	0	0	55	14.18	1
TREE	0	0	85	21.91	2
UNKNOWN	0	0	77	19.85	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2017) Created work request 2HGH052160 to address reliability issues found on this circuit as the result of a circuit patrol in 2018. Other potential improvements will be fusing any unfused CSP transformers on the backbone, fusing unfused taps and animal guarding.

Corrective Actions Planned

There were several circuit outages caused by overhead equipment malfunctions and tree contact during a September storm resulting in 81% of the 2019 customer interruptions. A field review identified reliability issues that will be addressed under work request 2HGH056098. An additional field review is planned for 2020 to identify unfused CSP transformers and taps on the backbone and locations requiring animal guarding.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 783053
Division: NORTHEAST MO
ZIP Codes(s) Served: 63334, 63359
Customers Served: 1156
Customer Interruptions (CI): 3143
SAIFI Value: Y2017 - 1.31; Y2018 - 2.59; Y2019 - 2.72
SAIDI Value: 248

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	19	23	14	0.45	12
CUSTOMER	0	2	0	0.00	0
EMPLOYEES	0	1	0	0.00	0
EQUIPMENT/OH	1276	2386	2388	75.98	26
EQUIPMENT/UG	1	0	2	0.06	2
LIGHTNING	29	155	24	0.76	14
OTHER	1	0	0	0.00	0
PUBLIC	3	172	1	0.03	1
TREE	16	226	310	9.86	9
UNKNOWN	0	0	404	12.85	7

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Three projects, work requests 2WWZ189410, 190459, and 190462, to add fuse switches on taps and transformers at 22 locations and replace one fuse switch with a Trip Saver switch in Bowling Green were completed in 2019. Work request 2WWZ194197 to add 3 lightning arrestors along Pike 334 and work request 2WWZ190290 to replace a solid-blade switch with a 12.5kV Intellirupter DA device were completed in 2019. An overhead circuit inspection was completed in 2017. An underground circuit inspection was completed in 2018. Any repair work identified as a result of the inspections was completed in accordance with Ameren Missouri's infrastructure inspection policy.

Corrective Actions Planned

Overhead equipment malfunctions during two separate storms accounted for 73% of the 2019 customer interruptions. Two projects to add lightning arrestors at 3 locations along Hwy 161 are planned for 2020 under work requests 2WWZ196539 and 196542. One fuse switch will be replaced with a Trip Saver in 2020 under work request 2WWZ195537. Also, a project to reconductor 5 spans of 3-phase 12.5kV overhead circuit along Old Hwy 61 will be completed in 2020 under work request 2WWZ190943. A full cycle tree trim was completed in 2019.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 845051
Division: CENTRAL MO
ZIP Codes(s) Served: 65016, 65054, 65085, 65101
Customers Served: 494
Customer Interruptions (CI): 1345
SAIFI Value: 2.72
SAIDI Value: 479

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	847	62.97	10
OTHER	5	0.37	1
UNKNOWN	493	36.65	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents involving overhead equipment malfunctions caused 62% of the customer interruptions in 2019. A third incident caused another 26% of the customer interruptions, no cause could be identified. A drone inspection completed as part of the field review identified a need for crossarm and pole repair work, additional animal guarding on fuses, and replacement of aluminum bells and porcelain insulators that will be addressed under work request 2JCP110393. A mid-cycle tree trim was completed in 2019.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 845052
Division: CENTRAL MO
ZIP Codes(s) Served: 65016
Customers Served: 133
Customer Interruptions (CI): 334
SAIFI Value: 2.51
SAIDI Value: 756

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	1	0.30	1
EQUIPMENT/OH	44	13.17	3
OTHER	1	0.30	1
PUBLIC	77	23.05	2
TREE	211	63.17	7

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Three incidents accounted for 63% of the customer interruptions in 2019 and were caused by broken trees. A fourth incident caused 23% of the customer interruptions and resulted from a public vehicle accident which broke a pole. A federal major disaster declaration was issued for Missouri in 2019 for a number of counties in the state affected by flooding, tornadoes, and severe storms. The Bonnots Mill area, served by the Bonnots Mill substation, was affected by flooding of the Osage River from May through August increasing durations of outages from power line, tree and property damage requiring major repairs. A drone inspection completed as part of the field review identified a need for pole and transformer repair work, additional animal guarding on fuses, spot tree trimming, and replacement of aluminum bells, lightning arrestors and porcelain insulators that will be addressed under work request 2JCP110381.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 847001
Division: CENTRAL MO
ZIP Codes(s) Served: 65061
Customers Served: 107
Customer Interruptions (CI): 215
SAIFI Value: 2.01
SAIDI Value: 344

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	215	100.00	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two of the three incidents on this circuit were caused by equipment malfunctions at the substation. These outages were unusual in nature, no resulting work is to be performed in 2020. A Smart Energy Plan project is planned to take place prior to 2025 to convert Morrison from 2400V Delta to 12.47kV primary. An underground visual inspection was completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 855052
Division: NORTHEAST MO
ZIP Codes(s) Served: 63536, 63561
Customers Served: 278
Customer Interruptions (CI): 579
SAIFI Value: 2.08
SAIDI Value: 569

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	1	0.17	1
EQUIPMENT/OH	566	97.75	3
TREE	1	0.17	1
UNKNOWN	11	1.90	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Overhead equipment malfunctions during two thunderstorms accounted for 98% of the customer interruptions in 2019. A field review identified reliability issues that will be addressed under work request 2HGH056106. An additional field review is planned for 2020 to identify unfused transformers and taps on the backbone and locations requiring animal guarding.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 864005
Division: SEMO
ZIP Codes(s) Served: 63701
Customers Served: 345
Customer Interruptions (CI): 718
SAIFI Value: 2.08
SAIDI Value: 241

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	350	48.88	4
OTHER	2	0.28	1
PUBLIC	346	48.32	1
TREE	18	2.51	4

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two incidents caused 96% of the customer interruptions in 2019. The first was due to a public vehicle accident that broke a pole. The second resulted from a failed lightning arrestor. A 3/4 mile section of 4kV line on the affected area of the circuit was rebuilt on work requests 2TSE123941, 125754 & 1255755 in 2019. No additional work is planned in 2020. A full cycle tree trim and an overhead visual inspection were completed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 888001
Division: CENTRAL MO
ZIP Codes(s) Served: 65280
Customers Served: 62
Customer Interruptions (CI): 127
SAIFI Value: 2.05
SAIDI Value: 280

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	124	97.64	2
LIGHTNING	2	1.57	2
TREE	1	0.79	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Two outages on the 34kV supply to the substation caused 98% of the customer interruptions on this circuit. No work was identified by the engineering review, however, a Smart Energy project will replace brittle conductor and porcelain insulators on this circuit while converting Rush Hill from a 2400V Delta to 12.47kV primary circuit. The construction of this project is planned to be completed by 2025. A mid-cycle tree trim was completed in 2019. An overhead visual inspection was completed in 2019 and an underground visual inspection is scheduled in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 949053
Division: CENTRAL MO
ZIP Codes(s) Served: 65233, 65248, 65250, 65274,
Customers Served: 1907
Customer Interruptions (CI): 4458
SAIFI Value: 2.34
SAIDI Value: 306

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	35	0.79	5
EQUIPMENT/OH	1210	27.14	26
EQUIPMENT/UG	12	0.27	5
LIGHTNING	22	0.49	5
OTHER	1	0.02	1
PUBLIC	104	2.33	1
TREE	2849	63.91	22
UNKNOWN	225	5.05	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Tree issues caused 64% of the 2019 customer Interruptions, while another 27% were caused by overhead/underground malfunctions. A field review identified an inline style switch that had recently caused issues during switching. The switch and a few small fiberglass crossarms will be replaced on work request 2DLD099619. An overhead visual Inspection was completed in 2019 and an underground detailed inspection is scheduled in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy. A full cycle tree trim was completed in 2019.



APPENDIX B

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 978053
Division: CENTRAL MO
ZIP Codes(s) Served: 63091, 65014, 65066
Customers Served: 348
Customer Interruptions (CI): 1035
SAIFI Value: Y2017 - 1.79; Y2018 - 1.41; Y2019 - 2.97
SAIDI Value: 324

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	0	0	170	16.43	2
CUSTOMER	0	0	6	0.58	1
EQUIPMENT/OH	0	0	182	17.58	7
LIGHTNING	0	0	65	6.28	4
OTHER	0	0	7	0.68	2
OVERLOAD	0	0	184	17.78	6
PUBLIC	0	0	181	17.49	1
TREE	0	0	212	20.48	5
UNKNOWN	0	0	28	2.71	4

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2019) A project to eliminate the cross-country line supplying the area south of Owensville and relocate that portion of the circuit along existing roadways was completed in October 2019 under work requests 2JCP103955, 2JCP104401 and 2JCP104912.

(2018) Since outages mostly occurred in the area south of Owensville supplied by a cross-country line, some of those customers were transferred to a different supply in 2018 via a 4kV to 12kV conversion project.

Corrective Actions Planned

The most recent improvements made to this circuit were completed in late 2019 to reconductor and change the supply to part of the circuit eliminating a cross-country line. Additional run-time is needed to determine if the improvements made were successful in addressing the issues. A coordination study and field review identified a need for a number of fuse replacements in the area north of Owensville as well as additional animal guarding that will be addressed under work request 2JCP110313. A full cycle tree trim is scheduled for 2020.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 980052
Division: CENTRAL MO
ZIP Codes(s) Served: 64469
Customers Served: 277
Customer Interruptions (CI): 842
SAIFI Value: 3.04
SAIDI Value: 237

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	13	1.54	2
EQUIPMENT/OH	274	32.54	8
EQUIPMENT/UG	3	0.36	3
TREE	550	65.32	4
UNKNOWN	2	0.24	2

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Tree issues caused 65% of the customer interruptions on this circuit in 2019 while another 32% were caused by overhead/underground malfunctions. A field review identified several inline style switches that had recently caused issues during switching operations. The switches will be replaced on work request 2HGH056057. A full cycle tree trim was completed in 2019.



APPENDIX B

Single Year WPC Analysis and Remedial Action Report

Circuit Number: 984052
Division: NORTHEAST MO
ZIP Codes(s) Served: 64628
Customers Served: 274
Customer Interruptions (CI): 690
SAIFI Value: 2.52
SAIDI Value: 320

Outage Analysis

Causes	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	18	2.61	6
EQUIPMENT/OH	330	47.83	4
EQUIPMENT/UG	1	0.14	1
LIGHTNING	1	0.14	1
OTHER	9	1.30	2
PUBLIC	1	0.14	1
TREE	330	47.83	7

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions

Broken trees and overhead equipment malfunctions accounted for 96% of the customer interruptions in 2019. A field review identified reliability issues that will be addressed under work request 2HGH056105. An additional field review is planned for 2020 to identify unfused transformers and taps on the backbone and locations requiring animal guarding.

APPENDIX C

Division	Operating Area	Circuit	Volt	Cust	CI	CMI	SAIDI	SAIFI	2017	2018	2019	Years WPC
GATEWAY	BERKELEY	259058	12	2280	4059	306027	134	1.78	WPC	WPC		2
NORTHEAST MO	WENTZVILLE	691051	12	1192	1250	156977	132	1.05	WPC	WPC		2
GATEWAY	BERKELEY	167052	12	605	612	87037	144	1.01	WPC	WPC		2
NORTHEAST MO	KIRKSVILLE	858052	12	1	1	36	36	1.00	WPC	WPC		2
NORTHEAST MO	LOUISIANA	672053	12	294	285	24587	84	0.97	WPC	WPC		2
SEMO	HAYTI	456057	12	129	92	15847	123	0.71	WPC	WPC		2
SEMO	DEXTER	678005	4	384	44	2989	8	0.11	WPC	WPC		2
ARCHVIEW	MACKENZIE	231051	12	2120	188	37024	17	0.09	WPC	WPC		2
ARCHVIEW	GERALDINE	202007	4	156	0	0	0	0.00	WPC	WPC		2



APPENDIX D

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 167052
Division: GATEWAY
ZIP Codes(s) Served: 63033, 63136, 63137, 63138
Customers Served: 605
Customer Interruptions (CI): 612
SAIFI Value: Y2017 - 2.45; Y2018 - 2.23; Y2019 - 1.01
SAIDI Value: 144

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	47	1	19	3.10	2
CUSTOMER	0	0	22	3.59	1
EQUIPMENT/OH	845	1285	347	56.70	9
EQUIPMENT/UG	0	42	70	11.44	2
LIGHTNING	0	0	1	0.16	1
OTHER	0	1	1	0.16	1
PUBLIC	0	0	2	0.33	2
TREE	0	13	5	0.82	1
UNKNOWN	609	0	145	23.69	5

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2017) Investigated circuit downstream of Fuse 2318. The fuse was replaced with a Trip Saver under work request 21MT694707 in 2018.

Corrective Actions Planned

Downed primary during storms and multiple blown fuses caused by unknown circumstances caused 80% of the customer interruptions in 2019. The installation of 2 distribution automation switches on work request 21MT718057 has been re-scheduled for 2020. An overhead groundline inspection was performed in 2019. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX D

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 202007
Division: ARCHVIEW
ZIP Codes(s) Served: 63105, 63110, 63117
Customers Served: 156
Customer Interruptions (CI): 0
SAIFI Value: Y2017 - 1.99; Y2018 - 4.97; Y2019 - 0.00
SAIDI Value: 0

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
EQUIPMENT/OH	154	0	0	0.00	0
EQUIPMENT/UG	153	761	0	0.00	0

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Four incidents caused 87% of the customer interruptions on this circuit in 2018. The other outages were from 2017. The first incident was due to switch failure in a switchgear which was restored under OAS 182082626. The second was due to underground primary dip failure and was repaired and restored under OAS 182552616. The third was due to an underground malfunction with customer equipment and was restored under OAS 182553113. The fourth incident was due to an underground primary dip failure. The dip was repaired under work request 21MT696063. No further work is planned. (2017) A fault of unknown cause resulted in 50% of the customer interruptions and a loss of the 34kV feed to the substation caused the other 50%.

Corrective Actions Planned

This circuit performed well In 2019 and experienced no customer interruptions resulting in a SAIFI of 0. A mid-cycle tree trim is scheduled in 2020. Underground detailed and overhead visual inspections will be performed in 2020. Any repair work identified as a result of the inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX D

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 231051
Division: ARCHVIEW
ZIP Codes(s) Served: 63017, 63123, 63129
Customers Served: 2120
Customer Interruptions (CI): 188
SAIFI Value: Y2017 - 3.24; Y2018 - 2.23; Y2019 - 0.09
SAIDI Value: 17

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	4	63	5	2.66	2
CUSTOMER	0	0	0	0.00	0
EMPLOYEES	0	0	0	0.00	0
EQUIPMENT/OH	2087	156	119	63.30	1
EQUIPMENT/UG	2254	2223	54	28.72	2
OTHER	72	0	0	0.00	0
PUBLIC	2070	2007	10	5.32	1
TREE	1	0	0	0.00	0
UNKNOWN	0	0	0	0.00	0

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Two incidents caused 90% of the customer interruptions in 2018. The first was due to a public vehicle hitting a pole that was repaired under work request 21MT698266. The second was due to a failure in the underground circuit exit cable which was repaired on work request 21MT711450. Repair work identified as a result of the 2018 overhead and underground visual inspections will be completed in accordance with Ameren Missouri's infrastructure inspection policy. The pole lead along Forder Rd. will be evaluated by Engineering to determine if there is a way to better protect these poles from being damaged by public vehicles.

(2017) Three incidents account for 92% of the customer interruptions in 2017. The first was due to an underground primary cable failure that was repaired under work request 21MT678122. The second was due to a public vehicle breaking a pole. The pole was replaced under work request 21MT680519. The third incident was a short outage to clear a pole, which had been hit by a public vehicle, to make repairs due to a hardware issue on the pole. That repair was completed on OAS 172833456. A mid-cycle tree trim was performed in 2018. An overhead visual inspection and underground detailed inspection were performed in 2018.

Corrective Actions Planned



APPENDIX D

This circuit performed well In 2019 with only 188 customer interruptions resulting in a SAIFI of 0.09. Five automated intellirupter switches will be added to this circuit in 2020. A full cycle tree trim will be completed in 2020.



APPENDIX D

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 259058
Division: GATEWAY
ZIP Codes(s) Served: 63031, 63034
Customers Served: 2280
Customer Interruptions (CI): 4059
SAIFI Value: Y2017 - 3.02; Y2018 - 1.79; Y2019 - 1.78
SAIDI Value: 134

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	266	9	0	0.00	0
CUSTOMER	0	0	25	0.62	2
EQUIPMENT/OH	3623	2182	93	2.29	4
EQUIPMENT/UG	2667	116	114	2.81	6
LIGHTNING	0	115	0	0.00	0
OTHER	0	52	0	0.00	0
PUBLIC	1	922	3771	92.90	7
TREE	265	659	53	1.31	6
UNKNOWN	10	7	3	0.07	3

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2019) Two distribution automation switches were installed on the circuit under work requests 21MT699476 and 21MT699478 to improve reliability on this circuit.

(2017) Fuses 9990 and 1712 were replaced with Trip Savers under work request 21MT694702 to reduce circuit outages.

Corrective Actions Planned

Two public vehicle incidents caused 93% of the customer interruptions on this circuit in 2019. The first at Vaile Ave and New Halls Ferry Rd and the second at Wiethaupt Rd and Patterson Rd. A full cycle tree trim was completed in 2019. An underground visual inspection is scheduled for 2020. Any repair work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX D

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 456057
Division: SEMO
ZIP Codes(s) Served: 63827, 63851, 63857
Customers Served: 129
Customer Interruptions (CI): 92
SAIFI Value: Y2017 - 5.75; Y2018 - 5.22; Y2019 - 0.71
SAIDI Value: 123

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	2	6	2	2.17	2
CUSTOMER	0	0	0	0.00	0
EQUIPMENT/OH	428	466	87	94.57	9
LIGHTNING	56	7	0	0.00	0
OTHER	125	179	1	1.09	1
PUBLIC	0	0	2	2.17	2
TREE	125	5	0	0.00	0

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) No other work is planned for 2019.

(2017) Additional reclosers were installed on this circuit to isolate outages on work request 2TSE120483 in 2018.

Corrective Actions Planned

The circuit performed well in 2019. A full cycle tree trim was completed in 2019. No additional work is planned in 2020.



APPENDIX D

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 672053
Division: NORTHEAST MO
ZIP Codes(s) Served: 63334, 63353
Customers Served: 294
Customer Interruptions (CI): 285
SAIFI Value: Y2017 - 3.44; Y2018 - 2.33; Y2019 - 0.97
SAIDI Value: 84

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	0	5	2	0.70	1
EQUIPMENT/OH	684	645	78	27.37	7
EQUIPMENT/UG	15	0	0	0.00	0
LIGHTNING	290	8	159	55.79	14
PUBLIC	6	0	23	8.07	1
TREE	9	24	1	0.35	1
UNKNOWN	0	0	22	7.72	10

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) Work request 2WWZ179995 was completed in 2019 to fuse switches on two single-phase transformers on the three-phase circuit. The mid-cycle tree trim was completed in 2018. The underground circuit inspection was completed in 2017. Any repair work identified as a result of the inspection was completed in accordance with Ameren Missouri's infrastructure inspection policy. (2017) Work Request 2WWZ184275 was completed in 2018 to add fuse switches on seven single-phase transformers on the three-phase circuit. Work request 2WWZ179995 was completed to add fuse switches on two single-phase transformers on the three-phase circuit. In addition, the full cycle tree trim was completed in 2015.

Corrective Actions Planned

The circuit performed much better in 2019 compared to the prior two years. A field review identified a project to install two 12.5kV Intellirupter DA switches to facilitate supplying affected customers from a different substation during certain contingencies under work request 2WWZ186938. Ameren Vegetation Management has been notified of six 'hot spot' pole locations for tree trimming and to cut/remove vines.



APPENDIX D

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 678005
Division: SEMO
ZIP Codes(s) Served: 63845
Customers Served: 384
Customer Interruptions (CI): 44
SAIFI Value: Y2017 - 2.00; Y2018 - 1.80; Y2019 - 0.11
SAIDI Value: 8

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
CUSTOMER	0	0	0	0.00	0
EQUIPMENT/OH	11	671	43	97.73	6
EQUIPMENT/UG	2	0	0	0.00	0
LIGHTNING	0	5	0	0.00	0
OTHER	1	0	1	2.27	1
OVERLOAD	743	0	0	0.00	0
PUBLIC	0	0	0	0.00	0
TREE	2	5	0	0.00	0

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) A circuit protection coordination study was completed. Any fused switches requiring replacement for better circuit operation were installed under work request 2TSE123852 in 2019.

(2017) The district identified and made corrective overhead repairs on work request 2TSE119410 in 2017. No other work was planned for 2018.

Corrective Actions Planned

The circuit performed well in 2019. A full cycle trim and an overhead visual inspection are scheduled in 2020. No additional work is planned for 2020.



APPENDIX D

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 691051
Division: NORTHEAST MO
ZIP Codes(s) Served: 63334, 63343, 63344, 63359,,
Customers Served: 1192
Customer Interruptions (CI): 1250
SAIFI Value: Y2017 - 3.20; Y2018 - 2.07; Y2019 - 1.05
SAIDI Value: 132

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	30	9	9	0.72	7
CUSTOMER	2	0	0	0.00	0
EQUIPMENT/OH	2483	2278	1084	86.72	23
LIGHTNING	41	85	86	6.88	15
OTHER	1	0	0	0.00	0
PUBLIC	1189	0	1	0.08	1
TREE	40	70	12	0.96	4
UNKNOWN	7	13	58	4.64	9

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) A full cycle tree trim was completed in 2018. Engineering and design of the Elsberry 630-53 12.5kV circuit along Hwy B occurred in 2019.

(2017) Work requests 2WWZ178208 and 2WWZ178209 were completed in the fall of 2017 to add two 3-phase 12.5kV automated switches to the circuit. One is located in this circuit and the other is located at the tie point between this circuit and the adjacent 674-52 circuit. Work request 2WWZ183823 was completed to add a fused switch on a single-phase tap of the three-phase circuit.

Corrective Actions Planned

Three incidents involving overhead equipment malfunctions caused 78% of the customer interruptions in 2019. Two leaning poles are planned to be replaced along Hwy E under work request 2WWZ196734. Addition of three lightning arrestors along Hwy D and replacement of one broken V-brace along Hwy E are scheduled in 2020 under work request 2WWZ196725. Replacement of a broken pole-top insulator and a few failed lightning arrestors along Cannonball Rd are planned under work request 2WWZ196704. Construction of a multi-year project will start in 2020 to extend the Elsberry 630-53 12.5kV circuit along Hwy B to provide tie capability to this circuit under work order J0FFS. Work requests 2WWZ191437 and 2WWZ191545 are scheduled to be completed this year. Additional projects are planned for the next few years. (Some load on the Auburn 691-51 12.5kV circuit can be picked up in certain contingency conditions.). An underground visual inspection is scheduled in 2020. Any repair



APPENDIX D

work identified as a result of the inspection will be completed in accordance with Ameren Missouri's infrastructure inspection policy.



APPENDIX D

Multi Year WPC Analysis and Remedial Action Report

Circuit Number: 858052
Division: NORTHEAST MO
ZIP Codes(s) Served: 63435
Customers Served: 1
Customer Interruptions (CI): 1
SAIFI Value: Y2017 - 2.00; Y2018 - 3.00; Y2019 - 1.00
SAIDI Value: 36

Outage Analysis

Causes	2017 Total CI	2018 Total CI	2019 Total CI	2019 % Total CI	2019 # Incidents
ANIMAL	1	1	0	0.00	0
EQUIPMENT/OH	0	1	0	0.00	0
EQUIPMENT/UG	0	0	0	0.00	0
LIGHTNING	0	1	0	0.00	0
TREE	1	0	0	0.00	0
UNKNOWN	0	0	1	100.00	1

Corrective actions taken or planned are noted below. These actions were developed through any combination of engineering reviews, circuit patrols, circuit inspections, and trimming. Circuit inspections and trimming are conducted on an appropriate cycle per rules 4 CSR 240-23.020 and 4 CSR 240.23-030 respectively.

Corrective Actions Taken

(2018) The outages in 2016, 2017 and 2018 were due to issues on the Culver Stockton College primary meter and the college's system past their primary meter. Outages at these fuses are due to customer issues. This circuit is only 300' in total length, it has been inspected by engineering and no reliability work on this Ameren circuit is needed.

(2017) The outages in 2016 and 2017 were due to issues on the Culver Stockton College primary meter. The customer's fuses on their primary meter pole are labeled K2516 on Ameren mapping for communication purposes. Outages to these fuses are due to customer issues.

Corrective Actions Planned

The outages in 2017, 2018 and 2019 were due to issues on the Culver Stockton College primary meter and the college's system past their primary meter. The customer's fuses on their primary meter pole are labeled K2516 on Ameren mapping for communication purposes. Outages to these fuses are due to customer issues. This circuit is only 300 feet in total length. There is no reliability work needed on this Ameren circuit.