

ANNUAL DEPARTMENT REPORT ELECTRIC DISTRIBUTION

November 2024

MISSION STATEMENT

To provide reliable and dependable service and ensuring safety, all in the best interest of our customers, and good working relations with neighboring power companies.

EQUIPMENT/PHYSICAL FACILITIES

161kV Transmission Line:

The first section of the 161kV line was built in 1978 from KCPL's Norton Substation on Route O to the Southeast Substation on WW Highway. It has two-pole H fixtures and is ten miles long. In 1985, the 161kV line from Route O to the Miami Substation was built on single steel poles, this section is eight miles long. In 1995, a seven-mile section of the 161kV line was built from the Southeast Substation to the new West Substation on West Highway 20, with single wooden and steel poles. In 2002, the 161kV transmission line loop was completed by building a section from the West Substation to the Miami Substation. This last section was built with single wooden and steel poles.

The transmission line uses relays located at Norton, Miami, West, and Southeast Substations for protection. Part of the protection the relays provide uses communication between the relays to speed up and isolate any problem on the line very quickly. We completed the installation of new micro-processor relays and a fiber optic communication link to Norton Substation in the spring of 2007.

The 161kV Emergency Tie to Central Electric Cooperative was completed in the fall of 2019. This gives MMU a second transmission tie to the outside world. In the event of an emergency or general maintenance, MMU can switch all or a portion of its load to Central Electric Cooperative. Also, during this project, MMU contractors replaced the #1 structure and eliminated the #1 switch which was very old and in disrepair. The section of the transmission line between the #1 structure and the new Emergency Tie on Watermill Road was also removed.

Miami Substation:

Switchgear:

Miami Substation has two 15 kV switchgear lineups. The Miami #1 switchgear is a 15 kV outdoor metal clad lineup with nine 15 kV breakers and one auxiliary compartment and was built by Pedersen Power in 1985. It has an overhead bus duct to the grounding and power transformer used to connect to the 161 kV transmission system. This switchgear provides a 13.2 kV tie to North Street Substation, Miami #2 switchgear, generating Units #10 & #11, and three 15 kV distribution feeders. Units #10 & #11 house power is fed off of two 15 kV fused switches at the north end of this gear. In 2002, the protective relays were all replaced with microprocessor relays that improved the protection of the switchgear and associated equipment. There is one spare breaker in this switchgear lineup. Monthly inspections are performed on the switchgear including checking heater circuits, relay and breaker operations, general condition of the structure, etc. The roof and aisle walls were insulated in 2006 and a wall-mounted AC/heat pump unit was added to control building temperature. This should take care

of the moisture problems we have had on this gear. Historically the breakers in this lineup have had reliability issues, especially with the MOC switch. The breakers are tested and inspected at 5- to 7-year intervals for proper operation. I would rate the condition of this switchgear as poor/fair. In December 2023 the Board of Public Works gave approval to replace the Miami #1 switchgear. The new 15kV switchgear lineup and building was ordered in April 2024 with an expected delivery date of September 2025.

The Miami #2 switchgear is a 15 kV indoor gear housed inside a climate-controlled building. This lineup has seven 15 kV breakers and one auxiliary compartment and was built by Pedersen Power in 2002. It has an overhead bus duct to the grounding and power transformer used to connect to the 161 kV transmission system. This switchgear provides a 13.2 kV tie to North Street Substation, Miami #1 switchgear, generating Unit #6, and two 13.2 kV distribution feeders. All of the relays for this switchgear are microprocessor relays. There is one spare breaker in this switchgear lineup for future 13.2 kV feeders. This control building also houses the relay panels and controls for the 161 kV transmission line breakers and power transformers. Monthly inspections are performed on the switchgear including checking heater circuits, relay and breaker operations, general condition of the structure, etc. The roof was sprayed with a polyethylene coating to prevent leaks in 2011. I would rate the condition of this switchgear as very good and the building as good.

Transformers:

Miami Substation has two 161 kV-13.2 kV transformers rated at 25 MVA each. These transformers are used to connect the 13.2 kV system to the 161 kV transmission system. The West (Miami #1) transformer was installed when the substation was built in 1985 and the east transformer (Miami #2) was installed in 2002. The Miami #1 transformer uses a nitrogen blanket oil preservation system and the Miami #2 transformer uses a conservator tank with a bladder. Each transformer has its own grounding transformer and they share oil containment. The transformers are inspected monthly for leaks, tap changer operations, high temperature, tank pressure, oil levels, etc. The transformers and tap changers have oil samples taken annually to monitor their condition. The Miami #1 load tap changer was completely rebuilt in February of 2023. The Miami #1 transformer was regasketed at the same time. The unit was tested and put back in service. In July 2023 the Miami 1 transformer, grounding transformer, and circuit switcher were evaluated by engineers to find out whether to keep the units in service or replace them along with the switchgear. The engineers report found the transformer and circuit switcher are in good working condition and recommended replacing the 15kV switchgear lineup only. The switchgear is currently on order with an expected delivery date of September 2025. The Miami #2 transformer load tap changer had three vacuum interrupters replaced in December 2022. I would rate the condition of the Miami #1 transformer as good and Miami #2 transformer as very good.

161 kV Breakers:

Miami Substation has four breakers that are used for 161 kV transmission, substation, and transformer protection. Two of the breakers are S & C circuit switchers used for over-current protection and isolation of the power transformers. The first switch was installed in 1985 and the second was added in 2002 when the substation was expanded. These switches are motorized with a manual hand crank for backup and use contacts housed in sulfur hexafluoride (SF6) for current interrupting. Loss of SF6 gas would disable the interrupting ability of these switches but they can still be operated with no load. The other two breakers are Alstom 170 kV power circuit breakers installed in 2002. They are used to protect the transmission line and the 161 kV substation bus.

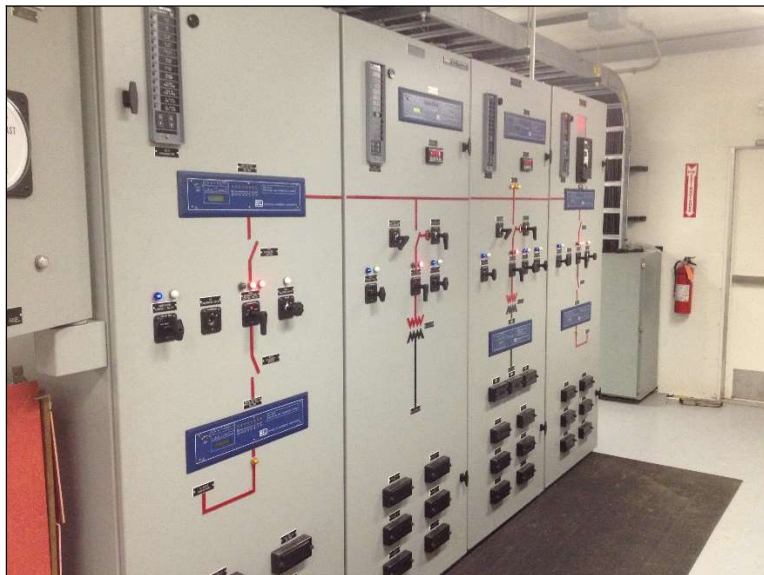
They are also motorized with a manual spring charging system for backup operation and use SF6 gas for current interrupting. These switches are equipped with gas density monitors and will lock out if the gas density falls below a certain level. We have not had to add any SF6 gas to these switches since they have been in service. These switches are inspected monthly and we have an SF6 gas bottle and regulator system at the substation if needed. I would rate the condition of all four switches as very good.

SCADA (System Control and Data Acquisition)

Miami Substation is controlled and monitored by the dispatch operator through the SCADA system. The relays at this substation are connected by fiber to a communication processor that connects to the dispatch operator. These newer-style microprocessor relays do not require any additional equipment to provide control and readings of the individual breakers and provide a great amount of information. I would rate the SCADA at this sub as very good.



Miami Substation



Miami Transmission Relay Panel

Miami #1 Switchgear

Feeder 201—Main from Miami #1 transformer.

Feeder 202—Control cabinet (no switch).

Feeder 203—Unit #11 turbine leads, 735' of 500mcm copper.

Feeder 204—Unit #10 turbine leads, 730' of 500mcm copper.

Feeder 205 (North Street Tie) feeds by 250' of parallel 750mcm aluminum underground to 556 ACSR parallel overhead and is a tie feeder to the North Street Substation Feeder 22B.

Feeder 206 (Wilson Northwest) feeds by 350' of 1,000mcm aluminum underground to 556 ACSR overhead and feeds west on 20 Highway to Kent Feeds, Cargill Meat Solutions, and AmeriCold Logistics. It has a tie with Feeder 14B to North Street Substation and to West Substation on Feeder 305.

Feeder 207 (ConAgra) feeds 900' of 1,000 mcm aluminum underground to 4,020' of 556 mcm overhead. The underground was replaced in May 2019. This feeder is the main feeder to ConAgra's plant. It has a tie to Feeder 13B in the North Street Substation and a tie to Feeders 208 and 403 from the Miami Substation.

Feeder 208 (Boyd Street) feeds by 900' of 1,000 mcm aluminum underground to 21,000' of 336 ACSR overhead. The underground was replaced in May 2019. It feeds the north part of town including C Substation. It has a tie to Feeder 104 to Southeast Substation and a tie to Feeder 402 to Miami #2 Substation.

Feeder 209 (Miami #2 Tie)—Bus tie to new switchgear breaker 407 fed by 700' parallel 750mcm 15 kV underground copper.

Feeder 210 is a spare switch.



Miami #1 Switchgear

Miami #2 Switchgear

Feeder 401—Main from Miami #2 transformer.

Feeder 402 (CMAS) feeds by 250' of 1000mcm aluminum underground to 336 ACSR, north on Miami Street, and then West on the south side of the industrial park. It has a tie to Feeder 403, 14B, 16B, 305, and 206.

Feeder 403 (Sergeant Street Feeder) feeds by 150' of 750mcm aluminum underground to 336 ACSR overhead, east in an alley south of Boyd Street to ConAgra's freezer. It has a tie to Feeder 13B at North Street and Feeders 207 & 208 at Miami #1.

Feeder 404 (North Street Tie) feeds by 250' of 1000mcm aluminum underground to 556 ACSR overhead. The feeder was tied to the existing North Street tie from Miami #1 to provide an alternate path for the tie to North Street after Miami #1 failure.

Feeder 405 (Spare switch)

Feeder 406 (Unit #6 turbine) feeds by parallel 750mcm underground copper.

Feeder 407 (Bus tie to Miami #1) feeds by 700' of parallel 750mcm copper to Miami #1 breaker 209.



Miami #2 Switchgear

West Substation:

Switchgear:

The West Substation switchgear is a 15 kV indoor gear housed inside a climate-controlled building. This lineup has seven 15 kV breakers and one auxiliary compartment and was built by Pedersen Power in 1995. It has an overhead bus duct to the power transformer used to connect to the 161 kV transmission system. The building has a basement under the north side used for cable entry and exit. This switchgear supplies 13.2 kV distribution to five feeders and has one spare breaker for future use. New SEL-351 relays were installed in the spring of 2014 for all the distribution breakers. This control building also houses the relay panels and controls for the 161 kV transmission line breakers and power transformer. Monthly inspections are performed on the switchgear including checking heater circuits, relay and breaker operations, general condition of the structure, etc. All breakers and relays were tested in the fall of 2023 with no issues found. I would rate the condition of this switchgear and building as very good.

Transformers:

West Substation has one 161 kV-13.2 kV power transformer rated at 25 MVA. This transformer is used to connect the 13.2 kV system to the 161 kV transmission system. The transformer was installed when the substation was built in 1995 and uses a nitrogen blanket oil preservation system. This transformer has oil containment with an inspection pit. The transformer is inspected monthly for leaks, tap changer operations, high temperature, tank pressure, oil levels, etc. The transformer and tap changer have oil samples taken annually to monitor their condition. I would rate the condition of this transformer as very good.

161 kV Breakers:

West Substation has three breakers that are used for 161 kV transmission, substation, and transformer protection. One of the breakers is an S & C circuit switcher used for over-current protection and isolation of the power transformer. This switch is motorized with a manual hand crank for backup and uses contacts housed in sulfur hexafluoride (SF6) for current interrupting. Loss of SF6 gas would disable the interrupting ability of this switch but it can still be operated with no load. The other two breakers are 170 kV power circuit breakers; one is an ABB installed in 1995 and the second is an Alstom that was installed in 2002. They are used to protect the transmission line and the 161 kV substation bus. They are also motorized with a manual spring charging system for backup operation and use SF6 gas for current interrupting. These switches are equipped with gas density monitors and will lock out if the gas density falls below a certain level. These switches are inspected monthly and we have an SF6 gas bottle and regulator system at the substation if needed. I would rate the condition of all three switches as very good.

SCADA (System Control and Data Acquisition):

The dispatch operators have monitoring and control capabilities of the equipment at this substation through the SCADA system. The SCADA system uses fiber optic cable to the West Substation where it is connected to a PLC before going to the individual equipment and relays. The relays that were installed in 2013 connect directly to the fiber and don't use the PLC.

Feeder 302 (Spare) is intended to be a back feed to the hospital under-build on the 161 line.

Feeder 303 (To South Loop) feeds to 20 Highway by 730' of 1000mcm aluminum underground to 14,000' of 336 ACSR overhead and feeds east on 20 Highway with a tie to the North Street Substation. It feeds the Westport area and has a back feed to Fitzgibbon Hospital and Feeder 106 at the Southeast Substation.

Feeder 304 (United Feeder) feeds to 20 Highway by 700' of 1000mcm aluminum underground to 4,200' of 556 ACSR overhead and feeds west on 20 Highway to AmeriCold Logistics. It has a tie to Miami Substation on Feeder 206, North Street Feeder 24, and West Substation Feeders 306 and 307.

Feeder 305 (Miami Tie) feeds north on the 161 line underbuild and ties to Feeder 206 in the Miami Substation. It has 1000mcm aluminum underground to 556 ACSR overhead with switching on 65 Highway to feed the Water Treatment Plant and a tie to Feeder 14B at North Street and Miami #2 feeder 402. Units #7 and #8 connect to Feeder 305 at the Water Treatment Plant.

Feeder 306 (Kent Feeds Feeder) feeds north on the 161 line underbuild. It has 1000mcm aluminum underground to 556 ACSR overhead and has a tie to Feeders 304 and 307.

Feeder 307 (Excel Feeder) feeds to 20 Highway by 700' of 1000mcm aluminum underground to 6,000' of 556 ACSR overhead and feeds west on 20 Highway to the Cargill Meat Solutions Plant. It has a tie to the North Street Substation on Feeder 13B, Miami Substation on Feeder 206, and Feeders 306 and 307 at West Substation.



West Substation



West Substation Switchgear



Distribution Relay

Southeast Substation:

Switchgear:

The Southeast Substation switchgear is a 15 kV indoor gear housed inside a climate-controlled building. This lineup has six 15 kV breakers and one auxiliary compartment and was installed in January 2022. It has a 13.2 kV underground dip to an open bus on insulated stands that connect it to the power and grounding transformer. The building has a basement under the west side used for cable entry and exit. This switchgear supplies five 13.2 kV distribution feeders and has no spare breakers. This control building also houses the relay panels and controls for the 161 kV transmission line breakers and power transformer. Bus differential relays were added to the 161 kV and 13.2 kV buses in 2011. Monthly inspections are performed on the switchgear including checking heater circuits, relay and breaker operations, general condition of the structure, etc. A new roof and HVAC system were installed in June 2009. The 15kV switchgear lineup was replaced in January 2022 with all new breakers and protective relays. I would rate the condition of this switchgear as very good and the building as good.

Transformers:

Southeast Substation has two 161 kV-13.2 kV power transformers rated at 25 MVA. The transformers are used to connect the 13.2 kV system to the 161 kV transmission system. Transformer #1 was installed when the substation was built in 1978 and uses a nitrogen blanket oil preservation system. In June 2024 a complete regasket and oil process was performed on Transformer #1. Transformer #2 was installed in November 2021 and put in service on June 14th 2023. Both transformers have oil containment with an inspection pit. Transformers are inspected monthly for leaks, tap changer operations, high temperature, tank pressure, oil levels, etc. The transformers and tap changers have oil samples taken annually to monitor their condition. Transformer #1 load tap changer had the stationary contacts, butterfly contacts, and braking assembly replaced in May of 2007. I would rate the condition of transformer #1 and tap changer as good and transformer #2 and tap changer as very good.

161 kV Breakers:

Southeast Substation has three breakers that are used for 161 kV transmission, substation, and transformer protection. One of the breakers is an S & C circuit switcher used for over-current protection and isolation of the power transformer. This switch is motorized with a manual hand crank for backup and uses contacts housed in sulfur hexafluoride (SF6) for current interrupting. Loss of SF6 gas would disable the interrupting ability of this switch but it can still be operated with no load. The other two breakers are ABB 170 kV power circuit breakers installed in 1995 during the addition of the southeast/west transmission line. They are used to protect the transmission line and the 161 kV substation bus. They are also motorized with a manual spring charging system for backup operation and use SF6 gas for current interrupting. These switches are equipped with gas density monitors and will lock out if the gas density falls below a certain level. Both ABB breakers were completely rebuilt in July 2014. Due to an SF6 gas leak, breaker 111B was replaced in April 2021 with a new GE SF6 breaker. The circuit switcher and SF6 breakers are inspected monthly, we have an SF6 gas bottle and regulator system at the substation if needed. I would rate the condition of breaker 112B and the circuit switcher as good and SF6 breaker 111B as very good. SCADA (System Control and Data Acquisition)

Southeast Substation is controlled and monitored from the dispatch operator's desk through the SCADA system. The relays at this substation were replaced with new microprocessor relays in January 2022. This will provide more information than what was available. The new relays are connected to the operator's booth using fiber optic cable.

Feeder 103 (North Loop) feeds by 1,200' of 750mcm aluminum underground to WW Highway and to 8,500' of 336 ACSR overhead. It feeds WW Highway and north to Potomac and Sunrise Additions and the Missouri Valley College area. It has a tie to Feeder 104 with a tie to the North Street Substation and to recloser #10.

Feeder 104 (Cross Town) feeds 1,200' of 750mcm aluminum underground to 22,000' of 336 ACSR overhead and feeds to WW Highway. It has a tie to the North Street Substation feeder 26, feeder 208 at Miami #1, and feeds B Substation on South Lincoln and East Vest Street.

Feeder 105 (South Loop) feeds by 1,200' of 750mcm aluminum underground to 9,000' of 336 ACSR overhead and feeds recloser #10 on South Odell with a tie to the North Street Substation Feeder 24B.

Feeder 106 (Hayner Feeder) feeds by 460' of 500mcm copper underground to 43,000' of 336 ACSR overhead to #2 copper with 11,000' of underground. It feeds the south part of town and west to Fitzgibbon Hospital. It has a tie to Feeder 105 on Lincoln Street and to Feeder 303 to the West Substation. The MC Power Solar Farm is hooked to this feeder at the Fairgrounds by Recloser # 11.

Feeder 107 (Watermill Tie) feeds by 1,200' of 750mcm aluminum underground to 336 ACSR overhead to 1/0 overhead. It feeds to WW Highway and east to the Wastewater Treatment Plant with a tie to recloser #6 in the B Substation. Unit #9 connects to Feeder 107 at the Wastewater Treatment Plant.



Southeast Substation



Southeast Substation Switchgear



Southeast Substation Transmission Relays

North Street Substation:

Switchgear:

The North Street Substation is a common isle switchgear with eleven 15 kV General Electric vacuum breakers. It was built by H.K. Scholz and installed during the fall of 2009. The new gear is insulated and HVAC is provided by a wall-mount unit. It replaced an ITE switchgear lineup that was installed around 1964. This substation was our first tie to KCPL with a 34 KV feed and a path for our coal units to reach the distribution system. The 34 kV tie was removed when Miami #1 was built and the coal units are no longer in service.

This lineup was installed over the existing concrete basement for cable entry and exit. Concrete piers were installed so the building that houses the gear could be extended to the east. This extra space is used for auxiliary equipment and working space. Batteries were added in this space to move the DC supply to the Sub from the Power Plant in 2017. The new switchgear lineup has two sections of bus — a north half with six 15 kV breakers, and a south half with a tie switch and five 15 kV breakers. The two halves are connected with parallel 1000mcm aluminum 15 kV conductor that runs through the basement on a cable tray. This switchgear supplies power to five 13.2 kV distribution feeders. Monthly inspections are performed on the switchgear including checking heater circuits, relay and breaker operations, general condition of the structure, basement sump pump, and anything that looks or sounds unusual. I would rate the condition of this switchgear as very good.

SCADA (System Control and Data Acquisition)

North Street Substation is controlled and monitored from the dispatch operator's desk through the SCADA system. The relays at this substation are connected to the dispatch operator with fiber. These newer-style microprocessor relays do not require additional equipment to provide control and readings of the individual breakers. The information available includes amperage, watts, voltage, power factor, and breaker status. I would rate the SCADA at this sub as very good.

Feeder 12B (Spare)

Feeder 13B (Industrial) feeds by 150' of 500mcm copper underground to 336 ACSR overhead. It feeds the central part of town north of Vest and has tie capabilities to Feeder 403 in Miami Substation, Feeders 16, and 26 in North Street Substation, and Feeder 104 in Southeast Substation. The primary conductor needs to be enlarged on several sections of this feeder in the future to increase back feed capability with other feeders.

Feeder 14B (water works) feeds by 125' of 500mcm copper underground to 336 ACSR overhead. It has ties to Feeder 206 in Miami #1, 402 in Miami #2, and a tie with Feeder 305 to the West Substation.

Feeder 15B (Spare)

Feeder 16B (Tucker Street) goes from North Street Substation with 800' of 350mcm copper underground to North Street and Tucker Street, to 336 ACSR overhead to 4/0 ACSR aluminum overhead with 39,200' of overhead lines and 665' of underground. It has a tie to

Feeder 206 and 402 in Miami Substation and a tie to Feeder 303 in the West Substation. It feeds the west and central part of town.

Feeder 22B (Tie to Miami) is a tie feeder between North Street Substation and Miami Substation. It is fed by 400' of parallel 1,000 mcm aluminum underground to parallel 556 ACSR overhead, 1,400' long on 14 poles in the line, and has a capacity of 28 MW (1,400 amps). The underground portion was replaced in October 2018.

Feeder 23B (Spare)

Feeder 24B (south loop) feeds by 300' of 350mcm copper underground to 336 ACSR overhead, it feeds the southwest part of town and A Substation on College Street. It has a tie to Feeder 105 at the Southeast Substation and a tie to Feeder 303 at the West Substation. The underground feeder cable was replaced in May 2021.

Feeder 25B (Spare)

Feeder 26B (Loop tie) feeds by 800' of 350mcm copper underground to Arrow Street and South Grant to 336 ACSR overhead. It is a main tie from the Southeast Substation (104) to the North Street Substation for back feed and switching of loads.





North Street Substation

A Substation (900 block of West College):

A Substation was built in 1965 and expanded in 1974. It is a 13.2 kV switching station that feeds from West Substation Feeder 303B or North Street Substation Feeder 24B and feeds businesses on West College and the east and south-central parts of town. Cooper Form 6 controls were installed in 2003. These controls allow us to monitor and control the reclosers from the dispatch operator's desk. In October 2024 both oil filled reclosers were replaced with NOVA vacuum reclosers along with all post insulators, switches, and arresters. . This substation is inspected monthly and I would rate its condition as good.



A Substation

B Substation (South Lincoln and East Vest):

B Substation was rebuilt in 2011 and converted to 13.2 kV. The step-down transformer was removed and Reclosers #5 and #6 were replaced with new Cooper NOVA vacuum units and Form 6 controls. One of the Form 6 controls (#6) failed in 2013 and was replaced with an SEL-651. Both reclosers are 13.2 kV and connected to our SCADA system allowing full monitoring and control. Recloser #5 feeds south on Lincoln and west on Yerby and has ties to Feeders 13 at North Street and 103 at Southeast. The conductor on Yerby from Lincoln to Lafayette was replaced with 1/0 ACSR in 2012. This will increase the capacity of this circuit to 200 amps. Recloser #6 feeds north on Lincoln and west on Eastwood and Arrow and has ties to Feeder 13 at North Street. This substation is inspected monthly and I would rate its condition as good.



B Substation

C Substation (North Brunswick and East State Street):

C Substation was built in 1965 and expanded in 1974. It is a 13.2 kV switching station that feeds from Miami #1 Feeder 208 or Southeast Substation Feeder 104 and has two reclosers. Recloser #7 is 200 amps and was replaced in 2000. Recloser #8 is 200 amps and was installed in 1994. New Cooper Form 6 controls were installed in 2003. These controls allow us to monitor and control the reclosers from the dispatch operator's computer. All the station insulators and switches were replaced in 2022. Recloser #8 feeds the north-central part of town with a tie to Miami Substation Feeder 208. Recloser #7 feeds the northeast part of town with a tie to C Substation Recloser #8 and B Substation Recloser #6. In July 2023 we replaced both oil-filled reclosers (reclosers 7 & 8) with Nova vacuum reclosers. We also replaced 6 porcelain station arresters with new polymer arresters and all post insulators. This substation is inspected monthly and I would rate its condition as good.



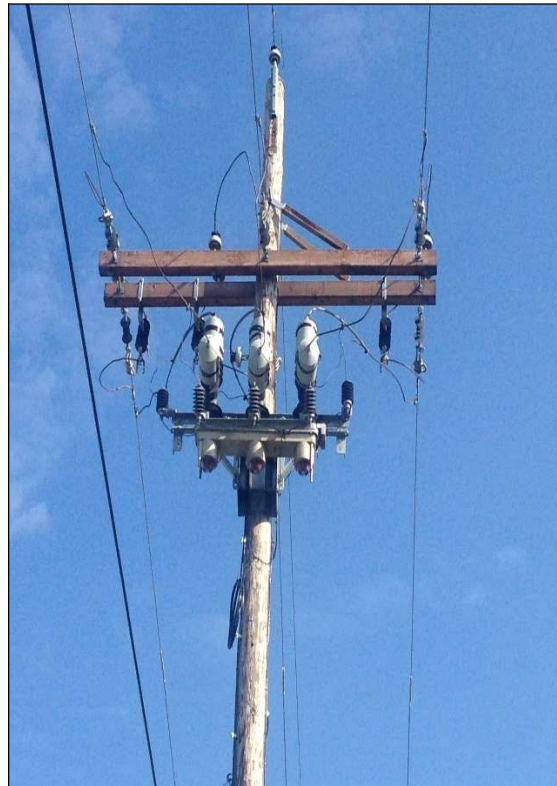
C Substation

Unit # 9 Generator Breaker

As part of the 2014 Wastewater Treatment Plant improvement, we added a recloser to automate Unit #9. We installed an Elastimold three-phase vacuum recloser with source and load-side voltage sensors. The recloser is controlled by an SEL-651R microprocessor recloser control with custom programming. This control interfaces with a new Cummins control on the generator and switches from utility to generator upon loss of source side voltage, and switches back to utility when service is restored. The automatic transfer scheme is tested every six months to ensure proper function.



Unit #9 recloser control



Unit #9 recloser

Mobile Equipment:

Type	Operated*	Condition	Cost	Cost to Replace
'22 Ford Pickup (301)	Daily (5,977mi)	98	\$40,000	\$45,000
'22 Ford Pickup (310)	Daily (11,959mi)	98	\$40,000	\$50,000
'24 Chevrolet 1-Ton Truck (302)	Daily (4,057mi)	100	\$31,500	\$70,000
'05 Altec Line Truck (303)	Daily (9,767mi/2,068hrs)	55	\$141,500	\$360,000
'94 Puller/Tensioner (304)	As needed (516 hrs.)	65	\$39,050	\$55,000
'10 Altec Bucket Trk. (305)	Daily (32,777mi/7,238hrs)	60	\$175,000	\$390,000
'21 Ford Pickup (306)	Daily (15,240mi)	95	\$40,655	\$50,000
'05 GMC Bucket Trk. (307)	Daily (23,525mi/4,850hrs)	55	\$111,000	\$360,000
'94 Ford Dump Trk. (309)	Bi-weekly (37,585mi)	45	\$31,855	\$80,000
'06 Chev. Pickup (348)	Daily (98,067mi)	45	\$18,850	\$0,000
'04 Bandit Chipper (311)	Seasonal (1,027hrs)	70	\$26,000	\$50,000
'96 Ditch Witch Trencher (312)	Weekly (1,394 hrs.)	30	\$30,885	\$42,000
'12 Altec Bucket Trk. (317)	Daily (27,362mi/5,804hrs)	80	\$111,000	\$390,000
'23 Ford Pickup (318)	Daily (3,492mi)	98	\$40,000	\$50,000
'12 Dodge Meter Trk. (319)	Daily (94,154mi/2,129hrs)	80	\$71,650	\$125,000
'06 Altec Line Truck (320)	Daily (18,209mi/3,975hrs)	60	\$105,554	\$360,000
'97 Pole Trailer (326)	As needed	45	\$7,742	\$15,000
'15 Altec Backyard Machine (327)	As needed (455hrs)	85	\$98,000	\$140,000
'23 Ford 1-Ton Truck (329)	Daily (2,321mi)	60	\$34,300	\$70,000
'21 Ford 1-Ton Truck (330)	Daily (19,927mi)	95	\$21,000	\$50,000
'06 John Deere Gator	Seasonal (793hrs)	80	\$7,800	\$25,000
'10 Ditch Witch Mini Skid (333)	As needed (1,754hrs)	60	\$25,000	\$45,000
'08 Ditch Witch HDD (334)	As needed (855hrs)	70	\$122,000	\$220,000
'12 Kubota Tractor	Weekly (2,346hrs)	70	\$42,500	\$70,000
'12 Ford F350 (340)	Daily (67,054mi)	60	\$26,000	\$50,000
'17 Dodge Meter Truck (324)	Daily (43,340mi/1,382hrs)	90	\$115,000	\$125,000
'23 Ditch Witch Mini Skid (420)	As needed (66.6hrs)	95	\$62,570	\$80,000

* Mileage and hour data taken November 2024

Buildings:

The *Miami Substation* has three control buildings. The small control building in the southwest corner of the station is used to house the batteries for the 130-volt DC power and fiber optic communication equipment. This building uses electric heat and air conditioning for climate control. The new east control building houses the Miami #2 switchgear lineup, 161 kV relay panels, and KCPL metering equipment. This building also uses electric heat and air conditioning. The west building is an outdoor metal-clad used to house the Miami #1 breakers and controls. This building was insulated and a wall-mounted AC/heat pump was installed in 2006, and the exterior was painted in 2008. The new Miami #1 building along with 15kV switchgear lineup is on order with an expected delivery date of September 2025.

The *West Substation* building houses the 13.2 kV switchgear, 161 kV relay panels, fiber optic communication equipment, and control batteries. It has electric heat and air conditioning for climate control. The control batteries at this station were replaced in 2012. It is in good condition.

The *Southeast Substation* building houses the 13.2 kV switchgear, 161 kV relay panels, fiber optic communication equipment, control batteries, and Central (CEPC) metering. It has electric heat and air-conditioning for climate control and a new HVAC unit was installed in 2009. The main structure is in good condition and a new roof was installed in 2009.

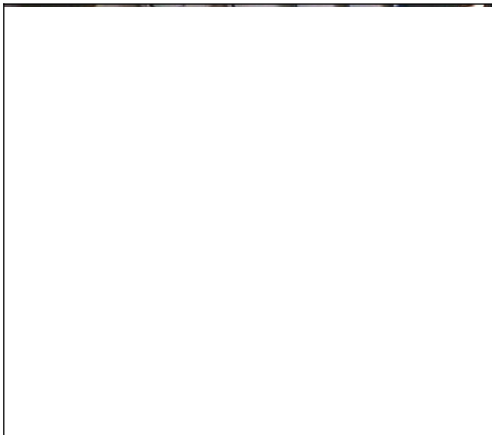
Stock poles are located on the west side of the Service Center. Transformers that are in inventory are located on the transformer storage pads on the north side of the warehouse.



The warehouse was constructed at the Service Center and completed in early 2018. This has improved efficiency and made keeping track of inventory items much easier. We have moved all the conductor reels to the new warehouse.

There are 41 *manholes*. The manholes are used for pulling primary feeder wire and control cable. Eight manholes have sump pumps and five have drains. The manholes and all associated information are being added to our GIS mapping.

The Electric *Building* at the Service Center (24,300 sq. ft.) was first occupied in 2000. The HVAC unit for the office/break room area was replaced in May 2024. Overall the building is in good condition.



Pole Joint Use Agreements:

We have joint use agreements with several other utilities in our service area. These allow attachments to other utility poles and reduce the number of poles required for each utility to provide service. Several of our agreements are well over 30 years old and need to be updated with current regulations and attachment rates. We are currently working with Healy Law Firm to update these agreements.

KCPL (EVERGY) Agreement (1981) — MMU has 126 attachments to EVERGY poles and EVERGY has 50 attachments to MMU poles. We paid \$14.34 rent on each pole to EVERGY in 2021. The net rent we owe EVERGY for 2023 is \$1,089.84.

Cable TV Agreement (1965) — Cable TV has 2,780 attachments on MMU poles with the rent per pole at \$7.50 each per year. The total rent received from Cable TV was \$ 20,853.75 for 2023.

AT&T (1980) — ATT has 967 attachments on MMU poles. MMU has 222 attachments on ATT poles. ATT pays \$7.50 rent on each pole. Rent from ATT was \$ 5,587.50 for 2023.

Central Missouri Electric (CME) Agreement (2006)— MMU entered into a pole use agreement with Central Missouri Electric Cooperative in 2006 for the attachment of fiber optic cable to poles along State Route O. Pole rent for fiber attachments is \$10.00 per pole. MMU has 93 attachments to CME poles and CME has 10 attachments to MMU poles. Rent paid to CME for 2023 was \$1,667.00.

OPERATIONS

The Electric Distribution Department operates according to the General Rules and Regulations Applying to Utility Service, City Ordinance No. 7726, dated January 16, 2007. This ordinance replaced Ordinance No. 5909.

Currently, the staffing level is appropriate. With the rising cost of wholesale power, we need to keep looking at ways to make operations more efficient and implement changes as needed.

RELIABILITY

We started tracking electric outages in 1998. In 2002, we received free software from the American Public Power Association that allows us to track outages and make comparisons with industry-wide outage indices. In 2015, we switched our outage tracking to APPA's e-reliability tracker. This is web-based and has more options than the previous software we used. We will use this information to help reduce future outages.

In 2006, MMU was recognized by the American Public Power Association by receiving its RP₃ platinum designation. The RP₃ program recognizes utilities that excel in the areas of safety, reliability, and system improvements. This designation was originally for a two-year period and was changed to three years in 2014. We received this designation (platinum) in 2008, 2010, 2014, 2017, and Gold Designation in 2012. MMU was recognized again in 2023 with a Platinum designation. In 2020, MMU was recognized by the American Public Power Association with a Diamond Member designation. This is the highest level awarded by the APPA.

MMU also received APPA’s award for Excellence in Reliability annually since 2017. This award recognizes the utility’s excellence in reliability by significantly outperforming the electric industry national average for reliability as reported by the Energy Information Administration.

Outages by Cause

	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>
Squirrel	10	15	8	22	23
Electrical Failure	2	6	0	1	0
Weather (Lightning, Ice, Wind)	5	7	18	11	12
Other	8	5	1	3	5
Tree Limb	18	7	4	4	4
Unknown	3	3	4	4	3
Equipment Failure	12	6	14	12	12
Public	5	4	3	2	3
TOTAL	63	53	52	59	62

	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023</u>
SAIDI (System Average Interruption Duration Index)	36.61	21.94	21.048	27.938	32.191
CAIDI (Customer Average Interruption Duration Index)	51.97	39.82	48.055	62.926	50.12
SAIFI (System Average Interruption Frequency Index)	0.7	.551	.438	.444	.642
ASAI (Average Service Availability Index)	99.993%	99.995%	99.995%	99.994%	99.9938%

REGULATORY COMPLIANCE

PCBs (ID No. MODO3071598):

Oil testing is required for PCBs in oil-filled transformers and electric equipment for 50 ppm (parts per million) and over. We have no transformers over 10 ppm. All of our capacitors and oil switches are non-PCB

Old Poles and Cross Arms:

Regulations require that old poles and cross arms be disposed of in a landfill, or, if an individual wants some poles, that individual must sign a treated wood information form, which states what they may or may not use them for. A copy of this form is given to the individual with a copy being kept with MMU. The unusable poles and cross-arm pieces are put in a dumpster to go to the landfill.

Oil Containment:

EPA requires oil containment on transformers with an oil capacity of 660 gallons or more. Oil containment has been installed on our six large substation transformers.

ONGOING CONSTRUCTION/IMPROVEMENTS

Single-Phase Overhead in Walkway Easements:

There are a lot of single-phase primary lines located in walkway easements used for residential distribution. We started a long-term project of replacing these overhead lines with underground. These areas are selected based on the condition of the lines and tree/power line conflicts. The cost to replace single-phase overhead lines with underground in walkway easements is about 30-40% higher. We can expect to recover these costs over the life of the line by eliminating tree trimming and reduced outages. In the past several years we have buried primary, secondary, and service lines that feed approximately 570 customers. We are currently working in the Potomac hills Subdivision east of Lincoln Avenue between Mitchell and Watermill Rd.

Feeder Reconductoring:

The capacity of some feeders is limited due to size of primary conductor. There are several feeders that have been converted to 13.2 kV that need to have the conductors enlarged to match the feeder breaker that feeds them. Larger conductor size will also improve system losses and provide greater physical strength during storms; this will help keep lines in the air and should improve outage minutes. Several feeders that have been identified needing larger conductors are 13B and 16B out of North Street Substation. To date, we have replaced approximately 5,300 ft. of three-phase primary on circuit 16B and approximately 2,000 ft. of three-phase primary on circuit 13B with 336.4ACSR.

Pole Inspections/replacements:

MMU has approximately 6,559 poles in its system. We started a wood pole inspection program in 2013 to identify poles that no longer meet strength requirements and create safety and/or reliability problems. Pole inspections were completed in 2017 and 441 reject/priority poles were identified by this project. All the priority poles have been replaced and there are approximately 16 reject poles remaining. Pole inspections were completed in July 2023 on 1212 poles. Of those inspected 39 were rejects with 3 of those being priority rejects. All priority rejects have been replaced, we continue to replace reject poles according to their remaining strength. Inspections are recommended every 10 years; our next cycle is scheduled for 2027.

Meters:

There are approximately 5,747 single-phase and 397 three-phase electric meters. The Board approved a pilot project in 2017 to look at replacing the AMI system we currently use. The pilot project will include 256 single phase and 14 polyphase meters. After completion of the pilot the Board approved a full deployment of the new system. The new system is working very well and has the capability of remote connects/disconnects, on demand reads and many other features that has improved customer service and efficiency. MMU signed the first net meter agreement in 2013 for a Photovoltaic (PV) System. Currently, there are 40 PV systems connected to MMU's electric grid generating a total of 365,754 kWh of electricity in 2023.

Street & Area Lights:

We own and maintain 2,016 streetlights and 963 area lights. We made the switch to LED Street and area lights in 2016. Payback is less than 5 years if we replace an HPS fixture that is not

working. As of September 2020, all street lights have been changed to LED. There are currently 12 HPS area lights left to replace. We plan to replace these lights as they fail.

Locates:

We are a member of Missouri One Call and receive locate requests when someone is digging in our service area. We responded to 1,119 locate requests in 2023.

Tree Trimming:

Tree trimming is an important part of providing safe and reliable electric service. We have approximately 86 circuit miles of three-phase feeder line that we must maintain clearance on along with single-phase laterals and 18 miles of transmission line. We use a combination of tools to maintain our utility easements including mowing, spraying and manual cutting (chain saws). Bids were requested in 2023 for trimming services thru 2026. Poor Boy tree was awarded the bid and continue to trim/remove trees near our transmission and distribution lines. .

Educating our customers is an important part of managing power line conflicts with trees. We make tree planting information available to customers with brochures at our office and local nurseries. There are also links on our web site that provide information on tree planting and care. We run ads on tree planting every spring when a majority of trees get planted.

Mapping:

We currently have 6,559 distribution and transmission poles numbered. Detailed information is kept on all of the numbered poles including size, attachments, type, ownership and inspection data. Any new construction or changes to existing poles is added to our map and pole database to keep current. The pole mapping system is used to print maps for the crews to use on construction projects. We have been working on adding layers for primary, secondary and service lines, both overhead and underground.

FUTURE PROJECTS/NEEDS

MMU System Study:

Toth & Associates performed a comprehensive study of our Electric System in 2023. . The main focus of this study was MMU's transmission line, substations and generation. Distribution projects and planning are handled by MMU staff. This plan should be reviewed every 5 years to maintain its accuracy and update costs due to inflation.

Arc Hazard Study:

An Arc Hazard Study has been performed on our system so employees are aware of the hazards they face. This study was last updated in 2020 and should be updated in 2024-2025 to include additions and/or changes to our system and facilities. Updating the Arc Hazard Study is in the 2024/2025 budget.

Electronic Work Order System:

We rely on a fax machine and emails to communicate between our main office on Morgan Street and field staff at the Service Center. The fax system has not been very reliable and orders may not be received in a timely manner. The fax system also limits the number of people who know what is going on to the person that sent or received the fax. Email works for staff as long as they are in front of a computer. We could provide better customer service and improve efficiencies by moving from fax machines and desktop emails to a computer-based system with mobile devices that allow crews to receive work orders and access other information in the field.