



BREAKING DOWN INDUSTRY JARGON, PART II

Coast Guard Pole

Former service connection to USCG's submarine cable to Plum Island; now just serves ferry dock.

Pole owned by WIEC, maintained by WPS

Interconnects the Island to the nation's electricity grid.

Pole owned by WIEC, maintained by WPS

Connects old and new submarine cables; metering is also done here.

What do the poles at Northport do?

In the last issue we included a graphic and description of what you might find on a typical pole. As noted in the description, there are some things in the graphic that you either won't find on our poles or that might be on our poles but are of a different configuration than what was shown in the graphic.

We want to continue this series and, in this issue, we are going to start with the cooperative poles that are located at Northport. We are often asked, "Where does our power come from?" The answer to that is, "From the grid." Because of interconnection and transmission, all sources of generation contribute to the Island's electric service and we will discuss that in a later issue. Since Northport is where the Island connects to the grid, we thought it would be a good spot to expand on our explanation of the system.

You may or may not have noticed the three poles

where the WPS/WE electric lines end at Northport. It might be a little hard to see on the photographs here and on the following page, but we will try to describe the interconnection and the equipment necessary that is located on these poles.

We have always called the last pole "the Coast Guard Pole" because that is where the service connection to the U.S. Coast Guard's (USCG) submarine cable to Plum Island was once connected. Since that cable failed a couple years ago, service on Plum Island comes from our submarine cable. The transformer on this pole not only served the USCG system, but also the ticket booth. Since the USCG equipment was disconnected, WPS upgraded the transformer so that it could serve the balance of the dock better, and the Ferry Line installed underground equipment during our cable replacement to facilitate this. Other than the purpose of trivia, this



Cooperative poles and equipment at Northport.

pole is really not related to the Island's interconnection to the grid.

Even though the first two poles and equipment on them are owned by the Washington Island Electric Cooperative, they are maintained by Wisconsin Public Service (WPS) as part of their routine. For safety reasons, they can only be operated remotely by WPS System Operating in Green Bay and although we have the ability to take a ride on the ferry and operate the equipment manually ourselves, we leave that up to WPS line personnel as well.

First Pole

The first pole of the three (farthest southwest) is where the interconnection actually happens. You can see a series of cutouts (which are basically high-voltage switches) located on the bottom crossarm of the pole. Below that, in the large rectangular box, is the Northport recloser. A recloser is basically a utility-scale breaker. While operating a little differently, this breaker is much like the breakers in your home electric panel in that it protects us from problems on the system.

It is different because it is electronically controlled and monitored and it looks at several different things. The monitoring and control equipment for the recloser is located at the bottom of this pole. WPS System Operating in Green Bay can see this equipment and monitor not only the state of the recloser, but also the load (voltage and current draw – volts and amps) on each electrical phase (there are three) coming to the Island. The recloser is configured to operate, or open (separating the Island from the grid), under a number of different circumstances. This operation happens automatically under these circumstances and most of the time leads to us going on our engines until the problem has been solved.

The recloser opens upon a loss of phase (meaning one or more of the three phases coming to the pole is no longer energized). This is usually the result of a tree, branch, or other issue much the same as power outages occur on the Island. It can also be due to an issue in



the Sister Bay substation or in switching equipment operated by WPS.

If the recloser opens due to one of these incoming or source circumstances, it will automatically close itself back in if the problem is corrected within 30 minutes. If it is not corrected within that timeframe it must be closed in either remotely from Green Bay through the control, or manually by WPS personnel at the control at Northport.

A significant amount of communication has to occur before the recloser is closed either remotely or manually in order to ensure both our safety here on the Island and the safety of the linemen working for WPS.

The recloser also opens if it senses a fault (large current draw) on our side as has been the case when we have had an underground fault or in the case of the failure of the submarine cable. Under these circumstances, the

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recloser will attempt to automatically close (hence the recloser term) and clear the fault in 45 seconds. If the fault cannot be cleared, the recloser will then lock open until the problem is solved and it will be reclosed either remotely or manually. If, for instance, a bird gets into our substation here at the electric cooperative or in the overhead equipment on the second pole, the reclose attempt might burn it out of the lines and power is restored automatically. Yes, we have suffered from squirrel terrorism at Northport much the same as we have seen it here.

Second Pole

The second pole (the shortest one of the three) is where our metering occurs and where both the old and new submarine cables are connected. The equipment on this pole are power transformers that reduce the voltage so the incoming wholesale power can be metered. The cutouts (switches) on the southwest side of the lowest crossarm are connected to the new submarine cable, which is currently powering the Island. The cutouts on the northeast side of the lowest crossarm are connected to the old, repaired submarine cable, which is still energized, much like an extension cord plugged into the wall with nothing connected at the other end. Keeping the cable energized actually helps prevent water intrusion and allows it to be an emergency backup.

These cutouts are actually fused using 20-amp fuses. Should this cable fail again, not only will the recloser operate, causing an Island-wide outage and the reclose as described, but the fuse will blow in the cutout, causing the cutout to fly open and giving us a visual indication of the failure. If this occurs, and we feel it is likely to happen at some point in the future, we will be able to see what happened without bringing locating equipment to Northport to troubleshoot. We can then

make a decision as to the value of repairing the cable once again.

As you may or may not remember, the old submarine cable runs directly from this second pole to the cooperative property on the Island, and the 2018 failure occurred west of Plum Island. The old cable actually runs underneath the east breakwall, which was built over the top of it. The new submarine cable is connected to this pole via underground cables running under the parking lot to the west side of the breakwall and then to Plum Island, underground on Plum Island, and then submarine to the cooperative property on the Island.

The equipment described above is also essential for our wholesale contract and for local (Sister Bay and North) grid stability.

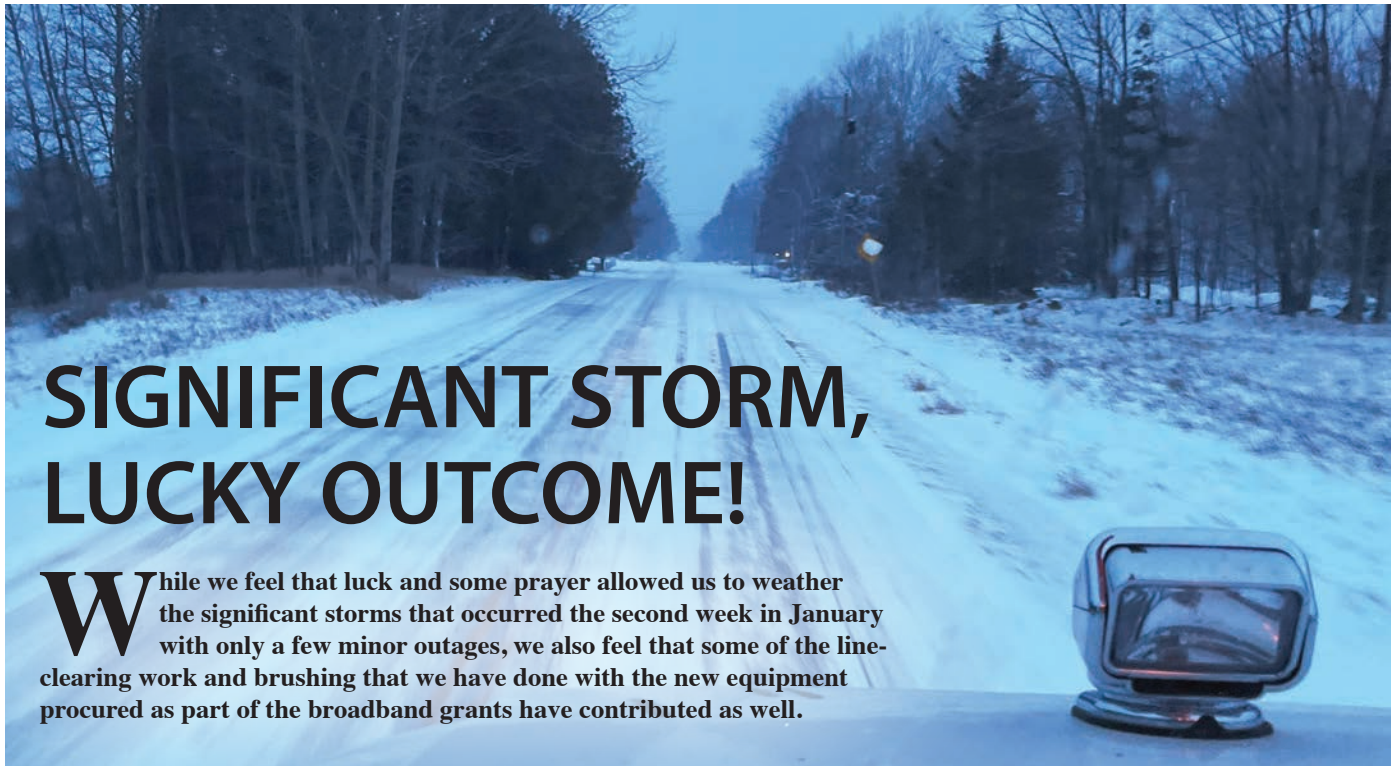
As part of our contract, we have given WPS permission to open this recloser under circumstances related to safety and if the Island's load is creating an issue for the equipment serving Northern Door County. Under a health and safety issue, WPS System Operating has permission to open the breaker without notice if necessary.

It is also essential to our "interruptible" status under the wholesale contract. As you have read in these pages over and over again, we buy power based on day-ahead market pricing (electricity is a commodity) and this pricing is dependent on many factors, but generally it can be described as generating capacity being matched to load requirements. As a side note, at the time of this writing we are under 24 hours of interruption with 19 hours the day before, largely because of the cold weather and the availability and price of natural gas.

During the summer months we are fully interruptible, meaning the breaker at Northport can be opened. During the winter months, we have a "firm" demand nomination under which the cable and substation transformer remain energized and we disconnect utilizing our own switch gear in the engine room (more on that in future installments).

RATE INCREASE REMINDER

While we wish it weren't necessary, as noted in the last issue, starting with the January billing cycle you will see an increase on your electric bill. Base charges are increasing by \$5 per month and electric rates are increasing by \$0.01 /kWh across the board. On the average bill where our member uses 1,000 kWh per month, this will amount to a \$15 per month increase on your electric bill.



SIGNIFICANT STORM, LUCKY OUTCOME!

While we feel that luck and some prayer allowed us to weather the significant storms that occurred the second week in January with only a few minor outages, we also feel that some of the line-clearing work and brushing that we have done with the new equipment procured as part of the broadband grants have contributed as well.

In the photo below, which is in the right-of-way off of Bay Farm Rd. on the way to Little Lake, you could not see the poles or lines and in high winds like the ones we experienced in January, the small trees would have been whipping back and forth and touching



Mike brushing the right-of-way.

the lines, causing blinks. Without the new equipment, this work, which occurred over the course of one day with the help of the Michels crew, would have required multiple planned outages probably over a couple of weeks.

With the winds and gusts as high as they were on January 12, 13, and 14, we did have a few isolated outages and will have some follow-up work due to them to finish repairs, but we were relieved to have fared quite well during this storm. It is no fun to be up in the air in the woods when the gusts are over 40 mph. There were numerous outages during the course of this weekend that WPS crews had to deal with in the county, but we were certainly the beneficiary of some of the system improvements they have made as well.

In the meantime, we will keep decreasing the squirrel population one at a time, and there will always be tree-related outages, but hopefully this

line-clearing work will not only improve reliability, but also decrease those problem blinks and help keep your crew inside where it is warm at night rather than out in the worst conditions.



More attempted Squirrel Terrorism discovered while working on system improvements out by Little Lake.

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