

# Frost bit

*Cooperatives rebuild in wake of ice storm*

*By Daryl Hill*



Watch the video, titled "TSM crews repair transmission lines," in the [www.basinelectric.com](http://www.basinelectric.com) video gallery, under the News topic.

Basin Electric TSM crews employ Condor and Bronto bucket trucks and a Grove crane to replace a damaged arm.

**A**nnette Tait and her husband, Harold, knew it was going to be a chilly day – and possibly night – on Jan. 22. That’s when the electricity to their rural Oliver County house went out a little after 7 a.m.

Despite waiting and hoping service would be restored throughout the day, she knew it might get pretty cold in the house. So, the couple prepared. Gale-force winds were causing the heavy snow that was falling to block their driveway. Departing for “warmer” locations wasn’t an option.

“We added layers!” Annette says. “Luckily, our house is designed with the majority of the water pipes running along inside walls. The only set along an outside wall is for the kitchen sink, so we left the cupboard doors open to allow the warmer air into the cupboard space, hoping the pipes wouldn’t freeze and burst.” It worked; the pipes remained intact.

The Taites were fortunate. Electricity service was restored to their home about 14 hours later by Roughrider Electric Cooperative, headquartered in Hazen, ND. For others elsewhere, it would take days, even weeks.

The Taites’ experience of hoping and waiting was played out by thousands of rural electric consumers in North Dakota, South Dakota and Iowa during the weekend of Jan. 23, 2010, and continued for two weeks.

## Scenic frost takes ugly turn

The storm started mid-week with frost that covered everything – very picturesque, but also very concerning. The frost was followed by a freezing mist. Then temperatures warmed up – but not enough to melt the frost and ice.

“That caused a few conductors to snap because of the added weight,” says Don Franklund, manager of

Mor-Gran-Sou Electric Cooperative, Flasher, ND. “Then the wind came. That took us out at the knees.” Franklund is part of a management alliance for not only Mor-Gran-Sou, but also Roughrider Electric Cooperative of Hazen and Dickinson, ND, and Slope Electric Cooperative of New England, ND.

The frost buildup followed by the freezing rain caused conductors to sag, placing a tremendous amount of strain on the poles, cross arms and insulators struggling to hold them in place. When the wind came up on Sunday, it caused the conductors to “gallop” – a condition similar to the movement of a jump rope. That caused everything to break loose – quite literally.

The weight of the ice, coupled with the windy conditions, was a disastrous combination for rural electric cooperatives in North Dakota and South Dakota as lines snapped from wind-driven galloping wires, and poles toppled, unable to support the added weight of the iced-up conductors.

Beginning with the 4 p.m. shift on Friday, Jan. 22, Tom Radenz, Basin Electric Security & Response Services (SRS) coordinator, says more than 22,000 outage calls were received from consumers of member systems who subscribe to the SRS after-hour call center. He says calls were received from North Dakota consumers at Roughrider Electric, Mor-Gran-Sou Electric, KEM Electric and Slope Electric, along with several other electric cooperatives in South Dakota.

“We logged around 4,000 outages throughout the system,” Radenz says. “These numbers do not indicate the full impact or extent of the outages because some of the harder-hit cooperatives manned their own phone lines long after regular business hours.”



Crews from Cass County Electric Cooperative, Fargo, ND, assist KEM Electric in replacing poles. (Photo by J.C. Balcom of the North Dakota Association of Rural Electric Cooperatives.)

## Critical line down

The morning of Friday, Jan. 22, Bryan Keller, manager of Transmission System Maintenance (TSM) for Basin Electric, reported the 345-kilovolt transmission line from the Antelope Valley Station near Beulah, ND, to the Broadland substation near Huron, SD, had tripped out a few times already, but seemed to stabilize late that afternoon. He soon discovered that was only a false sense of security. The 299-mile transmission line tripped out of service Saturday morning and couldn't be re-energized.

“Our line crews from Groton and Gettysburg in South Dakota were reporting heavy frost and ice buildup on the bundled conductors and static wires,” Keller says. “With the data from our substation fault locator, we suspected the line had permanently faulted near Bowdle (SD).” He was right. Eight towers were damaged and about five miles of static wire were in disarray.

Beginning Sunday, Jan. 24, 24 linemen and mechanic-operators from six TSM outposts in four states

started assembling equipment and materials to head toward Bowdle. Keller says they left TSM's main shops in Mandan and Beulah, but didn't get far; blizzard conditions made travel impossible.

Finally, they arrived in South Dakota on Jan. 26 to begin repairs, and they worked through the weekend. During this time, wind chills reached minus 24 degrees; the high temperature one day reached a balmy minus 5 degrees.

Keller says repairs were complete Feb. 4, and the line was returned to service at about 8 p.m.

## Thousands of poles snap

Franklund says the storm's breadth encompassed a wide geographic path – from Interstate 90 in South Dakota to Interstate 94 in North Dakota. “It was difficult to deal with a storm this large,” he says.

At Mor-Gran-Sou, Franklund says 1,000 poles were snapped, and at the height of the storm, 6,000 of the cooperative's 7,500 consumers were without electricity.

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**Moreau-Grand Electric Cooperative estimated the weight the ice added to their lines approached 1,200 pounds per 250-foot span. (Photo by Michelle Schweitzer of Moreau-Grand.)**

“The storm knocked out a transmission feed to one of Mor-Gran-Sou’s substations, which affected a lot of our service area,” he says.

At KEM Electric in Linton, ND, John Knox, CEO and general manager, reported 1,300 poles were down and about 700 members were without power.

Knox praises the efforts of the KEM line crews and the additional crews hired to help restore service to their members.

“We had service restored to our members on Feb. 2,” he says. “We have a great crew of people who took charge – we appreciate their efforts.”

According to Franklund, Roughrider Electric wasn’t affected as severely as the other cooperatives in southwest North Dakota, with only 400 poles toppled due to the storm. And at Slope Electric, he says, 1,100 poles were snapped.

Franklund says getting to the lines was a huge challenge. “Our guys

would spend six hours moving snow so they could do two hours of work,” he says. “However, in two and a half weeks, we accomplished amazing things.”

That’s an understatement. Crews from out-of-state and neighboring utilities were contracted to help get the system back together. “The weather was cold, and moving from place to place was extremely difficult,” Franklund says. “One of

the out-of-state contract workers said, ‘This is brutal.’”

Between Mor-Gran-Sou and Slope Electric cooperatives,

Franklund says 23 man-years of work were expended to get the system back in operation – 11 for Mor-Gran-Sou and 12 for Slope.

## SD co-ops hit hard

The storm’s effect was also felt in South Dakota. According to Brenda Kleinjan, a spokeswoman for the South Dakota Rural Electric Association, more than 10,000 poles were broken at 20 electric distribution cooperatives, and 15,500

homes were without service at the peak of the outages throughout the state. “This storm caused some of the worst damage in South Dakota cooperative history,” she says. “There were about 600 workers from 10 states assisting in the repair efforts in South Dakota.”

At East River Electric Power Cooperative, Madison, SD, Jim Edwards, assistant general manager for operations, reports their system experienced numerous breaker operations, broken cross arms, phase conductors and insulators, but no broken poles. “We were fortunate to withstand the brunt of the storm upon our system. Because of this, we were able to dispatch crews to (distribution cooperative) members in need of additional linemen,” he says.

East River crews assisted Dakota Energy and FEM Electric to restore power to members. South Dakota National Guard personnel also assisted in the restoration effort,



**Mor-Gran-Sou lost 1,000 poles in the storm. (Photo by Clarice Kesler of the North Dakota Association of Rural Electric Cooperatives.)**

providing payloaders to move snow in heavily drifted areas so cooperative crews could facilitate system repairs.

A 711-foot television tower located on Medicine Butte, about five miles north of Reliance, SD, collapsed from the weight of the ice, knocking out the communications system for West Central Electric Cooperative, Murdo, SD.

“We have a radio system that had an antenna on the tower that we used to communicate with the men in the eastern part of our system,” says Joe Connot, director of member services at West Central.

With the tower down, communications along a 60-mile stretch along the Missouri River from Chamberlain to Lower Brule were impossible, “unless we were able to communicate when the guys were on a high spot along the river, but that was about it,” he says. “We also lost our communication to our eastern (SCADA) switches, which are now being served from a temporary pole.”

At Moreau-Grand Electric Cooperative, Timberlake, SD, Melissa Maher, general manager, says the ice storm hit their service area on Jan. 19. “We are still assessing damage, but estimates are more than 3,000 poles were destroyed, along with seven miles of transmission line,” she says. “Crews worked 17 days straight, logging anywhere from 15 to 18 hours per day to restore service to 99.9 percent of our residential members. What a miraculous feat!”

About 160 outside crew members were brought in to repair damage at

Moreau-Grand. “The success of this mission did not rest solely on one person, but on every single employee involved – from answering the phones, to physically repairing the damages. It literally did take a village to make this happen,” Maher says.

At Cam Wal Electric Cooperative, Selby, SD, Susan Volk, accountant, reports the cooperative had about 1,100 poles down, causing about \$1.8 million in damage. “It took about two weeks to get power restored to everyone,” she says. “We had about 500 members without service for between two and 14 days.”

### Warmer weather brings more work

Even though service has been restored, the work isn’t done. “There’ll be a tremendous amount of work waiting for us this spring to get everything back together,” Franklund says. “We basically patch the system back together as fast as we can. When the weather is nicer,

we’ll put on the finishing touches.”

Tait says outages at their home have been few and far

between, and usually very brief, since they moved out there in 2003. “This is the first extended outage we’ve experienced,” she says. “No matter what the situation, our REC’s customer service has always been exceptional. Even during this outage, when Roughrider was scrambling to address multiple outages throughout its territory, the people I spoke with were friendly and courteous, and provided as much information as they had available.”

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*Annette Tait, member of Roughrider Electric*



Corn Belt Power crews knock ice off power lines southeast of Sac City on Jan. 22. (Photo by Marena Fritzier of Corn Belt Power.)

### Iowa co-ops hit hard

Electric cooperatives in Iowa were also affected by the massive ice storm. It started early Wednesday, Jan. 20, and affected the state for more than six days.

At Corn Belt Power Cooperative of Humboldt, their transmission system was hit hard. “The ice load was far greater than what the line was designed for,” explains Kevin Bornhoft, vice president, engineering and system operations at Corn Belt Power. “It’s designed for a half-inch of radial ice. We had close to two inches plus of radial ice.”

System restoration required Corn Belt Power linemen to use hot sticks to knock ice off power lines. By Jan. 25, Corn Belt Power’s system was back to normal, but member distribution cooperatives’ work continued.

Raccoon Valley Electric Cooperative of Glidden was hardest hit, with all but one of its substations out of power at one point. The cooperative experienced more than 600 downed poles and too many broken cross arms and braces to count. More than 100 additional linemen came to assist Raccoon Valley.

Jim Bagley, chief executive officer, Raccoon Valley Electric Cooperative, said, “This is a multimillion dollar disaster. It will have long-term ramifications for the co-op.”