

Minnkota Messenger

November-December 2018



Major outage completed, *Story pages 2-3*

Unit 1 major outage completed

Despite a four-week setback, outage comes in on budget



A generator specialist removes a stator cooling connection ring during the Young Station Unit 1 major outage.

The Unit 1 major maintenance outage at Minnkota's Milton R. Young Station was rolling along without a hitch.

Plant staff were even thinking the 37-day project would come in under budget. Then a pinhole leak was discovered, slowing the momentum. How much havoc can a pinhole create? In this case, the consequence to the Young Station was about four weeks of power generation downtime.

But this outage was more about good fortune than misfortune. Even with the setback, the outage was completed on budget from an operations

and maintenance and capital budget perspective.

That's despite finding about \$2.9 million of "discoverable work" – meaning it was outside of the original outage work scope. Discoverable work is usually found on the asset or in the area in which the targeted outage projects are performed.

Minnkota Senior Manager of Power Production Craig Bleth said solid planning, coordination and prioritization were key to coming in on budget.

Interestingly, a labor shortage might have helped produce cost savings.

“We do what we think is critical in order to be respectful to the budget and, above all, establish a good basis for the next three-year run.”

– CRAIG BLETH, Senior Manager of Power Production

“With a shortage of craft labor, project managers get a little nervous about whether they are going to get all the work done,” Bleth said. “There’s an even greater than normal sense of urgency and focus.”

The leak that extended the outage was discovered in the generator stator cooling water system. When workers couldn’t access the pinhole externally, they were forced to remove the rotor from the generator to make repairs.

“We were hoping the leak was near the outer end of the generator,” said Tim Hagerott, plant manager of engineering and environmental. “It was too far into the machine where we couldn’t do an acceptable repair without pulling that rotor out.”

The outage featured more than 800 separate work requests. Total project cost for O&M (operations and maintenance) and capital expenses is expected to be about \$18 million.

Several projects were tackled, including replacing Reheat Superheater (RSH) select pendants in the boiler. Replacing them was significant because a few tube leaks developed in this area in recent months.

Another big project was the replacement of the expansion joints in the back-end plant ductwork between the ID fan inlets and the chimney. The expansion joints had reached the end of their useful life of six to nine years. They were replaced with 18 expansion joints that have a 15-plus-year lifespan.

In addition, the air heater hot-side and cold-side expansion joints and the secondary air duct expansion joints were replaced, and the valves in the turbine generator were overhauled.

“We do what we think is critical in order to be respectful to the budget and, above all, establish a good basis for the next three-year run,” Bleth said.

An outage goal was to get people interfacing with each other. An added coordination piece included two Minnkota staff working the night shift to oversee work,

communicate with the contractor, and ensure high productivity.

There are many ways to determine whether an outage is successful – from safety to compliance to budget. One measurement often goes unnoticed.

“One of the most important factors to a successful outage is the documenting and tracking of all the pre-outage planning, inspections, cost estimating and discoverable work,” Maintenance Superintendent Ross Ford said. “It is vital that we can look back at past outage activities and easily pull reports, job plans, clearance requests and estimates for future outages, so we don’t have to reinvent the wheel each major outage. Having this information available allows for more accurate budgeting and estimating, job scope and plan development, and ultimately safer, more efficient and effective future outages; along with less employee stress.”

Stress was created when a cleaning outage on the other Young Station unit, Unit 2, had to be extended from five days to 10 days after a tube leak occurred during startup after the cleaning.

Access to this particular tube leak was the largest challenge. It was necessary to install several levels of scaffolding to get to the tube, which had separated itself from the tube bank, and caused collateral damage to some other tubes as well.

Ultimately, Minnkota had a mini-major outage within a major outage. That combination doesn’t happen often at the Young Station, especially when they overlap for 10 days.

“It took some planning to get caught up on the dual unit outage work,” Plant Manager of Operations and Maintenance Andy Freidt said.



(Top) A millwright cleans and inspects a hydraulic coupling bolt at the Young Station.



(Bottom) Millwrights measure and collect data on the generator rotor bearing journal.

Towering feats of engineering

Microwave tower overhaul brings system into the digital age

Ten miles north of Blackduck, Minn., an area called Busy Corner is not so busy. It's pretty darn silent, save for the twang of tensioned cable guy-wires that's as crisp as the cold.

Twenty degrees isn't so bad for a northern Minnesotan, but for the men who are nearly 200 feet up in the brisk air – halfway through constructing a nearly 400-foot microwave tower, somehow dexterously tightening nuts and bolts – cold is cold.

From the solid ground below, Minnkota Telecommunications Engineer Eric Bergman is glad his side of the project is more signals and circuits and less harnesses and hard hats.

"You couldn't pay me enough to do it, so bless them for doing that," said Bergman, eyes to the sky. He led the site design, licensing and material orders for the project, one piece in a plan to take Minnkota's telecommunications system from the analog past to the digital future.

The current project scope includes 11 "hops" – or connections from tower to tower. Work began in May 2018, with a goal of wrapping the initial phase by October 2019.

Busy Corner is the first guyed tower in Bergman's portfolio.

"This is a learning process for me," he said. "I've done a couple of self-supporting towers, but I've never seen how they string the guy-wires and lift each section at a time. It's interesting to actually see it instead of being behind a desk."

Going up

Over the span of a couple of weeks, the contracted construction crew hoists and assembles 20-foot sections of the tower, stringing and tightening guy-wires one elevation at a time. Once the tower is erect and stabilized



It's out with the old and in with the new at the Busy Corner microwave tower site. Once the new guyed tower and control house (right) are online, the old tower and house (left) will come down.



Left photo: Minnkota telecommunications engineers Alex Manz (left) and Eric Bergman (right) get a firsthand look at the task of tightening the tower's guy-wires. Right photo: The construction crew lifts one of many 20-foot sections to the top of the tower, part of a multiday stacking and stabilization process.

to massive underground cement anchors, the team affixes the dishes, antennas, lights, strobes and other equipment. Then it's time to run lines down to the brand new control house, where the Minnkota crew enters the game.

Communication technicians mount and wire radios in the control house and connect them to the tower lines. The signal is then tested at the next tower in Bemidji.

"We'll actually have someone up on the tower, turning and tuning the dish – just like at your house, trying to get the TV rabbit ears to work. It's just a little bit higher up," Bergman explained.

As soon as the new tower goes live, the old structure next to it can be taken out of service and deconstructed, likely in early 2019. That will kick off four to five more tower projects that will continue through the fall, many that have been in the queue for several years.

"It's nice to see traction on some of these projects," Bergman said. "This is a good warm up for the rest of them," he added, the irony of the phrase cracking a grin on his wind-pinkened face.

A tall order

At 390 feet, the Busy Corner tower is the tallest in Minnkota's microwave communications system. The network comprises a combination of more than 40 guyed towers (supported by anchored guy-wires) and self-supporting towers.

The telecommunications system is used primarily to send real-time information from Minnkota's substations to the power system operators in Grand Forks, allowing them to operate the entire power grid over a private network. With this infrastructure,

Minnkota can avoid reliance on outside entities to carry that critical traffic.

The system is also used for coordinating line trips, opening and closing breakers, monitoring power flow, and supporting mobile radio traffic and other essential communication. All these connections need to be made reliably – and fast. "We're talking milliseconds," specified Telecomm Engineering Supervisor Todd Bommersbach.

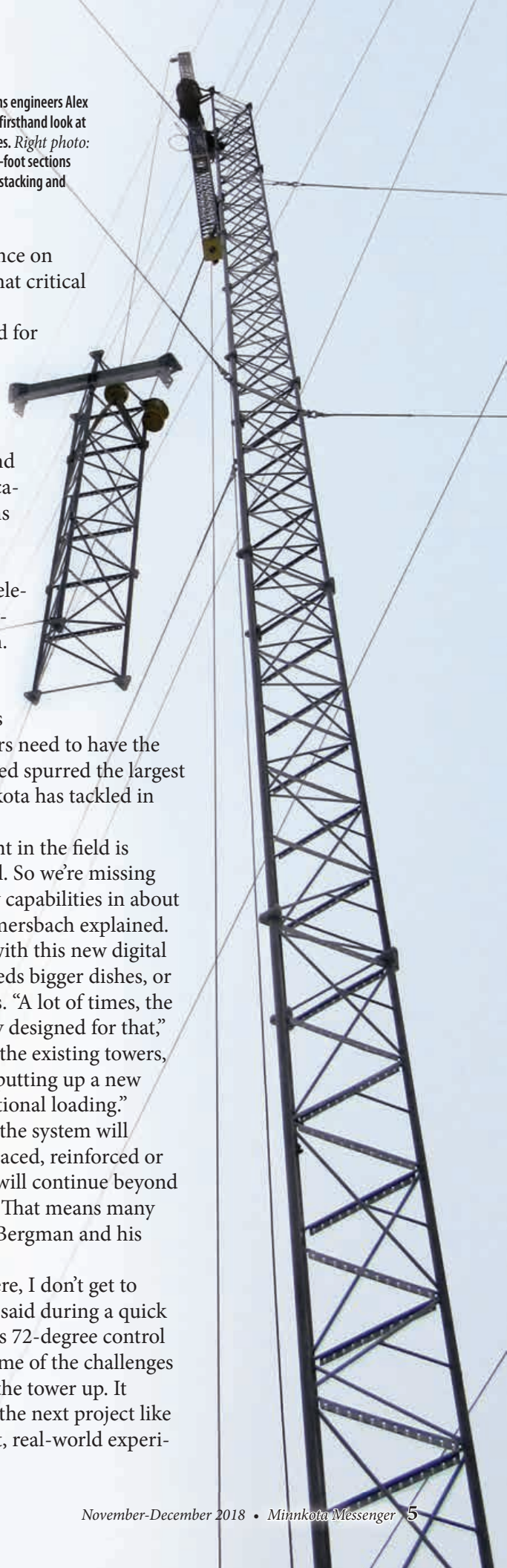
In order to keep the 50-year-old system running as quickly as it needs to, engineers and operators need to have the latest technology. That need spurred the largest microwave project Minnkota has tackled in one shot.


"A lot of our equipment in the field is analog-based – not digital. So we're missing out on a lot of technology capabilities in about half of our system," Bommersbach explained.

Bergman added that with this new digital technology, Minnkota needs bigger dishes, or more dishes, on its towers. "A lot of times, the towers were not originally designed for that," he said. "We've evaluated the existing towers, and where needed, we're putting up a new tower to handle that additional loading."

Nearly every tower in the system will eventually need to be replaced, reinforced or upgraded, in phases that will continue beyond the project's initial scope. That means many more chilly site visits for Bergman and his telecomm team.

"If I don't come out here, I don't get to see what it turns into," he said during a quick warm-up in Busy Corner's 72-degree control house. "It's great to see some of the challenges they have when they put the tower up. It makes it a little easier for the next project like this to have more relevant, real-world experience."



A photograph of the Milton R. Young Station, a large industrial facility with two tall smokestacks emitting white plumes of smoke. The plant is situated near a body of water, with tall grasses in the foreground. The sky is blue with scattered white clouds.

The Milton R. Young Station, a lignite-based facility located near Center, N.D., is the focus of Project Tundra.

Ready for research

State of North Dakota approves up to \$15 million for Project Tundra

Research on what would be the world's largest carbon capture facility received invaluable support from the state of North Dakota in November.

The North Dakota Industrial Commission unanimously approved up to \$15 million in state funding for Project Tundra, which aims to connect the state's coal and oil industries to produce more energy, reduce emissions and generate long-term economic benefits.

Funding for the project, led by Minnkota Power Cooperative, would help pay for the engineering and design study for a CO₂ capture system at the Milton R. Young Station located near Center, N.D. The funding is contingent on the project receiving an additional \$15 million from the U.S. Department of Energy.

"The state of North Dakota has long been a leader in energy innovation thanks to strong support from its elected officials and the pioneering spirit of its companies," said Mac McLennan, Minnkota president & CEO. "This research funding is essential to understanding how this breakthrough technology can be applied to North Dakota facilities."

The project would capture CO₂ inside a large vessel using a solvent called amine. Once enough CO₂ has bonded with the amine, it would be pumped to a separate vessel where heat is applied to break the bond and create a pure CO₂ stream. The CO₂ is then delivered through a pipeline to area oil fields where it can be used for enhanced oil recovery. This process includes injecting CO₂ into conventional wells to

substantially increase oil production.

The project, estimated to cost \$1.3 billion, is not something Minnkota will take on alone. Other entities involved in Project Tundra include BNI Energy, Bismarck, N.D.; Eagle Energy Partners, Minot, N.D.; and the Energy and Environmental Research Center at the University of North Dakota, Grand Forks, N.D.

Despite the initial capital cost, demand for carbon capture technology has been made even greater by the passage of 45Q tax credit reform. As part of legislation passed in February, the federal tax credits have been increased to \$35 per ton for CO₂ that is captured and used for enhanced oil recovery and \$50 per ton that is captured and stored in a geologic formation deep underground. These tax credits are projected to represent up to \$1 billion in value to Project Tundra.

Proven technology

As Project Tundra transitions into the next phase of research, it has hired one of the world's foremost experts in CO₂ technology and development. David Greeson joined the project team in October after previously serving as the vice president of development at Texas-based NRG Energy. In that role, he led the development of the Petra Nova initiative, which is the world's largest post-combustion CO₂ capture and enhanced oil

recovery project. Petra Nova was completed on schedule and on budget in December 2016.

Project Tundra is modeled after the Petra Nova initiative, which is capturing about 90 percent of the CO₂ emitted from a 240-megawatt (MW) flue gas slipstream. The captured CO₂ is then injected into mature reservoirs to release more oil. This process revitalized a diminishing oil field, increasing production by 1,300 percent.

Project Tundra aims to build on the success of Petra Nova by applying a similar, but much larger, set of technologies to Unit 2 of the Young Station. Unit 2 is a 455-MW generation facility that began commercial operation in 1977. The facility has previously been retrofitted with emissions control equipment that meets or exceeds all current air quality standards.

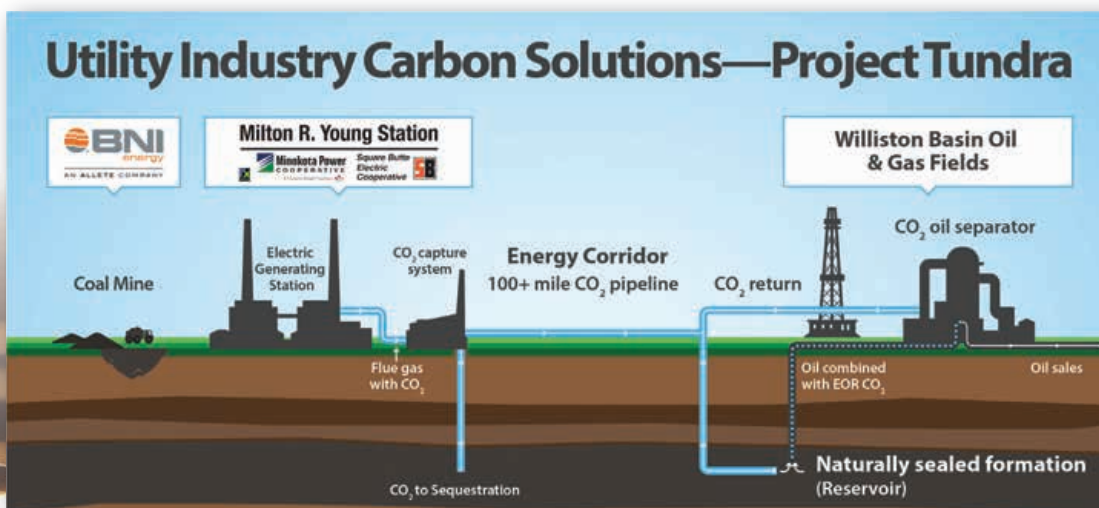
"David's knowledge and expertise in the area of carbon capture development provide immeasurable value to the Project Tundra team," McLennan said. "The project team has done an excellent job advancing the initial research projects. As we move forward, it becomes essential to have a dedicated project manager. David's credentials indicate that he has the ability to guide this project to the finish line."

For more information on Project Tundra, visit ProjectTundraND.com.



David Greeson

Project Partners:





Pebbles and Darin Thompson (right) founded Project Ignite light to help children affected by physical and sexual abuse. Every "Bag of Hope" (left) holds a fleece blanket, pajamas/undergarments, toiletries, fruit snacks, a water bottle, a flashlight, a book and more.

IGNITING LIGHT

Electric cooperatives illuminate lives using more than electricity

For two nights in October, the big brown tables in Minnkota's conference center turned soft and vibrant, overcome with 4-foot square bolts of fleece splashed with sheep, doughnuts and construction trucks.

"Can I borrow your ruler?"

"How do you get the colors to match on one side?"

"That tiger design is so cute!"

Minnkota volunteers were at work trimming and tying fleece blankets for Project Ignite Light, a nonprofit organization based in Rogers, N.D. The program's goal is to create "Bags of Hope" for children who are brought to hospitals or advocacy centers to be examined in cases of abuse or neglect. One of the items included in every backpack is a fleece blanket.

Monica Hanson, an administrative assistant new to the Minnkota team this July, saw Minnkota's charitable Jeans Day fund as a way to support Project Ignite Light and buy materials for blankets. Once her request was approved, Hanson put out the call for handiwork help.

In no time, she had more than a dozen volunteers.

"It was amazing," she beamed. "The best part is that almost everyone who volunteered had never tied a fleece blanket before. They were so willing to learn, and just fearless about it."

Growth of giving

With 15 blankets tied, folded and loaded, and an additional financial donation in hand, Hanson hit the road for rural Rogers. Project Ignite Light purchased the old North Central School there in 2012 with the help of a benefactor, and the 1960s-era building now serves as its headquarters. Founders Pebbles and Darin Thompson described their beginnings as they showed Hanson inventory rooms filled ceiling-high with bundled blankets and racks of jammies.

The project started at the Thompsons' dining room table 10 years ago. Pebbles couldn't stop thinking about pajamas and what could be done with them, so she hit Target with a mission in mind: creating kits to bring comfort to children at their most vulnerable.

"I honestly thought Darin was going to be upset because I had spent a couple hundred dollars. I set it all out on the table and



Minnkota's Monica Hanson hands over fleece blankets prepared by Minnkota volunteers.



“We see a lot of bad with what we do. You hear stories that make you question humanity. But when people come alongside you to support one of your dreams, suddenly you get to see the good in the world.”

– PEBBLES THOMPSON, *founder of Project Ignite Light*

he looked at me and said, ‘OK. Here we go,’” Pebbles recalled with a tender glance at her husband. “I was like, ‘I love you! This is why we’re together!’”

Project Ignite Light exploded, growing quickly by word of mouth among hospitals, agencies and advocacy centers that now saw a previously unidentified need fulfilled. The program spread throughout North Dakota in its first year and staff now serves entities as far as Rochester, Minn., and Sioux Falls, S.D., hand-delivering anywhere from 150 to 300 personal care backpacks every month.

Over the decade that the program has been active, volunteers from churches, schools, businesses and beyond have stepped up to donate pajamas, money and blanket-tying craftsmanship to sustain the nonprofit’s objective – sharing light in the darkness of child abuse.

“We see a lot of bad with what we do. You hear stories that make you question humanity,” Pebbles said, “but when people come alongside you to support one of your dreams, suddenly you get to see the good in the world.”

Energy solutions

The Thompsons outgrew their small Fargo office, and when North Central School went up for sale – where Darin attended K-12 – they saw the opportunity for a new home base.

What they weren’t prepared for was the electric bill, which ran around \$80,000 a year when the school bell was still ringing.

“It scared us to death,” Darin said. “Our first bills were quite a bit lower, but we didn’t know where they would end up. After a while, I got a phone call from Cass County Electric Cooperative (CCEC).”

Vice President of Member and Energy Services Paul Matthys and his team walked through the 42,000-square-foot facility with the Thompsons. Matthys recommended

lighting, heating and venting solutions that would help reduce the bill. Beyond advice, CCEC later gave a financial gift to the cause.

Energy audits are one of many efficiency services CCEC offers its members. “We want our members to use energy, but we want them to use it wisely,” Matthys said.

Now, Darin uses his CCEC-supported SmartHub app to monitor their energy usage, leverage off-peak savings and use strategic temperature control to get the monthly bill as low as possible. Every penny the Thompsons save can be routed to filling more backpacks with flashlights, socks, toothbrushes and other necessities that provide a child a sense of security.

“We’re not the cure. We know a bag of stuff isn’t going to fix the trauma that this child will be processing,” Pebbles said. “But all of sudden, these kids feel like they’re human, not that they’re being passed through the system.”



Pebbles’ sister Amanda Geisler (right) rounds out Project Ignite Light’s three-person staff, seen here receiving extra moral support from the Thompsons’ youngest of five children, 22-month-old Zendaya.



Minnkota staff volunteers display their craftsmanship before sending 15 blankets to Project Ignite Light in Rogers, N.D.



Tveitbakk retires from NMPA

Sitting across from two bond insurance underwriters donning slick-looking suits, Northern Municipal Power Agency (NMPA) General Manager Darryl Tveitbakk was first in line for the presentations to the men.

The 25th floor meeting room gave Tveitbakk a good window view of New York Harbor, the Statue of Liberty and Ellis Island.

Tveitbakk, who grew up on a dairy farm near Clearbrook, Minn., found his thoughts drifting after his part of the presentation concluded. He couldn't help it, apparently mesmerized by the view.

"I thought, what the hell is a dairy farmer's kid from Clearbrook doing here?" he said. "It was way beyond where I thought I'd be."

A decade later, Tveitbakk smiled and laughed as he reflected on the anecdote just weeks before his retirement after more than 23 years with NMPA – the energy provider for 12 municipal utilities in eastern North Dakota and northwestern Minnesota. Minnkota is operating agent for NMPA.

Only the second full-time general manager in history, Tveitbakk retired Nov. 5 from Thief River Falls, Minn.-based NMPA.

"Having the opportunity to work on some of the bond-

ing things we've done over the years, the financial things we've done over the years, has been fun," Tveitbakk said. "Even though I at first felt this was way out of my league, you learn fast. I think doing those things was a major responsibility but was also a highlight."

Dalene Monsebroten, the finance manager at NMPA, said Tveitbakk was the right person for the job.

"He's a huge advocate of public power," she said, "and he's very knowledgeable on the technical side of things. He's great at communicating with the governmental side, legislative and constituents. He's very well-rounded."

The well-roundedness came through schooling at the old AVTI (now Northland Community and Technical College) after spending a couple of years at the University of Minnesota. He earned degrees in audio communications and industrial electronics.

That allowed him to land a job at the city of Thief River Falls as a technician in the utility department. He spent 17 years with the city before taking a position at Northland as a professor of electronics. After being laid off, he found himself without a job in 1993.

So he went to Minnkota and asked the vice president of marketing and communications if he had any job openings. A business acquaintance of the manager, Tveitbakk was eventually hired to do a study on NMPA for the cooperative. He must have done a good job, as NMPA hired him as director of customer service in 1995.

He was promoted to general manager in 1999.

Tveitbakk says he feels good about finishing his career in the same county in which his grandfather homesteaded after immigrating from Norway in the early 1900s. On the wall of Tveitbakk's NMPA office was a letter from President Woodrow Wilson, approving his grandfather's homestead.

Next to the letter was a map of where the farm was located on the east end of Pennington County. Tveitbakk likes to uncover the history of everything in his path and the paths of his ancestors. He has an early 1900s picture of the location of the condo he owns just four blocks from Target Field in the Warehouse District of downtown Minneapolis.

In addition to the condo, Tveitbakk and wife Deborah will spend time at their cabin in the woods near Clearbrook. Their three boys and three granddaughters live in the Twin Cities area.

NMPA can thank Deborah for keeping her husband in the Thief River Falls area.

"In college, during my second year, I met this little girl from Red Lake Falls. That's really why I stayed here."

Tveitbakk plans to remain in Thief River Falls. In his late 60s, though, he thought it was time to move into another chapter of life.

"I enjoyed working here. I will miss it. But I'm going to be 69 years old. . . . Every day I'm here is one day I'm not retired."



Cass County Electric, Minnkota partner on ND's first electric school bus

Minnkota and Cass County Electric Cooperative have partnered with West Fargo Public Schools to help bring the first all-electric school bus to the state of North Dakota.

At its Nov. 13 meeting, the West Fargo School Board awarded bids to Hartley's School Buses for the purchase of a Bluebird electric school bus. While the new electric bus has a higher upfront cost, it is expected to be more cost effective than a traditional bus over the course of its lifetime. The district anticipates an

annual savings of \$2,500 in diesel costs and \$1,800 in maintenance costs with the purchase of the electric bus.

The school district will be comparing the costs of the electric school bus to two diesel-powered school buses that will be put into service at the same time. A long-term analysis of the operational and maintenance costs of the electric bus will provide data to assist future school bus purchasing decisions regarding the most cost-effective fuel sources for the district's fleet.

Funds to support the electric school bus project were provided from the North Dakota Department of Commerce through the State Energy Program, Cass County Electric, Minnkota and the Coalition for a Secure Energy Future.

The bus, which has a 160-kilowatt-hour battery capacity and an estimated range of 120 miles, is expected to arrive in spring 2019.

Roseau native, legendary electric co-op leader dies at 90

Bob Bergland, a former U.S. secretary of agriculture, congressman and electric cooperative leader, died Dec. 9 in his hometown of Roseau, Minn. Bergland, 90, will be remembered as a lifelong champion for a strong rural America, and a close friend to the cooperatives in the Minnkota system.

Bergland served as executive vice president and general manager of the National Rural Electric Cooperative Association (NRECA) from 1984 until his retirement in 1994, when he and his wife, Helen, returned to their wheat farm in Roseau Electric Cooperative's service area. They had seven children, 18 grandchildren and 16 great-grandchildren.

Roseau Electric General Manager Tracey Stoll remembers Bergland sitting in the front row at the cooperative's annual meeting each year.

"He was always looking for new ways to make the cooperative model work," Stoll said. "Well into retirement, he was still engaged with the co-op and wanted to make life better for the rural member."

While representing Minnesota's 7th Congressional District from 1971 to 1977, Bergland became known as a leader for rural America and is credited with

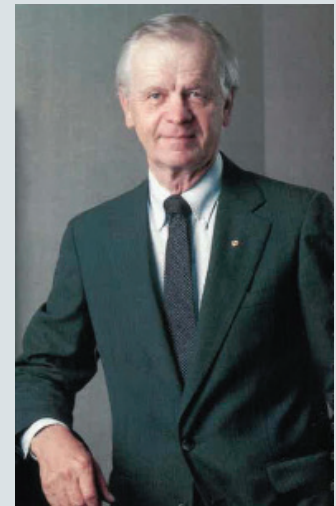
shepherding the Farm Act of 1977 to passage.

That same year, President Jimmy Carter nominated Bergland to head the Department of Agriculture, where he pursued programs for rural development that emphasized the role electric co-ops played in improving communities and people's lives.

In his farewell address at NRECA's 52nd Annual Meeting in New Orleans in 1994, Bergland predicted the broadening mission of electric co-ops as "old-time REA champions retired," but said the motivations of co-ops would remain "family, church, community, honesty, integrity, caring."

"Those are the things you do every day," Bergland said. "And those are the reasons why I've enjoyed this job enormously."

Source: Cathy Cash, National Rural Electric Cooperative Association



Bob Bergland



Minnkota Power Cooperative and the associated systems will again provide an opportunity for area electricians to obtain credits for license renewal by attending one of the six continuing education classes being offered throughout Minnkota's service area.

This marks the 31st year of the successful program, which is aimed at providing area trade allies with the latest information on electrical code and practices.

The electrical workshops will be held Jan. 22 and Jan. 23 at the DoubleTree Inn in West Fargo. The training then moves to the Bigwood Event Center in Fergus Falls on Jan. 31, and the Eagles Club in Bemidji on Feb. 1. The workshops conclude with classes Feb. 5 and Feb. 6 at Minnkota Power Cooperative's headquarters in Grand Forks.

The registration fee is \$75 for eight code credits. Taking the class on multiple days will not qualify for 16 code credits. Registration can be done online at www.minnkota.com. Registration must be completed at least seven days prior to the seminar.

For residential building contractor continuing education workshops, contact your local home builders association.

For more information about the program, call (701) 795-4292 or email questions to contractortraining@minnkota.com.

Minnkota Messenger

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For subscription or editorial inquiries, call (701) 795-4282 or email bfladhammer@minnkota.com.

Minnkota is a generation and transmission cooperative supplying wholesale electricity to 11 member-owner distribution cooperatives, three in eastern North Dakota and eight in northwestern Minnesota. Minnkota also serves as operating agent for the Northern Municipal Power Agency, an association of 12 municipal utilities in the same service region. Together, the Joint System serves more than 150,000 customers.

Visit Minnkota's website at www.minnkota.com.



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On the cover: An ICI boilermaker welds bow ties inside a cyclone during the Milton R. Young Station Unit 1 major outage. *Story on pages 2-3.*