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## A Second Century of Service



Greetings, All,

As we enter our second century of service, I would like to extend a heartfelt thank you to our valuable trade partners, suppliers and subcontractors for their contributions. Without them, Lakehead Constructors, Inc. would not be the organization it is today or be able to present this publication to you.

lakehead continues to regard safety, quality, innovation and integrity as core values of our corporate foundation. Each of these qualities is the basis for each employee's commitment to you, the owner. Not only do we invest in the training and mentoring of our employees, we also engage in the latest technology to provide the finest workmanship for each of our projects. Our strategic alliances with the labor bodies, as well as owners, create a can-do-must-do attitude that meets any challenge a project may present.

This issue features articles on projects that continue to reflect the caliber of employee we have here at Lakehead as well as the quality of subcontractors. These projects range from MINOS, a special demolition project 689 feet below sea level, to the vast and diverse construction of the Mustang project for Cliffs in Forbes, Minnesota. A specific department article features our further commitment to the ISO 9000 program, a program certification that is extremely rare in the construction industry, of which we are very proud to have achieved and practice as an additional core value. Also highlighted is a unique project for the BNSF, incorporating state of the art rail car safety constraint systems.

As mentioned, we are entering into our second century of providing construction services to the upper Midwest. The dedication of our employees and trades people continues to open new doors to opportunity. I am proud to lead an organization that has this kind of talent, fortitude and commitment that we display on a daily basis.

In closing, I would again like to thank our employees, suppliers, subcontractors, unions, and associates that make this organization what it is today — the contractor of choice for so many great customers.

Best regards,

Brian Maki

Chairman, President and CEO





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## QUALIT **CORNER UPDATE**

## **ISO** 9001

by Charlie Cleaver, Manager, Corporate Quality

akehead Constructors, Inc. continues to remain committed to safety, quality, service and innovation. We consider it an honor to be among the less than 1 percent of North American construction companies to hold an ISO 9001 certification. As a general contractor that also offers equipment rental services, we're proud we can offer unique solutions and services — even within this 1 percent group.

As a readily accepted quality and quality management standard within the United States and throughout the world, ISO 9001:2008comprehensively sets its own standards. Compliance to the standard and our own procedures are directly driven to maintain a client's satisfaction, streamline contract administration, provide document control and commit management to continually aid in improving other key processes internally. As you can see, the standard provides the framework for more than the quality of a finished product. It provides structure for an entire management system — specifically, an inclusive quality management system.

Continual improvement is a common theme not only to ISOcertified organizations, such as Lakehead, but also to the ISO 9001 standard itself — as a product of the standard's various requirements and in the form of the recently published ISO 9001:2015 standard. ISO 9001:2015 is a newly revised version of ISO 9001:2008, and Lakehead is in the beginning stages of transitioning to the latest standard. We're looking back at the things we've learned since our initial certification in July 2010, comparing current and projected needs, and establishing how we can meld all of this together in a manner that will allow us to completely and successfully transition to the new standard.

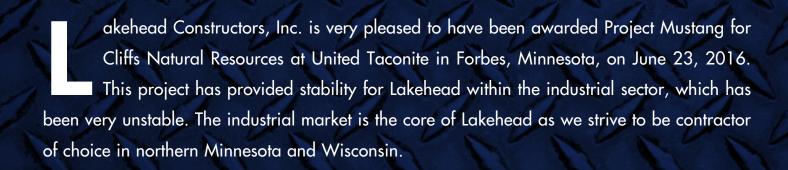
Throughout the last few issues of this publication, our ISO program has been viewed in a number of different lights: the journey to our initial certification, the realized benefits of receiving certification, the process of using the ISO program to further refine procedures and attain an AISC Advanced Certified Steel Erector certification, and how the same spirit of exceptionalism that moved Lakehead beyond 100 years of service is the same spirit that's harnessed to make continual improvement projects meaningful. Looking back through these issues, one can certainly see how personnel, projects and programs have all grown.

As we look forward, we see a dedicated commitment to further growing and refining our core values, maintaining or upgrading various certifications, and striving to be the contractor of choice for clients. A few more issues down the road, it'll be interesting to page through the magazines that have been published and look back at the path that got us to that point in time.

Until then, though, we'll keep working to provide the level of safety, quality, service and innovation clients have come to expect. Our projects are real-world examples of the efforts put forth to maintain our ISO certification, among others. Because of this, every project, regardless of size or scope, is given the same level of commitment from the top down.







Within Project Mustang are three distinct facets:

- Installation of a new fluxstone pellet production system the Mustang pellet.
- 2. Green production projects (GPPs) consist of the replacement of three older plant vacuum pumps with new pumps, the addition of three new disc vacuum filters, replacement of a snap blow compressor, and a new 50-foot-by-50-foot concentrate slurry tank. These upgrades will allow Cliffs to increase production and reliability, regardless of the Mustang pellet production.
- 3. Replacement of line 1 main kiln burner and grate replacement on both lines 1 and 2.

The diversity in scope of Project Mustang is amazing when looking at the project in total. The project includes construction and relocation of 2 miles of railroad track. A sheet pile wall with helical anchors as tie backs protects a wetland. A second sheet pile structure was installed, creating access to the limestone winter unloading platform. Seven buildings were constructed:

- ► Four CMU MCC buildings
- A pre-engineered metal building allowing for through-rail delivery and housing of the summer unloading process equipment
- A pre-engineered steel frame and fabric shell for dry storage of limestone (146 feet by 230 feet)
- A structural pump building providing enclosure for two 250and two 125-horsepower pumps used to move concentrate slurry from the newly constructed 50-foot-by-50-foot steel concentrate slurry tank into the new and existing process

Almost 450 feet of conveyors tie the winter-summer unloading building to a storage building with a secondary surge pile of 15,000 long tons and two 33-foot diameter storage silos with a capacity of 1,500 long tons each. The surge pile and silos are linked by 215 feet of conveyor. The limestone moves 670 feet along another conveyor supported by drilled pier foundations from the storage building through to a roll crusher in a transfer tower. The newly crushed material moves



210 feet again on a conveyor and into the existing concentrator, then enters an existing mill. The existing mill is now part of the regrind circuit, which breaks down the limestone discharges from the mill and is pumped around and over a screen. The oversized limestone goes back through the mill while the undersized limestone is then pumped by the new thickener pumps through slurry lines to the former concentrate slurry tank. The scope also included repurposing an existing bin for bentonite storage and installation of a new screw conveyor.









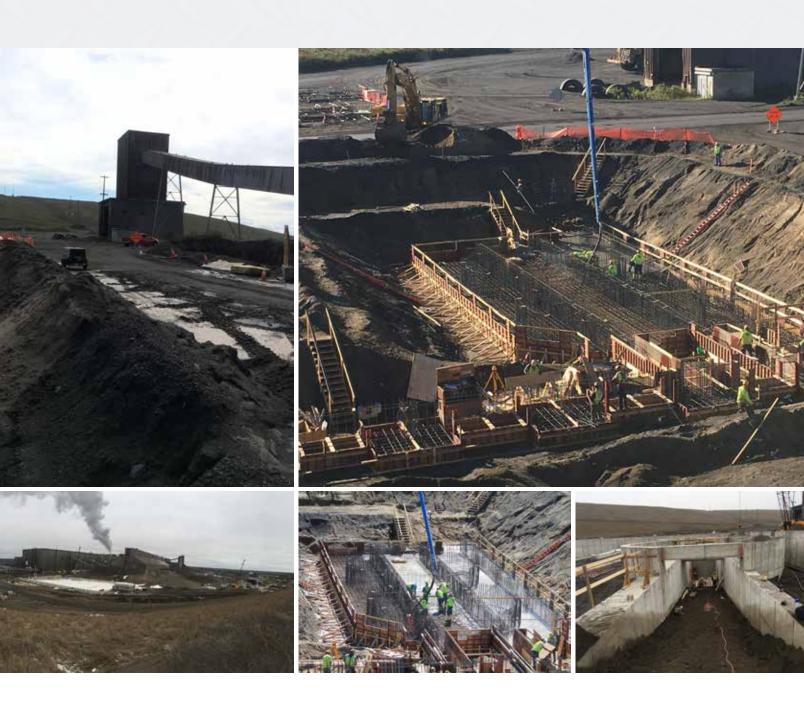




This is where the Mustang and the GPP meet. The new tank is increased in size from the existing 40-foot diameter to allow for flexibility in operation of the existing process. A pipe bridge goes over the top of the new pump building and concentrate slurry tank, conveying pipe and supporting an agitator for the new tank. This new pipe bridge enters into the existing agglomerator at an elevation known as the filter floor. Within the filter floor, our work scope changes from mainly new construction to retrofitting an existing plant. We started off with truss reinforcement to accommodate a new monorail system and installation of beams beneath an existing concrete pour deck to support new equipment installation. Crews demolished existing structural steel, concrete and equipment, leading into the installation of three new conveyors and chutes, six receiver tanks, three vacuum filters, a

five-way slurry distributor, and a two-way slurry distributor. The new filters are supported by three new vacuum pumps and a new snap blow compressor. These four items all required demolishing existing equipment in a very congested and loud pump room before the new foundation work could begin.

The challenge of this project from day one has been pushing a proactive approach to meet the June 1, 2017, Mustang pellet production deadline set forth by Cliffs. Our on-site management approach allowed us to work closely with Cliffs to identify critical items and understand schedule needs. The challenge has been getting suppliers, subcontractors and engineers who are removed from the site to take the proactive approach need to meet deadlines. When deadlines are not met, it requires constant adjustment to the project schedule and



manpower. With peak craft labor, on-site at 175 and an estimated 200,000 man hours, managing manpower resources is no small task for Lakehead and the subcontractors. When information is lacking or incomplete, it affects the flow of the job, which is so crucial to the success of a project. Processing the information on this project has been an enormous task with hundreds of submittals, hundreds of requests for information, constant construction bulletins and drawing revisions required.

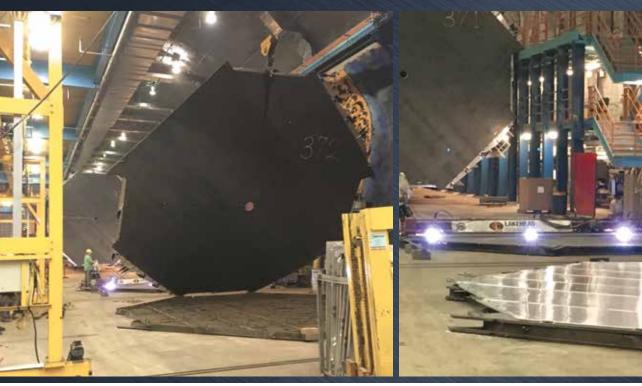
The results of a proactive approach have allowed Lakehead and subcontractors to install 1.1 million pounds of rebar and place 6,000 cubic yards of concrete in 3.5 months, finishing critical concrete the first week of December. This allowed crews to move on to erecting over 2 million pounds of steel through the winter. The newly

erected steel and existing infrastructure allowed Parsons Electric to pull 320,000 feet of wire throughout the project. Lakehead and AW Kuettel pipefitters installed 2 miles of pipe varying from 0.25-inch tubing to 42-inch vacuum piping. AW Kuettel also installed six new dust collectors. Lakehead installed a new main burner and grate replacement during the January outage. Both projects finished ahead of schedule and under budget. The two scope items showed the skill and experience of Lakehead's mining maintenance crews and supervision.

The broad scope of this \$35 million project has been a great opportunity for Lakehead to showcase its abilities to Cliffs. As stated by Cliffs, Lakehead was the best general contractor to lead this strategic upgrade to United Taconite and meet its customer's demands.

## DECOMMISSIONING THE MINOS DETECTOR

by Dean Barrett





## In September 2016, Lakehead Constructors, Inc. was awarded a unique contract to decommission the MINOS detector at the Lake Vermilion-Soudan Underground Mine State Park in Soudan, Minnesota. The work scope, in general, involved cutting up approximately 6,000 tons of plate steel a half-mile underground into pieces small enough to fit into the elevator (cage), in which the material was brought to the surface, then placed in scrap trailers and removed from the site.

The project has an interesting history and began back in 2003 as a physics experiment called The Main Injector Neutrino Oscillation Search, or MINOS. According to an article in the Duluth News Tribune, "The experiment had been searching for changes, or oscillations, in neutrinos shot in a beam

underground to the Soudan Mine from Fermilab near Chicago. The funding for the project came from the U.S. Department of Energy and was administered by Fermilab in a contract with the University of Minnesota."1 Lakehead was the general contractor that was awarded and performed the original outfitting

of the underground laboratory in 2001. At the beginning of that project, numerous large pieces of construction support equipment had to be completely disassembled to fit within the cage during the half-mile trip underground and were then reassembled to perform the work.

MINOS has been in operation since 2003 and has collected all the data necessary for the scientists to evaluate. The MINOS detector is located in a Minnesota state park. Terms of the lease agreement with the Minnesota Department of Natural Resources (DNR) required the equipment used in the experiment be removed from the mine once the experiment ended. Lakehead was hired to remove the 486 12-ton detector plates, which hung like file folders during the experiment. Each plate consisted of eight pieces of AISI 1006 plate steel, measuring roughly 26 feet long by 6.6 feet wide by 0.5 inch thick. The rolled steel was plug welded together to produce an octagon shape plane measuring approximately 26 feet by 26 feet by 1 inch thick.

A scintillator comprised of plastic-encased aluminum covered one side of each plane. This also had to be cut into small pieces that were taken up the elevator and removed from the site. As stated earlier, the plates hung vertically in a row during the experiment. The existing overhead crane was used to pick up the individual plates "off the rack." The plates were then lowered to the laboratory floor, horizontally, where the scintillator was first removed followed by the plate being cut into pieces. The maximum size piece that would fit inside the elevator was approximately 40 inches wide by 60 inches long. The eleva-

tor's capacity was 6 tons; therefore, approximately 1,000 hoist trips were required for the scrap steel plus additional for the scintillator.

The demolition work was performed during the winter nontourist season, which ran from early October 2016 through the end of March 2017. This schedule was selected so the work did not interfere with underground tours or Minnesota DNR shaft maintenance.

The goal is to complete the project during one nontourist season.

Safety planning and performance were key components throughout the project. All loads were secured inside the elevator to ensure no scrap material or equipment came loose during the many trips up and down the shaft. Air quality was continually monitored in the underground work area. The owner's air handling system was supplemented by localized "smoke eaters" and an air filter provided by Lakehead. The workers had a nicely controlled and warm environment for this wintertime work.

In the end, Lakehead was involved with both the original construction and final decommissioning of the MINOS detector. The Minnesota DNR is interested in finding a new tenant to utilize the space once the underground laboratory is cleared out.



#### Reference

1. Kaczke, Lisa. "Work Winding down on 2 Big Experiments in Soudan Mine." Duluth News Tribune. N.p., 13 Feb. 2016. Web. 12 Jan. 2017.

## **BNSF Allouez Taconite Facility Metso Wheel Clamping System**

by Todd Koneczny and Brian Johnson



akehead Constructors, Inc. was hired by BNSF Railway and Metso to install a new hydraulic wheel clamping system at the southern car dumping building at the Allouez taconite facility. The Metso wheel clamping system is designed to provide reliable railcar safety restraint as part of the automated railcar indexing system installed in 2014. The project was engineered, managed and inspected by TKDA.

Features of the project included refurbishment of the hydraulic pump room, a heated concrete wheel clamp pit and installation of hydraulic wheel clamping equipment including hydraulic piping, and a new hydraulic pumping unit (HPU).

The main challenges of the project were removal and replacement of the existing railroad track concrete equipment pit in a manner that would minimize interruption of car dumping services at the southern dumping building.

Of special concern was the installation of a new, drilled, 4-inch diameter hole through 7 feet of poured structural concrete in a man-

ner that would not compromise the integrity of existing concrete steel reinforcement at 6 feet on center in each direction. Ground-penetrating radar was deployed to scan the underside of the existing concrete floor structure. The hole was drilled avoiding existing concrete reinforcement.

The concrete equipment pit replacement schedule was developed to coincide with a scheduled maintenance shutdown at a large taconite plant on the Minnesota Iron Range. One week prior to the shutdown, concrete demolition began through saw cutting, hydraulic hammer and hand work on two sides and the middle of the existing concrete pit utilizing a 12-hour-shift crew.

The remaining existing concrete pit components were removed, and a new cast-in-place concrete pit was constructed within a five-day period utilizing two 12-hour shifts for a 24-hour workday.

Installation of rail splice points on each side of the pit, along with temporary structural bracing, allowed for dumping of railcars during the evening and weekend while demolition occurred during the day.

To assure the new Metso wheel clamping equipment would fit onto the new concrete structure properly and without unnecessary modification, Lakehead employed a quality assurance practice of checking between Metso equipment documentation and cast-in-place concrete pit construction documents, as well as field measuring Metso components that had arrived on site.

The result was a savings to the owner for modifications that would have been required in order for new equipment to fit and align properly, as well as minimizing the service disruption of the car dumping station.

The quality assurance process identified several conflicts, which were resolved and corrected before structural steel and concrete steel reinforcing were fabricated and embedded components were cast into new concrete. The result was a savings to the owner for modifications that would have been required in order for new equipment to fit and align properly, as well as minimizing the service disruption of the car dumping station.

Once the concrete with the embedment was placed, the installation of the wheel clamps began. BNSF provided a knuckle boom crane able to travel the rails, and an operator helped set the clamps. Lakehead had already adjusted the leveling nuts to the proper elevation, so setting the clamps in place only took about a half-hour of crane time. From that point it took another 12 crew hours to finish alignment and grouting so the rail section above the clamp pit could be installed to allow for train traffic. The piping crew had been running the stainless steel hydraulic piping from the new HPU during some of the earlier work so that, by the time the clamps were in place, the new manifold was already installed. From the manifold, two large hydraulic hoses ran to each of the four hydraulic cylinders that open and close the clamps. The crew had to finish installing the hoses between trains so BNSF could continue to service its customers.

It took several trains to get all the logic and controls set properly to make sure the interface between the positioner, wheel clamps and car door openers were debugged, but when it was done, the system worked as designed, and the project came in on time and on budget.



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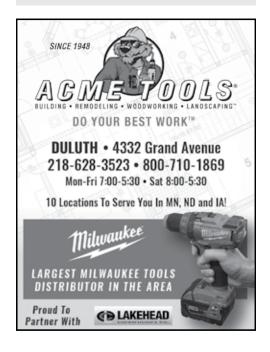
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