VALE

Foundation for the Future

2016/2017 Annual Update
on Vale in Manitoba

Value our People — Engaging Stakeholders

One of our core values is about people. To show that we value people, we have initiated a number of actions to engage employees, the community and the region.

The Community Liaison Committee (CLC) connects Vale, the community of Thompson and neighbouring communities. Stakeholders meet quarterly to discuss topics ranging from environmental matters to careers and training. Presentations, tours and open discussion are among the activities of the CLC.

Employee events and initiatives help Vale engage with employees at work and in the community. Whether it is 'Vale Night with the Northstars' hockey event, the Commuter Challenge or a photography contest, Vale seeks to build a sense of community among employees. The photo on this page was submitted to the contest by BethAnn Bourgon, Procurement Analyst.

We are what we do

Mission

To transform natural resources into prosperity and sustainable development.

Vision

To be the number one global natural resources company in creating long-term value, through excellence and passion for people and the planet.

Values

- Life matters most
- Value our people
- Prize our planet
- Do what is right
- Improve together
- Make it happen

A Message from Mark Scott

These are certainly challenging times for all of us who live and work in Thompson. The sustained downturn in nickel price and the changes underway in our operations are causes for concern and I'm sure each of us is feeling that anxiety in our own way. Nickel price volatility, sustaining capital requirements, operating cost and productivity concerns represent long-term challenges we must overcome together to ensure the sustainability of our Manitoba Operations and our community. We must deal head-on with the challenges we face and work together to control our own destiny while exercising active, genuine care for one another.

Overcoming these challenges requires focus on that which is within our span of control. To ensure that we remain competitive at all points in the price cycle, we have initiated a 20% Breakthrough Challenge with our employees and our key stakeholders. We must cover our operating and capital expenses as a division at today's nickel price, and every single employee will have a role to play in reducing our costs and improving our productivity in order to affect the best possible future as a mining and milling operation.

Of course, our deepest commitment remains to SafeProduction. The distinctive actions to plan, accept, care and lead will continue to guide us in managing risk to our people, the community, our business and the environment, to as low as reasonably achievable. Despite the challenges we have already faced and those yet to be faced by the community, we have continued to move ever closer to achieving zero harm, as is reflected in this update. Vale and USW 6166 recently renewed our commitment to SafeProduction in support of this shared goal, and we continue to work together to identify and realize opportunities to ease the impact of the transition to mining and milling, and achieve the breakthrough that is required.

As I write this, we are in the process of placing our Birchtree Mine on care and maintenance. I want to recognize the accomplishments and commitment of every single employee that contributed to the rich history of production and safety — SafeProduction — at Birchtree Mine. While the number of employees affected by the suspension of operations was smaller than we initially anticipated, every employee affected is dealing with one of the most stressful events that a person can face, and as we move towards the closure of the smelter and refinery, more people will face this. We have launched a joint Vale-USW Workforce Adjustment Committee with the province that will provide services and supports to those affected. As we move through this transition, it is incumbent upon each of us to offer help when we see others that need it, and to ask for help when we need it.

Despite the challenges, there is cause for optimism and there is a good deal of yet-to-be realized opportunity in Thompson and region. This is why the work of the Thompson Economic Diversification Working Group (TEDWG) remains vital, and it is why the ongoing efforts of Thompson 2020 are essential. Vale has continued to invest in positioning our operations for years of mining and milling through investments in our tailings management area and the completion of the $80 million concentrate loadout facility in 2018. We all have work to do to realize our full potential.

We have overcome significant challenges in the past and we have accomplished a great deal to date — together we can and will succeed again. Together, we are building the strongest possible foundation for our future.

Renewing our Commitment

SafeProduction, launched in 2003, reinforces two of Vale's Values: 'Life Matters Most' and 'Value our People'. It is also a symbol of the Vale and USW Local 6166 joint commitment to achieving zero harm to people and the workplace, community and natural environment.

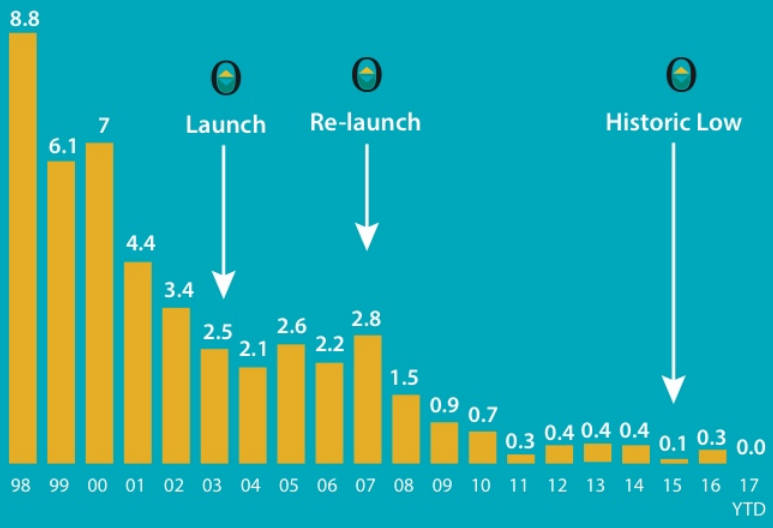
SafeProduction is an ongoing commitment that regularly goes through several audits to measure its effectiveness. On several occasions, Vale and USW have committed to refocus on the fundamentals of managing risk. This commitment was reinforced with the re-signing of the SafeProduction Charter by Vice-President Manitoba Operations Mark Scott and President USW Local 6166 Les Ellsworth.

Notable milestones:

- Lowest number of injuries (including disabling injuries) in company history.
- Vale Mine Rescue team won the Provincial Mine Rescue Competition in 2016 (back-to-back with 2015).
- SafeProduction model has been adopted by Vale operations in the North Atlantic region, as well as the City of Thompson.
- Emergency response teams include Mine Rescue, Refinery Rescue, Fire Crew, High Angle Rope Rescue and Critical Incident Stress Management teams.
- Creation of the Investigative Coach Resource roles, with representatives from both Vale and USW Local 6166, which provide training to supervisors and investigation teams to help them better find the root cause of incidents and implement effective controls to prevent recurrence.

SAFE PRODUCTION

Manitoba Operations — Historic Disabling Injury (DI) Snapshot



Annual Provincial Mine Rescue Competitions test skills and training under the stress of competition. The 2017 competition included five teams. The Vale team is far right.

"I've experienced the effects of a workplace fatality with the loss of my biological father, when I was a toddler," said Francois Dubuc, Senior Supervisor, SafeProduction. "Having children of my own has made me value risk management in the workplace in order to return home safe at the end of each day, so that my family does not experience what I have. I try to pass on my experiences to others to drive home the importance of SafeProduction principles and practices in risk management, both at work and away from work."

Mark Scott, Vale Vice-President, Manitoba Operations and Les Ellsworth, President, United Steelworkers Local 6166 re-signed the SafeProduction charter in 2017 as part of a refocus on achieving zero harm.

Striving to Improve

Towards Sustainable Mining (TSM) is a performance system developed in 2004 by the Mining Association of Canada, that helps mining companies evaluate and manage their environmental and social responsibilities.

It is a set of tools and protocols that helps companies like Vale to engage with communities, drive world-leading environmental practices, and commit to the safety and health of employees and surrounding communities. The protocols are: Tailings Management, Aboriginal and Community Outreach, Biodiversity Conservation Management, Energy Use and Greenhouse Gas Emission Management, Safety and Health and Crisis Management.

Within each set of protocols are dozens of tasks that Vale undertakes to meet the TSM objectives and government regulations. Some of these include:

- Sampling of effluent from the Tailings Management Area, Birchtree Effluent Plant and other targeted areas. A compliance rate of 98.74% was achieved in 2016.

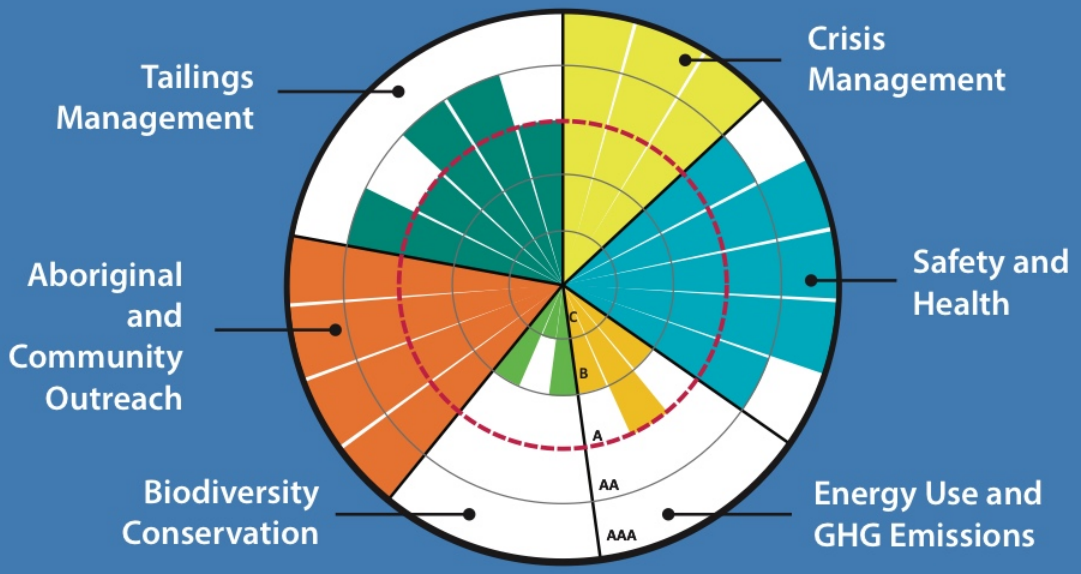
Presence of aquatic and other wildlife are indicators of sound Tailings Management, as well as Biodiversity Conservation Management.

- Effluent toxicity studied by an independent laboratory in accordance with the federal Metal Mining Effluent Regulations.
- Four water quality/environmental effects surveys assessed acute toxicity on rainbow trout and daphnia (water flea). All effluent samples were in compliance with regulations.
- One water quality/environmental effects survey assessed chronic toxicity on a minnow, aquatic plant, algae and water flea species. The effluent sample was in compliance with regulations.
- Air quality monitored at four sites within city limits. There were 15 hours of elevated levels of sulphur dioxide, affecting 10 days that surpassed provincial guidelines.
- An annual report for 2016 on processes, tests, results and other factors at the Water Treatment Plant is available online at www.thompson.ca/index.aspx?page=232.

Major achievement:

SLAM Dunk is a waste management and recycling program initiated in 2013. By separating waste into streams that can be sold, reused or recycled, Vale is reducing the pressure on its landfill. In 2016, Vale was able to divert more than 95% of its waste material from landfill. Saleable and recyclable items include 93,285 pounds of cardboard, 210 pounds of ink cartridges, 35,667 pounds of pallets and 2,999,378 pounds of scrap metal.

Thompson — 2016 TSM Audit



The Mining Association of Canada (MAC) uses a letter grade system to indicate performance within the six indicators. The letter grade system ranges from C (no systems in place) to AAA (excellence and leadership is demonstrated and validated by external, independent assessments). The more the outside circle is filled, the better the performance. Note: Biodiversity Conservation is the newest indicator. For more information on TSM, or to download TSM results for Mining Association of Canada members please visit www.mining.ca.

The success of SLAM Dunk is, in large part, due to partnership with our environmental solutions provider and with our employees who segregate their waste in the workplace.

Students from Juniper School's Green Team visited Vale to learn about SLAM Dunk and how they can apply it at their school.

Ensuring our Future

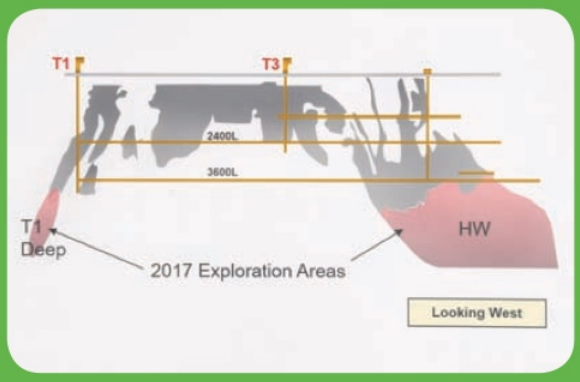
Exploration for nickel in the Thompson Nickel Belt (TNB) started in the late 1940s. Airborne geophysical surveys, which were advanced technology at the time, were followed by detailed ground geological and geophysical surveys and diamond drilling. This systematic approach has led to the discovery of more than a dozen nickel deposits. Production from the TNB deposits has produced more than 2,500 kilotonnes of nickel since the late 1950s.

Nickel price varies according to market demands and the amount of nickel available worldwide. Today, the global demand for nickel has slowed and supply remains high, which has caused the price to remain at prolonged, historic lows. This makes it more important than ever to focus present exploration efforts to produce the best 'picture' possible of ore resources and reserves. This will ensure money spent on mine development and future production is fully optimized.

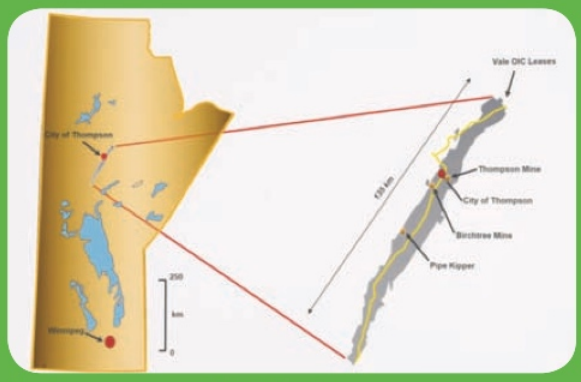
Historical trivia:

- Diamond drill borehole number 11,962 was the 'Discovery Hole' which led to the development of Thompson Mine.
- "We used to make these Twiggi-cams. It was a way for (the company) to see what metals were in the ground by analyzing what was in the foliage."
  — Roy MacInnes (Celebrating the Years of Discovery 1956–61)

As a result, exploration in 2017 is focused on existing mines at both T-1 and T-3, in particular at the north end of the T-3 zone, which is known as Hangingwall resource zone. Through aggressive underground drilling programs, exploration teams will evaluate and advance targets in and near existing mines. Targets include extensions of known deposits, satellite deposits that are in-mine, as well as new resource zones both north and south of existing mines.



Exploration efforts in 2017 are centred on the T-1 Deep and Hanging Wall extensions of the Thompson orebody.



The Thompson Nickel Belt (TNB) spans an area approximately 130 kilometers long by 30 kilometers wide.

Information from core samples and geotechnical surveys is used to map potential ore deposits. While computer 3D modelling is the norm, certain data is still confirmed through traditional methods.

Diamond drilling produces thousands of meters of drill core each year. Drill core is visually analyzed, prepared for laboratory analysis, logged and catalogued. It is the foundation for mapping orebodies.

Moving to Care and Maintenance

In May 2017, Vale announced Birchtree Mine would suspend production and go on 'care and maintenance' in October of this year. The reason? Weak nickel prices and an excess amount of nickel for sale on world markets. But this situation is not new for Birchtree. In fact, you could almost call Birchtree's a checkered past as it has been placed on care and maintenance once before in the 1970s, and has had a shaft sinking project suspended twice — all due to market conditions.

And yet, Birchtree stands out as an industry leader in operations, safety and innovation. The ground conditions at Birchtree are not as stable as at Thompson Mine due to the type of rock that hosts the ore. Ground control was always a challenge and Birchtree became a leader in understanding ground support methods. Other mines are starting to use methods developed at Birchtree.

Birchtree was one of the first mines to try bulk mining, as opposed to the traditional cut and fill mining. It was also the site chosen for testing a continuous mining machine called the Roadheader.

Most importantly, employees at Birchtree have achieved some of the safest work habits and practices in the industry. In fact, it has earned two national and five regional John T. Ryan Awards since 2004. The award is given by the Canadian Institute of Mining and Metallurgy.

Historical highlights:

- **1953** – Staking of the Birchtree property begins
- **1962** – Nickel-bearing mineralization is discovered
- **1967** – Production shaft completed to a depth of 2,820 feet
- **1974** – Deepening project begins
- **1978** – Birchtree put on care and maintenance; deepening suspended
- **1989** – Birchtree re-opened with development of 83 orebody
- **1995** – Shaft deepening project resumes
- **1997** – Shaft deepening project suspended
- **2000** – Shaft deepening resumes
- **2005** – Production increased to 3,800 tons per day
- **2007** – Portal collared

Henry Linklater (left), who surveyed and staked the land on which Birchtree sits, recalls some of the history of the mine with Manager Al Proulx.

Birchtree employees earned two national and five regional John T. Ryan Awards in recognition of safety since 2004.

Birchtree Mine earned a reputation as a leader in ground support practices and methods, ensuring the safety of people and equipment.

Birchtree Mine is the only mine in Manitoba Operations which you can enter through a portal (shown under construction) rather than down a shaft.

Building our Future

Manitoba Operations is building a new future as a mining and milling operation. A vital component of this future is the addition of the Thompson Concentrate Load-Out (TCLO) facility to the existing mill building. Demolition of specific areas in the Mill are being carried out to make way for the new processes.

The processes that are new to the Mill include a 15-meter diameter thickener. The thickener is the first step in dewatering slurry produced in the Mill's flotation area. The second new process will be a vertical filter press, which is the second step in dewatering slurry. It will reduce moisture content in the slurry to 8.5%, effectively making it a transportable concentrate.

Additional new construction includes the 'truck terminal' portion of the TCLO. Trucks will enter the west end of the building, be loaded with concentrate, and exit the east end of the building. The forecast is to produce a maximum of 1,240 tonnes per day of concentrate.

New tanks for the TCLO project are readied for shipment to site from a southern Manitoba manufacturing plant.

Project milestones:

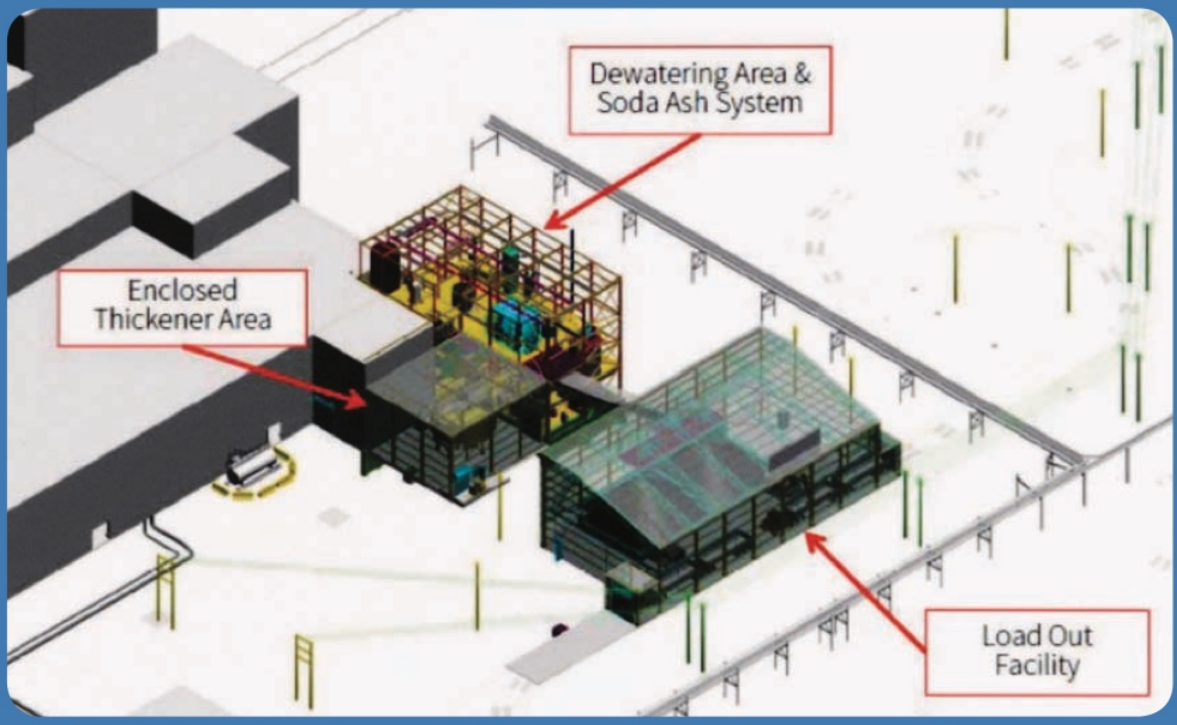
- Project sanctioned by Vale Board of Directors July 2016
- Power lines moved to enable construction; demolition started summer of 2016
- TCLO concrete foundation and containment wall finished June 2017
- New thickener arrived on site July 2017; installed August 2017
- Mill building dewatering asbestos siding removed; new siding completed August 2017
- New filter press arrived on site August 2017
- Project at 61.5% physical completion August 31, 2017 versus plan of 63.4%
- Commissioning planned for May/June 2018
- Project handover to Operations planned for June 2018.

Traditional Mill flow sheet:

Crush ore in cone crushers, grind ore in rod and ball mills, begin separating nickel from the ore in flotation cells. Flotation cells produce a slurry with 14% nickel content, which is sent to the Smelter for dewatering, roasting, smelting, converting and pouring into molds. The molds are sent to the Refinery and refined as a saleable nickel product.

New Mill flow sheet:

Crush ore in cone crushers, grind ore in rod and ball mills, begin separating nickel from the ore in flotation cells, dewater, load onto trucks and ship to Ontario Operations and/or Long Harbour NF for further processing.



The isometric rendering of the Project Model plan of the new TCLO facility shows both 'adjacent to' and 'within' the existing Mill building in Thompson.

Asbestos cladding was removed from the Dewatering Area of the Mill and new inner siding is in progress.

A temporary copper filter press was installed behind the Mill in order to free up the Dewatering Area for demolition and construction.

Focusing on Water Quality

The Tailings Management Area (TMA) is a collection and settling area for mine discharge and mill tailings. It takes up roughly 58 square kilometers just east of the main plant site. It became necessary to increase the capacity of the TMA in order to ensure water quality, protect the environment, and extend the life of the Manitoba Operations.

Planning that process began in 2006 with construction beginning in 2010. Since construction started, more than $30.5 million has been invested in raising dams, building dikes, building roads, repairing culverts and building other infrastructure. Although the work is meant to increase the capacity of the TMA, every decision, every step and every structure is designed to protect and enhance water quality and wildlife within the TMA.

Each year, flocks of Canada Geese return to the Tailings Management Area to raise new families. Canada Geese are only one of several species of waterfowl in the TMA.

Highlights of work to date:

- Dam B was raised eight feet and extended by nearly 900 feet.
- Dam B Saddle Dam is about 40% complete.
- The Toe Dam at 'Bucky's Pond' is complete. (Bucky the beaver still makes his home there.)
- The Splitter Dike in Area 4 is complete.
- Water level in TMA has been raised 15 inches, which will improve water quality in the future by keeping tailings submerged.
- Tailings Management Policy signed by Vice-President Mark Scott.
- Floating tailings line test in 2016 was successful and will continue in 2017.

Highlights of work planned for 2017:

- Build up a remaining portion of road at the Narrows Coffer Dam to accommodate higher water levels.
- Build a road to the farthest northeastern corner of Area 4 to accommodate building a clay dike.
- Continue to raise water levels. The plan is to raise levels a total of three feet by fall.

Fox pups were 'captured' on film by Al Szabo of the Mill (who also took the photo on the opposite page). Foxes, wolves, moose, and small fur-bearing animals are among the wildlife prevalent in the TMA.

Manitoba Operation's TMA policy can be found at www.vale.com/canada/en/business/mining/nickel/vale-canada/thompson/Pages/default.aspx.

Preparing for Closure

Since 1961, the Smelter and Refinery have produced approximately 2.7 million tonnes of pure electrolytic nickel for world markets. However, changes to environmental regulations, combined with the lack of local feed for processing, have resulted in the decision to close both facilities.

Manitoba Operations will be transitioned to a mining and milling operation only. Production from both plants will cease by July 31, 2018, as the transition must be complete by January 1, 2019 to comply with the sulphur dioxide performance target agreed upon with the federal government.

Several steps are being taken to achieve the transition as smoothly as possible. For example, the Smelter has moved from a two- to a one-furnace operation; equipment and materials are being relocated; and plans are being developed to finalize the specific timing and sequence of ramp down activities, and to prepare the facilities for care and maintenance prior to final demolition.

The Refinery Tankhouse is where anodes from the Smelter are dissolved, resulting in the nickel migrating to cathode sheets or mandrels (for Rounds production).

Targeted milestones:

- Smelter & Refinery Production Ceases — July 2018
- Smelter Cleaning Complete — October 2018
- Refinery Electrolyte Processing — September 2018 — September 2019
- Final Isolation of Smelter & Refinery — Q4 2019
- Plants placed into Care & Maintenance — Q4 2019
- Demolition of Smelter & Refinery tentatively begins — 2023
- Site Remediation — 2026 continuing to final site closure

Historical trivia:

- "The Thompson Refinery is a replica of the old Port Colborne (Ontario) Refinery in terms of layout."
  — Ken Biglow (Celebrating the Years of Discovery 1956-61)
- "Dr. Barth designed the original furnace in the Thompson Smelter. He had peculiar ways. For example, he would not allow the start-up until a three-course dinner had been served and eaten inside!"
  — Bill Bilows (Celebrating the Years of Discovery 1956-61)
- Thompson Smelter, at its peak, operated with five furnaces and produced copper ingots, in addition to nickel anodes.
- Thompson Refinery's reputation for quality nickel was evident in that many customers would not accept the nickel cathode unless they could see the company's name stamped on it.

The automated anode casting section of the Smelter fills molds with molten Bessemer matte from the converters.

The molten material from the molds (above) cools and hardens into anodes containing 75% nickel. These are sent via narrow-gauge rail to the Refinery for processing into 99.9% pure nickel.

Reflecting on Success

Vale's Northern Employment Strategy (NES) is designed to attract, hire and invest in individuals from the north who have the ability to learn, the desire to excel and the values to guide them. The strategy was adopted in 2012, and since then, 100% of the 300 labourers have been hired from the north; 50% of them self-identify as Indigenous.

NES owes its success to partnerships with northern communities and organizations that offer employment assistance and career counselling. Through these partnerships, Vale has been able to create awareness about careers in mining and develop a northern workforce. Vale's participation in career conferences, as well as our hosting of employment events and plant tours, have introduced careers in mining to thousands of youth and young adults.

In addition, Vale introduced the Henry Linklater Scholarship to reward the academic achievements of northern Indigenous students pursuing studies in Engineering and Geological Sciences at the University of Manitoba. The scholarship is named in honour of Henry Linklater (see page 8), one of the first Indigenous people to work for the company. He joined the exploration group in 1955 and retired in 1992, although he continued to work under contract until 2006.

Examples of employment events:

- UCN Try-a-Trade Career Booth
- Frontier School Division Career Days in Cranberry Portage
- Northern Connections Job Fair in Flin Flon
- Vale Employment Event in Nisichawayasihk Cree Nation
- Recruitment Booth at City Centre Mall in Thompson
- Exploring Employment Opportunities for Women, YWCA in Thompson

Examples of career events for youth:

- Northern Young Women's Conference
- Northern Young Men's Conference
- Frontier School Division Career Fair in Leaf Rapids
- WISE Kid-Netic Energy Kids Camp
- Grade 6 Trades & Technology Olympics

Examples of mining plant tour groups:

- Grade 8 student tours
- Careers North tours
- Youth Build tours (Thompson Boys & Girls Club)
- MKO (Manitoba Keewatinowi Okimakinak) summer student tour

Each year, Grade 8 students from Thompson tour the Central Maintenance area of Manitoba Operations to learn about the various trades opportunities in industry.

Vale employees assist with skill teaching at the Northern Young Men's conference.

Hands-on learning involves teaching skills, as well as the importance of personal protective equipment.

Better Tomorrow than Today!

Continuous Improvement is a culture shift in which everyone is encouraged to see waste and remove it, question everything we do, and act on facts. It requires working together so that many small improvements can add up to big impacts. Although a Continuous Improvement culture is not new to Manitoba Operations, it was reignited in 2016 and has been gaining momentum ever since.

At Vale, the culture of Continuous Improvement is more formally known as the Vale Production System (VPS). It is a management model that requires consistent and continuous effort through engaging people in the pursuit of operational excellence. More simply, VPS considers employees as the company's most valuable resource, because they have the day-to-day experience.

T-1 Mine employees joined forces to transform the drill bit sharpening room.

In addition, through VPS, 15 supervisors have been trained to be 'Lean Green Belt' certified, giving them the tools to further the culture of Continuous Improvement.

Since November 2016, more than 180 projects have created improvements throughout our plants. The success of these projects could only have been obtained by our passionate employees who know "there has to be an easier way to do this." The result is safer workplaces, less waste and cost savings.

Environmental Hotline

Call 204-778-2888 any time of day to report sulphur dioxide in the air or any other environmental concerns.

For more information on the Community Liaison Committee or any topic in this report, contact Ryan Land at ryan.land@vale.com or 204-778-2326.

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