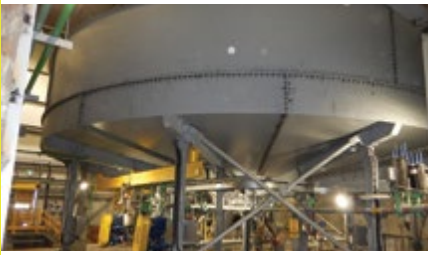


# A New Era

2017/2018 Annual Update on Vale in Manitoba



## 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



Continual monitoring of our environment helps ensure we have minimal impact on our planet.

## Kawītotamāhk

Ta othas ta yāhk aski apacihkowīna mina kita mithopathik tapitawi pasikonikiwin.

## Ka isi wapāhtamāhk

Tanikana kisowāhk misiwī aski ka isi ayāmakāhk atoskiwin ikota ta ohcipathik kinwākac isi ohtisiwin kwayask isi akwa sakihiwīwin ithiniwak akwa aski ohci.

## Kistitamowina

- Pimātisiwin māwac nikānithihtākwan
- Ki tithinimināwak ta nikānithih ta kosicik
- Ta kistithihtāk wāhk kitāskinaw
- Kwayāsk tatotamāhk ka isi mithwāsik
- Āwasimī tamithonakohcikiyāhk isi māmawiyahk
- Totāhtan takihīkihik

# A message from Ricus Grimbeek



In May 2018 I took on the new role as Chief Operating Officer of North Atlantic operations and Asian refineries, which includes operations in Canada, the UK and Asia. These past months have seen a lot of change throughout our organization. A new organizational structure for the Base Metals business will maximize integration within our operations and across Vale as a whole. I am confident that we are now well-positioned to fully realize our potential as a reliable and sustainable contributor to the broader business and to our communities. In our ongoing mission to be prosperous and sustainable, we want to build a better business and a better world.

The industry of the future must be a safe one. and I hope employees will come to understand that safety is at the core of everything I stand for. My desire is to run a business where people's safety is guaranteed — one where no lives will ever be lost or changed as a result of a serious workplace injury or illness. While this guarantee may seem elusive, we are going to see a profound transformation of the mining industry as a result of digital technology. If we are willing to embrace this reality by acting fast and thinking differently, I know

that we will be able to unlock a new level of safety performance that today is hard to imagine. And as we exponentially improve safety by using technology to better manage work, the rest will follow in terms of our improved ability to be productive, profitable and sustainable.

The decision in 2010 to decommission the Smelter and Refinery gave plenty of time for our people, the Company and the City of Thompson to prepare. Still, this transition has been an emotional time for our employees and the broader community of Thompson. I want to sincerely thank all of our people who, over the years, have made significant contributions to our smelting and refining operations in Thompson. During a very challenging number of years, employees have managed to improve safety, significantly reduce unit costs and achieve positive production results. They have truly lived our Company value of 'Make it Happen'.

There has been excellent work to transition to a mining and milling operation — one that will continue to be a vital part of our North Atlantic operations well into the future. In June,

the Thompson Concentrate Loadout Project was successfully completed. The de-watering and loadout facility ensure we can continue to ship valuable nickel concentrate from our Mill. The project was completed on time, on budget, and most importantly, very safely — with more than half a million person-hours without a lost-time injury.

We will pursue growth in Thompson by considering previously deferred studies and by expanding our exploration, development and capital investment in the near term. As we do so, we must continue to pursue operational excellence, innovation and continuous improvement. My plan is to enroll employees at all levels in this work, along with USW 6166, government stakeholders, the local community and Indigenous peoples. Only by working together will we truly be able to maximize our potential for success as we embark on this transformative journey together.

# SafeProduction

## We are all SafeProduction leaders

SafeProduction is an ongoing commitment to achieve zero harm to people, the workplace, the communities in which we operate and the natural environment. Since 2003, employees have been trained how to use the tools of risk management, regular audits have been conducted, and a re-launch was initiated. Now, SafeProduction is helping every employee be a SafeProduction leader.

This is being achieved on many levels, but starts with a leadership training program conducted jointly by management and union officials. Two new roles were created to provide training and coaching on investigations and



**Leadership training is a key component of SafeProduction.**

reporting. A major overhaul of the mines training process was also started to further reduce workplace risk.

Crisis management is also improving as it is introducing a mentoring system for new employees coming into those roles. A major change from task safety management to process safety management is the focus of a new Process Safety Management system.

As part of the holistic approach to SafeProduction, a five-year mental health strategy is being developed for Manitoba Operations. The joint Vale-USW Mental Health Committee, among other things, will develop a curriculum for Workplace Wellness training, maintain a mental health dashboard and support community efforts, such as the Defeat Depression Walk/Run.

Many existing practices that help support the goals of SafeProduction continue. One example is the voluntary health screening, which continues to get participation from more than 90% of employees.



Ayakwamī nokōhtawinihk nikanastāwak ika kita mamathinikit awina, ita katoskaniwāhk, ihtawīna ita katoskiyahk akwa aski. Aspin 2003, otatoskiwak kiskinwahamawāwak ta isi apacitācik apacihcikana ika tawantōtasōcik. Anōc niwīh kocinan tawicihakihcik kāhkithāw otatoskiwak ayakwami nokōhtawinihk nikāniwak.



Clockwise from top: Voluntary health screening; employees participate in the Defeat Depression Walk/Run; mines training process is overhauled to further reduce risk.



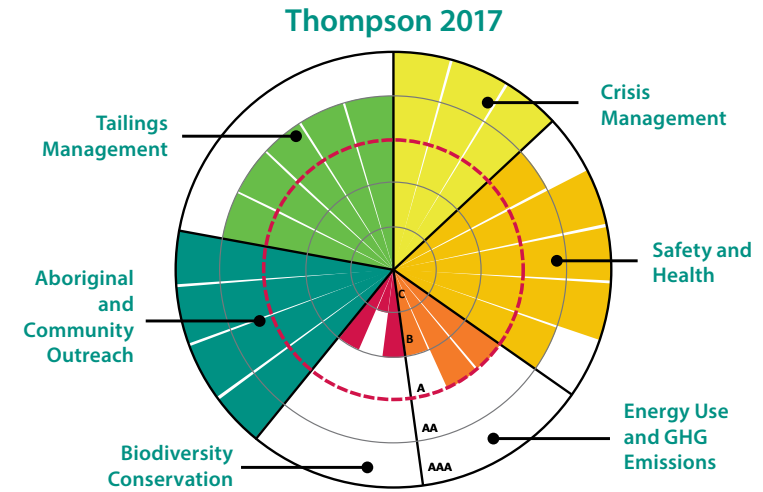
# Toward Sustainable Mining

## Sharing our story

Towards Sustainable Mining (TSM) is a performance system developed by the Mining Association of Canada (MAC). It is a set of tools and protocols that help mining companies evaluate and manage their environmental and social responsibilities, with emphasis on sharing this information.

The protocols are highlighted in the accompanying circle graph. Within each set of protocols are dozens of tasks to meet the TSM objectives and government regulations.

These tasks range from sampling effluent in the Tailings Management Area to holding regular meetings with the Community Liaison Committee (a group of stakeholders from surrounding communities and



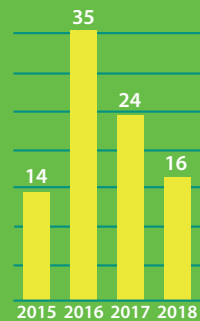
The dashed red line represents MAC's goal for all member facilities to achieve a Level A or better in all indicators.

organizations in Thompson), government reporting and more. More information can be found on the MAC website at [www.mining.ca/towards-sustainable-mining](http://www.mining.ca/towards-sustainable-mining).

Of special significance this year is our SLAM Dunk recycling program.

It was one of three finalists in the TSM Environmental Excellence Award. In 2017, Vale was able to divert more than 90% of its waste material from landfill. Saleable and recyclable items include cardboard, office paper and scrap metal.

Yakoma kwayask tipapāh cikiwin monahīsoniyawana ohci ki othastāwak misiwiskamik Canada ta wicīhācīk monahīsoniyawana okimawina aski ta nanakacihtacik mina kitapāhcikiwina. Ikwani ōho nīkotwasik pāhkan isīhcikiwina kita pāhci katiwa. Ikwani ōho pāhpiyak mīhcit isīhcikiwina ihtakwanwa tawicīhīkocik oko monīsoniyawinīhk. Yakōma kaki othasinahīkātīk nōkwān kwayask itotamāhk.



## Environmental Hotline Calls

Most calls regard air quality (sulphur dioxide). As of July 2018, these emissions ceased.

# Vale Production System

## Engaging our people

In February, Vale introduced the Vale Production System (VPS) — a management model that engages employees at all levels to pursue operational excellence, especially the safety of all employees.

VPS is designed to build a culture of teamwork, transparency, ownership and continuous improvement. The pillars of VPS are the company's values, leadership development and technology. VPS training is being rolled out throughout Manitoba Operations.

Hubology is one process that will help VPS move forward. Hubology or Hubbing, is a way of connecting and engaging people. It breaks down silos or



barriers by using cross-functional teams within Manitoba and across the North Atlantic Operations for a more 'agile' approach to problem solving. It develops more collaborative work environments to help focus on getting the basics right by planning, scheduling and executing work with certainty and precision. It also embraces technology that provides real-time data to make real-time decisions.

The Hubbing process will allow Manitoba Operations to be

more productive, profitable and sustainable — but most importantly, it will exponentially improve safety, which is vital to achieving operational excellence.

Manitoba Operations employees will see the use of technology increase across all parts of the operations. This could change how work is allocated, how progress is reported and how problems are solved. It will also help the business become safer and improve the way people design, plan and execute work.



Hub meetings are designed to connect and engage people by breaking down silos for a more agile approach to problem solving.

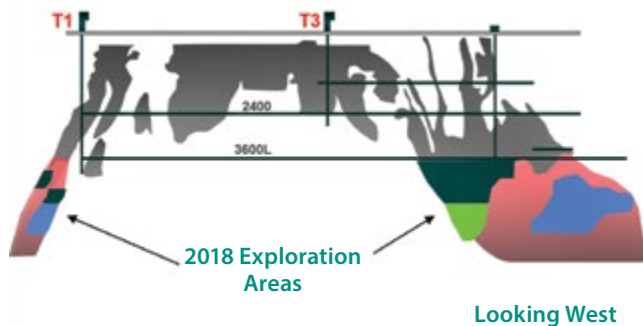
# Exploration Activities

## Back to the skies

Airborne electro-magnetic geophysical surveys conducted in the 1940s to the 1960s guided the Company's field exploration in the Thompson Nickel Belt. In February and March 2018, exploration was back to the skies with a modern helicopter-based electro-magnetic survey.

The modern technology and techniques are more sensitive and will detect potential ore bodies much deeper than the historic survey. The data collected in the 2018 survey will guide exploration programs for years to come.

Most other exploration was in-mine at T-1 and T-3, particularly at the north end of T-3. Through aggressive underground drilling programs, exploration teams will evaluate and advance extensions of known deposits, satellite deposits and new resource zones both north and south of existing mines.



For 2018, at Thompson mine, the exploration program is split between underground drilling and mine design studies.

- Mining
- Developing
- Growth Opportunities
- Exploration

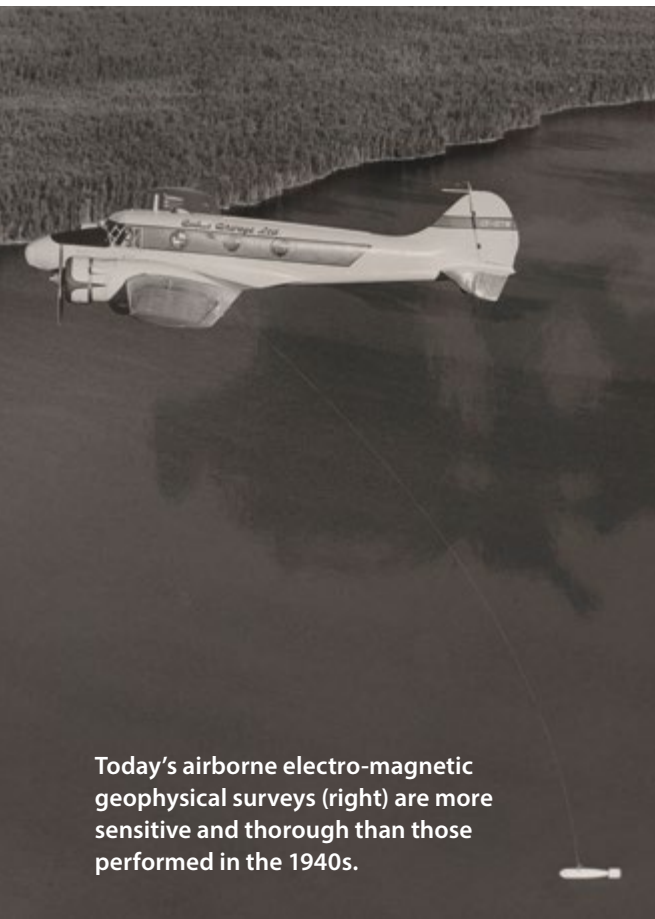
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Ati nikānihk kiyapic monahīsoniyawana nitawīhtakwan tananākacihcikatik. Kakipi akimīht Opawāhcakinas akwa Mikisi pisim Vale ki apācihtawak apācihcikana tatipaskatāhkaww itāmaskāmik. Ikota kiwīhcikipathinwa tantowī soniyāwasīni kapit itamāskamik. Kotaka nitonawīwak soniyawasiniya itamaskamik T-1 akwa T-3 monisoniyawanihk.



More than \$154 million dollars have been invested in exploration in Manitoba Operations since 2007.





Today's airborne electro-magnetic geophysical surveys (right) are more sensitive and thorough than those performed in the 1940s.



### Flight comparisons:

**1940s** — Fixed-wing aircraft electro-magnetic geophysical surveys flew at a height of 55 meters, with a spacing of 400 meters, reaching depths of 100 meters.

**2018** — Helicopter electro-magnetic geophysical surveys flew at a height of 30 meters, with a spacing of 150 meters, reaching depths of 500 meters.

# Decades of production and change



## Smelter milestones

**July 15, 1960**

First Smelter unit starts.

**September 10, 1960**

Smelter produces first Bessemer nickel matte.

**April 1987**

Automated anode casting line is commissioned.

**May 1991**

First installation of fibre optics.

**November 1995**

Hydraulic mud gun is installed to tap matte in furnaces.

**April 2000**

No. 5 furnace is turned off, ending the era of copper ingots.

**2008**

Electro-static precipitator project is commissioned.

**2017**

Smelter moves to a single furnace operation.

**July 8, 2018**

Last anodes are poured.

The Smelter and Refinery have officially stopped producing nickel. These photos touch on some of the processes and history of these two operations.

Ita katihkisöht akwa ka osihit soniyawapisk pöhnitawak ika ta osihacik. Ikwani öho cikasticikana nokohtawak kakipispathik öho niso isicihkiwina.



## Refinery milestones

**March 10, 1961**

Power supplied to first unit.

**March 25, 1961**

First official production of nickel cathodes.

**1972**

Refinery Rescue Team was formed.

**October 1984**

First S ROUNDS™ are produced; R ROUNDS™ the year after.

**October 1989**

Total Quality Improvement is adopted.

**April 1994**

Refinery is registered with International Standards Organization (ISO9000).

**2006**

Refinery Modernization project begins.

**August 2009**

Refinery introduces new design for slab nickel.

**December 2017**

Final production of nickel ROUNDS™.

**July 16, 2018**

Last nickel cathode is pulled.

# Thompson Concentrate Load-out Facility

## A new future begins

The first shipment of concentrate from the new Thompson Concentrate Load-Out Facility (TCLO) was loaded onto truck June 24, 2018. Construction and commissioning of the TCLO are complete and the new facility is now officially part of Mill operations.

The TCLO is critical to Manitoba Operations' future as a mine/mill operation. It takes slurry from the Mill's flotation circuit and dewateres it in two stages. A 15-meter diameter thickener (huge cone-shaped vat) draws solids out of the slurry primarily through gravitation.

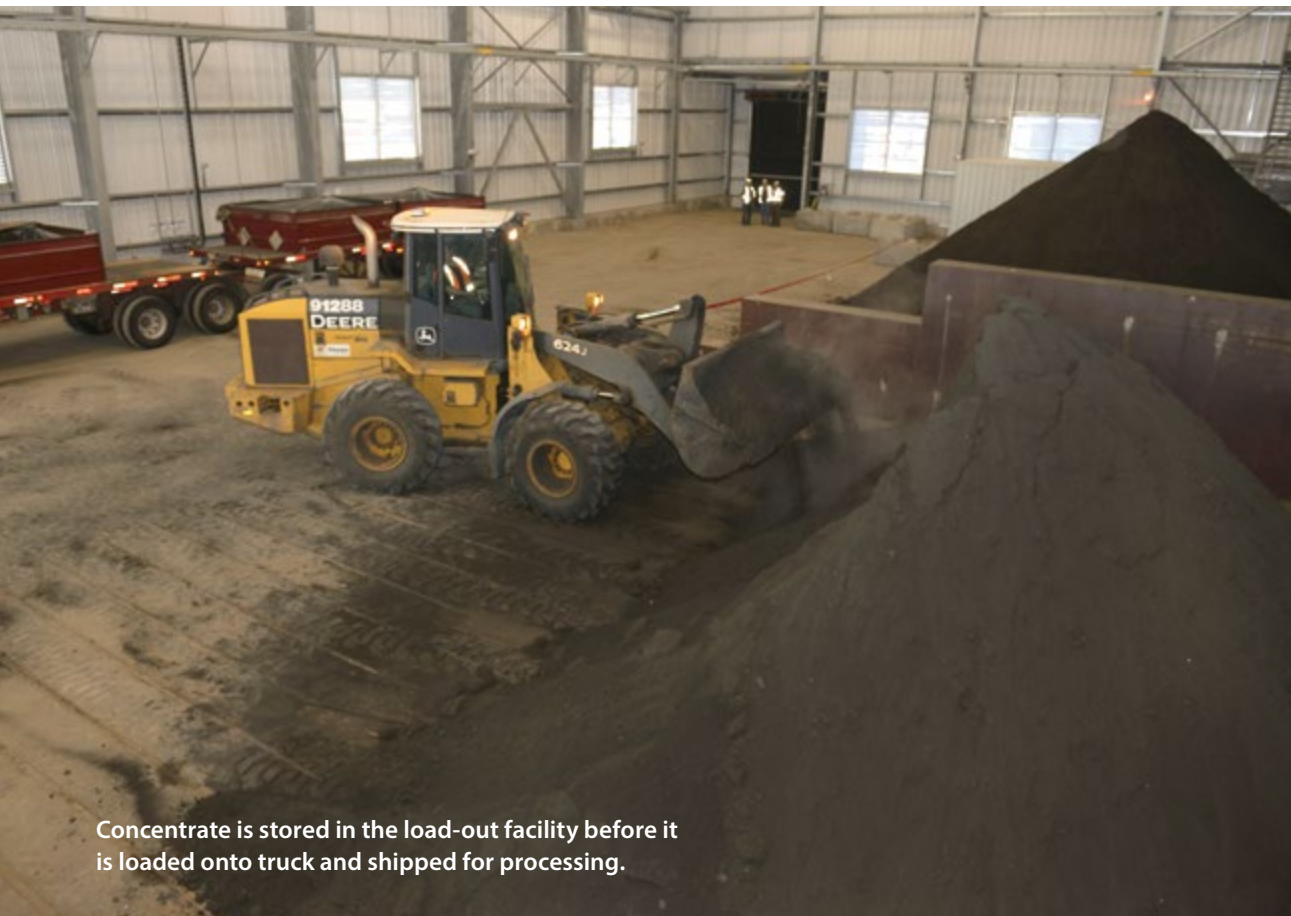
The resulting material is sent to a 12-meter tall filter press where water is literally squeezed out of it, reducing moisture to less than 8.5%. This results in a concentrate, which is fed by conveyor to the load-out facility. Here, it is loaded into trucks by front-end loader and shipped to Sudbury for processing.



Dewatering of slurry begins in the thickener (left) and is completed in the filter press (right).



Oma Thompson kamamāwinikatik ita ta ōchi sipwitisahōt soniyawāpisk [TLCO] nāspic kistithihtākwan atinikānihk monisoniyawīwin akwa ita ka osihīt soniyawapisk. Oma atoskiwin kinaskomonaniwan tatocikatik Paskahawi Pisim 2016. Wipāc kimacipathin atoskiwin, Pinawī Pisim 2018 kikisipathin. Nistam kakiposihīt soniyawāpisk misti tapanaskōhk nistānaw nīyosap yākimihit Pinawī Pisim 2018.



Concentrate is stored in the load-out facility before it is loaded onto truck and shipped for processing.

**Key project milestones:**

**July 2016** — Project is approved.

**August 2016** — Mill power line is relocated.

**July 2017** — Foundation work is completed.

**January 2018** — Load-Out building is constructed.

**April 2018** — New dewatering area is completed. (This includes the thickener and Larox filter press.)

**June 29, 2018** — Commissioning is complete and project is handed over to the Mill.

# Tailings management area

## It's all about water quality

Water quality remains the focus of daily operating practices and capital projects in the Tailings Management Area (TMA). Work for the past six years has involved raising of dams and installing other infrastructure to allow the level of water to be raised in order to better ensure water quality.

The TMA is a collection and settling area for mine discharge and mill tailings. It is important to keep tailings submerged to stop oxidization. Not only will the efforts of the last six years increase the capacity of the TMA, they will also extend the life of Manitoba Operations.



Ensuring water quality is not only the work of major capital projects. It requires diligent daily monitoring and discharge practices. Currently, Mill tailings are being discharged into Area 4 of the TMA where water levels are being raised. It is interesting to note that there has been 100% compliance with government

limits for water flowing from the TMA into the Burntwood River.

Another major achievement is in performance measurements of the Towards Sustainable Mining (TSM) performance audits. For the first time, the TMA has received AA scores in every category.

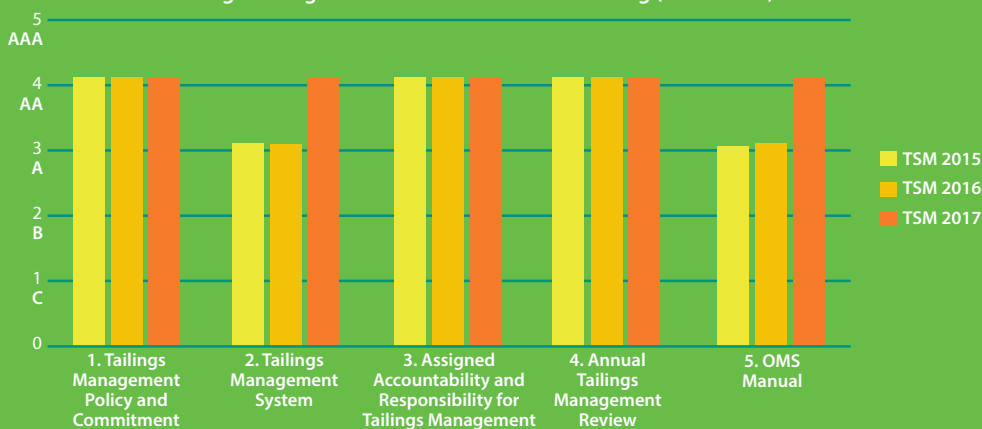
Anihī kaponapatahki monahīsonawanihk  
ka isikopathiki. Kwani piko itampik tastiki  
ōho iskwaskisikana ta astopathiki kwayask  
ta mithwasik nipiy. Kitapāhckatiwa  
oskotimwa tāhtokisikaw akwa nipiy kihtwam  
kapakitiniatik Wīposkawī Sipiy ta pihkāhk.





Water quality is important, not only for human consumption and the aquatic animals who live in it, but for the wildlife who live on and near it.

TSM Tailings Management Performance Audit Scoring (2015-2017)



# Asset retirement

## What happens after closure?

Closure of the Smelter and Refinery is not as simple as turning off a switch and walking away. Numerous steps to a safe decommissioning are required, starting with things as basic as cleaning up materials.



The top of the Smelter stack is being capped as part of the decommissioning process.

Equipment must be dismantled and sold, repurposed or recycled. Materials, such as that stuck to the masonry in the Smelter furnace or convertors, must be removed and shipped for processing. Electrolyte in the Refinery plating tanks must be emptied and processed. By late this year, both buildings will be brought to a safe and secure state.

The stack will be capped in September. This requires the installation of steel lattice, plywood, special paint and weather membrane. The design of the structure requires a gap between the top of the stack and the cap to allow for ventilation and 'breathing' of the stack.

The gap will be encased in a steel mesh to keep birds from becoming trapped inside.

The timeline for this work began with the last pouring of anodes in the Smelter in early July and pulling of the last cathode in the Refinery in mid-July to completion of the capping at the end of September.

By the end of July almost 2.5 million tonnes of electro-nickel will have been produced in these two facilities.

Where has all this nickel gone? Examples are in the photographs on the facing page.



Kipahīkatiwa ita katikisōht soniyāwasini akwa ita ka osihīt, mistahī atoskiwin kiyapic kwayask takipāhīkatik. Takicistinīkatik, piskihtayawa apacihcikana, tasikopatinīkatikwaw astopana akwa kotāka atoskiwīna takisicīhkatiki tāhkoc takipahīkatik kihci okohtaskway kitakwakik. Tānti kaki ispathit awa soniyawapisk? Ota nokwanwa cikāstiticikanihk.





Whether it is (clockwise from top) your bathroom taps, a jet engine or dental tools, today's quality of life depends on the nickel that has been produced from Manitoba Operations these past 60-plus years.

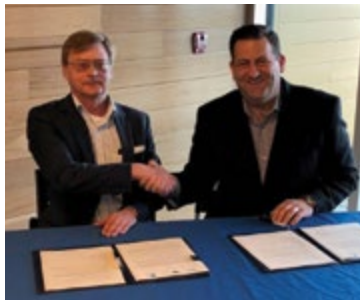


# Community outreach

## Value our people

We feel there are no borders when it comes to reaching out to people. That is why you will find us talking to individuals and groups in Wabowden, Nisichawayasihk Cree Nation and Thicket Portage, as well as at the Thompson Rotary Club or Thompson Chamber of Commerce.

That is also why we serve on boards and committees, such as MAMI's Indigenous Relations committee, the Thompson Aboriginal Education Advisory committee and the City of Thompson Communications committee. You will also see us participate at events, such as Keewatin Tribal Council's Duty to Consult workshop, UCN's second annual Truth, Reconciliation, and



the Road to Wellness Conference, National Indigenous People's Day celebrations, and MKO's Aboriginal Skills and Employment Training Strategy Conference.

We collaborated with the Northern Manitoba Sector Council, USW Local 6166 and Thompson 2020 to establish Workforce Adjustment Services to assist workers in finding pathways to employment

following adjustments at Vale Manitoba Operations. And we helped host two Northern Job Fairs providing both affected Vale workers and Thompson residents at large with opportunities to meet potential employers.

We continue to participate in career and outreach events at local schools and provide industrial tours for students and other interested parties. We initiate informational meetings with the Community Liaison Committee (CLC) and through our annual Open House during a special Vale Night event. We also continue to support dozens of charitable and non-profit organizations, such as the Boreal Discovery Centre.

Mwāc nitāstākatinan ithiniwak tawici isicihcimākihčik. Tapiskoc kiwapaminan pikwiti ka itahkamikāhk iwīcihiwiyahk. Niwicihiwanan oma ka othasowaniwik akwa kamamawapiniwik ota misiwī nipīskihtāskināhk mina oko nanatōhk akawatamowīna kapamināhkaw. Īwako ōhci katāhkohtastayahk ithiniwī kiskinwahāmaki wicīhiwīwin oko kawikocicik kistithimikowinihk ōhci.





Community outreach over the past year has included participation in the development of the Northern Workforce Development Centre at UCN (signing of the letter of intent, page left), to tours at Vale (top photo), to establishment of scholarships and awards (below).

### Scholarships & Awards:

Vale Manitoba Operations now offers four scholarships in honour of our indigenous pioneers:

**Henry Linklater Scholarship** — established in 2016.

**Henry Cook Award** — established in 2018.

**James Spence Award** — established in 2018.

**Robert 'Snowshoe' Parenteau Award** — established in 2018.

For details email [ryan.land@vale.com](mailto:ryan.land@vale.com).



# Manitoba Winter Games

## Proud partners, proud volunteers

Vale and employees of Manitoba Operations supported the Manitoba Winter Games held in Thompson in March 2018 with heart. Of the 800 volunteers, more than 100 were Vale employees.

Of the 1,400 athletes who participated from throughout Manitoba, 20 were children of Vale employees. Underpinning all this involvement, was a contribution of \$50,000 from Vale, which contributed to swimming pool upgrades, including lockers and locker rooms, as well as

the installation of bleachers. Winter Games sports included gymnastics, archery, badminton, table tennis, swimming and wrestling, as well as hockey, ringette, figure skating, curling, speed skating, alpine skiing and cross-country skiing.



New sports, such as speed skating, were introduced to Thompson (left) while long-time favourites, such as alpine skiing (right) drew stiff competition.

Vale akwa otatoskithakana ota ōhci Manitoba pimpathicikiwinihk ki mamihcisiwak ta sitoskakwaw Manitoba piponi mitawiwīna Thompson kaki tocikatik Mikisi Pisim 2018 kaki ispathik. Oko ayināniw mitāhtomitanaw owīchihiwak, asimī mitatāhtomitanaw Vale atoskithakanak kiwicihiwak. Vale kipakitiniw niyānomitanawaw kihci mitanaw tahtwapisk.

### Contact us:

To report environmental concerns, call the Environmental Hotline at 204-778-2888. For more information on any topic in this report, contact Ryan Land at [ryan.land@vale.com](mailto:ryan.land@vale.com) or 204-778-2326.