Sustainable Mining & Environmental management

13/02/2021

Contents

ERAMET Group

Eramet at a glance

Mining and Metals Division | **High Performance Alloys Division**

Turnover of **€3.67b**

39 industrial sites

13,000 employees in **20** countries

2019 Data

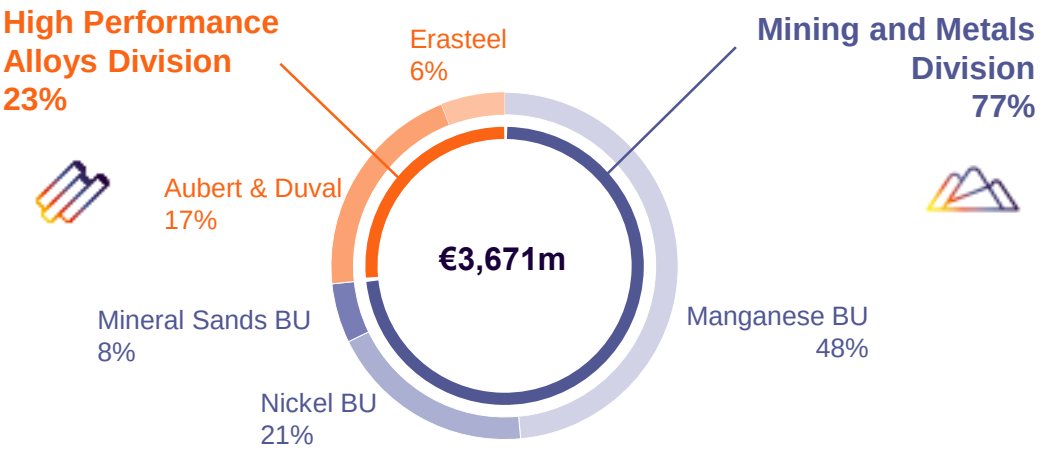
- **Eramet is a major player in the extraction and transformation of metals as well as the production and transformation of high-performance alloys.**
- **Eramet also develops activities with high growth potential, such as lithium treatment, which will play a key role in the energy transition and the mobility of tomorrow.**

Priority to the safety of all

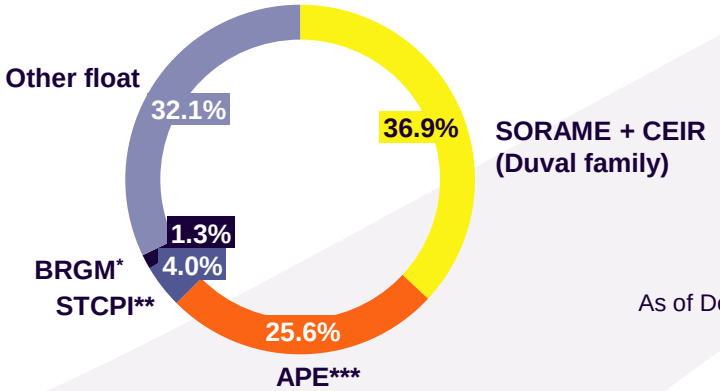
Our ability to perform our activities in complete safety is our absolute priority. We owe it to our employees, to our subcontractors and to all of our partners.

A world leader and a diversified mining and metallurgical Group

2 Divisions, 5 Business Units



A historical and stable shareholding



As of December 31, 2019

2019 Results

Turnover **€3,671m**

EBITDA **€630m**

COI **€341m**
(Current operating income)

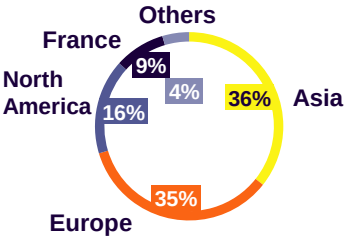
Net income - Group share **-€184m**

* BRGM (Bureau de Recherches Géologiques et Minières): the French geological survey office
** STCPI (Société Territoriale Calédonienne de Participation Industrielle): entity owned by the New Caledonian provinces
*** APE (Agence des participations de l'Etat): the French Government Shareholding Agency

A global industrial footprint

PROJECTS
MINING SITES
TRANSFORMATION
- Manganese
- Nickel
- Mineral Sands
- Lithium
- Erasteel
- Aubert & Duval

2019 Group Turnover
by sales destinations



* Mothballed project

Our activities

Two divisions, five business units

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Mining & Metals Division

Commercial Network Innovation and R&D

High Performance Alloys Division

Manganese BU

Mineral Sands BU

Nickel BU

Lithium BU
(mothballed project)

Forged & Rolled Long Products BU Closed Die Forgings BU (Aubert & Duval)

High Speed Steel and Recycling BU (Erasteel)

Applications

Manganese BU	Mineral Sands BU	Nickel BU	Lithium BU	Forged & Rolled Long Products BU Closed Die Forgings BU (Aubert & Duval)	High Speed Steel and Recycling BU (Erasteel)
Construction, automotive, chemical, batteries, fertilizers, paint pigments	Ceramics, chemical, refractory materials, foundry, pigments and titanium metal	Stainless steel and nickel-based alloys Batteries	Aerospace, electric vehicles and energy storage	Aerospace, land turbines, petroleum, Defense and recycling	Aerospace, high-speed steels, tools and recycling

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Mining & Metals Division

A world-class producer, highly competitive mines

Manganese

#2 for high-grade manganese ore
#2 for manganese alloys
#1 for refined manganese alloys

Nickel

#1 for high-grade ferronickel

A major player in high-purity nickel salts

Mineral Sands

#4 for zircon
#5 for titanium raw materials

7,400
employees

€2,829m*
turnover

* 2019 Data

Manganese

Resources & Activities

- **A mine in Gabon**, operated by Comilog, a subsidiary of Eramet:
  - Lifespan of resources > 40 years
  - In operation for more than 50 years
  - Very high commercial grade ores
- **5 pyrometallurgical plants** in Europe, the United States and Gabon
- **Ore transportation** by train in Gabon and operation of the Trans-Gabon (+600km of railway tracks) by Setrag, a subsidiary of the Group

What is manganese used for?

- **Production of carbon steel** in alloy form (more than 90% for global production) for automotive, rail, and construction industries
- **Chemicals** (cells and batteries, agriculture, pigments, etc.)

Our main customers

ArcelorMittal
中国五矿集团公司 CHINA MINMETALS CORPORATION
NUCOR
USS
AVEKS
SALZGITTERAG Steel and Technologie

4,000 employees

€1,765m* of turnover

Production*

4.8 Mt of manganese ore

740 kt of manganese alloys

* 2019 Data

Focus: Increased manganese production in Gabon

Continued operations at the Bangombé plateau

- End of 2018: launch of **dry processing** for a part of the ore
- Flexibility in mining operations:
  - > Short-term increase in production volumes as part of a **modular approach**

Development of the Okouma plateau

- **The calendar is being finalized with our partner, the Gabonese State**
- Supported by **dry processing**
- 1st phase of capacity increase brought to ~ **6 Mt**
- **€150m investment** over 2 years

Production target : +50% v. 2018

Increase in the Trans-Gabon railway transport capacity

- Objective: **increasing the capacities sustainably**
- More than **€140m** invested since the beginning of the renovation program in 2016

Nickel

Resources & Activities

- **New Caledonia**
  - Operation by SLN of 4 mines and 1 pyrometallurgical plant (ferronickel)
  - Lifespan of resources: ~ 50 years
- **Sandouville (France)**
  - Production of nickel salts and high-purity nickel metal (total capacity of 15,000 tons)
- **Weda Bay Nickel (Indonesia)**
  - One of the world's largest undeveloped nickel deposits, which began operating at the end of 2019
  - Production of low-grade nickel ferroalloy, in partnership with Tsingshan

What is nickel used for?

- **Stainless steel production**[1] (~70% of global production)
  - Everyday objects, construction, medical equipment
- **Other applications**[2] : alloys / superalloys, batteries, electroplating, chemicals
  - Aerospace, automotive
  - Mobile phones / laptops
  - Electric and hybrid cars

Our main customers

aperam, WALSIN, 台塑關係企業 FORMOSA PLASTICS GROUP, ACERINOX, NAS NORTH AMERICAN STAINLESS, TISCO TAIYUAN IRON & STEEL (GROUP) CO., LTD.

2,200 employees

€778m* of turnover

Production*

4,7 Mth of nickel ore, of which 1,6 Mth exported
47 kt of ferronickel

1 From low-grade or high-grade ferronickel
2 From high-purity nickel, nickel salts
* 2019 Data

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Focus on Weda Bay Nickel

A joint venture with the Chinese group Tsingshan

- Shareholder structure: Eramet 43% / Tsingshan 57%
  - Tsingshan: construction and operation of plants
  - Eramet: mining concession and expertise
- No Capex supported by Eramet for plant construction

A business model shared between mining and metallurgy

- Nickel resources of 9.4 Mt, **one of the largest deposits** in the world
- Very **competitive production** of low-grade nickel ferroalloy, known as NPI
- Production target of **35,000 t** of nickel contained per year, including 15,000 t / year for Eramet

A project carried out ahead of schedule

- Beginning of **mining operations** in October 2019
- **1st metal tapping** in April 2020
- Gradual ramp-up to reach 80% of nominal capacity by December 2020

Mineral Sands

Resources & Activities

- Production of **titanium ores** (ilmenite, rutile, leucoxene) and **zircon** by Grande Côte Opérations (GCO) in **Senegal**
  - Lifespan of resources > 30 years
  - In operation since 2014
  - Rail transport of the ore from the mine to the port of Dakar operated by GCO
- Obtainment of exploration permits in **Cameroon**

What are mineral sands used for?

- **Pigments** (90% of output of titanium products) for the production of paint, plastics and paper
- Welding flux industry[1]
- **Ceramics** (~50% of global production of zircon) and chemical derivatives (~20% of global production of zircon)
- Casting[2], wind turbine production in particular

1,000
employees

€286m*
of turnover

Production*

735 kt of mineral sands concentrate
189 kt of titanium dioxide

[1] Concern titanium ores
[2] from high-purity cast iron
* 2019 Data

High Performance Alloys Division

Unique know-how serving strategic industries

#2 global producer of high-power closed-die forged parts

#1 global producer of gas atomized powder metallurgy

One of the European leading producers of high-performance special steels

5,000
employees

€847m*
of turnover

* 2019 Data

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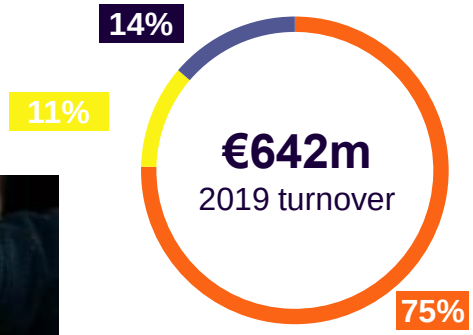
High Performance Alloys: diversified businesses and markets

Aubert & Duval

- Aerospace
- Energy & Defense
- Others



Erasteel

- High-speed steels, Tooling & Specialties
- Recycling

Our main customers

AIRBUS
ROLLS ROYCE
IHI
SAFRAN
BOEING
asco

A global industrial footprint

22
Industrial sites

- Europe: France (14 sites), Spain, United Kingdom, Sweden,
- Asia: China, India
- United States

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High Performance Alloys: an agile and value-creating organization

1 6 major strategic segments

- Aerospace
- Land-based Turbines
- Defense
- Nuclear
- High-speed steel powder metallurgy
- Additive manufacturing

2 Industrial and commercial reorganization around 3 product families

CLOSED-DIE FORGINGS BU

FORGED AND ROLLED PRODUCTS BU

HIGH-SPEED STEEL & RECYCLING BU

3 Operational excellence and targeted investments

R&D Innovation

An innovation center and R&D centers integrated throughout the value chain: mining, semi-finished products, digital transformation.

High-level expertise

- Extractive metallurgy (mineralogy, mineralurgy, geometallurgy, hydrometallurgy, pyrometallurgy)
- High-performance alloy and steel production metallurgy (including powder metallurgy)
- Thermomechanical processing of alloys by forging and die-forging

Open innovation culture

- Benchmarking
- Leadership / partner of European projects

300 employees (in-house R&D)

€60m in spending

25 European collaborative projects in progress

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Eramet Ideas*: European center of excellence in extractive metallurgy and recycling

Open innovation approach

- Leadership/Partner of European projects
- Partnerships with universities and other higher education institutions, manufacturers, start-ups, and SMEs
- Open Innovation Challenge
- Creation of “LILAB”, a joint laboratory with CNRS on metals of the energy transition

Resources

- Innovation center based in Trappes, near Paris:
  - 60 years of experience
  - Laboratories
  - Steering centers
  - High-performance observation tools

A few examples of collaborative projects

- **SOLSA**: project to improve the efficiency of mineral exploration by combining technologies (sonic drilling, analytical equipment, IT)
- **GO-4-0**: project to recover by-products from the steel and manganese metallurgy industries. In progress: semi-industrial ferromanganese manufacturing pilot

Key figures

- **January 2019: creation of Eramet Ideas****
- **150 employees (experts, engineers and technicians)**
- **1st microscope in Europe equipped with QEMSCAN mineralogical analysis software**

Some partners

BASF The Chemical Company
NTNU Knowledge for a better world
metso
eurotab
PROMETIA
eit RawMaterials
brgm
Eijkelkamp SonicSampDrill
GÉOLOGIE
Chimie Paris ParisTech

* Eramet Ideas : Innovation, Development, Engineering for Advanced Solutions
** resulting from the merger of Eramet Research & Eramet Ingénierie

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Vision & strategic directions

Our vision

Develop a global player that is sustainably effective and well-known, a reference in responsible extraction and metallurgy, and in the energy transition

- Develop a **selective portfolio of value-creating mining and metallurgical activities**,
- Be among the best in each of our businesses, in terms of **performance**, **profitability**, and **innovation**,
- Be **admired** for our strategic model, our management system, and our societal commitment.

OUR STRATEGIC VISION IN 5 YEARS

Sustainable value creator	Business partner of choice	Committed & contributive corporate citizen	Home for best talents	Entrepreneur

Strategic Transformation

Managerial Transformation

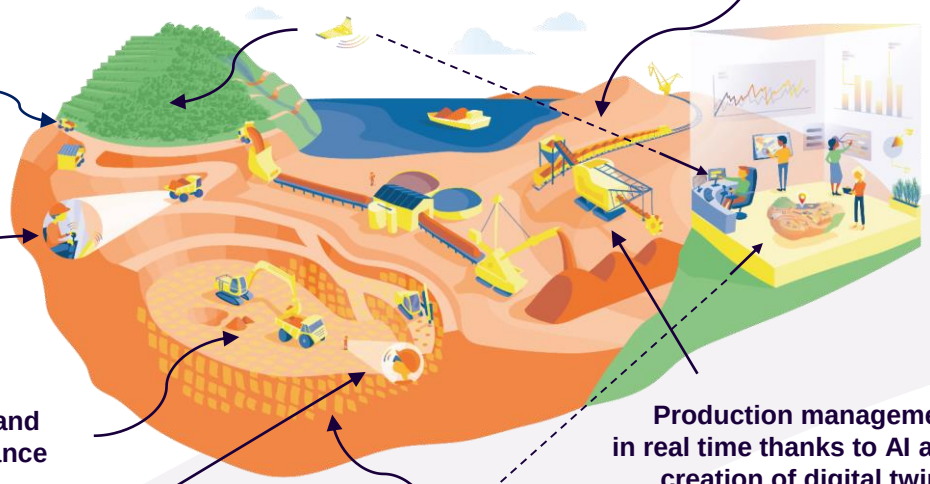
Digital Transformation

The digital at the service of our mining and metallurgical activities

A vision based on 3 pillars

- **Connecting geology to the economy** with real-time optimization of the supply chain according to market conditions, from the extraction of metals to the customers.
- **Optimizing our metallurgical processes** thanks to **Artificial Intelligence**
- **Ensuring the traceability and quality of our products**, from their elaboration to our customers

Mining 4.0 by Eramet



10%

of current CAPEX dedicated to digital transformation every year

Safety, environment and optimization of operations

Operations centers & digital twins

Committed & contributive corporate citizen

Committed to women and men

1. Ensure the **Health** and **Safety** of our employees and subcontractors
2. Enhance **skills**, promote **talent**, and **career** development
3. Strengthen the **commitment** of our employees
4. Integrate and promote the richness of **diversity**
5. Be a respected and contributive partner for our **host communities**

A responsible economic player

6. Be a leader in metals for the **energy transition**
7. Actively contribute to the development of the **circular economy**
8. Set the standard in **human rights** in our field of activity
9. Be an **ethical** business partner of choice
10. Be the go-to **responsible** business in mining and metallurgy

Committed to our planet

11. Reduce our **air emissions**
12. Preserve the **water** resource and accelerate the rehabilitation of our mining sites promoting **biodiversity**
13. Reduce our **energy** and **climate footprint**

Strong progress in Corporate Social Responsibility in 2019

Increase in the CSR Performance index*

112 representing **+12** points (v. 2019 target)

80%
of industrial sites ISO14001 certified

87%
of purchased electricity produced with low carbon footprint

1.2
Ratio of rehabilitated / cleared areas

€20m
Invested to the communities benefit

-35%
accidents
employees, temps and subcontractors' FR2)

Improvement of non-financial rating

- **Vigeo Eiris rating's progression** on the evaluated ESG domains

Vigeo Eiris
Rank
3/43
among the companies on the mines & metals panel 2019

- **Performance recognized by ISS ESG**

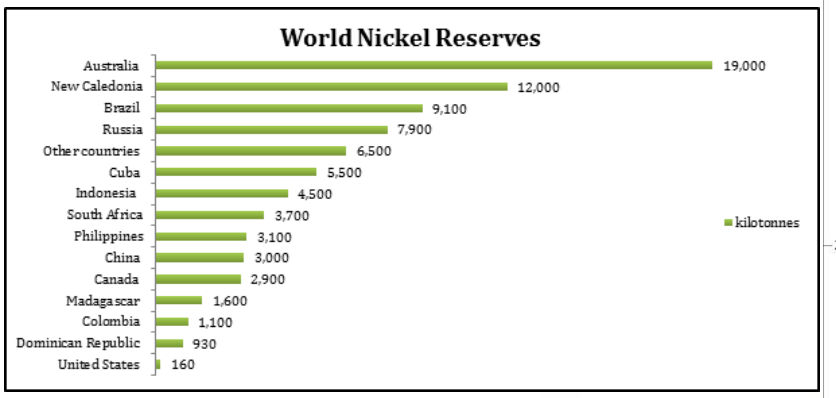
Global score
B-
"Prime" status
First decile of the ISS ESG mining and metals panel

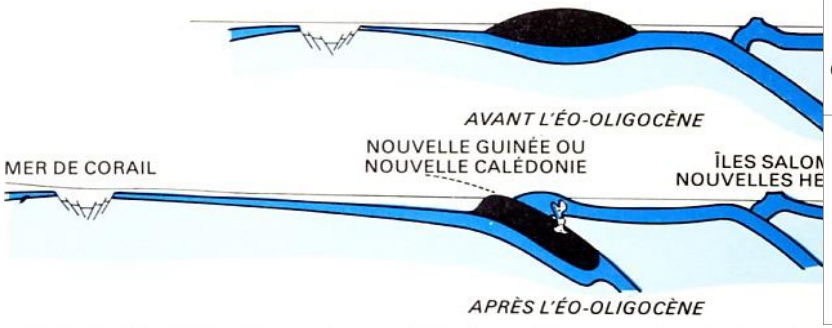
* The CSR Performance index measures the annual progress of Eramet's 2018-2023 CSR program

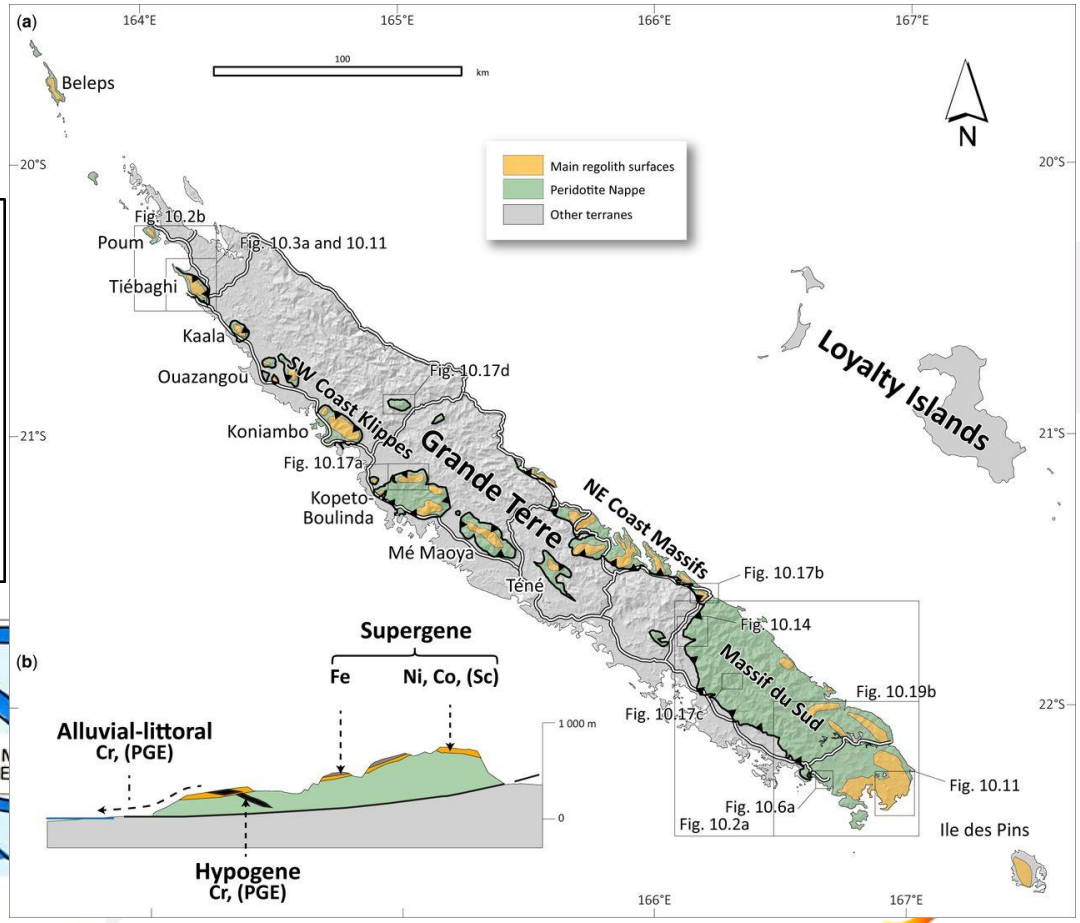
Nickel in New Caledonia

New Caledonia Geology and Reserves

- **Peridotites put into place by obduction 37 MY ago**
- **Followed by Metamorphism and Weathering transforming them into Laterites**
- **Covers 1/3 of the grande-Terre**
- **10 to 15% of world reserves**
- **2 types of ore**
  Limonites and Saprolites







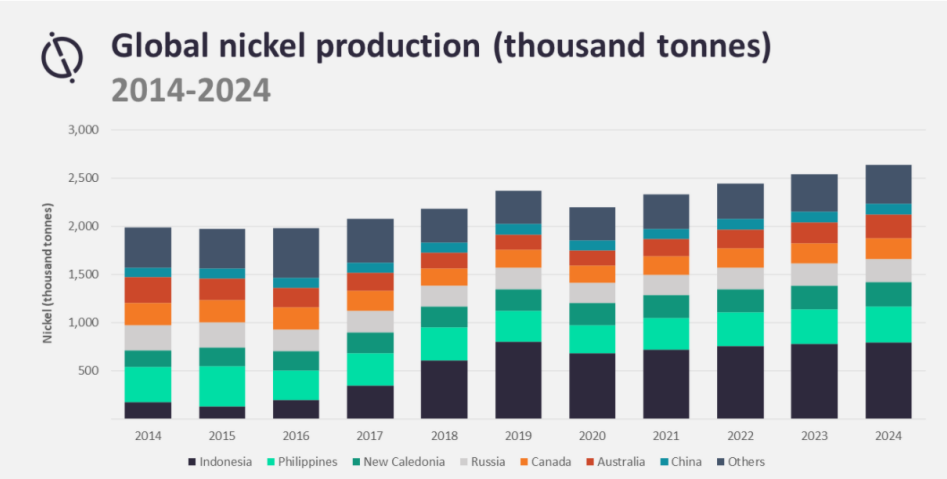
Competition and market

New caledonia, one of the major world Producer

- **Production of refined nickel**
  3 large producers
  - > SLN
  - > KNS
  - > Goro (Vale)
- **Export of Laterites**
  SMSP, SLN and smaller companies
  - > Korea (metallurgical plant owned 51% by SMSP)
  - > China
  - > Japan

Strong competition from Indonesia and Philippines on ore production

- **Lower grade ore**
- **But much closer to market**
- **Lower costs**
  (high energy costs in NC)



SLN at a glance

SLN Organisation

Integrated industrial organisation from Mine to final product

Mining

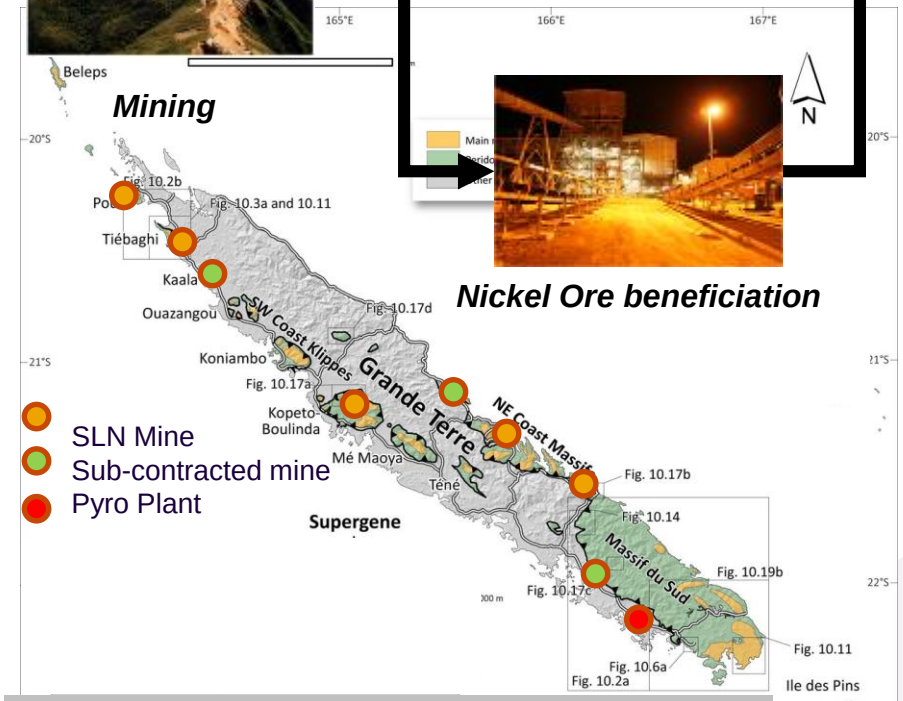
Nickel Ore

Truck transport or conveyor to the wharf

Homogeneisation and stockpiling at the wharf

Ship Loading

Nickel Ore beneficiation



Doniambo Pyro Plant

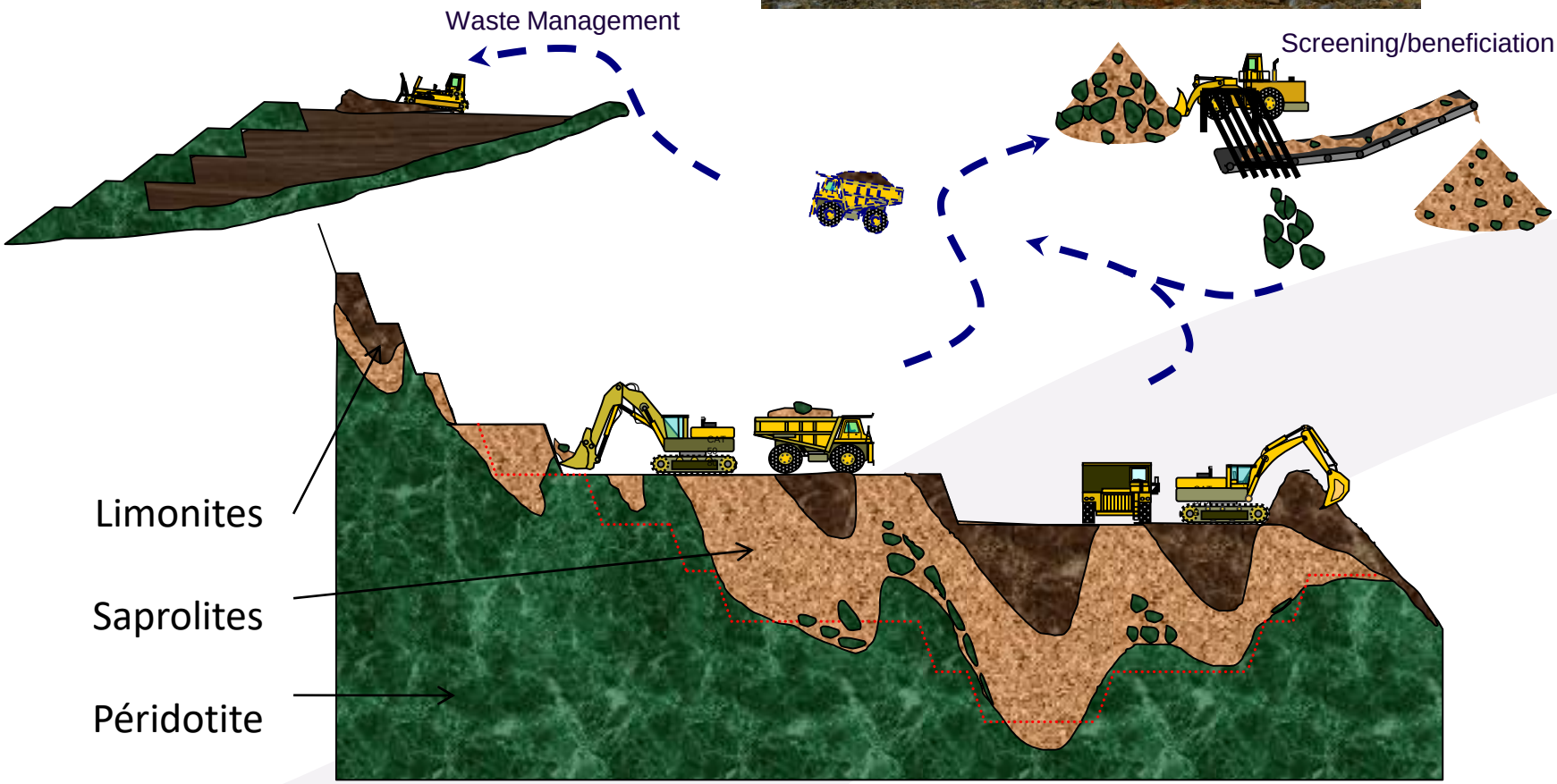
Nickel Ore

Shipping

Ferronickel

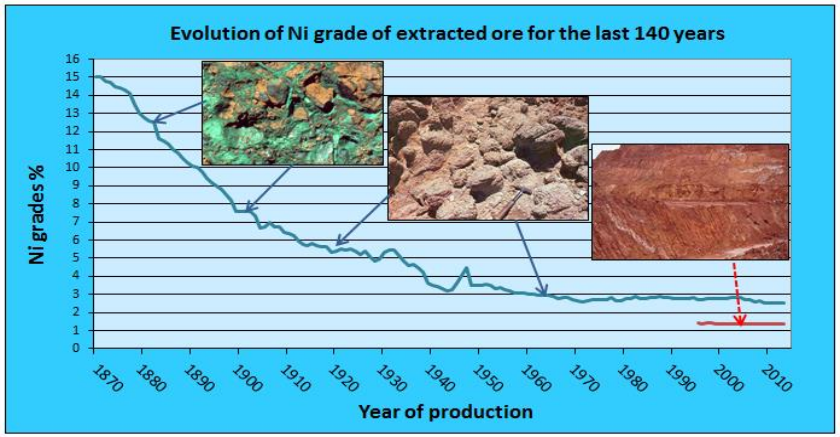
Market

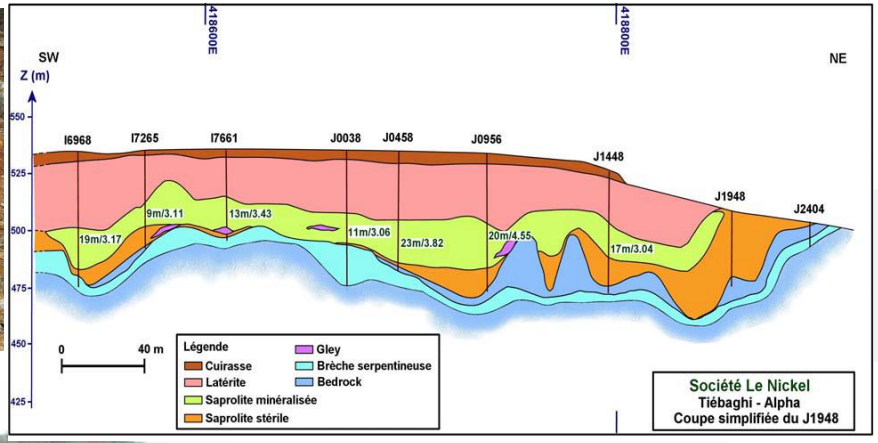
SLN Mine Diagram



Mine Geology

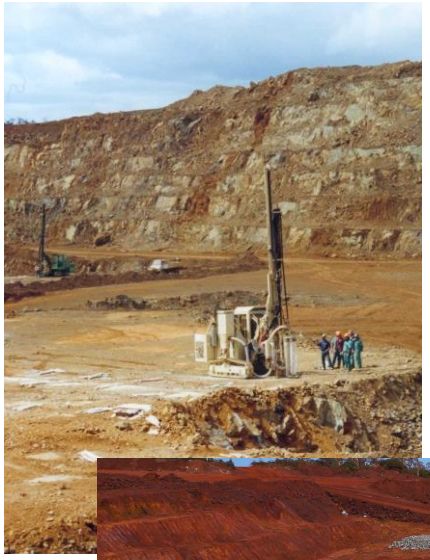
- **Grade control or face sampling**
- **Selective Mining**
  Harder with Grade drop
  Introduction of mineral processing plants
  in the 90s combined with geometallurgy





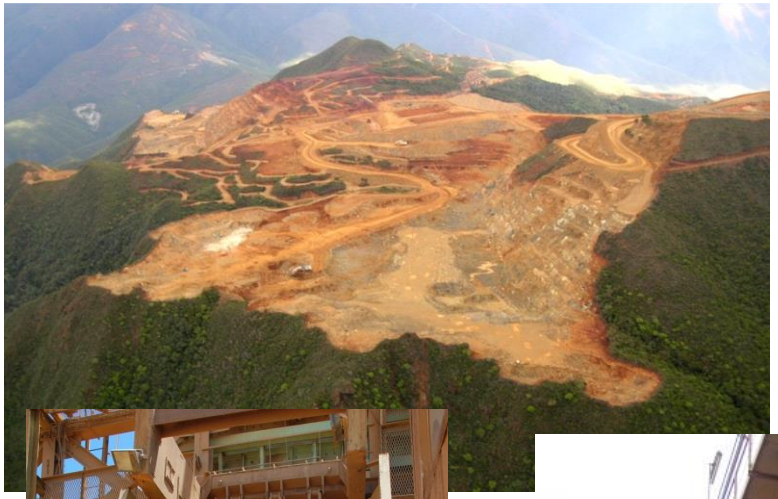
Mine production

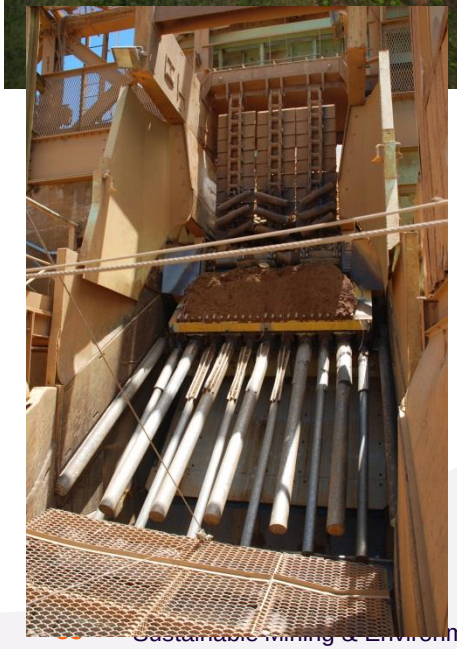
- Overburden removal (high ratio)
- Waste dump management
- Rock layers for truck and shovel stability
- Free digging and blasting
- 2*10 hour shifts
- FMS

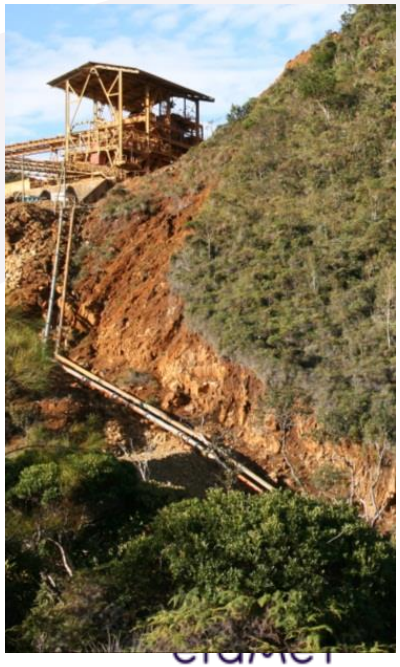


Upstream Mineral processing at Népoui

- Screening with divergator
- Pulping
- Screening (oversize crushing)
- Hydraulic transport





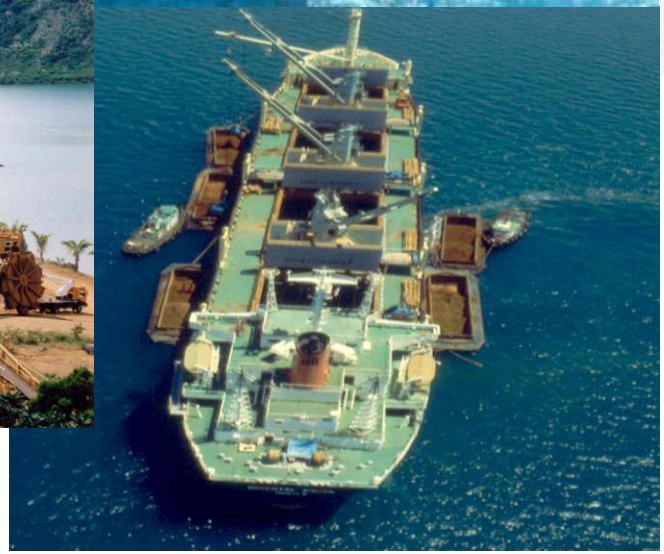


Népoui downstream mineral processing plant

- **Screening operations and solid liquid separation**
- **Density separation has stopped (DMS and spirals)**
  - No more waste produced, export of lower grade fraction, everything is sold

Stockpiling and shipping

- Stockpiling at the wharf
- Stacker reclaimer loading (Pyro plant) or using barges (export and sub-contracted mines)



Pyrometallurgical plant and overseas market

Shift to a more sustainable strategy

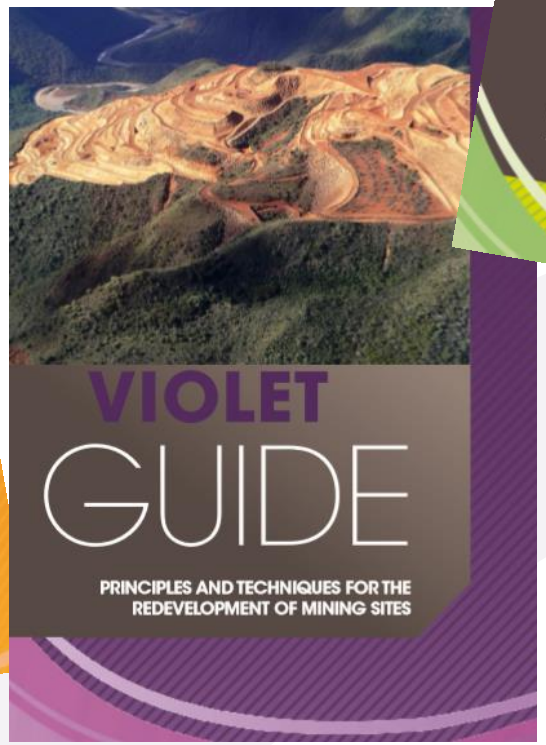
New focus on export ore

- **Export market**
  Strong overseas demand
  More ore sold, less waste produced
- **Doniambo plant**
  High grade saprolites
  Power plant using fuel
  50 to 60 kt of FeNi/year

Environnement & Eramet

Engaged since 1975 started Société Le Nickel (Ni, Nouvelle Calédonie)
=> tropical Climate with cyclones
=> Minimise environnemental impact of the mining industry
Comilog (Mn, Gabon), Weda Bay (Ni, Indonésia), GCO (Ti, Senegal), Eramine Li, Argentina)

Cross-functional workshops to create best practice guides
Iso 14001 compliant since 2015 (first mining company in New-Caledonia)



Best practice, Rule of thumb, tools, to build structures respectful of the environment

Water management at SLN

New Caledonia, an exceptionnal natural habitat

Consequences of nickel boom on the environnement

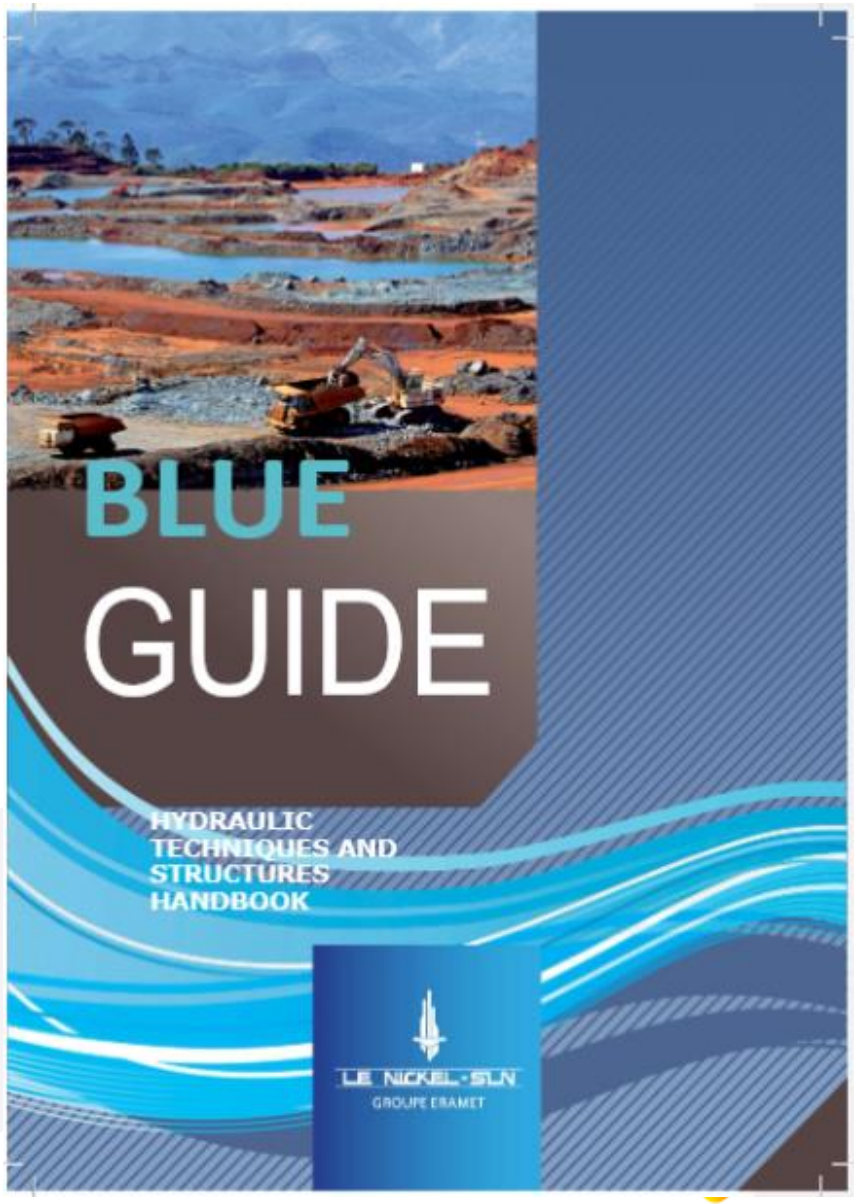
- **Mechanised production following WWII dramatically increase: from 0.2Mt in 1950 to about 2Mt in 1960…**
- **No care taken for waste management, no existing regulations from administration body.** Waste simply dumped down the slopes

Mine water management

2005 – First edition of Blue guide
Updated on a regular basis

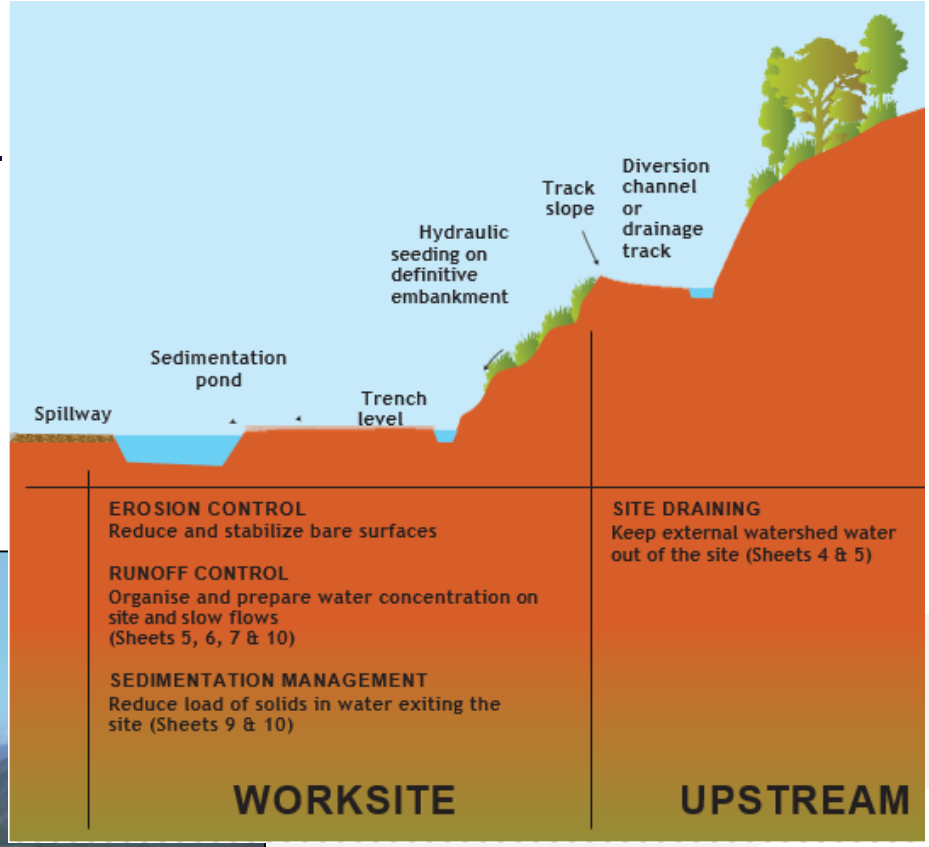
- Techniques and Principles to fight against erosion and minimise solid transport during mining operations

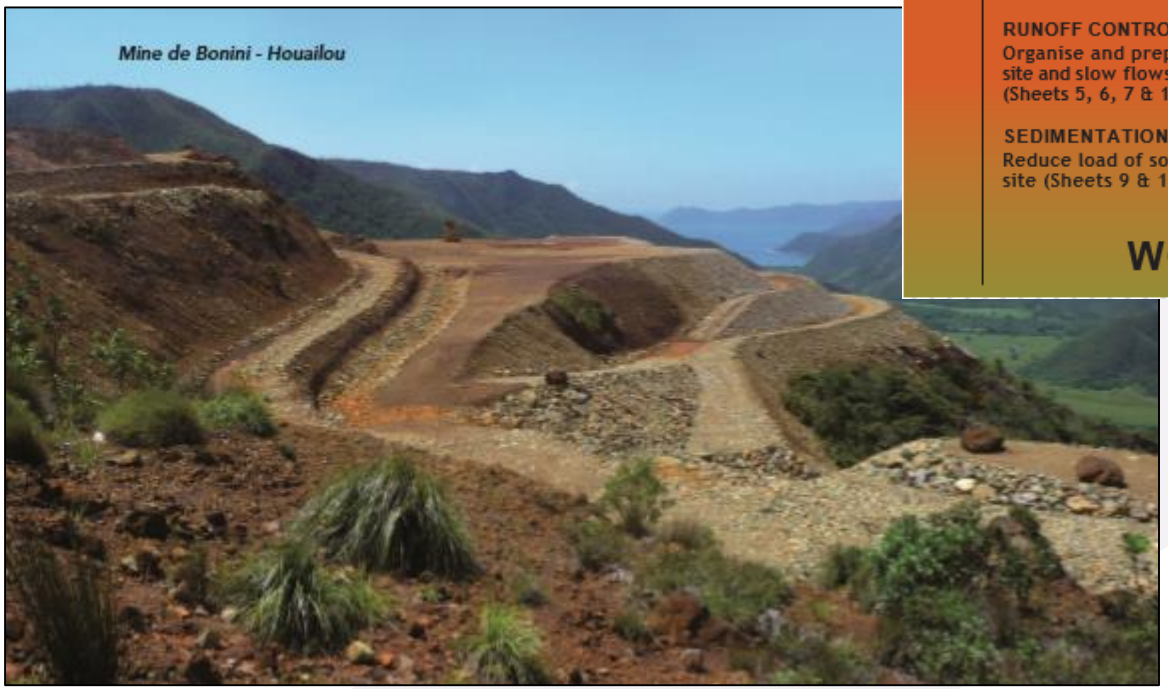
- Data sheets describing main type of hydraulic structures: purpose, dimensioning, construction



Main principles

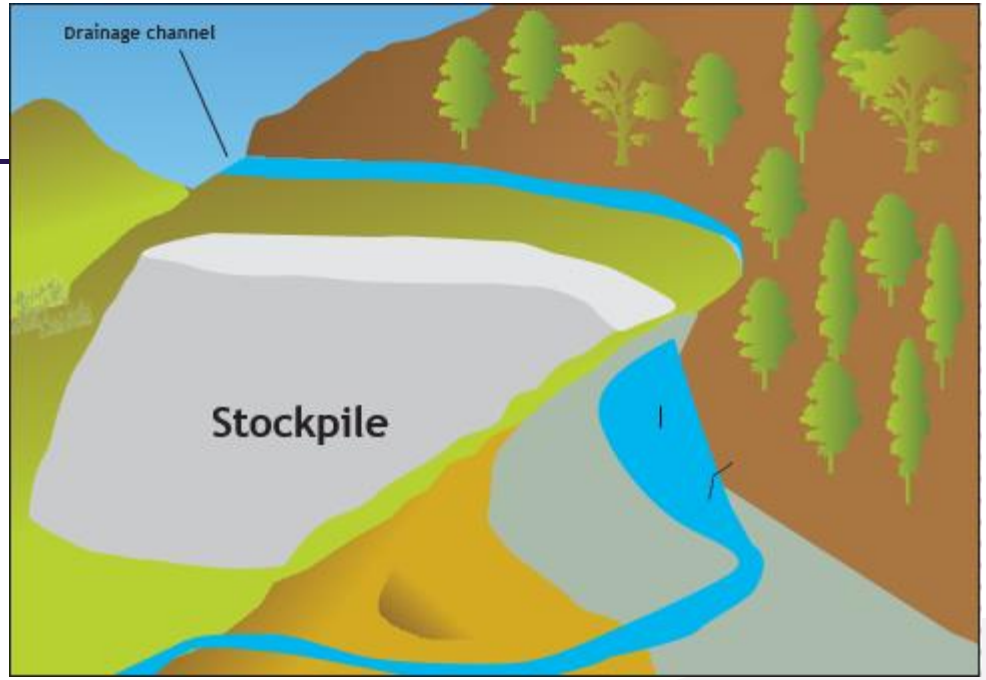
- Prevention
- Water flow management
- Active response setup





Actions

- ✓ Put working areas out of water flows
- ✓ Remove erosion at the source
- ✓ Organise water flows before reaching the naturel habitat
- ✓ Minimise solid content in water leaving the mine site
- ✓ Build run-off water management plan



Step 1

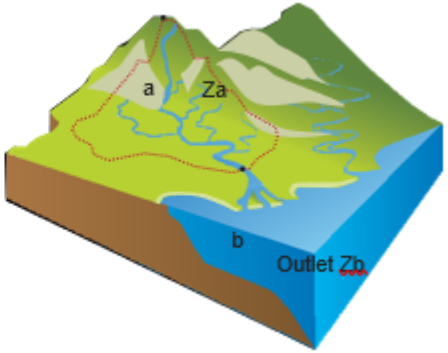
Determine characteristics of watershed

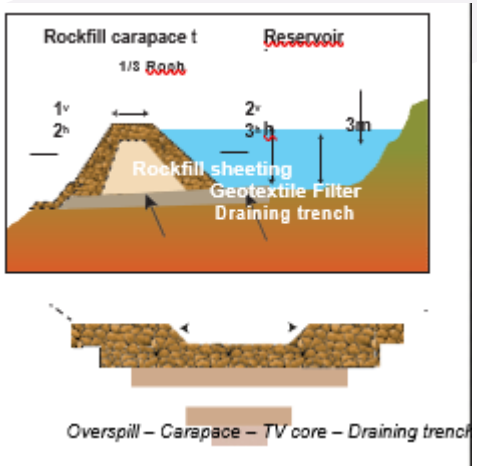
A: Surface of watershed (km²)

L: Length of longest flow path a-b (km)

H: Average gradient = { (Za+Zb)/2 - Zb } (m)

P:Average slope of flow path = H/L (m/m)





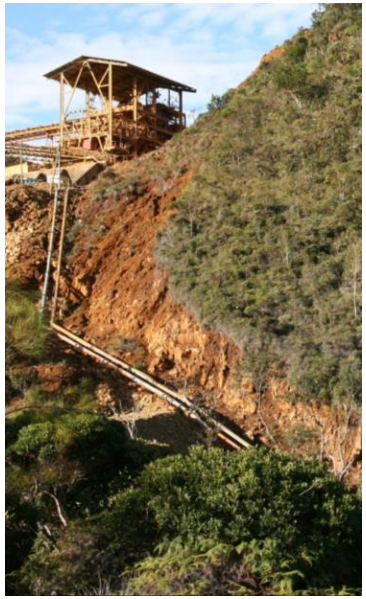
Fact sheets

12 fact sheets

- ✓ Flood flowrate Calculation
- ✓ Culvert pipes
- ✓ Water spillway
- ✓ Diversion channel
- ✓ Road/tracks drainage
- ✓ Trench levels
- ✓ Diffusion ponds
- ✓ Check Dams
- ✓ Sedimentation pond
- ✓ Sedimentation dams
- ✓ Draining Levee
- ✓ Rockfill Sills

Hydraulic structures description
Dimensioning with calculation rules
Construction rules with recommandations and maintenance advice
Restrictions

Water process management



Hydraulic Transport and mineral processing plants

- Use of recycled water as much as possible (storage in buffer ponds) and some of it in the nearby rivers
  - Impact limitation
- All plants equiped with dewatering solutions (ponds, thickeners…) 90% water recycled
- Lost water : Moisture content in products, Evaporation

Waste water quality

- Frequent controls by NC administration (ICPE)
- No toxicity (Iron oxides particles, clay…)
- Floculant presence (only traces).

Results

- **2 430 ponds built and maintained**
- **303 measuring stations**
  - Rainfall, hydrobiology, piézometers
- **Clear water leaving the mining area**
- **Rehabilitation of old workings**

Waste management, Rehabilitation and Recovery

Waste dump project

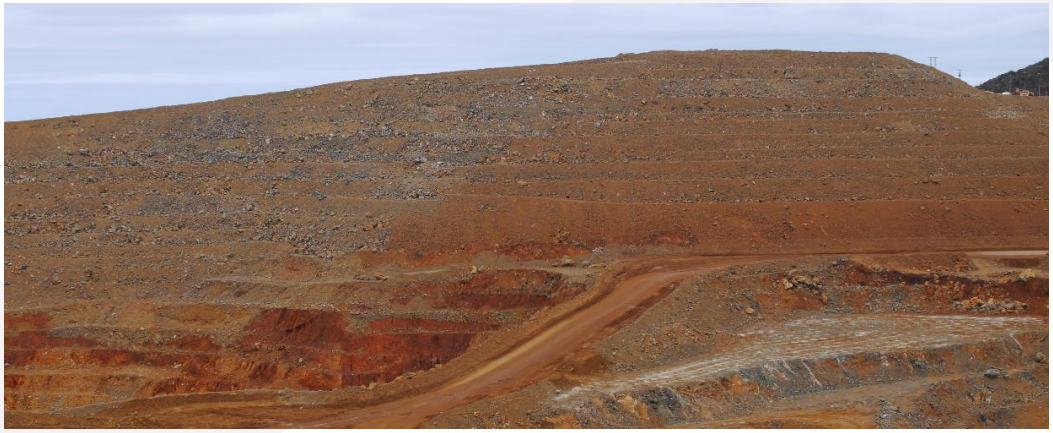
Objectives

- **Acceptability by local population**
- **Safe**
- **Follows current regulations**
  Minimising the footprint
  - Backfilling of old open pits is preferred

Preparation

- **Nursery**
- **Topsoil storage**

Studies



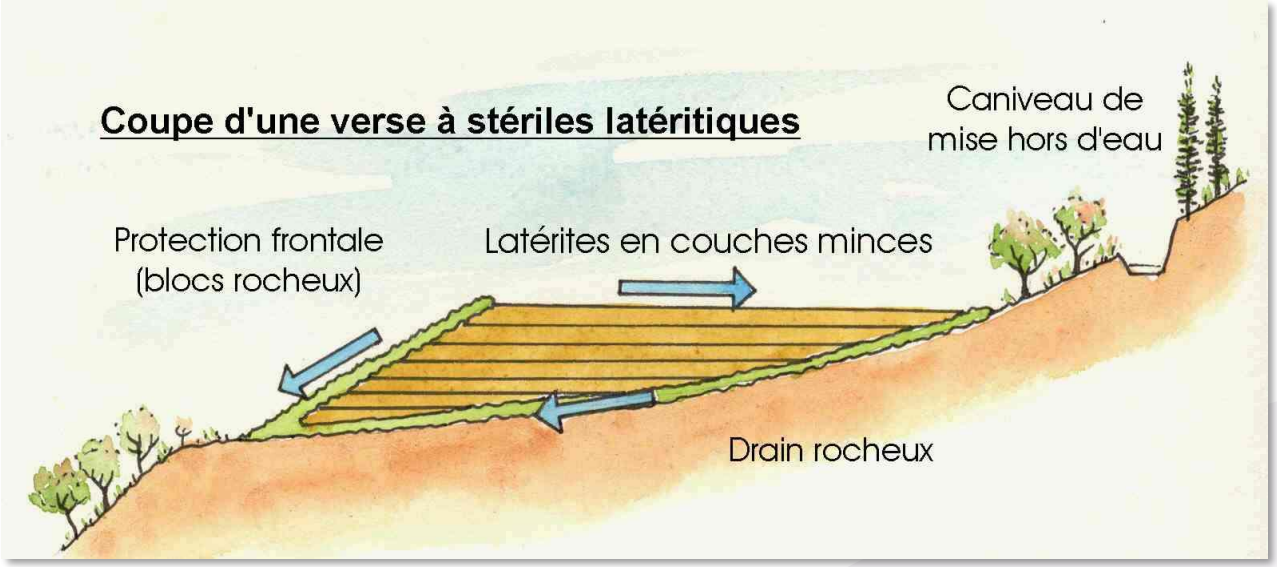
- **Water management**
- **Full Enviromental impact assessment**
  Inventory of fauna and flora
- **Geotechnical studies**
  Stability of workings
  Dependant on raising speed

Rehabilitation

- **Visual Aspect**
  Getting close to the initial state or spatial integration
  Use of topsoil
  Remodeling and Revegetalising

Theory of stable waste management of laterites

Development from 1969 to 1995 (SLN-Paris and Nancy Schools of Mine)



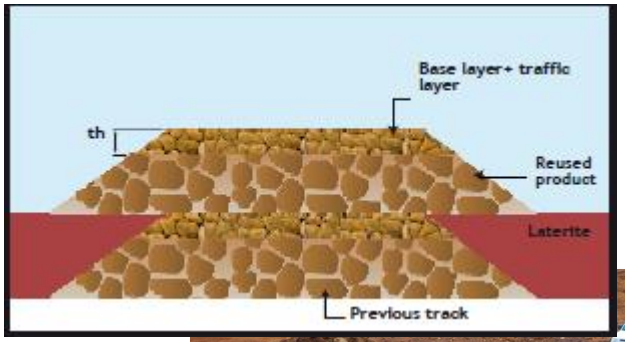
- **Goal : Ensure the long term stability of the waste dump**
- **Limonites when properly drained have a good cohesion by auto-compaction and appropriate filling speed**
- **To avoid any landslides, good drainage is key as well as a good control of the slope**
  30° max for a thickness below 40 m et 27° max for a thickness above 40m.

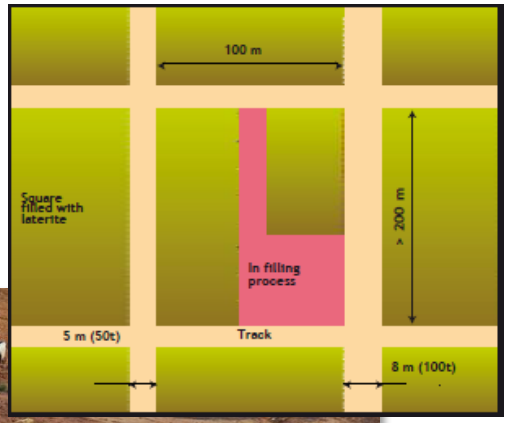
Types of waste dump

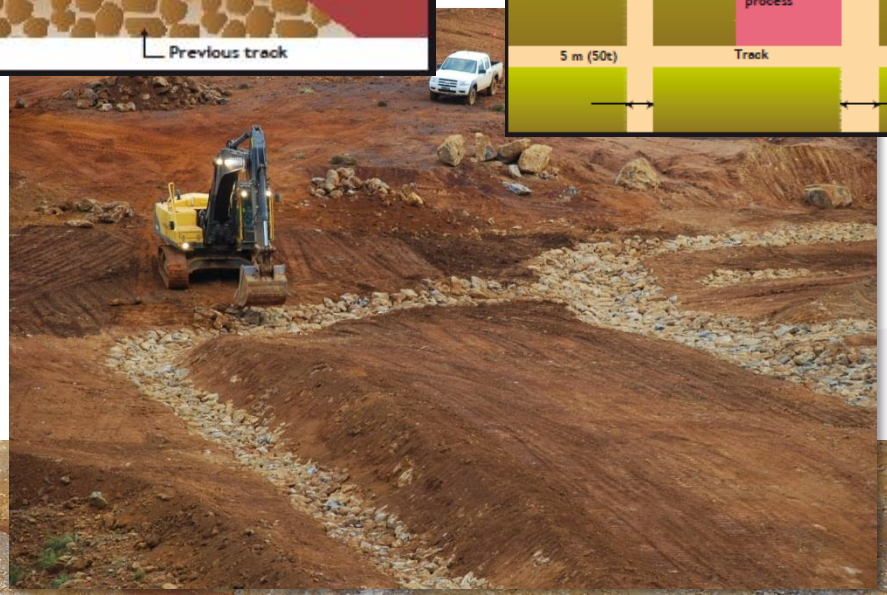
- **Common stockpiles**
  Height under 60m, low-to-medium capacity (less than 5mtons).
  Requiring no specific geotechnical justifications
- **Large stockpiles**
  Height over 60m, high capacity (more than 5mtons).
  requiring geotechnical justifications verified by a relevant expert

Inside structure

- **Organised drainage with large rocks**
  Horizontal drains and chimneys
- **Stockpiling squares**
  Tracks with rocks for trucks
  Help drainage
- **Laterite is dumped then spread with a dozer**





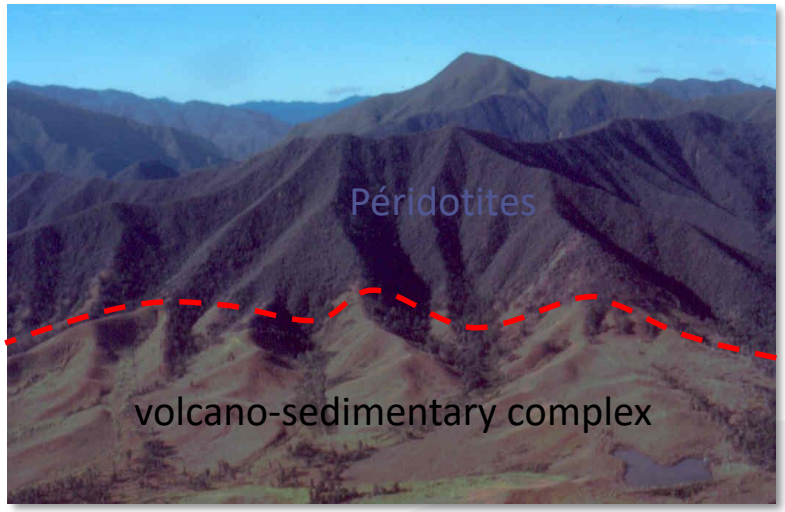


Waste dump design, outside structure

- **Clean water back to the environment**
  Drainage
  Reprofiling of waste dumps
  Monitoring
- **Wall protection with rocks and topsoil for rehabilitation**

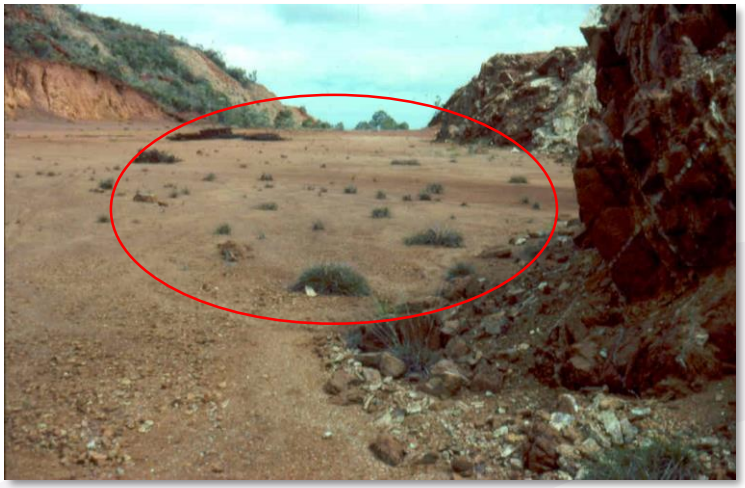
Specificity of Mining ranges ecosystems

- Ultramafic background (peridotites)
- On peridotites, the soil has a high content in Fe, Mg, Ni, Mn, Cr… and a low content in nutriments.
- Specialised flora with more than 1000 species restricted to their own ground ; 98% of unique species or endemism.
- Endemic species specific for each mining range
- Most of the common species cannot survive on these very specific mining soils



Adaptation of the rehabilitation technique

- **Copy what nature does with the use of pionneer plants which colonise naturally the mining type soil**
- **40 different species have been selected for their ability to revegetalise naked ground**
  - Herbaceous and Woody plant species
  - 4 species used for hydro seeding
  - 36 species can be raised in nurseries

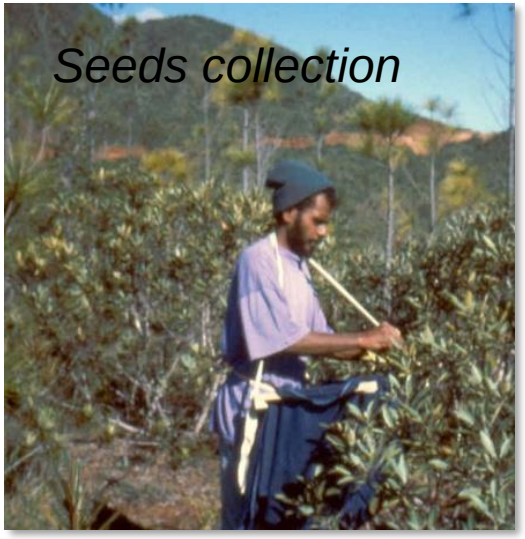


Costularia
Herbaceous plant

Grevillea
Woody plant

Mining Sites revegetalisation

- Seed collection, sorting, storage
- Seedling development in nurseries
- No maintenance required: these plants from mining background do not rely on fertilizers for growth
- Slow growth but long-lasting
- Creates local jobs



Revegetalisation of mining sites, Hydraulic seeding

- **Hydraulic seeding allows the growth of pioneer local/endemic plants**
  Possibility to seed on rugged terrains, progressive reconstruction of the local biodiversity
- **Technical improvement of hydro seeding by the use of pionneer plants that subsequenly die (grass type)**
  The plants creates a quick vegetal cover which helps the germination of the local species

1 month

4 years

In practice

- **Mining fund**
  Help Miners in difficult times
  Rehabilitations of old mines
- **Commitment to rehabilitate more surface than what has been cleared for each year**
  18.5 ha in 2019
- **Dedicated team at SLN**
  Works are subcontracted

Sustainable mining through reclaiming of our waste dumps

Reclaimation of a waste dump using XRT sorting

Projects for other dumps

Sland

Local use in construction
Sales of nickel slag from the pyro plant slag dump for construction as a replacement for sand
42000 t sold

Other Corporate Social Responsibility actions

Environment

- **Environmental Compensation measures**
  Botanical protected area (850 ha)
- **Projects stopped in very sensitive areas**

Education

- **Deust Mines**
  University degree
- **CFTMC**
  Training school on mining equipment

Social action

- **6 community offices**
- **Funding of community projects**
  Nickels de l'initiative
  3 party conventions

Conclusion

⇒ Strong commitment of SLN in New-Caledonia towards the environment

⇒ Strong Enviromental and waste dump management compentence acquired over the years

  ⇒ Key factor to keep our right to operate

⇒ Shift in strategy towards sustainable mining to beneficiate all mining products

⇒ Moving forward to a « clean » mining industry

Eramet has set itself the production of metals essential for energy transition (Ni, Mn, Li, Co) as its main line of business

More generally, as environment management is also linked to climate change and the production of greenhouse gases, Eramet is working in parallel on several projects

Ore Transport
- Conveyors, hydraulic transport, Trains, shipping

Fleet (trucks, shovels…)
- Electric energy

Power plants
- Less polluting and if possible renewable

Metallurgical plants
- Use of Hydrogen as an energy source

Digital Transformation
- Better stream management

eramet