



Conclusion of the Ferro-Carvão Stream Water Treatment Station in Brumadinho, MG

Vale

PRI Webinar
June 18th, 2019

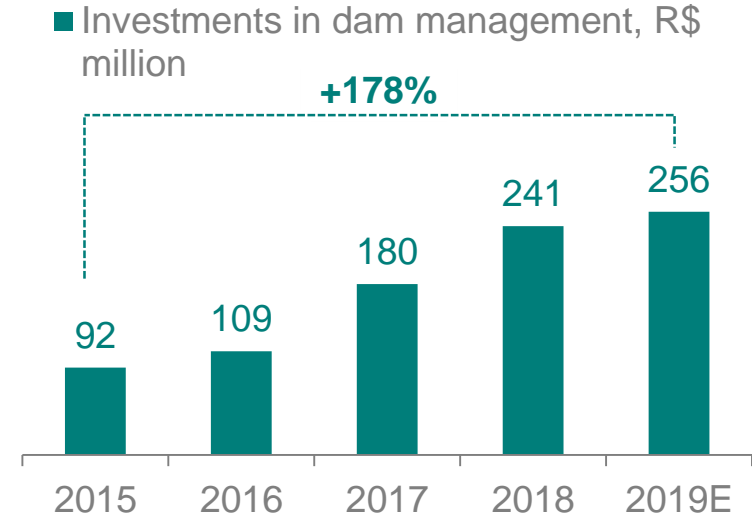
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Since 2015 Vale has taken several steps to improve safety at its operations

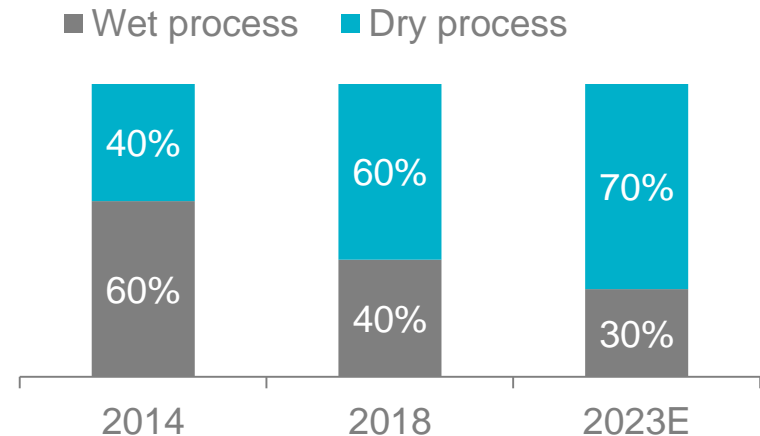
Investments in dam management¹

- Reinforced continuously since the Samarco dam failure in 2015
- Applied mainly in maintenance, monitoring, improvements, audits, risk analysis and revisions of the PAEBM²
- Started the decommissioning program, with 9 dams concluded



Operational processes

- Increase in dry-processing
- Research on dry-stacking applied to large scale
- Research on large scale dry concentration



¹ In Brazil

² Emergency Action Plan for Mining Dams

Vale is accelerating the decommissioning of 9 upstream iron ore tailings dams in Brazil

US\$ 1.9 billion already provisioned to decommission upstream dams

- **2** will be completely decommissioned by February 2020
- **5** will be transformed into downstream prior to decommissioning, out of which 1 will be concluded by February 2020 and the others by January 2022
- **2** will have its safety factor increased in 3 years prior to decommissioning by April 2022
- Still ongoing assessment on engineering projects and costs for other geotechnical structures (owned and JVs¹)

Revaluation under higher safety standards, evacuation of upstream dams areas

¹ Joint Ventures

Several measures to increase safety standards are being taken



Additional **626 piezometers** to measure water level and **234 inclinometers** to measure angles of inclination and elevation are being purchased



Geotechnical Monitoring Center launched at the end of February, 24 professionals monitoring information on 25 structures 24hrs/day, 7days/week



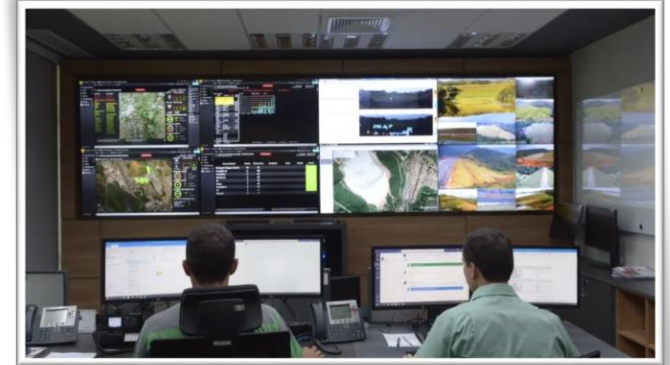
Investments in video monitoring systems, radars, drones, microsymbmetric monitoring, satellite tracking systems are being **accelerated**



Implementation of improvements in the structures such as: **lowering the water level** and **cleaning the drainage channels**

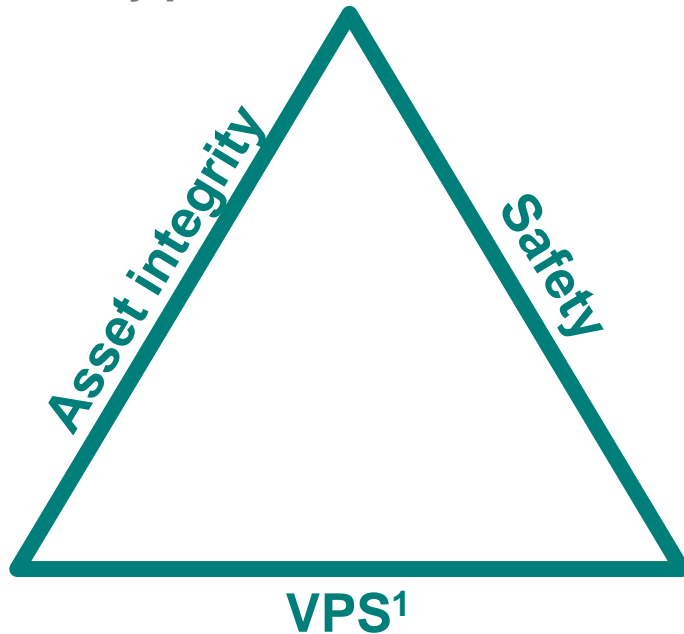


Another layer of external auditors hired together with the Public Prosecutors for **reviewing 99 structures**



Safety and operational excellence area reinforces our risk governance and brings safety to a new level

New Executive Office focused on three key pillars



- Define technical parameters, focus on standards and procedures
- Audit with independence and transparency

Carlos Medeiros: new Executive Officer as of July 1st

- Extensive international experience
- Former CEO Americas of Ball Corporation
- 25+ years of operational and leadership experience for Asia and South America operations at Pilkington / Nippon Sheet Glass
- Well-versed in international best practices for operational standards

¹ Vale Production System

Three lines of defense to support safety conditions, management and mitigation of risks related to dams

1st

Responsibility of the asset owner: the operational and technical team in charge of the operation has the duty to treat imminent risks and stop the operation in case of critical deviations from the standards

2nd

Safety and Excellence Executive Office: reporting directly to the CEO, has the goal to establish the minimum standards, to inspect and audit the enforcement of these standards. Also has the power to stop operations in case of critical deviations

3rd

Internal Audit reporting directly to the Board of Directors, external auditors and ombudsman channels to ensure compliance with the company's policies and guidelines

To strengthen the conditions of its operations, the Board of Directors created the Extraordinary Independent Consulting Committee for Dam Safety (CIAESB)

Three Extraordinary Independent Committees addressing key issues in response to the dam rupture

Extraordinary Independent Consulting Committee for Dam Safety

- Interacts closely with the Compliance and Risk Committee and Vale's geotechnical, engineering and operations departments
- Assists the Company in the **review** of all structures, prioritizing **upstream structures in Brazil** at the moment
- Recommendations related to additional online equipment to reinforce the **monitoring of dams**
- Evaluates **stability of dams** and the **decommissioning plan**
- **Two technical inspections** to dams with critical Safety Level and dams requested by the Board of Directors
- **9 meetings** took place since the Brumadinho dam rupture

Three Extraordinary Independent Committees addressing key issues in response to the dam rupture

Extraordinary Independent Consulting Committee for Investigation

- More than 30 thousand documents reviewed
- Hiring of a specialized geotechnical engineering company to compose the Assessment Team ongoing
- Works should be concluded by the **end of 2019**
- **19 meetings** took place since the Brumadinho dam rupture

Three Extraordinary Independent Committees addressing key issues in response to the dam rupture

Extraordinary Independent Consulting Committee for Support and Recovery

- **26 recommendations:**
 - i. Diagnosis and evaluation of resources and needs
 - ii. Strategy of communication with the communities affected
 - iii. Support to the people for managing indemnifications received
 - iv. Key metrics for variable remuneration related to Brumadinho; and others
- Members specialized in **human rights, environmental and governance**
- 37 meetings took place with **internal** and **external stakeholders**

Vale will not rest until every damage from Brumadinho is repaired or compensated for

Special Director for Recovery & Development

- Directly reporting to the CEO
- Over 400 staff allocated to the structure
- From **emergency** to **permanent recovery**
- Actions of recovery to be carried out in Brumadinho and along the Paraopeba river

Availability of resources to enable all reparation and compensation efforts to be effectively carried out

Vale is committed to the full and effective reparation

Full reparation

- **Apologies**

Public apologies to individuals

- **Restitution**

Restoration of affected areas and productive capacity

- **Rehabilitation**

Restoring the dignity of those affected and livelihoods

- **Economic and Non-economic compensation**

Individual and collective indemnifications, reimbursement of public expenses

- **Administrative and regulatory sanctions**

- **Measures to guarantee non-repetition**

How to restore the means and ways of life

Systemic view taking into account:

- Health
- Psychological assistance
- Culture
- Living standards
- Work
- Sources of income
- Bonds with the community

Following the international principles of IFC¹

¹ International Finance Corporation

Key immediate response indicators

Health

- **10** Hospitals and Health Units Available
- **242** Accommodations available
- **2,622** Medical Services at Help Centers
- **89,000** Pharmacy Items Purchased
- **1,536** Professionals at Help Centers
- **6,374** Psychological Services at Help Centers

Acquisitions

- **157** Rented Houses
- **1,598** Seats available in vehicles
- **R\$ 1.4 billion** for Supply Demands
- **168.6 million** Liters of water delivered
- **48** occupied beds

Key immediate response indicators

Donations to individuals

- **R\$ 100 thousand** donations to the families of the fatalities:
 - i. 276 donations made
 - ii. Totaling R\$ 28 million
- **R\$ 50 thousand** donations to the ones that resided in the Self-Saving Zone
 - i. 101 donations made
 - ii. Totaling R\$ 5 million
- **R\$ 15 thousand** donations to the ones who had their businesses impacted
 - i. 96 donations made
 - ii. Totaling R\$ 1.4 million
- **R\$ 5 thousand** donations to the ones living and/or with businesses impacted due to the reallocation of the ZAS (excluding Brumadinho)
 - i. 247 donations made
 - ii. Totaling R\$ 1.2 million

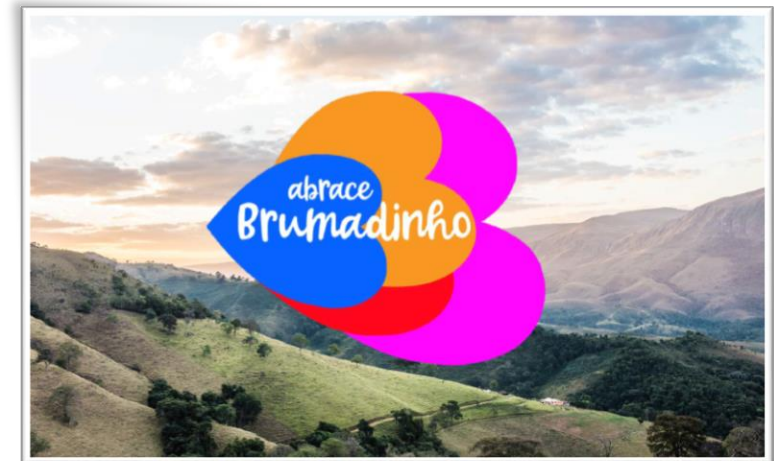
Donations to cities/institutions

- **US\$ 29 million** in donations¹ to Fire Department, Civil Defense and Police Force
- **R\$ 2.6 million** transferred to the Municipality of Brumadinho for the purchase of emergency equipment and for the hiring of professionals in the health and psychosocial areas
- **R\$ 80 million** to Brumadinho city over 2 years
- **R\$ 100 million** to the municipalities where Vale's operations are suspended
- **R\$ 6.5 million** to the Belo Horizonte IML (Legal Medical Institute)

¹ As recorded in 1Q19 Earnings Results

A structured plan to last: “Alliance for Brumadinho” program

- Inauguration of “*Estação da Cidadania*” (with wifi, sports activities, playground, outdoor spaces, public events, library and multimedia room)
- Investment in the campaign “*Abrace Brumadinho*”
- Health Cycle project by the Vale Foundation in Brumadinho, Sarzedo and Mário Campos
- 35 new health care units in Brumadinho
- Income generation program by Fundação Vale
- Support to the “Flowers for Brumadinho” project (State Department of Agriculture)
- New train passenger service from Belo Horizonte to Brumadinho
- Architecture, urbanism and landscaping project for Córrego do Feijão (with Instituto Kairós)
- Professional training project in civil construction and gardening for Córrego do Feijão and Parque das Cachoeiras (Yara Tupinambá Institute)
- Strengthening of tourism in Brumadinho



Vale is advancing with the Preliminary Agreements for indemnifications with the Brazilian authorities

Emergency indemnification payments¹

111,053 plaintiffs

90,990 indemnifications paid

Labor preliminary agreements

192 agreements signed

Individual indemnification²

546 plaintiffs

49 agreements signed

¹ Payments to all residents of Brumadinho and those who resided within a 1km radius of the Paraopeba riverbed, between Brumadinho and the city of Pompéu, at the Retiro de Baixo dam

² Expedited indemnification procedures with the support of the Public Defenders office

Other 10 agreements have been signed covering infrastructure, health, environmental and social initiatives

Examples

Infrastructure

- Renovation of the road police station
- Hiring of independent external auditors for dam safety assessment

Health

- Ensure psychological assistance to the ones affected

Environmental

- Ensure the rescue and care of fauna
- Remediate and compensate the impacts of water supply shortage

Social

- Full remediation of damages in the community NAÔ XOHÃ
- Health support and emergency payments to Pataxó Indigenous Community

Tailings stopped flowing in the region upstream the watercourse allowing preventive works ahead of the rainy season



New water treatment measures already started up at the Ferro-Carvão stream



Conclusion of the Ferro-Carvão Stream Water Treatment Station

[Watch the video](#)



And actions to ensure the water supply

Artesian wells

- 135 artesian wells planned
- 21 already drilled
- 55 in operation by beginning of August



Well drilling

Water pipeline in Pará de Minas city

- Implementation of a water catchment in Pará river
- 47 kilometers of pipeline to ensure water supply
- Same capacity as originally collected from Rio Paraopeba



Water collection in the reservoir

Ecotoxicology tests¹ assure that the river can be recovered

- **66** monitoring points and daily analyses
 - ✓ **+1,600,000** samples analyzed
- Previous conditions maintained after the plume flow, **non-toxic** in 97% of samples
- The fish contamination: **zero toxicity in 100% of samples**
- Since the end of March, IGAM (Minas Gerais Institute of Water Management) has **not detected levels of mercury and lead above legal limits**



Tailings have not reached the São Francisco River

¹The Coordination Department of Graduate Engineering Programs of the Federal University of Rio de Janeiro (Coppe-UFRJ) evaluated the adopted methodology and validate the data already presented by the four laboratories

Vale reallocated all Self-Saving Zones¹ (ZAS) residents of dams with Level 2 and 3 back in February

About the reallocations:

- About 357 families were reallocated, out of which 242 are in definite homes chosen by them
- Every Tuesday Vale hosts meetings with the ZAS Residents Commission to inform about ongoing actions and listen to demands
- Residents of the Vargem Grande ZAS are returning to their homes due to the level reduced from 2 to 1
- On May 9th, Vale concluded the construction works for the Rubem Costa Lima Municipal School, in Macacos



Rubem Costa Lima Municipal School

¹The Self-Rescue Zone (ZAS) comprises the valley downstream of the dam where alert warnings, extending up to 10 km or 30 minutes, defined by the Emergency Action Plan for Mining Dams (PAEBM).

Movements on the slope have been losing energy indicating a soft accommodation without impacting the Sul Superior dam

Actions are being taken to mitigate the risks

- All residents from the Self-Rescue Zone (“ZAS – Zonas de Auto-Salvamento”) in Barão de Cocais were reallocated on February 8th
- Drills are being carried out in the Secondary Safety Zone
- Both the slope and the Sul Superior dam monitored 24 hours a day
- More than 3,000 animals taken out from the ZAS

- On May 31st, fragments of the northern slope slipped and settled gently at the bottom of the pit, evaluations made show that any further slippage will not compromise the Sul Superior dam
- General cargo trains resumed operations

Nevertheless, Vale has been implementing containment works in specific areas

- 1st phase

DELIVERED

- 1st barrier of granite blocks
- 1st metallic netting



- 2nd phase

UNDER CONSTRUCTION

- Flow detour channel to a decantation pond (3 million m³) – Aug/Sep 19
- 2nd set of granite blocks barrier and metallic netting – end June 19



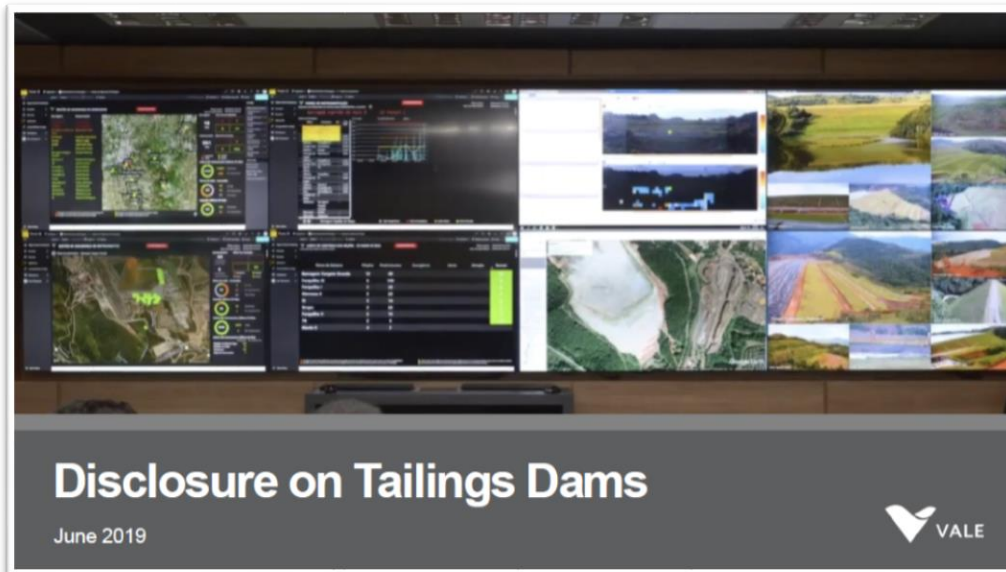
- 3rd phase

UNDER CONSTRUCTION

- Implementation of a physical containment structure, located ~6 km downstream – end 2019



Aligned with its commitment to transparency, Vale made available information related to its tailings dams and JV's



Link to [presentation](#)

Link to [complete list](#)

A new pact with society: to act as a force for generating wealth to communities by fostering sustainable development

Vale is considering to increase Carajás Serra Sul to 150 Mtpy and developing the associated railroad and port infrastructure



Debottlenecking of the Ponta da Madeira Port through a new port in Vila do Conde, Pará



Total length of 400 km



Enable business opportunities and positive legacy to local development in the state of Pará



Railway in Pará state connecting EFC to the Vila do Conde Port

Our challenges ahead

1

Rebirth of Brumadinho

- Brumadinho sustainable development

2

Cultural transformation

- Safety becomes an “obsession” with our risk perception and safety culture evolved into an interdependent mindset
- Sustainability entrenched in local operations and Vale perceived as a development agent

3

Lean portfolio

- Optimization of risk and growth factors

4

Recognition from society

- Support to our license to operate

The safest and, therefore, most reliable mining company in the world



VALE