



# Update on Brumadinho

Rio de Janeiro, February 28<sup>th</sup>, 2019



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Disclaimer

# Agenda

1. Dam I overview
2. Humanitarian actions
3. Emergency response
4. Environment and tailings retention works
5. Actions implemented since 2015



## **Dam I overview**

# The Dam I of the Córrego de Feijão mine



## Main info

- Inactive since July 2016
- Built by Ferteco in 1976
- Brought to Vale along with Ferteco's acquisition in 2001
- 86m high
- 11.7 million m<sup>3</sup>

## Facts on safety monitoring

- 94 piezometers, out of which, 46 were automated
- 41 water level indicators
- Stability Condition Statements duly issued in Jun-18 and Sep-18
- Water levels were being continually reduced

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**Humanitarian actions**

# Action has been taken in humanitarian emergency aid

## Medical support and help centers

- 1,441 professionals working in 11 help centers
- Psychological support with specialized team and 142 professionals
- 10 hospitals and health units in service
- 40 ambulances mobilized
- 1,550 medical consultations
- 3,645 psychological consultations
- 39,870 pharmacy items purchased
- Preventive fumigation in the affected areas against the proliferation of diseases such as the dengue fever, yellow fever and other infections maladies



# Action has been taken in humanitarian emergency aid

## Transportation, accommodation and other support

- 322 accommodations arranged
- 97 houses being rented for the families
- Toll-free call center
- More than 14.1 million liters of water for human and animal consumption and agricultural irrigation distributed to 15 cities
- 1,864 available seats for transportation (including light vehicles, buses and ambulances)
- Creation of alternative routes such as one for the Alberto Flores avenue
- Notary services for issuing documentation



# Action has been taken in humanitarian emergency aid

## Donations

- R\$100,000.00 donation to the families of each victim of the dam breach: 264 payments made
- R\$50,000.00 donation, by residence, to those who resided in the Self-Rescue Zone: 68 payments made
- R\$15,000.00 donation to those who had their business activities affected (early registration)

## Financial support

- R\$120 million allocated for acquisition of medicines, water, equipment and other logistics costs
- Financial compensation to the city of Brumadinho due to shutdown of activities
- R\$2.6 million allocated to the city of Brumadinho for purchase of emergency equipment and hiring of healthcare professionals and psychological and social assistants, with the aim of improving the humanitarian aid in the affected municipalities
- Acquisition of R\$6.5 million in equipment for the Legal Medical Institute of Belo Horizonte



**Emergency response**

# The Board of Directors created three Extraordinary Independent Committees addressing key issues in response to the dam breach

## Extraordinary Independent Consulting Committee for **Support and Recovery**

Dedicated to follow-up on the measures taken to support the victims and the recovery of the areas affected by the dam breach, assuring that all necessary resources will be applied

## Extraordinary Independent Consulting Committee for **Investigation**

Dedicated to investigating the causes of the dam breach

## Extraordinary Independent Consulting Committee for **Dam Safety**

Dedicated to provide support in questions related to the diagnosis of safety conditions, management and risk mitigation related to Vale's tailings dams, also providing recommendations of actions to strengthen safety conditions of those dams

Coordinated and composed by external and independent members, with unblemished reputation and experience on the matters

## The quick response to the dam breach culminated with the signing of the Preliminary Agreement for indemnification...

- Management established a Crisis Committee
  - BoD established three Extraordinary Independent Consulting Committees (“CIAE”). CIAE for Support and Recovery, CIAE for Investigation and CIAE for Dam Safety
  - BoD suspended (i) the shareholder remuneration policy and (ii) the variable remuneration payment for executives
  - Vale accelerated the decommissioning of all its remaining upstream tailings dams
  - Vale hired Skadden to assist in the investigation
  - Vale hired expert panel, to assist in the investigation of the causes
- Vale signs a Preliminary Agreement for indemnifications

## ...an unprecedented agreement that reinforces the active cooperation between Vale and Brazilian authorities

### **Broad coverage for accelerated indemnification...**

- The agreement will anticipate the emergency indemnification 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
- Indemnity amounts: monthly payment of one minimum wage per adult, 50% of the minimum wage per adolescent, and 25% of the minimum wage per child, for a period of 12 months, starting on January 25<sup>th</sup>, 2019
- Vale will keep paying 2/3 of the salaries of all employees and third-party employees who died in the breach until the company signs the final indemnity agreement
- The missing people will continue to receive their salaries
- Guarantee of employment or salary for employees of Brumadinho, including third-party employees, until December 31<sup>st</sup>, 2019
- Health insurance for the family members of Vale employees and third-party employees, whole-of-life insurance for widows or partners and up to 22 years for dependents
- Psychological assistance until discharge
- R\$920 in daycare assistance for employees with children up to the age of three
- R\$998 in educational assistance for children of employees until they turn 18 years old

### **...minimizing the uncertainty of those impacted by the dam breach**

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**Environment and  
tailings retention works**

# A tailored approach to each of the sections affected in the Dam I area and along the Paraopeba river

## 1<sup>st</sup> section: Dikes, hydraulic barriers and bridge construction

- Covers the area of up to 10 Km from the Dam I breach site
- Construction of dikes for retention of heavier tailings
- Ongoing transportation and storage of rocks that will be used in the structures
- Installation of more hydraulic barriers and small dams to assist in the tailings control
- Removal of tailings that blocked a stretch of the Alberto Flores Avenue and installation of metal barrier to prevent the tailings from covering the road again
- Construction of a bridge to restore traffic between communities and downtown Brumadinho

## 2<sup>nd</sup> section: Dredging

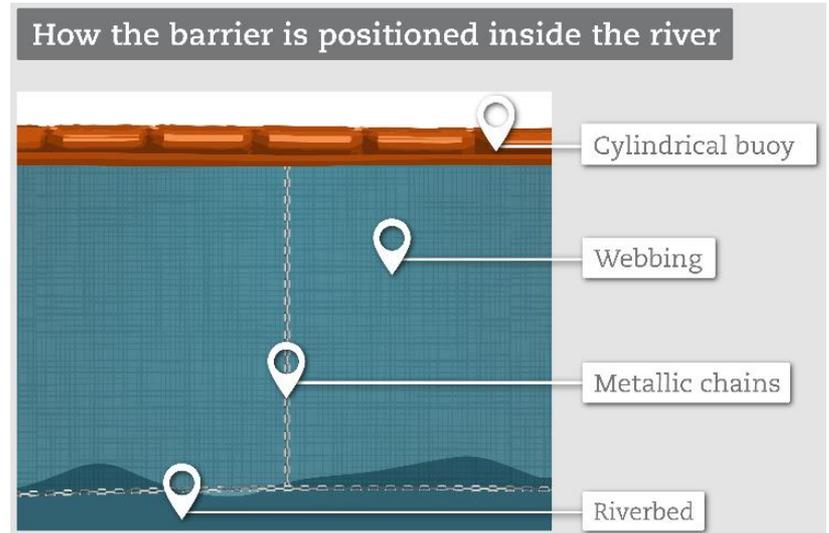
- Covers the 10 to 30-kilometer area that stretches to the city of Juatuba
- Installation of equipment for the dredging of debris
- Objective of cleaning and de-sanding the Paraopeba river channel
- Residues collected by the dredgers will be properly disposed outside the Permanent Preservation Area of the river



# A tailored approach to each of the sections affected in the Dam I area and along the Paraopeba river

## 3<sup>rd</sup> section: Control membranes and water monitoring

- 170 km stretch of the Paraopeba river between Juatuba and the Retiro Baixo Plant
- Sediment control barriers – turbidity membranes
- 5 in total, 3 in Pará de Minas region and 2 in the municipalities of Juatuba and Betim
- 30m wide and 2-3m deep
- Functions as a filtering fabric, retaining solid particles



**10-15% reduction in water turbidity levels**



# Monitoring of water quality from the Paraopeba river to the São Francisco river mouth

48 monitoring points

Daily collection of water and sediments for chemical analysis

Turbidity analyses every hour at four different points

The tailings that leaked from Dam I are concentrated in the Feijão e Carvão stream as well as in the confluence of the stream and the Paraopeba river



# Animal care is included in the scope of remediation initiatives

## Field hospital for animals



- 184 professionals (among veterinarians, biologists and technicians) dedicated to rescuing the local fauna
- Treatment of fowls, birds, reptiles, horses, bovine animals, cats and canines

## Specialized helicopter for assistance in animal rescuing



- Heli-basket, an equipment coupled to the external area of the helicopter
- Transportation of small and middle sized animals of up to 113 kg
- Large animals are lifted by the aircraft

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**Actions implemented  
since 2015**

# Since Fundão dam breach Vale has taken several steps to improve safety at its operations

## Operational processes

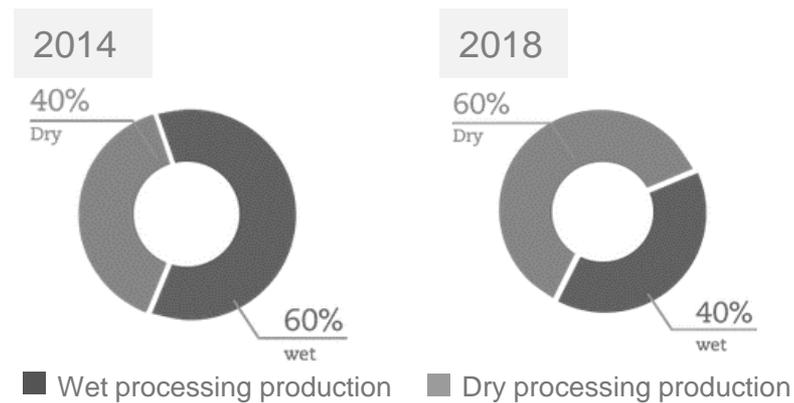
- Increase in dry-processing
- Research on dry-stacking applied to large scale
- Research on dry concentration

## Decommissioning of current upstream dams

- Vale decommissioned 9 of the 19 upstream tailing dams after Fundão dam breach
- Vale is accelerating the decommissioning of the remaining 10 upstream dams.

## Increased dam management expenditures

- Vale increased approximately 180% of its investments in the management of dams between 2015 and 2019
- Dam management in Brazil will reach R\$ 256 million in 2019 vs. R\$ 92 million in 2015
- Investments applied to maintenance services, monitoring, improvements, audits, risk analysis, revisions of the Emergency Action Plan for Mining Dams (PAEBM), implementation of alert systems, video monitoring and instrumentation



# In 2018 all Vale dams stability were certified by external auditors

## Periodic monitoring

- External audit and review with statement of stability condition every 6 months
- Internal inspections reported and analyzed to check compliance with Brazil's National Dam Safety Policy every 2 weeks
- Dam safety internal crosscheck

## Monitoring technology

- Implementation of automated geotechnical equipment, providing real-time information to monitoring and control center
- Video monitoring
- Seismological network

