

SEPTEMBER 2019



Repair **Report**

The Repair Report describes Vale's actions to minimize the impact caused by the B1 dam breach. The second edition shows the progress of works on the social, environmental and construction work fronts in Brumadinho and along the Paraopeba river.

It also encompasses dam safety and risk prevention initiatives carried out, including the de-characterization of the upstream structures.

We know there s a lot to be done. We will continue on this path and keep society informed.

The date presented in this material refers to the period between January and August 2019.



The Special Executive Board for Repair and Development continues working 24 hours a day to repair the damages caused by the B1 dam breach in Brumadinho. We continuously strive to remain close to the community and give legitimacy to everything we hear from them. Our focus is to provide care and assistance for the affected people and communities, as well as prioritizing the environmental recovery of the Paraopeba river basin.

Marcelo Klein, Special Recovery and Development Director



We're turning Vale into an increasingly safe company, focused on people and repair efforts. Today, we make all decisions and investments based on these aspects. Therefore, the construction works for containment of Vale's dams that are currently at emergency level 3 and the process of de-characterization of its upstream structures are the two most important measures in progress.

We are committed to showing that our operations can be safe and people and nature-friendly.

Eduardo Bartolomeo
CEO

— SOCIAL

• *Vale's Comprehensive Assistance Program for Affected People operates on six social and technical assistance fronts to help the **affected people adapt to a new reality.***

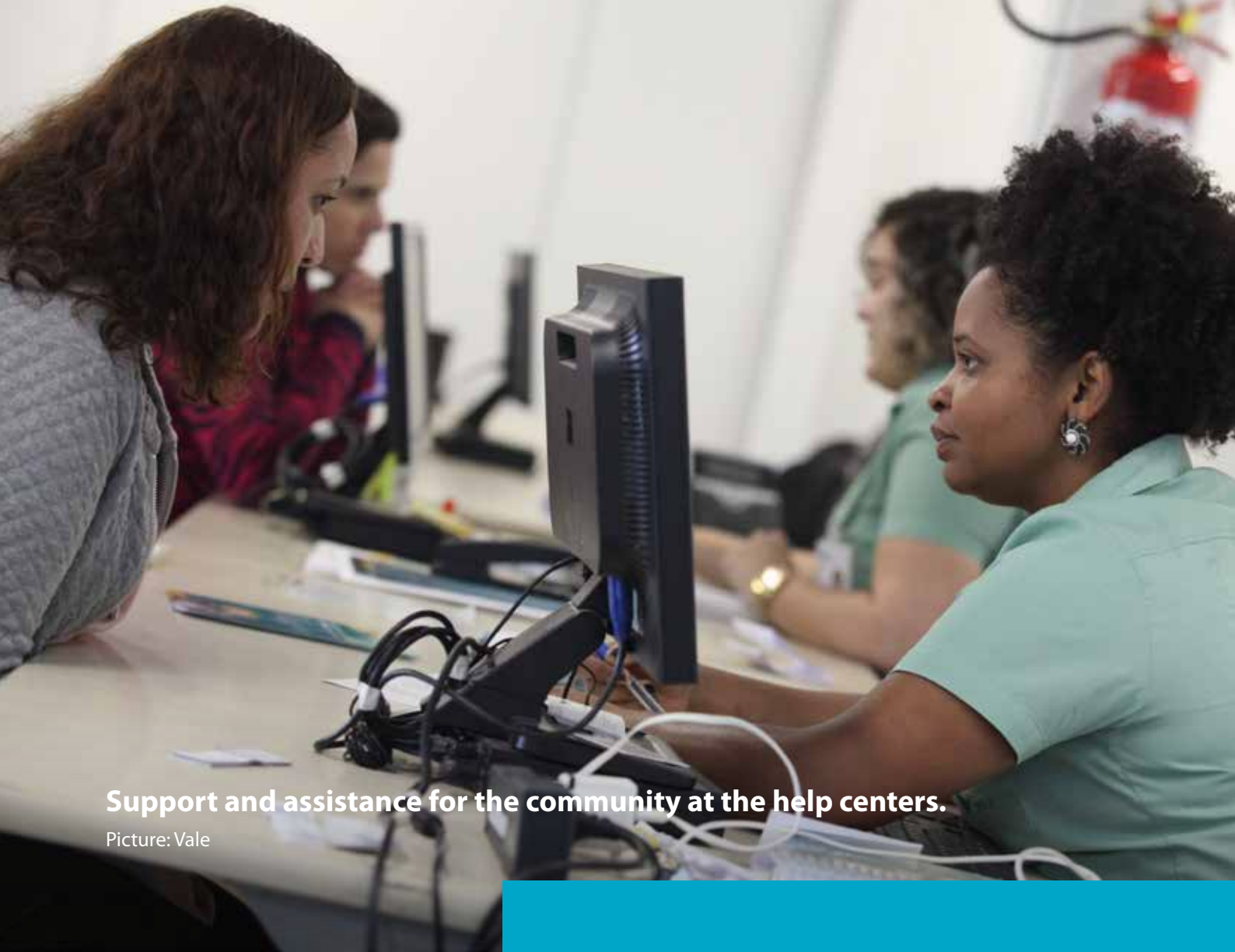
Vale's help centers set up in Brumadinho shortly after the dam breach continue offering humanitarian assistance for those affected. In these locations, our teams carry out analysis of the situation and needs of the community and report it to specialized teams responsible for addressing issues, including:

- Medical and psychological assistance. So far, approximately **12,000 cases have** been registered.
- Accommodation in provisional housing. **90 people are already** been accommodated in temporary accommodation with financial assistance from Vale.
- Water distribution for the population. By August, **more than 250** million liters of water for human and animal consumption as well as agricultural irrigation were distributed to **19 municipalities.**



Water distribution for the population.

Picture: Vale



Support and assistance for the community at the help centers.

Picture: Vale

Vale has taken actions to provide financial security for the affected families. The affected families, rural producers and traders received emergency donations seven months after the event. In addition, more than 100,000 people are currently receiving labor and individual indemnities and emergency compensation.

Social projects and assistance programs implemented in Brumadinho are also helping communities cope with the new reality, resume their routines and plan the future.

Comprehensive Assistance Program for the Affected People

Vale designed the Comprehensive Assistance Program for the Affected People to support and guide them in resuming their routine and planning the future. Participation in the program is voluntary and aimed at people who are already receiving individual indemnities. Vale offers technical consultancy and assistance for the following:

- **Financial planning and education** – planning and financial management support in the short, medium and long term.
- **Purchase of residential, rural or commercial properties** – support and consultancy for investment and acquisition of property, either for residential or commercial purposes.
- **Resumption of agricultural activities and rural technical assistance** – training on sustainable productive practices, rural property management, and support to strengthen or diversify rural productive activities.
- **Resumption of small business activities** – training, business plan and technical support to resume, strengthen, or diversify commercial or service activities.
- **Support to micro-entrepreneurs and activities for supplemental income** – technical support, production training, and discussion of strategies for regulating the activities carried out by informal workers and micro-entrepreneurs who have been affected and wish to resume their activities.
- **Social Monitoring** – ongoing systematic social assistance provided by the technical team.

Financial support and indemnities.



Emergency Compensation

Agreement between Vale, the Federal and State Prosecution Offices, the Federal and State Public Defender's Offices, and the Federal and State Attorney's Offices for payments of emergency compensation to all residents of Brumadinho and residents within a 1km radius from the Paraopeba river channel, for one year, starting on 25 January 2019. To date, more than **100,000** people have already received emergency aid comprising one minimum wage per adult, half minimum wage per teenager and one quarter minimum wage per child.



Individual or Family Indemnity

Affected residents can start negotiating their indemnities at Vale's offices or the Public Defender's Office. Negotiation can be done individually or on a family basis. To date, approximately **240 agreements** have been signed.



Labor Indemnity

Agreement between Vale and the Labor Prosecution Offices enabling relatives of those affected by the breach to be eligible for negotiation. Approximately **300 agreements** have already been signed.



Emergency Support

Approximately **280 people** have received the R\$100,000 donation, while 100 people received R\$50,000.00 and 100 people received R\$15,000.00.



Community Garden of the Novo Rumo project.

Picture: Vale



Ateliê Social Comfio

Picture: Vale



Social Projects supported by Vale

Novo Rumo (New Direction)

The Novo Rumo project is carried out in partnership with Instituto Kairós. After the dam breach, it was strengthened to support the residents of Córrego do Feijão in restarting their lives and regaining their self-esteem. Currently, more than 60 residents have participated in actions **that maximize activities suitable to the location, including productive backyards, community gardens and crafts.**

Comfio

Another initiative held in partnership with the Instituto Kairós, is the Ateliê Social Comfio. It offers handcraft workshops where residents receive support and share experiences and feelings, improving their sense of belonging and recovering their self-esteem. Participants can strengthen trust in collective gatherings and their productive potential while working together on creations.



Batucabrum Cultural Project

Picture: Vale

Batucabrum

The Batucabrum project is now assisting more children with the addition of the Cantagalo community, and adults can also participate in singing choir and guitar lessons. The activities take place before and after the school time **and help approximately 80 children and young people deal with losses from the breach and transform their reality.**

By December, the project will increase the attendance capacity to approximately 150

young members.

Semeando Esperança (Sowing Hope)

The Semeando Esperança project is carried out at the Knowledge Center by Vale Foundation in partnership with Instituto Matizes Dumont. The embroidery workshops offered to residents of Brumadinho and several communities in the region stimulate creativity, strengthen affective bonds and attenuate grief.

Support for Indigenous People

Vale signed an agreement with the Federal Prosecution Office, the National Indigenous Foundation (FUNAI, Fundação Nacional do Índio), and the chiefs of the Pataxó indigenous community located in the city of São Joaquim de Bicas for emergency payments to **150 indigenous people of 46 family nuclei**. In addition to healthcare and independent social and economic consultancy to assess possible environmental impacts, the agreement also includes technical assistance to indigenous people.



Transfer of Funds to the Health and Social Assistance area of Brumadinho

Picture: Vale

Support to the city of Brumadinho

- Financial assistance for the city due to the shutdown of Vale's activities:

R\$80 million.

- Payment of advertising campaign to encourage tourism via the Tourism Association of Brumadinho:

R\$14.5 million.

- Investment for purchase of emergency equipment and hiring of health care and psychological and social assistance professionals through the City Government:

R\$2.6 million.

- Health Care and Social Assistance for those affected by the dam breach, via an agreement with the City Government:

Approximately **R\$30 million.**

Support to other Municipalities and Institutions

Vale has allocated approximately **R\$137 million** to other municipalities and institutions, including the Mining Municipalities Association of Minas Gerais and Brazil (AMIG), the Fire Service, the Forensic Medical Institute, Military Police of Minas Gerais, Civil Defense of Minas Gerais, and the city governments of Mário Campos and São Joaquim de Bicas.

Support to the Forensic Medical Institute

Vale imported and donated to the Forensic Medical Institute a DNA recognition equipment (Illumina), which streamlines the work and expedites the identification of the dam victims.



Illumina - DNA recognition equipment

Picture: Vale

ENVIRONMENT

• Approximately **three million** water, soil, tailings, and sediment analyses have identified that the water in some points of the Paraopeba river is starting to return to its original condition – as observed before the breach.

Environmental recovery and fauna protection measures are ongoing and evolving and supported by entities specialized in analysis, water treatment and animal care.

Paraopeba River

Currently, there are **67 daily water quality monitoring points** between **Paraopeba river and the São Francisco river mouth**. There are points installed along the Ferro-Carvão stream, the Paraopeba river, along the São Francisco river to its mouth in the Atlantic Ocean, in the reservoirs of the Retiro Baixo and Três Marias plants, in addition to the main tributaries of the Paraopeba. Turbidity analyses are carried out **24 hours a day across ten points** of the river by means of automatic probes.

Today, after **three** million **analyses** of water, soil, tailings, and sediment, it is possible to verify that the water in some points of the Paraopeba river is starting to return to its original condition – as observed before the breach and after the beginning of the drought period.

Analyses carried out by Vale and the Water Management Institute of Minas Gerais (IGAM, Instituto Mineiro de Gestão das Águas) show that the sediment plume has not reached the São Francisco river and attest that the Paraopeba river can be recovered. Water monitoring systems have been installed to evaluate the water performance, quality, and reliability.

Since the end of March, mercury and lead levels detected by the IGAM in the Paraopeba river have been within the legal limits.



Floating Water Monitoring Station

Picture: Vale



River Water Treatment Plant (ETAF, Estação de Tratamento de Água Fluvial)

Picture: Vale.

River Water Treatment Plant (ETAF, Estação de Tratamento de Água Fluvial)

More than **one billion liters** of clean water were returned to the Paraopeba river between May 27 – when the River Water Treatment Plant started operating in the Alberto Flores region – and the end of August.

The water treated at the plant arrives **with approximately 6,300 NTU** (turbidity measuring unit) and is returned to the Paraopeba at levels **below 29 NTUs**, on average. The turbidity standards established by the National Council for the Environment (Conama) are up to 100 NTU.



Open Doors

The River Water Treatment Plant is regularly visited by the community, schools of Brumadinho, public authorities and other institutions. Visitors learn about the plant's operations and how the water treatment contributes to the environmental recovery of the Paraopeba river. Those willing to learn about the unit should contact Vale's help centers in Brumadinho, in the communities of Parque da Cachoeira, Córrego do Feijão and Clube Aurora, **or call the Service Center at 0800 031 0831.**

Feira de Adoção de Cães e Gatos de Brum

Adoption Fair held at Águas Claras mine in Nova Lima, in the state of Minas Gerais

Picture: Vale.



Animal Care

Dog and Cat Adoption Fairs

Vale is organizing the Dog and Cat Adoption Fairs to promote responsible adoptions, either finding a new home for the animals currently sheltered in the Fauna Shelter Farm or enable reunion with their owners.



This is an agreement signed with the Prosecution Office of Minas Gerais within the Preliminary Agreement (TCP, Termo de Compromisso Preliminar). In addition to organizing the adoption fair, Vale undertook to monitor the adopted animals for six months.

The complete list with pictures of the animals is available on Vale's website (www.vale.com), and the helpline number for fauna-related issues is 0800 031 0831.



**EMERGENCY
CONSTRUC-
TION WORKS**

• R\$144 million investment, emergency construction works for geotechnical safety, containment and removal of tailings in Brumadinho already carried out.

Vale continues to act on several emergency construction works fronts for environmental recovery and containment and removal of tailings, with a focus on minimizing the impacts caused by the breach.

Tailings Containment and Removal Structures

The construction and installation of these structures reduces the flow of sediments into the Paraopeba river, in addition to contributing to efforts to clean the river and the Ferro-Carvão stream.

CONSTRUCTION WORK	STATUS
Hydraulic Filtration Barrier BH0	Completed
Dike 2	Underway
Hydraulic Barrier BH1	Underway
Sheet Piles - Alberto Flores	Completed



New exclusive access to the construction works.

Picture: Vale.

Tailings Removal Road

A new road built by Vale for the exclusive traffic of trucks involved in the removal of tailings in Brumadinho is already operating. Deployed where the old rail branch operated, the road is approximately 3.6 kilometers long, starting near the Avenida Alberto Flores bridge and running to the Córrego do Feijão mine. The result is a **significant reduction in traffic of heavy vehicles on local roads, thus minimizing impacts.**

Water Treatment

The construction works of this front focus on cleaning and returning the treated water to the Ferro-Carvão stream and the Paraopeba river:

CONSTRUCTION WORK	STATUS
River Water Treatment Plant Ferro-Carvão Coal - Alberto Flores	Completed
Removal of antlers and materials from the Paraopeba river	In progress
River Water Treatment Plant Paraopeba River – Laginha	Under Test
Dredging of the Paraopeba River	In progress



Aerial view of the dredging, confluence of Ferro-Carvão. At the top, overview of the ETAF.

Picture: Vale.

Dredging of part of the Paraopeba river area.

This action is an important step in the environmental recovery of the Paraopeba river. Dredging removes the tailings accumulated in the silted area of the river

The removed material is stored and dehydrated in large bags. The water drained from these bags will go to a treatment plant and returned clean to the Paraopeba river.

Dredging activities are planned to continue until 2020, beginning at the confluence of Ferro-Carvão stream and the Paraopeba river, and along almost 2km downstream from this point. It is estimated that between 300 and 350 million m³ of material leaked from B1 dam is deposited along this stretch.



Overview of the dredged material storage bags

Picture: Vale.

Water Supply System in Pará de Minas

Vale signed an agreement for the implementation of construction works to ensure the water supply of Pará de Minas. The company has already built a new water withdrawal system at the confluence of the Moreira and Cova Danta streams, interconnected to the utility's existing pipeline, in addition to drilling new artesian wells and carrying out maintenance on the existing ones. In addition, a new pipeline system extending approximately **50km** and with a flow rate of **284** liters per second is **underway** and will enable the withdrawal of water from the Pará river.



Water withdrawal at the confluence of the Moreira and Cova Danta streams

Picture: Vale.

Water Supply System in the Belo Horizonte Metropolitan Area

Vale will invest approximately **R\$450 million** in a series of construction works on water withdrawal and supply systems for the Belo Horizonte metropolitan area. The agreement signed between the company and the Prosecution Office of Minas Gerais, with the participation of Copasa, the state of Minas Gerais and the Federal Prosecution Office established the following investments:

- *Construction of a new water withdrawal system in the Paraopeba river, upstream of the confluence of the river with the Ferro-Carvão stream in Brumadinho;*
- *Implementation of preventive measures related to the withdrawal in the Das Velhas river;*
- *Hiring of an external audit firm to analyze the projects and monitor the volume of water stored in RMBH's reservoirs.*



Water Treatment Plant Bela Fama – Rio das Velhas System

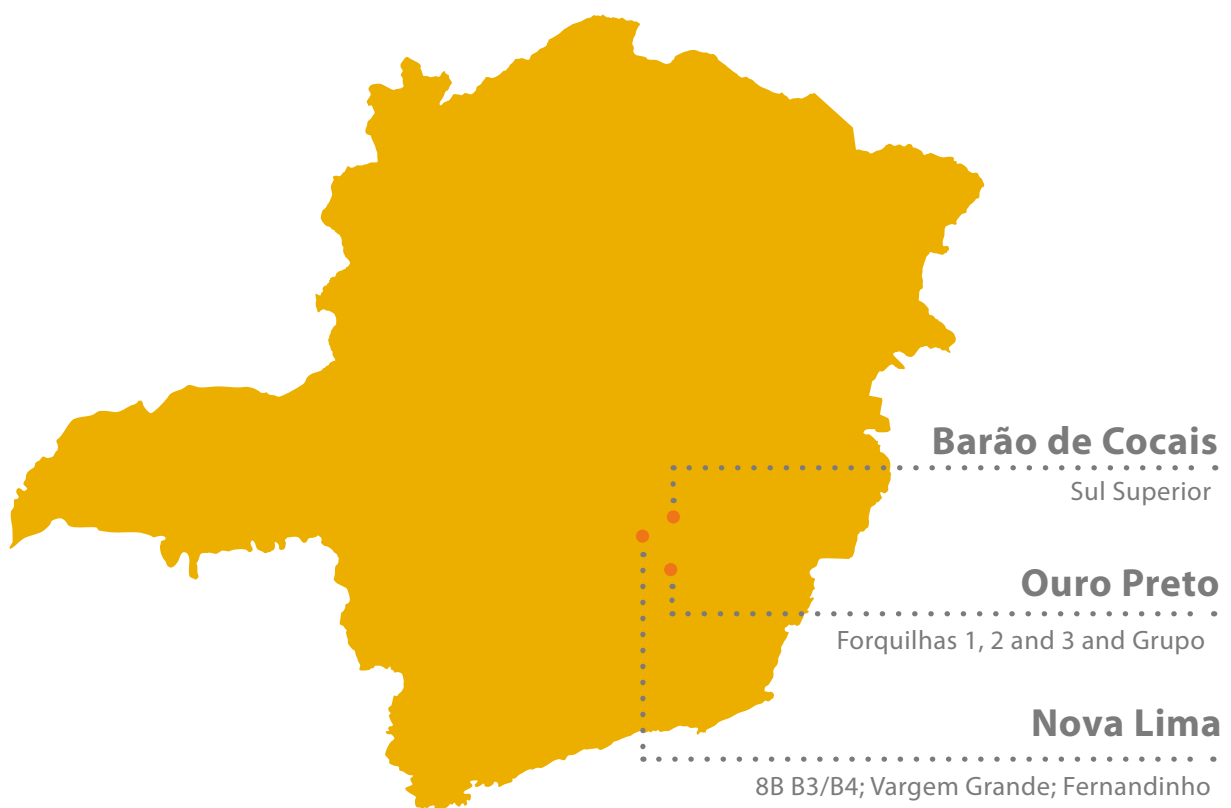
Picture: Vale.

SAFETY AND PREVENTION

De-characterization of Upstream Dams

Vale has started implementing measures to de-characterize its upstream dams. As such that, the company will eliminate all structures built on the same dam raising method of the dam that collapsed in Brumadinho. These structures will no longer pose risks to people.

The plan was announced in January and covers nine dams.



What does de-characterization mean?

The structure loses the characteristics of a dam. The damming is removed and the tailings are also taken from the reservoir. In the last stage, the site is revegetated.

The first de-characterization process will be completed at the dam 8B at the Águas Claras mine, in Nova Lima. Construction works are already underway. De-characterization is expected to be completed by 2020.



The de-characterization process has already begun at dam 8B.

Pictures: Video delivery.

Measures underway at the dams

Some actions are required to improve the factor of safety of the structures before removing the damming and the tailings. Therefore, Vale is implementing the following:

- *Lowering the water surface levels of the reservoirs;*
- *Drilling wells to withdraw the underground water added;*
- *Building channels to deviate additions, such as rainwater.*



Vargem Grande – measures dropped the dam’s emergency level from 2 to 1

Pictures: Video delivery.

Mobilization to eliminate risks

- **R\$7.1** billion invested in de-characterization;
- More than **3,000** workers at the peak of construction works (September);
- About **70%** of the workforce is hired locally;
- **16 large contractors.**



In the event of a breach, the containment will retain all material deposited in the Sul Superior dam

Pictures: Video delivery.

Emergency containment works in progress

Vale is also building containments in concrete or stone in the vicinity of its upstream dams that have reached the maximum emergency level. These emergency construction works are aimed at reducing impacts on people and the environment. The upcoming structures will have the capacity to retain all the material deposited in the dams, in case of a breach.

Approximately **R\$1.47 billion** will be invested in these construction works.



Total focus on people's safety

The construction works are carried out according to the highest workforce safety standards. Actions include evacuation plan, emergency training, air rescue emergency training, 24-hour monitoring of the teams, and geolocation devices used by all workers with access to the areas of risk.

Workers at the containment works.

Pictures: Video delivery.

VALE HELPLINE NUMBERS:

Community Help Centers

BRUMADINHO

- Central PA: Aurora Tênis Clube, Rua Presidente Vargas, 1.490
- PA Parque da Cachoeira: Rua Francisco Jorge Diniz, 143.
- PA Córrego do Feijão: Rua Um, 6.

BARÃO DE COCAIS

Av. Wilson Alvarenga, 535.

NOVA LIMA (MACAGOS)

Praça 25 de Março, 1.010.

Offices - Indemnities

BRUMADINHO

Public Defender's Office

Rua Oligisto, 197, bairro Ipiranga.

Service hours: 10:00 to 12:00 and 13:00 to 17:00,

MONDAY to Friday.

Vale Office

Rua Turquesa, 103, bairro Planalto.

Service hours: 9:00 to 18:00,

Monday to Friday.

NOVA LIMA (MACAGOS)

Vale's Office

Rua São Luiz, 181

Service hours: Monday to Friday, 9:00 - 18:00

BARÃO DE COCAIS

Vale's Office

Rua José de Paula, 104/2º andar, Vila Regina

Service hours: Monday to Friday, 9:00 to 18:00

BELO HORIZONTE

Vale's Office

Rua Pernambuco, 1077/4º andar, Savassi.

Service hours: 9:00 to 18:00,

Monday to Friday.

Those interested shall be accompanied by the Public Defender's Office representatives or attorneys.

Official Communication Channels

Use these channels to clarify doubts and stay informed about Vale's repair initiatives:

www.vale.com

Helpline number: 0800 031 0831

Hello Indemnities: 0800 888 1182

www.vale.com/barao-de-cocais



facebook.com/valenobrasil



linkedin.com/company/vale



instagram.com/valenobrasil/



youtube.com/vale

