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## Vale increases the lifespan of its iron ore mines by up to five times

*A US\$5.5 billion project will make it possible to process low-grade ores and expand the company's production capacity by 65 million metric tons per year*

If someone in 1942 had predicted that, following 70 years of activity, Cauê Mine would still have an estimated working life of 50 years ahead of it, they would certainly have been greeted with an incredulous smile. Technology, however, has made it possible to turn what seemed impossible into reality. Cauê, Vale's first iron ore operation, is part of one of the biggest mine revamp projects now under way in the mining industry. Vale is investing US\$5.5 billion in the construction and adaptation of processing plants at six iron ore mines in Minas Gerais, which will add 65 million metric tons per annum (Mtpa) to the company's nominal production capacity by 2015. This will more than double the six mines' current production capacity (around 60 Mtpa).

The project consists of processing low-grade compact itabirite ores containing up to 40% iron and high levels of contaminants (silica and phosphorus), extracted from both existing mining sites and stockpiles formed over the course of

40 years of operations. These piles also contain high-grade ultrafine ores measuring less than one millimetre across. Using a new process, the low-grade ore will be fragmented into superfine particles and mixed with the ultrafine ore from the piles. After this, both types of ore will be concentrated, generating pellet feed and, in some cases, sinter feed, with iron content of up to 68% and low silica levels, making these products attractive on the global market. The use of low-grade ores and the reuse of stockpiles will extend the mines' lifespans by at least five decades. The project will also reduce environmental impacts by eliminating the need for new sites for new piles.

"As of next year, we should already see a gradual recovery in the quality of the iron ore sold by Vale. Our customers have been informed of this and they have been monitoring these projects," explains Vale's Ferrous and Strategy Executive Director José Carlos Martins. Alongside greenfield projects such as S11D and Additional 40 Mtpa, in Carajás, Pará, the processing of compact itabirite ores in Minas Gerais is part of Vale's strategy to increase its iron ore output by 30% in five years, from 303 Mtpa in 2012, to 402 Mtpa in 2017.

The reuse of low-grade iron ore in Minas Gerais is divided into four projects: Conceição-Itabiritos I and II and Cauê-Itabiritos, including the mines of Meio, Conceição and Cauê, all in Itabira; and Vargem Grande-Itabiritos, composed of the mines of Vargem Grande, Tamanduá and Abóboras, located in Nova Lima in the metropolitan region of Belo Horizonte. The US\$5.5 billion budget provides for the construction of two concentration plants and adaptations to two existing plants. In 2013 alone, US\$1.13 billion will be invested.

### **Third wave**

Contrary to what one may imagine, the extraction of iron ore from a mine does not only take place once. Vale's project to use compact itabirite ores with iron ore content of under 40% is considered by specialists to be the "third wave" in the sector. The first happened between the 1940s and 1960s, when the steel industry basically used high-grade lump ore, each piece from 6 to 50 millimetres across, extracted from rocks called hematite. At that time, blast furnace technology did not permit the use of smaller pieces of iron ore, as this reduced reactor permeability, harming productivity.

As a result, a large amount of fine ore particles smaller than 6 millimetres across accumulated at mines. However, the development of agglomeration technologies solved the problem of fines, making it possible to transform them into pellet feed and sinter feed. In 1956, Vale decided to enter the pellet market by building its first pelletizing plant and integrating it into its mine-railway-port structure. In a short time, pellets gained a prominent place in the company's results, as important as iron ore.

A few years later, however, Vale saw its output of high-grade ore decline at the same time that international competition intensified, with Australia entering the market. The "second wave" then took place in the sector, when Vale began using iron ore from crumbly itabirite rocks, with iron content of between 40% and 60%. To develop technology to process lower grade ores, in 1965 the company established the Mineral Development Centre (known by Portuguese acronym CDM), which still operates to this day in Santa Luzia, a municipality in the metropolitan region of Belo Horizonte.

### **Projects**

Conceição Itabiritos I - Construction of concentration plant in Vale's Southeast System in Minas Gerais. Estimated additional nominal capacity of 12 Mtpa. Project at final electromechanical assembly stage. Plant's operating licence expected in first half of 2013. Start-up estimated for second half of 2013.

Conceição Itabiritos II - Adaptation of plant to process low-grade itabirite ores from Conceição mine in the Southeast System, Minas Gerais. Estimated nominal capacity of 19 Mtpa. Civil engineering and assembly of mills under way. Construction licence already issued and operating licence expected in second half of 2014. Start-up estimated for second half of 2014.

Vargem Grande Itabiritos - Construction of new iron ore processing plant in the South System in Minas Gerais. Estimated additional capacity of 10 Mtpa. Installation of screening building's metal structures under way. Operating licence expected

in first half of 2014. Start-up estimated for first half of 2014.

Cauê Itabiritos - Adaptation of plant to process low-grade itabirite ores from the Meio mines of the Southeast System in Minas Gerais. Estimated nominal capacity of 24 Mtpa, with net addition to capacity of 4 Mtpa in 2017. Earthworks finalized and civil engineering work under way. Operating licence expected in second half of 2015. Start-up estimated for second half of 2015.

### More information

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