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## In Minas Gerais state, Vale develops major mining revamp project

*US\$5.5-billion Itabirites Project will enable low-grade ore to be processed and expand the company's annual output by 65 million metric tons*

In the Brazilian state of Minas Gerais, Vale is developing one of the largest revamp projects in the mining industry: Itabirites. Involving investment of US\$ 5.5 billion to construct and adapt processing plants, it will make possible to reuse low-grade iron ore that has been stockpiled over the last four decades. Investment in processing technologies will expand current production volumes and extend the lifespan of three mines: Vargem Grande, in Nova Lima, in the metropolitan region of Belo Horizonte, and Conceição and Cauê, both in Itabira. Cauê was Vale's first ever iron ore operation, opened in 1942. The work should be completed by the start of next year.

The project will add 65 million metric tons to Vale's annual nominal output, representing a net increase in capacity of 26 million metric tons. "The Itabirites Project is very important to Vale in current market conditions, in which product quality

and productivity improvements are fundamental,” explained Vale’s director of Ferrous Projects for Southeastern Brazil, Carlos Miana.

The Conceição Itabirites I plant, operating since 2013, and the Vargem Grande Itabirites plant, which started up in the second half of 2014, have already helped Vale to cut its iron ore production cost as delivered to the port from US\$23.2 in 4Q14 to US\$19.8 in 1Q15. The Conceição Itabirites II plant began operating in June, and Cauê Itabirites will start up at the end of this year.

The project involves processing so-called compact itabirites – low-grade ores with up to 40% iron content and a high presence of contaminants (silica and phosphorus), which come from existing mining areas and stockpiles. These piles also contain high-grade ultra-fines, with ore particles of less than one millimetre across. The new production process entails fragmenting low-grade ore into super-fine particles and mixing it with the ultra-fines from the stockpiles. After this, the blended ore is concentrated to generate pellet feed (an input for pellets) and, in some cases, sinter feed, with iron content of up to 69% and low levels of silica, making them attractive in the global market. The project will reduce environmental impacts by eliminating the need for new areas to form additional stockpiles.

“Together with S11D and our expansion projects such as Plant 2 and N4WS Mine in Carajás, the processing of compact itabirites in Minas Gerais will help Vale to increase its iron ore production by 35% over the next four years, from 340 million metric tons expected this year to 459 million in 2019,” said Vale’s director of Ferrous Operations for the South and Centre-West Systems and Manganese, José Flávio Gouveia.

### **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 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 its 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 Itabirites I** – Construction of new ore processing plant to process compact itabirites with low levels of iron, taken from waste rock piles. Capacity: 12 Mtpa. Started operating in 4Q13.

**Conceição Itabirites II** – Adaptation of existing plant to process compact itabirites with low levels of iron extracted from Conceição Mine. Capacity: 19.5 Mtpa. Started operating in 1H15.

**Vargem Grande Itabirites** – Construction of new iron ore processing plant. Capacity: 10 Mtpa. Started operating in 2H14.

**Cauê Itabiritos** – Adaptation of existing plant to process compact itabirites with low levels of iron. Capacity: 23.7 Mtpa. Start up planned for 2H15.

More information

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