

# Genesis of High-Grade Iron Ores of the Archean Iron Ore Group around Noamundi, India

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## Abstract

High-grade hematite ores of the Iron Ore Group in the Noamundi area, Jharkhand state, India, are hosted by a laterally extensive, 220-m-thick banded iron formation (BIF) in a folded greenstone belt succession of Paleoproterozoic age. Single orebodies, which are up to 3 km long along strike and several hundred meters wide, depending on dip of the beds, are strata bound and composed of two major ore types—namely, hard hematite ore that is of ancient geologic origin and ores related to recent weathering along a lateritized Cretaceous-Cenozoic land surface. The ancient hard hematite orebodies comprise laminated hematite ores in which microplaty hematite is dominant, and massive ores composed almost entirely of martite. Supergene ores, in contrast, are comprised of goethite-rich duricrust and soft saprolitic hematite ores representing the leached zone of the Cretaceous-Cenozoic laterite profile.

Hard hematite-martite ores formed by hydrothermal replacement of BIF protolith, not only through leaching of silica but possibly also through introduction of iron by hydrothermal fluids of meteoric origin. Hematite iron ore pebbles in a conglomerate at the base of the Meso- to Neoproterozoic Kolhan Group near Noamundi attest to the antiquity of the hard hematite orebodies.

Soft saprolitic iron ores formed as a product of lateritic weathering processes in Cretaceous-Cenozoic times. Supergene alteration took place under the influence of reducing and acidic meteoric water, which is typical for lateritic soil profiles developed under humid tropical climatic conditions with lush plant cover. Goethitic duricrusts capping the laterite profile suggest alternating wet and dry seasons in this environment.

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