

Iron mines in Algeria

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Given the importance of iron ore in the national economy and in view of the increasing demand for this strategic substance using in the steel and cement industry; The Algerian Iron Mines Company SOMIFER-Spa, specialized in the production and the marketing of ferruginous ores, is concerned to elaborate an iron ore inventory and to update the data and information related to ferruginous ore deposits and occurrences in all the national territory.

The main objective of this work is to locate, identify, classify according to types and importance, and select the potential deposits that would deserve detailed exploration for possible exploitation, and this in order to increase the geological potential and refresh the exploitation of iron mines which would boost the development of the national economy.

To make this possible, it was proceeded to the classification of iron deposits taking into account several criteria, such as the iron content, the size of the deposits, the type of ore, the genesis of mineralization, etc.

Keywords: mines, iron ore, deposit, potentials, Algeria

i/ Definition

Iron ore is a rock containing iron, usually in the form of oxides (hematite, goethite and limonite), carbonates (siderite) or sulphides (pyrite).

ii/ Classification of iron deposits

1/ According to Fe concentration, depending on the concentration of Fe element in the ore, there are three categories of ore:

- ✓ Poor ore: $Fe \leq 30\%$
- ✓ Medium ore : $30\% < Fe < 50\%$
- ✓ Rich ore: $Fe > 50\%$

2/ According to the type of ore:

- ✓ Sulphides: pyrite and pyrrhotite (FeS_2 , $Fe_{1-x}S$);
- ✓ Carbonates: siderites or sideroses ($FeCO_3$);
- ✓ Iron oxy-hydroxides Fe_2O_3 , Fe_3O_4 , $Fe_2O_3 \cdot nH_2O$, $3Fe_2O_3 \cdot 4H_2O$, $2Fe_2O_3 \cdot 3H_2O$.

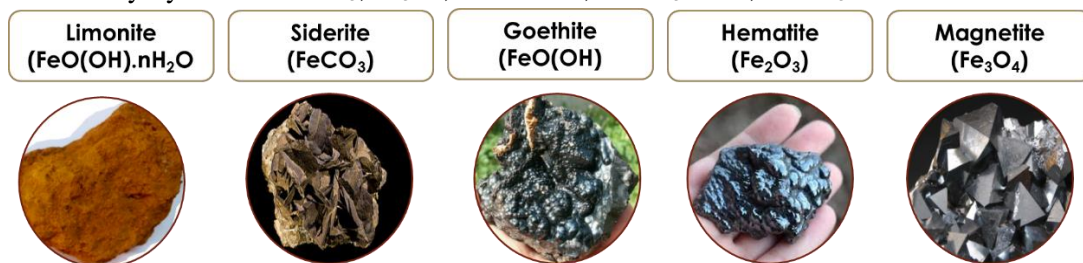


Fig. 1. Different types of iron minerals

3/ According to size of deposits, depending on the dimensions, size or geological potential and other essential factors (morphology, structure, tectonics, regularity of component contents, etc.), they are classified into four main groups:

- Group I (large): > 50 million t, with great economic and geologic importance (Gara Djebilet, Ouenza, Boukhadra, etc.)
- Group II (medium): 2.5-50 million t, deposits exploited or to be exploited that may have economic interest (Chaabet El Ballout, Rouina, Anini, Ain Babouche, etc.)

- Group III (small): < 2.5 million t, small deposits or deposits artisanally exploited (Khanguet, Djebel Ladjbel, etc.)
 - Group IV (occurrences) : <100,000 t, ferruginous occurrences which may have a metallogenic interest.
- 4/ According to the genesis of the mineralization (origin): the mineral concentrations that give genesis of deposits are at the origin of various geological processes (magmatic, metamorphic and sedimentary). Some are formed at very high temperatures, deep within the Earth's crust, others at low temperatures, on the surface of the Earth.

4.1/ *Metasomatic/hydrothermal origin*: hydrothermal (metasomatic) deposits are formed from different substitution processes. Example: the deposits of Ouenza, Boukhadra, Bou Amrane, Timezrit, PK, etc.

4.2/ *Sedimentary origin*: (a) *Banded iron Formation (BIF) deposits* are sedimentary rocks rich in iron, represented by millimetric to centimetric layers (e.g., In Ouzzal, Gour Emellalen, etc.). (b) *Oolitic iron deposits* formed in neritic shallow marine environments, they are the most developed in southern Algeria (e.g., Gara Djebilet, Mechri A. Aziz, etc.).

5/ According to the types of deposits and the morphology of the ore bodies:

- Segregation deposits associated with volcanic acid rocks: located in the granite and microgranite complex (e.g., Ain Sedma),
- Magnetite skarn deposits in metamorphic rocks (e.g., Bou Hamra, Edough, etc.),
- Vein deposits (siderite veins): presented by peri-diapiric deposits at the Algerian-Tunisian borders, (e.g., Ouenza, Boukhadra, etc.),
- Substitution deposits in carbonate rocks (e.g., Sidi Maarouf, Tissimiran, etc.),
- Karstic deposits (Anini),
- Reworking deposits, residual, or due to non-thermal infiltration waters.



Fig. 2. Iron mineralization of Ain Sadma - abandoned mine (Skikda) Fig. 3. Oolitic Iron mineralization of Ain Babouche mine (Tebessa)

iii/ Geographical distribution of iron in Algeria: more than 330 deposits and ferruginous occurrences have been inventoried on the national territory. These include, as an indication, from North to South:

- Kabyle Basement: 98 (79 deposits and occurrences, and 19 abandoned iron mines),
- Tellian Atlas: 119 (02 mining activities, 02 projects, 72 deposits and occurrences, and 43 abandoned iron mines),
- Highlands: 21 (19 deposits and occurrences, and 02 abandoned iron mines),
- Saharan Atlas: 52 (05 mining activities, 02 projects, 44 deposits and occurrences, and one abandoned iron mine),
- Saharan Platform: 32 (02 projects and more than 30 iron occurrences).



Fig. 4. Iron mineralization of Sidi Maarouf - abandoned mine (Jijel) Fig. 5. Iron mineralization of Anini mine (Setif).

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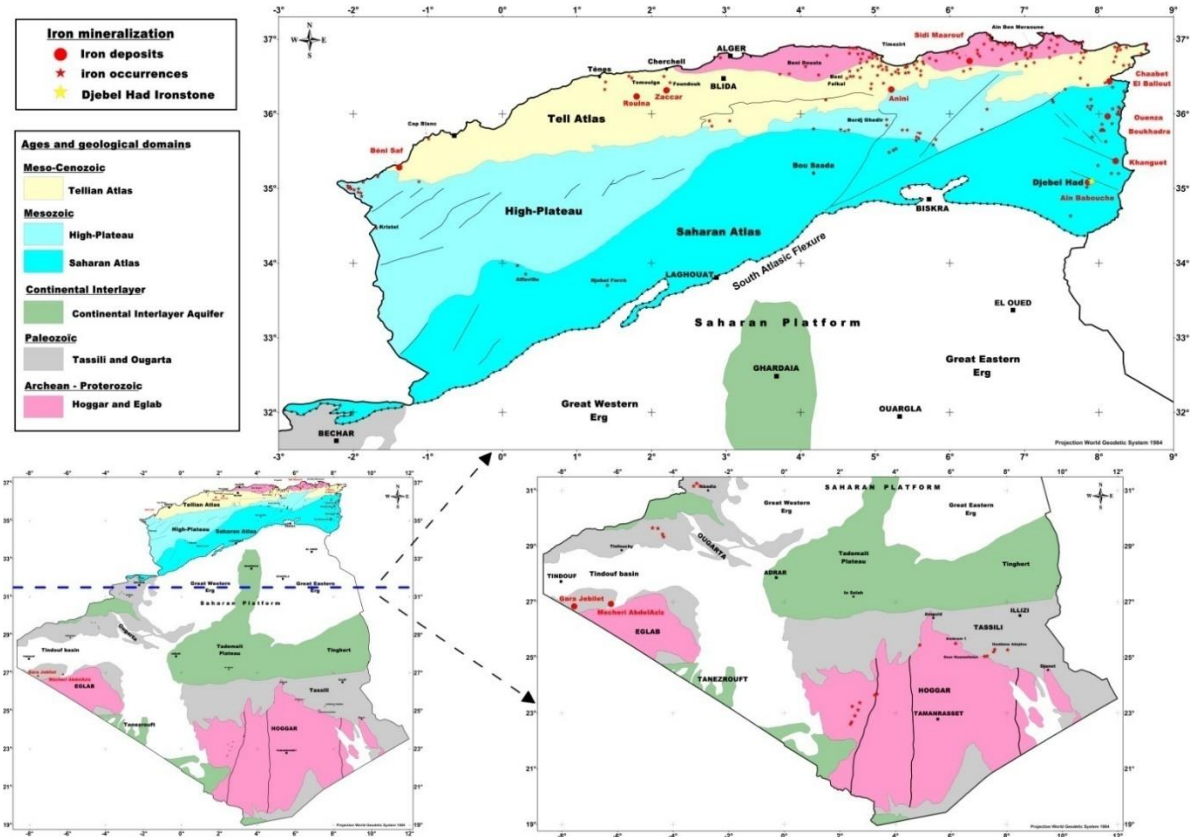


Fig. 6. Geological map indicating the distribution and the location of iron ore deposits and occurrences in Algeria.