

# MINERAL POTENTIAL OF ALGERIA

## I. GEOLOGICAL AND STRUCTURAL FRAMEWORK OF ALGERIA

Due to its position in the north west of Africa, Algeria shows geological and structural characteristics of the African continent and of the south of Europe (Mediterranean).

It is constituted by several geological megastructures represented by:

- The Tellian area, part of the Alpines chain, and its front countries,
- The Saharan platform and sedimentary basins,
- The Archean and Proterozoic basement of the Hoggar,
- The Eburnean base represented by the massive Eglab part of the West African craton,
- The Hercynian chain Ougarta with Proterozoic buttonholes, Sebkhah El Mellah, Damrane, Guettara- BetTouraris and further north and Boukaïs TheniaZerga.

The Alpine field is attached to the African area (the Saharan platform) via a major accident, called "**Atlas South Accident**". This accident is formed by a set of small cracks in steps oriented along the NE direction.

All over the territory, one dismembers the following structural domains:

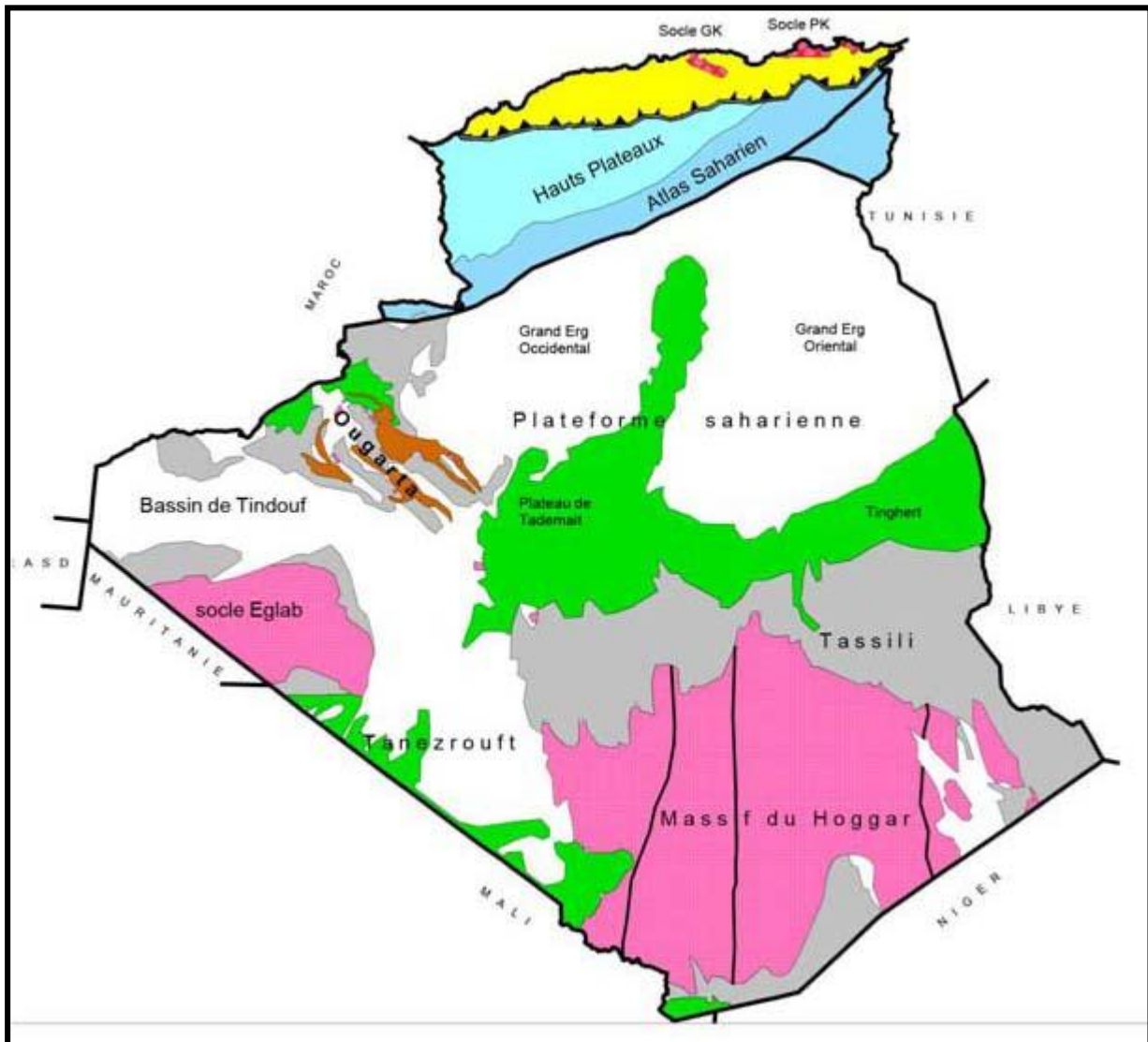
□ **The Tellian area**, limited to the south by forwards African countries, includes three areas:

- The internal domain, characterized by cristallophyllian sedimentary formations and little or not metamorphosed and its hedging or Dorsal Kabyle.
- The area of Mauritanian flyschs - massylien
- The tello Rif external domain (Tellian furrow) constituted by a stack of overlapping sheets to the south and on the front country of Cretaceous to Paleogene ages.

□ **The front countries autochthonous and para- autochthonous**

They run alongside the Tellian area to the South and consist of thick sedimentary series of Mesozoic age. Carbonate formations, often dolomitic are widely developed. They are rigid breakwater that has more or less resisted the Alpine compressions. These are common areas of the Highlands and the Saharan Atlas.

**The northern zone is characterized by** magmatic activity occurred between the Early Miocene (Burdigalian) and Middle Miocene (the Langhian), with establishment of volcano-plutonic complex to calc-alkaline trend (Cap Edough iron, Cape Bougaroun, El Aouana, Oued Amizour, M'Sirda, etc.) represented by at least 14 buttonholes on the Mediterranean coast;



#### □ BECHAR AND OUGARTA REGION

It is located in the western part of the Saharan platform. It is characterized by volcano-sedimentary formations (tuffs and greywacke) and volcanic (andesite, dacite and rhyolite) assigned to the Neoproterozoic and on which unconformably overlies Paleozoic series. This Paleozoic cover corresponds to an accumulation of powerful terrigenous and carbonate formations ranging from Cambrian to Carboniferous.

The Paleozoic formations, pleated during the Hercynian phase have Proterozoic nuclei represented by the massifs of Damrane, Guettara, Betouaris, Boukhbaisset and Sebkhât El Mellah. It is characterized by three structural floors separated by major discrepancies.

The pelitic series, being flush with the Damrane, separated by an angular structural unconformity and the andésito-basalt series. It would be equivalent to that which is known at Sebkhat El Mellah.

- The rhyolitic series (Guettara, Betouaris, Boukhbaisset) relies on the structural mismatch andésito-basalt series.
- The arkosic quartzite and Cambrian series based on different terms of Proterozoic.

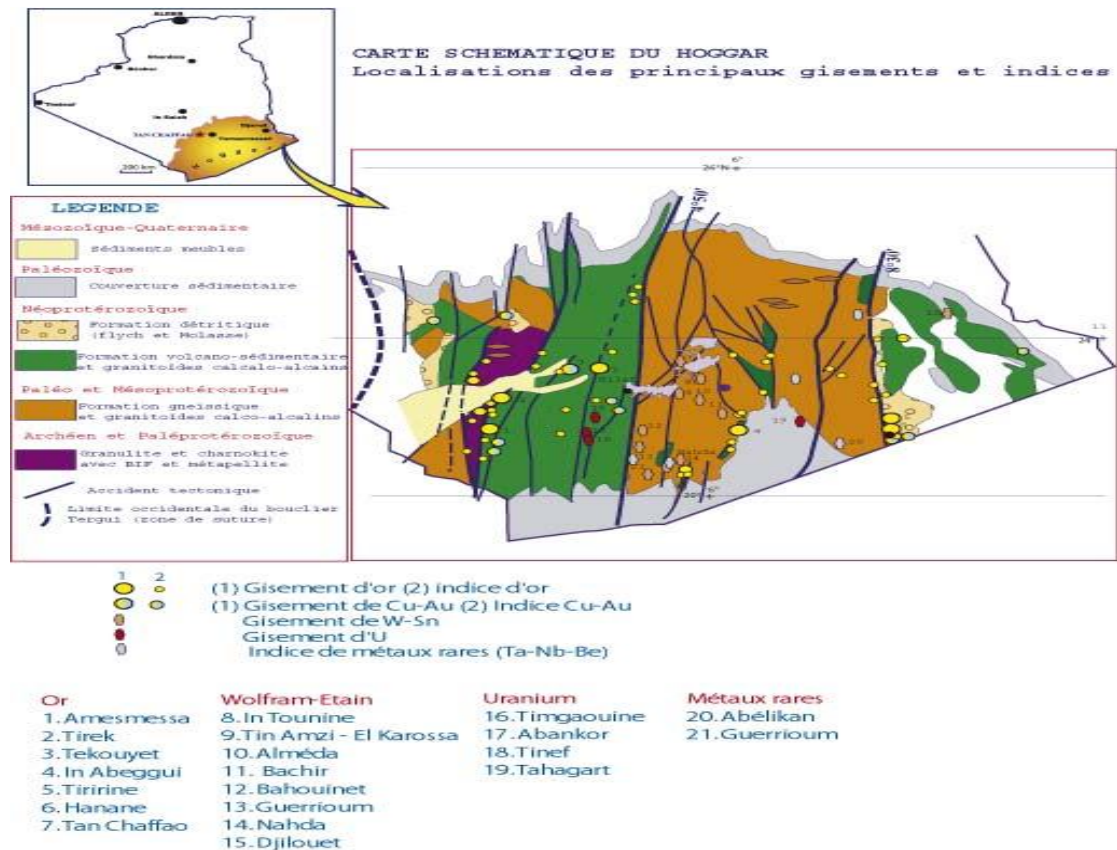
## □ HOGGAR MASSIF

It is subdivided into three structural domains separated by NS deep faults called 4 °50 and 8° 30. One distinguishes from west to East:

1. **The western Hoggar**, where flush with a chain said Pharusian comprising two branches (western and eastern) separated by the Archean granulite mole In Ouzal. This chain consists of two volcano-sedimentary series of Neoproterozoic age (lower Pharusian and upper Pharusian) intruded by a highly developed orogenic plutonism. These series are based on a gneissic basement of the lower Paleoproterozoic and series of platform (Ahnet series and stromatolites series). The assembly is covered by a large sandstone (purple series) which closes the Pan African orogenic cycle.

2. **The central Hoggar**, said polycyclic, dominated by gneissic sets of the lower Paleo-Proterozoic (series of Arechchoum and Aleksod) unconformably covered by volcano-sedimentary pharusian series (Arefsa, Aleksod and Sérouenout). These series are affected by the Pan-African tectonic and largely intruded by granitic batholith syn-orogenic.

3. **The oriental Hoggar**: It is characterized by two different structural domains. The Taffassasset - Djanet block and Tiririne chain. The latter includes a series detrital (mudstones and conglomerates) and is set up along the accident 8 ° 30 '. The Taffassasset- Djanet block consists of a large number of orogenic granitoid batholith intrusive of unknown age in a metasedimentary sequence.



### ❑ MASSIF of Eglab

It represents the northernmost outcrop of the West African craton in the South West of Algeria. It is a permanent base since Eburnean (2 billion years ago). This Algerian craton is divided into Yetti area, west, and east Eglab area, a major discontinuity called seam zone Yetti - Eglab.

It is characterized by several series defined in two areas:

- **Series and granites of Chegga;**
- **The Series of Yeti,**
- **The Series of Oued Sousset of Akil and Deilel);**
- **The Series of Guelb El Hadid;**
- **The series of Hank.**

It is also characterized by plutonic complex says "All", and a volcanism called Aftout and Eglab.

## II. GEOLOGICAL INFRASTRUCTURE

The various geological and mining research work and campaigns financed by the State allowed (i) to have a large base of geological infrastructure and (ii) many discoveries and deposits. Thus the following documents has been consulted:

- ✓ 140 geological maps of 1/200 000 scale in the massifs of the Hoggar and Eglab,
- ✓ 41 maps at 1/200 000 of north of the country
- ✓ 33 synthesis maps to 1/500 000
- ✓ 170 maps to 1/ 50 000
- ✓ Numerous metallogenic studies and synthesis, gîtologiques, geophysical and metallic and non-metallic minerals from all regions of the country;
- ✓ hydrogeological synthesis and studies of aquifer basins of Hoggar, Bechar and Tindouf;
- ✓ Aero Geophysical survey (magnetic and spectrometric aero gamma) at scales 1/200 and 1/500 000 000 of the national territory ;
- ✓ Inventory of the country's mineral resources;
- ✓ Booklets preparation and edition of 48 wilayas (with two (2) maps of nonmetallic mineral and metal substance) for each wilaya: 22 highlands are scheduled for publication in 2015 and 26 in 2016;
- ✓ maps of mineral resources of Algeria and several regions of the country;
- ✓ Creation of a national bank of geological and mining data.

## III. MINERAL RESOURCES

The many works achieved to date helped to identify and inventory the presence of mineralization following:

Precious metals: Gold, Silver

Precious and semi-precious stones: diamonds, topaz, beryl ...

Base metals: Zinc, lead, copper,

The platinum group elements (PGE) (platinum, palladium, iridium, ruthenium, rhodium, osmium) and Nickel-Cobalt

Rare metals: tungsten, tin, tantalum, niobium, beryllium,

Industrial minerals: phosphate, barite, bentonite, diatomite, magnesite, perlite, pozzolan, ornamental rocks, talc, gypsum, silica sand, etc.

These work carried out by mining research, on behalf of the State, helped highlight several deposits having totaled:

- **3 billion tons of iron ore,**
- **2000 000 000 tonnes of phosphates,**
- **More than 1 billion tons of salt,**
- **Over 100 Mln t Pb / Zn,**
- **More than 100 tons of gold,**
- **24 Mln t WO<sub>3</sub> / Sn,**
- **1.4 Mln t manganese**
- **6.3 Mln t Celestine,**
- **22 Mln t barite,**
- **6.5 Mln t kieselguhr,**
- **7 Mln t feldspar ... ..**

The discoveries made to date have helped the realization of the tendering activities by the agency of mining activities (ANAM) since 2000. Several other deposits in various substances are still in the portfolio, awaiting invitation to tender for development and enhancement: lead-zinc, gold, wolfram-tin, semi precious stones, gypsum, calcium carbonate, silica sand ...

Several other deposits of calcium carbonate, phosphate, barite, gold, bentonite, feldspar, diatomite ... are being developed by companies in the sector to reduce imports.

The geological and geodynamic analysis of the various geological and structural assemblies inventoried in the country showed that the induced gene metallo phenomena may have generated mineral concentrations of different types of mineralization that have yielded significant deposits elsewhere in the world:

- **The volcano-sedimentary and shearzone types** for gold and copper-gold;
- The **type VMS** (volcanic massive sulphide environment) that enables the production of a wide range of products: basic metals and precious.
- **Porphyry and volcano-sedimentary types** contributing 70% of world copper production. The porphyry type itself provides 50-60% of the world production of copper and 99% molybdenum. It is an important source of rhenium;
- **Mississippi Valley Type (MVT)** involved in the production of base metals for 25% of world production of Pb-Zn;
- The copper deposits associated with mudstones (**shales and copper redbed**) and provide 27% of world production;
- Deposits of **SEDEX-type (sedimentary exhalative)** sometimes called "deposits hosted in shales". This type supplied 40% Zn and 60% Pb in the world;
- The **hydrothermal deposits type** that form deposits of several metallic and nonmetallic substances;
- **Skarn deposits** type that are worldwide a major source of tungsten, copper, iron, molybdenum, zinc (lead) and gold;
- **The rare metals (Zr nb- Be -Your ..) and rare earth** related to carbonatite and hyperalkaline rocks associated with acid intrusions in a closed system;
- **PGE Mineralization group** in mineralized horizon (cumulate type or Bushveld-type);
- **The diamond** in **primary** deposits commonly associated with kimberlites, lamproites and various basaltic and secondary rocks related to alluvial deposits.

Based on these studies, a significant exploration program of a lot of these substances (rare earths, gold, phosphates, iron, ....) with high added value is in progress to identify new prospects.



Ministère de l'Industrie et des Mines  
Agence du service géologique de l'Algérie  
Division des ressources minérales

## Carte des ressources minérales de l'Algérie

### خريطة الموارد المعدنية للجزائر Carte des ressources minérales de l'Algérie

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**Documents consultés:**  
Fonds géologique simplifié par l'acteur 8 issu de la carte géologique de l'Algérie (1:2 100 000) compilée par S. GAZEM sur la base des principales cartes suivantes:

\* Carte géologique de l'Afrique du Nord à 1:5 000 000 (J. FAHRE, 1973, Editions SNEDEC).  
\* Carte géologique de l'Algérie à 1:500 000 (E. MOUTOU, 1953).  
\* Carte géologique du massif Eglab et de la bordure nord du Yfès à 1:500 000 (J. M. BUFFET, J. C. FATHY et J. P. PAIN, 1985)

**Données minérales:** Catalogue des gîtes élaboré par l'Agence du service géologique de l'Algérie sur la base des travaux réalisés sur fonds publics par les entreprises de recherche minière : SONAREM, EREM et ORGM.

#### Légende lithostratigraphique

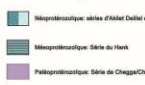
##### Atlas tellien et saharien



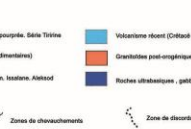
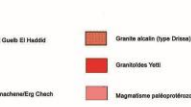
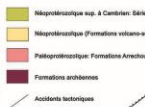
##### Ougarta et plateforme



##### Socle des Eglab



##### Bouclier du Hoggar



#### Légende des gîtes



#### Echelle



Projection: Lat/Long (WGS84)