MAURITANIA

Geography

Mauritania is located on the north-west coast of Africa. The country is generally flat, with arid plains broken by occasional ridges and cliff-like outcrops. A series of scarps face south-west, longitudinally bisecting these plains in the centre of the country. The scarps also separate a series of sandstone plateaux, the highest of which is the Adrar Plateau, which attains an elevation of 500 m. Isolated peaks, often rich in minerals, rise above these plateaux. The concentric Guelb er Richat (also known as the Richat Structure) is a prominent feature of the north central region. Kediet Ijill, near the city of Zouïrât, has an elevation of 1000 m and is the highest point. Approximately three quarters of Mauritania is desert or semi-desert. To the west, between the ocean and the plateaux, are alternating areas of clayey plains and sand dunes. Most of the population depends on agriculture and livestock for a livelihood. Mauritania has extensive deposits of iron ore, which account for almost 50% of total exports [1].

Geology

Mauritania forms part of the African Plate and, geologically, can be subdivided into four major domains (Figure 1):

(i) The Archaean Reguibat Shield in the north of the country, which continues into both southern Morocco and Algeria;
(ii) The Neoproterozoic N–S striking Mauritanide Belt, folded and thrust during the Variscan Orogeny;
(iii) The Taoudeni Basin, with predominant continental sediments of Neoproterozoic–Phanerozoic age covering most of central and southern Mauritania;
(iv) Parts of the Senegal Basin in the south-west of the country, which have marine sediments of Jurassic–Recent age. Sand dunes cover about 50% of Mauritania and form an extensive peneplain studded with inselbergs over the folded belts [2].

Several companies are currently exploring for uranium in Mauritania. In December 2007, Forte Energy NL completed its first drilling programme, a 4006 m reverse circulation drilling campaign of 41 holes, each of 50–150 m depth. The drilling was carried out in the Bir en Nar area of the Zednes region and followed up on the high grade results previously recorded. Downhole radiometric logging results indicated numerous high-grade uranium intersections, including 1.55 m at 1.55% U.

Uranium exploration

The first uranium exploration project in Mauritania was carried out in 1959 by France’s Atomic Energy Commission (CEA) in the area of the Ogmone Anticline.

In 1972, following the discoveries of surficial type uranium deposits in Western Australia, uranium exploration was initiated in the Reguibat Shield by Total Compagnie Française de Pétrole (in joint venture with the Société Mauritanienne de Recherches Minières, the French Atomic Energy Commission (CEA) and the Tokyo Uranium Development Company). The two exploration permits covered a total area of 164 000 km², divided into four blocks (Chami, Bir Hogrein, Nouadhibou and Ghallamane). In 1975, the total area was reduced to five blocks totalling 41 000 km². These joint ventures were modified after the foundation of Minatome SA (subsidiary of Total) and Compagnie Générale des Matières Nucléaires.

The joint ventures held the areas up until 1983. Work on the permits was carried out between 1972 and 1975 and again in 1981 and targeted the evaluation of surficial type deposits (Reguibat Shield), as well as occurrences in the Precambrian basement, where radioactive anomalies were found associated with
syenites and granites (Bir en Nar, Tigismat, Tenebdar). In 1983, all uranium exploration activities were suspended.

More recent exploration activities

The United Kingdom’s Alba Mineral Resources is investigating the uranium potential of areas located in north-east Mauritania. The area is considered prospective for unconformity-type uranium mineralization. The permits cover significant areas of an unconformable contact between Early Proterozoic reworked granitic terrain and overlying sediments of Late Proterozoic–Carboniferous age. Airborne geophysics surveys, flown on behalf of the Government of Mauritania, reveal radiometric anomalies within a mapped, organic-rich unit near the base of this sedimentary sequence, and coincident with its intersection with large, deep penetrating crustal shear structures. Uranium mineralization has been recorded in the north and north-west part of the permit area, hosted by granites and rhyolites that have been cut by these shear structures [3, 4].

Forte Energy NL, based in Australia, holds several uranium exploration licences in Mauritania, including the A 238 and Bir En Ar areas. The A 238 and Bir En Ar, which are associated with granites near Bir Moghrein in the north of Mauritania.

Following the positive results of the 2009/10 reverse circulation drilling, a further drilling programme of 10 450 m of RC and diamond core drilling commenced in October 2010, focusing initially on the A 238 project. Preliminary results indicated the potential for a shallow, medium-grade deposit. In June 2011, an initial JORC code compliant U resource of 26.5 Mt at 217 ppm U (0.022% U) for 5 730 tU (85 ppm U cut-off).
In 2011/2012, a further 63 holes (8 567 m) of reverse circulation drilling was completed, and an updated JORC resource was announced in April 2012.

In 2015, Forte Energy was delisted and its leases in Mauritania expired. [5]

Australia’s Aura Energy owns the Tiris Project (previously known as the Reguibat project) which comprises several developments of calcrete uranium mineralisation in northern Mauritania. Between November 2010 and February 2011, Aura Energy completed a drilling programme that totalled over 9 100 m in 2 022 holes.

In 2014, extensive radiometric surveys allowed Aura Energy to estimate an exploration target of an additional 19 000 tU, inferring a total mineral resource target of around 38 000 tU at Reguibat.

In 2015, the project progressed to the Definitive Feasibility Study stage. The Tiris Project has an initial production profile up to 385 tU per annum with a life of mine over 15 years.

In 2015–2016, Aura Energy continued to conduct test-work and validation work aimed at defining optimal methods for the recovery of uranium. Additional exploration works were completed, including downhole gamma logging, disequilibrium test-work, trenching, and detailed ground radiometric surveying. In 2017, Aura continued the Tiris Feasibility Study, including mining lease application, resource definition, geophysics for the definition of water resources and drilling, metallurgical progress on test work, simulation and flowsheet development, early-stage engineering, completion of an Environment and Social Impact Assessment, and a community consultation process. A program of ground radiometric surveying was carried out over all Tiris uranium resource zones. The Environmental and Social Impact Assessment (ESIA) was completed in 2017, and was approved by the Mauritanian Government on 5th October 2017. In 2018, field activities focused on the Tiris project where an extensive drilling program was conducted to upgrade a substantial part of the Inferred uranium resource to the Measured and Indicated Resource categories, in particular within the Hippolyte and Lazare deposits, where mining could commence. The program involved 7 900 m of air-core drilling in 1 428 drill holes. Fifty-two diamond drill holes were completed to provide validation of downhole gamma logging results and to provide density information [5].

**Uranium resources**

In 1983, IUREP estimated Mauritania’s speculative resources to be 1000–10 000 tU, hosted in sandstone and vein type environments [6].

Forte Energy (now Bos Global Holdings) published resources in its 2013 annual report for 3 deposits in the Bir en Nar area. The largest one, A 238-A 238 NW contains 8999 t U at an average grade of 205 ppm in granite-derived metasomatites [7]. The project is dormant.

Aura Energy Ltd started exploration on its Reguibat project in 2009 and following two drilling campaigns published a JORC compliant resource estimate in 2011: 19 327 t U at 280 ppm within 8 surficial lacustrine-playa deposits. Carnotite is the main uranium mineral [8].

As of 1 January 2017, in situ reasonably assured resources and inferred resources, in the < US$ 260/kgU cost category, amount to 1200 tU and 27 500 tU respectively [9].

Following the 2017 drilling campaign, Aura Energy released a new JORC code compliant resource estimation dated 30 April 2018. Based on an 85 ppm U cut-off, global resources of for the Tiris project total 6 576 tU in the measured + indicated categories, and 13 346 tU in the inferred category (in situ resources) [5].
Potential for new discoveries

Areas in north-east Mauritania, where unconformable contacts are known between Early Proterozoic reworked granitic terrains and overlying sediments of Late Proterozoic–Carboniferous age, can be considered prospective for unconformity-type uranium mineralization.

Uranium mineralization is known in the north and north-west of Mauritania where it is hosted by granites and rhyolites cut by shear structures.

Comments

There has been no uranium production in Mauritania.

On 29 July 2019, Aura released the results of the Definitive Feasibility Study, which confirmed that the Tiris Uranium Project is a low cost and low operating cost development. The project is designed to support an open-pit mine and produce 310–425 tU per year for over 15 years. Two exploitation licences were granted to Tiris Ressources SA on 8 February 2019 [5].

Mauritania has no plans to develop nuclear generating capacity and, consequently, has no uranium requirements.

References