

## Industrial Minerals Potentials of Ijero Pegmatite in Ekiti State, Southwestern Nigeria

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**Abstract:** Nigeria pegmatites are concentrated in a 400km NE-SW trending belt of which Ijero pegmatite is inclusive. Ijero pegmatite is wholly crystalline igneous rock located in about 50km NW of Ado-Ekiti with coordinates 7°49' N and 5°5'E and is mineralized. The Industrial minerals found here after mapping and sampling 12 mining pits includes minerals typically found in igneous rocks (such as granites) which are now actively mined by local miners, these includes: feldspar, sheet mica, tantalum-niobium, lithium minerals and gemstones. The granite within the intrusive is rich in garnets (Garnetiferous granite). These minerals can be harnessed by the government of Ekiti state, which will be a source of employment. It will also serve to increase the Internally Generated Revenue (*IGR*) base of the state.

**Key words:** Pegmatite • Industrial minerals • Ijero • Ekiti state

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### INTRODUCTION

The study of pegmatite belts globally has increased because of its attractive economic potential. Over the years, as the government of Nigeria sought to reduce the reliance of the country's economy on the Niger Delta oil, the tempo on the study of solid minerals pegmatites has increased. Earlier before this trend, Jacobson and Webb [1] studied the pegmatites of Nigeria and noted that they are concentrated along a 400km NE-SW trending belt. Matheis and Caen [2] further studied the pegmatites of the Pan African reactivation zone covering areas like Egbe, Ijero and Wamba, Southwestern Nigeria. In their research work, they were able to distinguish between the barren and mineralized pegmatite. Recently, other workers who studied the mineralized pegmatites in the Southwestern of Nigeria such as [3, 4] concentrated on the geochemical exploration for Sn-Nb-Ta (Tin, Niobium and Tantalum). Okunlola and Jimba [5] carried out petrographic and geochemical evaluation of pegmatite bodies around Aramoko, Ara and Ijero area and concluded that majority of the samples are lepidolite subclass and magmatic pegmatite while some pegmatite bodies may have undergone mild post-magmatic alteration especially those outcropping around Ijero area. Akintola [6], found out from whole rock analysis that muscovite

extract samples of Ago-Iwoyeppegmatites have values that are significantly lower than the averages for the rare metal pegmatites of Ijero-Aramoko-Ara.

The Ijero Pegmatite belongs to the industrial mineral groups that form from igneous processes which include many pegmatite minerals, such as muscovite, feldspars, tourmaline and beryl. Indeed, Nigeria is endowed beyond imagination with choice minerals that could be explored (MSMD, 1999) [7].

**Regional Geological Setting:** The Ijero area belongs to the Basement Complex of South Western Nigeria. The Basement Complex forms an important domain of the pan-African mobile belt east of the West African Craton. The mobile belt extends from the hogger through air, Adrar des iforas and gourn (Algeria) to the Dahomeyides and Cameroon. The Dahomeyides fold belt constitute the Southern margin of West Africa craton east wards, three major tectonic domains are present: the voltaic foreland basin in sedimentary sequences, the Beninian thrust and fold belt and the Nigeria high grade migmatite gneiss terrain Affaton *et al.* [8].

The Ijero pegmatite areas are hosted by three distinct petrologic units: Medium to high grade polytic gneisses, low pressure amphibolites and granitic rocks (Figure 1).

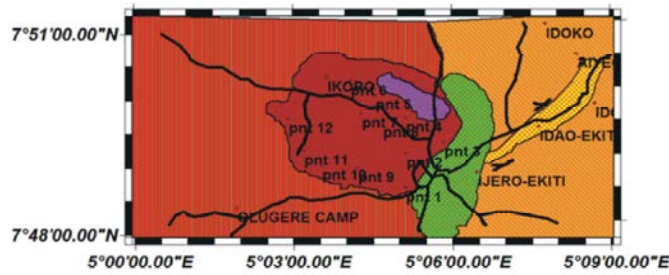


FIG. 1: THE GEOLOGICAL, LOCATION AND ACCESSIBILITY MAPS OF THE STUDY AREA

1cm:1km

KEY/LEGEND

- SCHIST INTERCALATED WITH PEGMATITE
- UNDIFFERENTIATED SCHIST
- PEGMATITE
- GRANITE
- GRANITE GNEISS
- QUARTZITE



Fig. 1: The pegmatite stretches about 2km Northwest of Ijero from the tripartite junction of Ijero, Ipoti and Ikororo roads

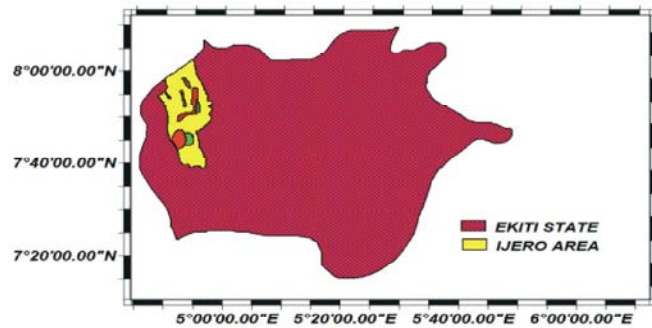


FIG. 2: GEOLOGICAL MAP OF IJERO AREA, EKITI STATE

1cm:10km

KEY/LEGEND

- PORPHYRITIC GRANITE
- SCHIST INTERCALATED WITH PEGMATITE
- QUARTZITE
- UNDIFFERENTIATED PORPHYRITIC GRANITE

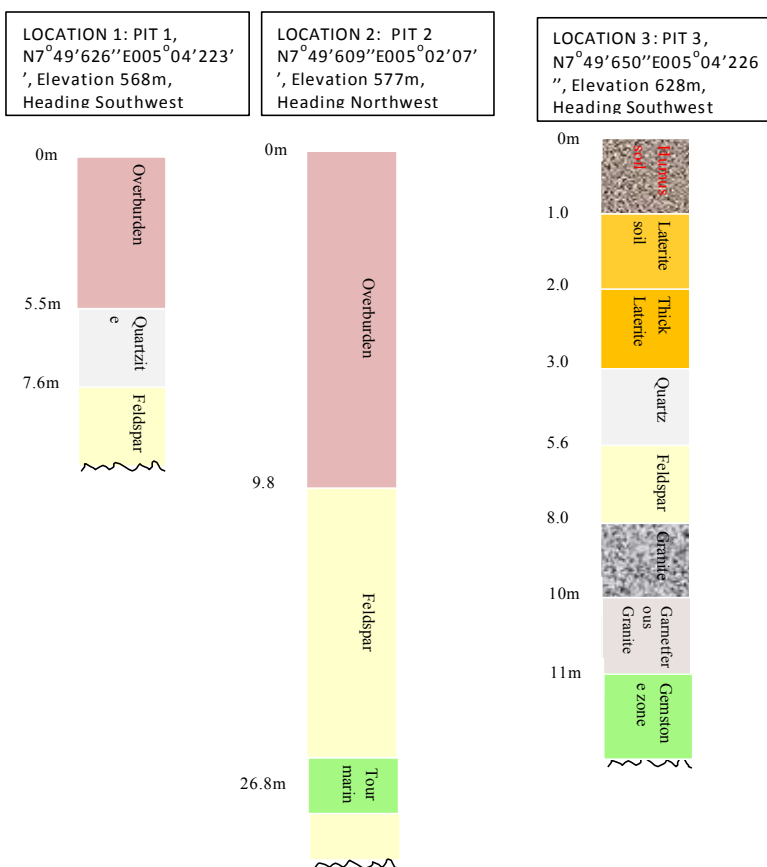


Fig. 2: Brief Description Some Industrial Minerals Locally Mined From The Ijero Pegmatite Ridge

**Migmatite and Gneisses:** Migmatite are by far the most widespread group of rocks and form the background in which all other basement rock seems to occur. Banded gneiss is one of the most abundant types in ijero area but migmatites in which schistose and gneissose rocks has dissected into irregular blocks of quartz feldspar dykes and pegmatites are also common Grant, [9].

**Quartz and Quartz Schist:** The most obvious of the metasedimentary rocks are the quartzite. They form very impressive ridges in the field and their texture varies from one massive quartzite to quartz schist.

**Muscovite:** Muscovite is commonly present as fine flakes and some of the schist are rich in this minerals. Other minerals associated with the quartzite are tourmaline,



sillimanite and hematite. No comprehensive study of the quartzite has been carried out, but at least two types of quartzite seem to be present [10].

**Location of Studied Area:** Ijero pegmatite occurs within the schist belt which lies within the Precambrian Basement Complex rocks of South Western Nigeria (Fig. 1). Ijero is located in about 120km NW of Ado-Ekiti the capital of Ekiti State and lies between 7°48'N to 7°51'N and 5°00'E to 5°09' (Fig. 1) on (1:100,000 Ekitisheet 244).

### MATERIALS AND METHODS

Mapping and sampling of industrial minerals from existing mining pits.

Geological investigation along the pegmatite belt of Ijero revealed the followings:

- Weathered feldspar is been mined in abundant towards Ijero/Ikoro Road.
- Kaolin is mined.
- Gemstone like Garnet, Beryl, Tourmaline (black, green, purple, red) is mined on the pegmatite ridge.

- The pegmatite occurs as ridge and lowland. It consists of feldspar, quartz, micas (muscovite).

### Brief Description of Rock Lithologies on Ijero Pegmatite Ridge

**Schist:** This is a crystalline metamorphic rock composed of more than 50% tabular and elongated minerals which are coarse in grain size. It has a tendency to split into layers and has foliated structure (schistosity). From hand specimen the common minerals are mica and hornblende. (O.A. Okunlola and O. Ogedengbe, [11].

**Intrusive Granite:** The granite forms low ridges with prominent exposure. The granite bodies carry xenolithic inclusions of schist and amphibolites. They are coarse grained and consist essentially of quartz, microcline, oligoclase and biotite with muscovite. (Okunlola and Ogedengbe [11].

**Granite Gneiss:** The granitic gneiss is generally fine to medium-grained rock. It is weakly foliated and contains quartz and oligoclase feldspar with minor biotite and muscovite and accessory minerals such as magnetite and chlorite. I.B. Odeyemi, [12].



Fig. 3: Pit 1



Fig. 4: Pit 2



Fig. 5: Quartzite in Ijero area



Fig. 6: Part of pit 3



Fig. 7: Opening to a Feldspar mining site

**Quartzite:** The quartzite is linearly disposed and sandwiched between the gneisses stretching from Aiyegunle to Idao in the north eastern part of the study area. I.B. Odeyemi, [12].



Fig. 8: Local Feldspar miners at a packaging site



Fig. 9: Locally made conveyor at Feldspar mining site



Fig. 10: Feldspar mining site 1



Fig. 11: Feldspar mining site 2











Fig. 12: Feldspar mining pit

#### **Industrial Minerals in Ijero Pegmatite**

#### **Stratigraphic Columns of Some Selected Local Miner**

**Pits:** In this study twelve local miner pits were reviewed. The depth ranges between 5m to 20m. Pits 1-3 were dug mainly for searching for various types of gemstone.

Table 1: Industrial Raw Materials of the Pegmatite, location and end users

S/N	Economic Rocks and Minerals	Locations	End Use
1.	<i>Quartz</i> 	North East, central part of study area (Picture of Quart sample associated with Feldspar from pit 1 and 2).	Recommended glasses, clock, Jewelries
2.	<i>Feldspar</i> 	North East of Ijero and Ijero Ikoro road (Picture of Pink Feldspar sample from mining site 2. Fig. 11 also)	Glass industry, ceramics, pharmaceutical, soap and cleansing powders
3.	<i>Mica (muscovite)</i> 	North East of study area (Picture of Mica sample from pit 1. Fig. 3)	Electrical industry, Drilling ingredient in boreholes
4.	<i>Tourmarine</i> 	North East of study area (Picture of Tourmarine sample from pit 2. Fig. 4 also)	Jewelries and ornamentals
5.	<i>Beryl, aquamarine</i> 	Ijero-Ikoro road (Picture of Beryl found in association with Feldspar. Pits 9, 10, 11 and 12 (Fig. 1)	Jewelries and ornamentals
6.	<i>Garnet</i> 	Within the granitic suite (Picture of Garnet (dark red) in Granite sample from Pit 4).	Jewelries, ornamentals and abrasives
7.	<i>Granite</i> 	On Ijero-Ikoro road (Picture of White Granite sample with speckles of Garnet from pit 4).	Construction purposes
8.	<i>Kaolin</i> 	Ijero-Ikoro road (Picture of kaolin found in association with Feldspar in Pit 12 (Fig. 1 and Fig. 12))	Coating tablets, functional filter, extender in paper industries, ceramic raw material

Source: Pictures of mineral samples taken from mining pits at Ijero Pegmatite ridge

Pits 4-8 on Ijero –Ikoro road are the areas for production of feldspars for glass industry. Pits 9-12 are for searching for beryl and aquamarines gemstones.

**Mining Site and Pits:** Around the pegmatite ridge are about five different mining sites belonging to the locals. These include three different sites where gem stones are mined (pits 1 to 3) and two different sites where feldspar are mined.

## RESULTS AND DISCUSSIONS

The Ijero pegmatite is a dyke associated with larger igneous and metamorphic masses. The pegmatite consists of the feldspar, quartz and mica. Gemstone like beryl, aquamarine, garnet, tourmaline (green, purple and red) are mined by local miners. The weathered feldspar in the central part of the ridge is been mined by various investors. The method of mining is by open cast method and final product is by local sieving. The products are packaged in fifty kilogram bags and sold to buyers in tons which are transported to bottle making factories in Lagos and Delta State. These efforts have created lots of employment opportunities for the Ijero community and others from various places in Ekiti State. The success of

gemstone miners in the area has attracted more miners and buyers from across Nigeria and far away West Africa countries. The granite is being quarried for construction purposes. The mica is being mined and buyers come from various places like Port Harcourt, Lagos and Ibadan. Part of the revenue generation for Ijero-local government and Ekiti State comes from this rich pegmatite.

## CONCLUSIONS

To improve the economy of Ekiti State, the State government should harness all the mineral resources that attract foreign investors to her, thereby generating more employment for teeming unemployed youths. It will also serve to increase the Internally Generated Revenue (IGR) base of the state.

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#### REFERENCES

1. Jacobson, R.R.E. and J.S. Webbs, 1946. "The Pegmatite of Central Nigeria. Geological Survey Nigeria Bulletin", 17: 40-61.
2. Matheis, G. and V. Caen, 1983. "Rb-Sr isotopic study of rare metal bearing and barren pegmatites in the Pan-African reactivation zone of Nigeria". *Journal of Africa Earth Sciences*, 1: 35-40.
3. Matheis, G. and W.O. Emofurieta, 1987. "Nigerian Rare metal pegmatites and their lithological framework". *J. Geol.*, 22: 271-291.
4. Garba, I., 2003. "Geochemical Discrimination of Newly Discovered Rare Metal Bearing and Barren Pegmatites in the Pan-African (600 +150 ma) Basement of Northern Nigeria". *Applied Earth Science Transaction Institute Of Mining And Metallurgy*, 13: 112.
5. Okunlola, A.O. and S. Jimba, 2006. "Compositional Trends in Relation to Tantalum-Niobium Mineralization in Precambrian pegmatites of Aramoko-Ara-Ijero Area, Southwestern Nigeria". *Journal of Mining and Geology*, 42: 113-126.
6. Akintola, 2012. "Compositional Features of Precambrian pegmatites of Ago-Iwoye Area South Western". *Nigeria Journal of Ecology and the Natural Environment*, 4(3): 71-87.
7. MSMD (Ministry of Solid Minerals Development), 1999. "An Inventory of Solid Minerals in Nigeria". GSN Press.
8. Affaton, P., M.A. Rahaman, R. Trompete and J. Soughy, 1991. *The Dahomeyide Orogeny: Tectonothermal Evolution and Relationships With The Volta Basin*. In: R.D. Dallmeyer and J.P Lécorché J.P. (Eds.), *The West African Orogens and Circum-Atlantic Correlatives*. IUGS-IGCP-UNESCO Project233, Springer-Verlag, pp: 107-122.
9. Grant, N.K., 1969. "The Late Precambrian to Early Paleozoic Pan-African Orogeny in Ghana, Togo, Dahomey and Nigeria". *Bulletin of Geological Society of America*, 80: 45-55.
10. Rahaman, M.A., 1973. "The geology of the district around Iseyin, Western state, Nigeria". Unpubl.Ph.D. Thesis Univ. of Ibadan, pp: 268.
11. Okunlola, O.A. and O. Ogedengbe, 2003. "Investment Potentials of Gemstone Occurrences in Southwestern Nigeria In: A.A. Elueze, (ed.) *Prospects for Investment in Mineral Resources of Southwestern Nigerian*", pp: 41-45.
12. Odeyemi, I.B., 1972. "The Geology of Ijero Ekiti area, Western State". B.Sc Thesis, University of Ibadan.