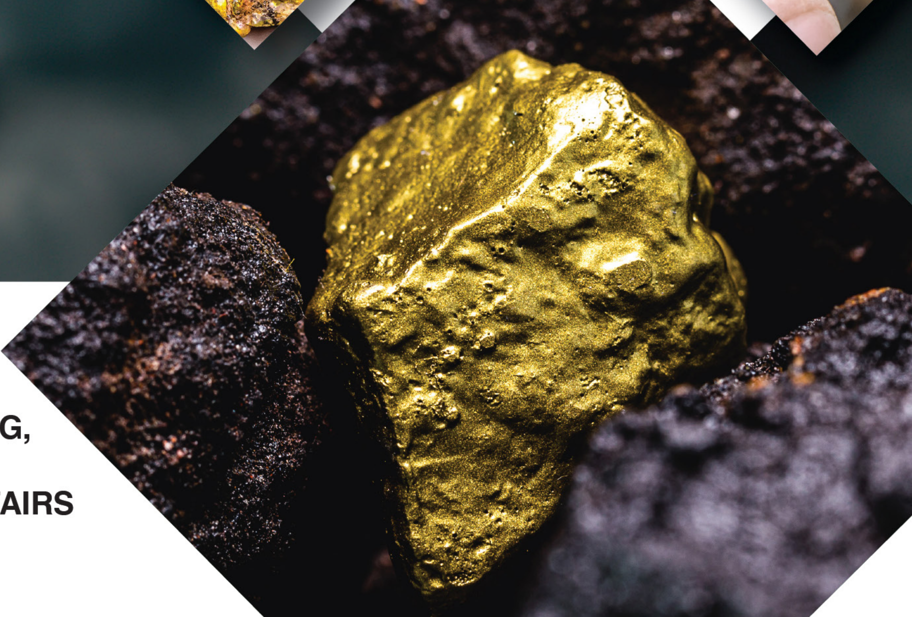
CRITICAL MINERAL *Catalogue* KENYA



REPUBLIC OF KENYA

MINISTRY OF MINING, BLUE ECONOMY AND MARITIME AFFAIRS

State Department for Mining

Summary

This mineral catalogue presents a strategic overview of selected mineral commodities of economic and critical importance globally that are found in Kenya. It highlights the geological characteristics, mineralization styles and reported occurrences of nine key minerals: copper, coltan (columbite-tantalite), rare earth elements (REEs), niobium, graphite, lithium, chromium, nickel, and uranium.

Kenya's mineral potential is underpinned by a complex and varied geological framework that includes Archean greenstone belts, the Proterozoic Mozambique Mobile Belt, Neogene sedimentary basins, and alkaline intrusive complexes. These terranes host diverse mineralization styles ranging from magmatic sulphides and pegmatite-hosted rare metals to carbonatite-associated niobium and REEs, as well as surficial uranium in calcrete environments.

The catalogue compiles verified locality data, mineralogical associations and host lithologies, serving as a preliminary reference for exploration targeting and investment prioritization. The occurrences summarized herein remain largely underexplored, with many known deposits at the reconnaissance stage. This underscores the need for integrated geological, geophysical and geochemical programmes to evaluate their resource potential and economic viability.

This catalogue aims to support the State Department of Mining and national agencies in resource planning, while also providing baseline data for investors, researchers and international development partners. It contributes toward positioning Kenya as a prospective destination for sustainable mineral exploration and development, aligned with the global transition to critical raw materials.

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Contents

Introduction

Kenya's geological framework is exceptionally diverse, shaped by complex tectonic, magmatic and sedimentary processes that span over three billion years. This rich geologic history has endowed the country with an expanse of mineral resources, ranging from strategic metals and rare earth elements (REEs) to industrial minerals and energy-critical commodities. This mineral catalogue serves as a foundational reference for reported occurrences of key economic and strategic minerals in Kenya, providing a concise synthesis of their geological setting and mineralogical characteristics.

The minerals covered herein include copper, coltan (columbite-tantalite), rare earth elements (REEs), niobium, graphite, lithium, chromium, nickel and uranium. These commodities are of growing global interest due to their vital role in renewable energy, battery technologies, electronics, construction and high-performance alloys. Kenya's potential in these minerals is underpinned by the presence of Archean greenstone belts, Proterozoic mobile belts (notably the Mozambique Belt), Neoproterozoic alkaline intrusions and Tertiary-Quaternary sedimentary basins.

Each mineral entry in this catalogue outlines a brief geological context, host rock associations, mineralization style and reported localities across various counties. This information is based on geological mapping, regional geochemical surveys, legacy exploration data and academic research. While several of the deposits remain underexplored, they collectively highlight Kenya's strategic position as an emerging frontier for critical mineral exploration and development in Africa and globally.

This catalogue is intended for use by government agencies, private sector investors, research institutions and development partners interested in resource mapping, exploration targeting and mineral policy formulation.

Copper

Figure 1: Copper mineralization at Nachola

Copper mineralization in Kenya is predominantly hosted within Precambrian terranes, particularly the Archean Nyanzian greenstone belt and the Proterozoic Mozambique Mobile Belt. Copper occurs in structurally controlled quartz veins, shear zones, and fracture systems that cut across mafic to ultramafic metavolcanics, banded iron formations, and high-grade metamorphic basement rocks.

The copper is present in both hypogene sulphide and supergene oxide assemblages. Primary sulphide phases such as chalcopyrite, bornite and pyrite are commonly observed in quartz-carbonate veins and alteration halos, while malachite, azurite, and occasionally chrysocolla dominate in the weathered zone. Some mineralization also occurs in iron oxide-copper-gold (IOCG)-style systems and sediment-hosted copper at continental red-bed sequences of younger basins such as the Lokichar Basin.

Tectonic controls, including major regional shear zones, folding, and lithological contacts, play a significant role in localizing copper mineralisation. In some cases, mineralization is associated with hydrothermal breccias, epithermal veins and the margins of intrusive bodies.

Known Localities:

	AREA	COUNTY	OCCURRENCE STYLE
1	Macalder Colonial Mines	Migori	Copper-gold mineralization within an Archean greenstone-hosted volcano-genic massive sulphide (VMS) system
2	Korr Complex	Marsabit	Quartz vein-hosted copper in high-grade gneisses and amphibolites
3	Suiyan, Masiketa, Nachola	Samburu	Disseminated and vein-type copper mineralization hosted in altered ultra-mafic rocks and metasediments, often near pegmatitic contacts and hydro-thermal alteration zones
4	Matule	Isiolo	Copper-bearing quartz veins in biotite gneisses
5	Lokichar Basin	Turkana	Sediment-hosted copper mineralization in red-bed sandstones and siltstones of the Cretaceous–Tertiary rift basin.

Chromium

Figure 2: Chromite stockpile at Dabel

Chromium mineralization is associated with ultramafic sequences, predominantly peridotites, dunites and their altered forms, serpentinites, which are mapped as fragments of ophiolitic complexes or tectonically emplaced mantle-derived rocks within the Mozambique Mobile Belt. The main ore mineral is chromite.

It occurs in two principal styles:

- Podiform chromite, forming as lenses or irregular bodies, typically hosted in strongly deformed and serpentinized ultramafic suites along shear zones and fold closures.
- Stratiform chromite, though less common, may be present in layered mafic-ultramafic intrusions with magmatic layering.

The chromite is often associated with metamorphic deformation, and many deposits show evidence of hydrothermal alteration, talc-carbonate metasomatism and intense shearing. Chromite is frequently accompanied by accessory minerals such as olivine, pyroxene and magnetite. Exploration challenges include structural complexity and variable grades caused by tectonic dismemberment of the original chromite layers.

Known Localities:

	AREA	COUNTY	OCCURRENCE STYLE
1	Kalkacha, Dudati, Raboli, Dabel	Marsabit	Chromite-bearing serpentinite rocks within the Mozambique Mobile Belt
2	Mt. Kulal Zone - Loiyangalani		Ultramafic enclaves with disseminated and vein-type chromite mineralisation
3	Kangura	Samburu	Pod-like chromite hosted in serpentinites and talc-rich schists
4	Wamba		Scattered occurrences of chromite within deformed peridotite associated with magnetite and olivine in shear-controlled pods
5	Kora	Tana River	Chromite bands in serpentinized dunites associated with talc-carbonate alteration

Nickel

Figure 3: Nickel-Copper sample collected from Masiketa in Samburu County

Nickel is primarily associated with ultramafic-mafic complexes and Archean greenstone belt remnants, largely within the Mozambique Mobile Belt and marginal Archean terranes. The mineralization characteristically occurs as disseminations or massive zones in magmatic sulphide deposits, such as pentlandite and millerite, often in association with pyrrhotite and chalcopyrite.

Some areas display potential for lateritic nickel formed through deep tropical weathering of ultramafic rocks, leading to secondary enrichment in nickel-bearing clay and oxide phases such as garnierite. Additionally, a notable geochemical correlation between nickel and copper in several localities indicates possible co-genetic magmatic or hydrothermal systems. Structural control, particularly along regional shear zones, plays a key role in the emplacement and exposure of nickel-bearing lithologies.

Known Localities:

	AREA	COUNTY	OCCURRENCE STYLE
1	Nithi	Tharaka-Nithi	Nickel-bearing ultramafic suites aligned with NNE-SSW regional shear strike
2	Mutomo, Ikutha	Kitui	Anomalous nickel values in serpentinized peridotites and talc schists; remobilized sul-phides along shear and foliation planes.
3	Ololokwe, Masiketa	Samburu	Altered ultramafic suites in contact with pegmatites in rich hydrothermal alteration zones
4	Korr Complex	Marsabit	Associated with copper disseminations in the gneisses
5	Loperot	Turkana	Indications of nickel-bearing laterites from ultramafic 'basement' rocks

Rare Earth Elements

Figure 4: Monazite from Embu

REEs in Kenya are primarily associated with alkaline igneous complexes emplaced within Proterozoic alkaline igneous complexes and carbonatite intrusions emplaced within the Mozambique Mobile Belt. Mineralization occurs in syenites, nepheline syenites and carbonatites, which exhibit significant enrichment in light REEs (LREEs) such as cerium, lanthanum and neodymium, with minor occurrences of heavy REEs (HREEs). The REE-bearing minerals include bastnäsite, monazite, and occasionally xenotime, often occurring in association with gangue minerals such as fluorite, barite, apatite and magnetite.

The REEs are hosted both in primary magmatic phases and in later hydrothermal alteration zones, particularly along dike margins and structural conduits. In several localities, extended tropical weathering of REE-bearing carbonatites and syenites has resulted in the development of secondary lateritic REE-enriched zones, which could offer low-cost extraction possibilities. Structural controls and magmatic differentiation play significant roles in concentrating REE mineralization in these complexes

Known Localities:

	AREA	COUNTY	OCCURRENCE STYLE
1	Mrima Hills	Kwale	Carbonatite-hosted LREE (Ce & La) enrichment with high thorium content
2	Ruri Hills	Homa Bay	REE mineralization in syenites and magnetite-rich carbonatites
3	Kuge-Lwala (Ruri Complex margin)	Homa Bay	REE ferrocarbonatite dikes cutting through the peripheral zones of the Ruri Complex. Considered of sub-economic grade owing to low REE concentration and high iron content
4	Kiruku and Ngauri Hills	Kitui	Geochemical anomalies
5	Buru Hills	Nandi	Nepheline syenite intrusions into gneissic host rocks, with weathering likely enhancing surface enrichment
6	Rwanguo	Embu	Pegmatite and granitic intrusions hosted along shear zones cutting high-grade biotite and garnet gneisses

Coltan (Columbite-Tantalite)

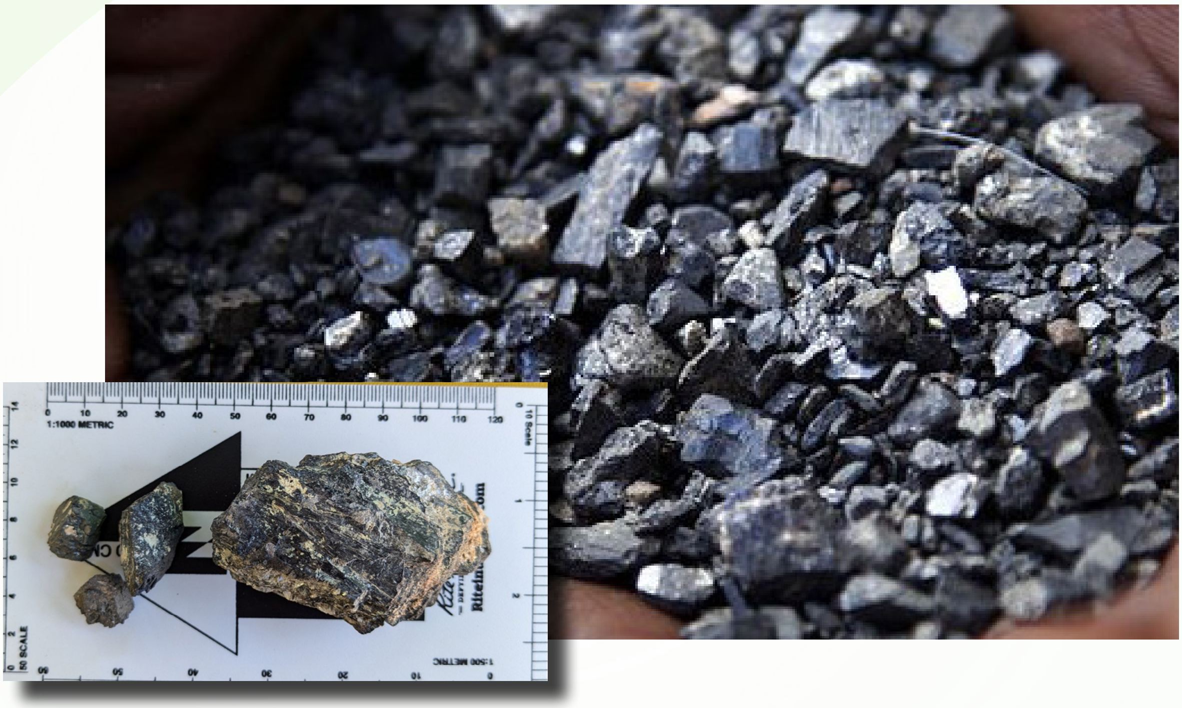

Figure 5: Coltan sample from Kora Wells

Coltan in Kenya is predominantly associated with zoned, rare-element granitic pegmatites, typically of the Li-Cs-Ta (LCT) geochemical class, derived from highly fractionated peraluminous granitic melts. These pegmatites intrude high-grade garnet-bearing biotite gneisses, amphibolites and schists of the Mozambique Mobile Belt. Pegmatite emplacement is commonly structurally controlled, occurring along shear zones, foliation planes and fold hinges, where pegmatitic fluids were preferentially focused.

Primary coltan mineralization occurs within the intermediate to inner zones of zoned pegmatites, often associated with feldspar, quartz, muscovite, lepidolite, beryl and occasionally spodumene. In deeply weathered profiles, eluvial and alluvial placer deposits form as a result of the mechanical concentration of resistant columbite-tantalite grains from decomposed pegmatites.

Known Localities:

	AREA	COUNTY	OCCURRENCE STYLE
1	-	Tharaka-Nithi	Pegmatites hosted in biotite and garnet-bearing gneisses of the Mozambique Belt
2	Kiambere	Embu	Coarse-grained LCT-type pegmatites intruding high-grade biotite gneisses. Artisanal recovery of Ta-Nb minerals reported in saprolite zones
3	Kilibwoni	Nandi	Alluvial and eluvial coltan occurrences in weathered pegmatite-derived gravels
4	Nachola	Samburu	Pegmatite intruding metasediments and amphibolites
5	Banya	Isiolo	Feldspar-quartz-mica pegmatites intruding granulitic basement
6	Kapenguria-Chepareria	West Pokot	Pegmatites in sheared amphibolite-grade rocks with indications of LCT geochemical affinity
7	Mutomo-Ikutha	Kitui	Pegmatite hosted in granulite-facies gneisses
8	Kora Wells	Tana River	Hydrothermally zoned LCT-type pegmatites

Niobium

Niobium mineralization in Kenya is primarily hosted in carbonatite complexes of Proterozoic age, which were emplaced within the Mozambique Mobile Belt. These intrusions are often alkaline in composition and are associated with REE-rich syenites, nepheline syenites and ferro-carbonatites.

The dominant niobium-bearing mineral is pyrochlore [$(Na,Ca)_2Nb_2O_6(OH,F)$], commonly associated with magnetite-rich zones within carbonatites. Niobium enrichment typically overlaps with light rare earth element (LREE) mineralization due to the geochemical compatibility of Nb and REEs in such environments. Accessory minerals include fluorite, barite and apatite.

Surface weathering of carbonatites may result in supergene enrichment, concentrating niobium in residual lateritic profiles. However, the economic viability of these occurrences is constrained by factors such as thorium content and the grain size of pyrochlore.

Known Localities:

	AREA	COUNTY	OCCURRENCE STYLE
1	Mrima Hills	Kwale	Ferrocarbonatite intrusions with abundant pyrochlore hosted in magnetite-rich zones
2	Ruri Hills	Homa Bay	Minor niobium mineralization associated with syenite and carbonatite phases
3	Kuge-Lwala Zone	Homa Bay	Ferrocarbonatite dikes on the margin of the Ruri Complex; considered to be low grade

Lithium

Lithium mineralization in Kenya is hosted in complex, zoned Lithium-Cesium-Tantalum (LCT) pegmatites, which are genetically linked to highly fractionated granitic intrusions. These pegmatites are emplaced within high-grade metamorphic terrains of the Mozambique Mobile Belt, particularly along ductile shear zones and lithological contacts between gneisses and intrusive granitoids.

The primary lithium-bearing minerals include spodumene, lepidolite, petalite and amblygonite. These minerals occur in the intermediate to inner zones of pegmatites, often in association with tourmaline, garnet, muscovite, quartz, albite and accessory coltan (columbite-tantalite).

Structural control plays a critical role in pegmatite emplacement, with most swarms occurring along major shear zones and foliated belts, indicating syn- to post-tectonic magmatic intrusion. Alteration features such as albitization are common.

Known Localities:

	AREA	COUNTY	OCCURRENCE STYLE
1	Namanga	Kajiado	Well-developed spodumene- and lepidolite-bearing pegmatites hosted in high-grade sheared gneisses of the Mozambique Belt
2	Maralal	Samburu	Pegmatites with suspected lithium enrichment intruding gneisses and quartzites
3	Tyaa River - Kanyekine Belt	Tharaka Nithi	Lepidolite-bearing pegmatites within a pegmatite swarm hosted in biotite gneisses??
4	Kinyiki Hill	Taita Taveta	Small LCT-type pegmatites mapped within a granitic complex

Graphite

Figure 6: Graphite hand sample from Shah Colonial Mine

The majority of the reported graphite occurrences in Kenya are predominantly of the flake variety, occurring within high-grade metamorphic terrains of the Mozambique Mobile Belt. The deposits are hosted in quartz–feldspar–biotite gneisses, amphibolites and garnet-sillimanite-bearing granulites, which represent metamorphosed sedimentary sequences rich in organic carbon. The transformation of carbonaceous material into graphite occurred under amphibolite to granulite facies metamorphism, driven by regional tectonic and thermal events.

The mineralization is mapped as disseminated flakes, lenses or intercalated graphite-rich bands. Localized structural features such as fold hinges, shear zones and lithological boundaries enhance graphite concentration, particularly in zones of high strain or fluid movement. Flake sizes vary from fine to coarse, with coarse-flake graphite being of significant commercial interest.

Known Localities:

	AREA	COUNTY	OCCURRENCE STYLE
1	Kyenze, Shah Mine	Kitui	Coarse flaky graphite in paragneisses, aligned with regional metamorphic foliation
2	Jaribuni, Ganze	Kilifi	Crystalline graphite bands associated with biotite gneisses
3	Bamba		Flaky graphite disseminated in foliated quartz-feldspar gneisses
4	Mlima Chui	Isiolo	Graphite occurs in thin, sheared lenses and fine-grained disseminations within amphibolite-facies metasediments
5	Tsavo	Taita Taveta	Coarse-grained, well foliated graphite beds in garnetiferous granulites, schists and amphibolites
6	Udan Alake	Marsabit	Graphite bands in pegmatites appear as thick bands, short discontinuous graphite-laden schists and very fine-grained disseminations

Uranium

Figure 7: High uranium counts associated with a pegmatite at Isiolo

Uranium mineralization in Kenya occurs in two main geological settings: calcrete-hosted surficial deposits and intrusive/metamorphic-hosted deposits. In the arid and semi-arid regions of northeastern Kenya, calcrete-hosted uranium is found within Tertiary sediments, typically in ephemeral playa-lake environments. These deposits form through supergene processes, whereby uranium is leached from source rocks and transported by evaporative groundwater, precipitating as uranyl minerals such as carnotite and autunite within calcrete layers.

In central and northern Kenya, uranium also occurs within granitic and pegmatitic rocks of the Mozambique Mobile Belt, particularly where structurally controlled systems (shear zones and fracture networks) enhance fluid flow and mineral deposition. Here, the primary uranium-bearing minerals include uraninite, autunite and torbernite, often associated with quartz veins, feldspar-rich pegmatites and high-grade metamorphic rocks.

Known Localities:

	AREA	COUNTY	OCCURRENCE STYLE
1	-	Wajir	Calcrete-hosted uranium within Tertiary sedimentary basins and evaporitic settings
2	-	Garissa	Calcrete-hosted with evaporative concentration of uranium from groundwater in arid depositional basins
3	-	Marsabit	Uranium anomalies in granitic and pegmatitic systems within the Mozambique Belt
4	Chabich	Isiolo	Anomalous uranium values in pegmatite-granite contacts linked to post-tectonic intrusions

Conclusion

The mineral occurrences outlined in this catalogue confirm Kenya's significant untapped potential in a variety of critical and industrial minerals. From the REE-enriched carbonatites of Mrima and Ruri Hills, to the lithium-bearing pegmatites of Kajiado and the calcrete-hosted uranium in the arid north, the geological indicators suggest that the country possesses a considerable strategic resource endowment.

Despite the presence of these mineral systems, most remain at the reconnaissance or early exploration stages, with limited systematic evaluation of their economic viability. This accentuates the urgent need for modern, data-driven exploration strategies, including geophysical surveys, geochemical assays and mineralogical characterization. Additionally, the importance of coordinated efforts between the government and the private sector in improving mineral intelligence and investment readiness is emphasized.

The information in this catalogue is not exhaustive but serves as a guiding framework for further geological investigations and mineral development initiatives. As global demand for energy transition minerals increases, Kenya is strategically positioned to play a significant role in the international supply chain, provided that exploration, policy and value-addition efforts are strategic.

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