MINING DEVELOPMENTS MAGAZINE

NOVEMBER DECEMBER 2026 EDITION

PROJECTS | INVESTMENT | TECHNOLOGY | SUSTAINABLE GROWTH

NYANZAGA GOLD PROJECT

TANZANIA'S NEXT GOLD MINE NEARS FIRST PRODUCTION

A WORLD-CLASS GOLD ASSET
High-grade resources and strong economics

ADVANCING DEVELOPMENT
Construction, infrastructure and key milestones

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NYANZAGA GOLD PROJECT

Tanzania's Next Major Gold Mine Moves Toward First Gold

Mining Developments Magazine | November–December 2026 Issue

Location: Sengerema District, Mwanza Region, Tanzania
Developer: Perseus Mining
Project investment: Approximately US$523 million
Target first gold: January 2027
Ownership: Perseus Mining 80%; Government of Tanzania 20%

A landmark gold development approaching production

The Nyanzaga Gold Project is entering one of the most important phases of its development as construction advances toward the planned **January 2027 first-gold milestone**. Located in Tanzania's Mwanza Region, within the prolific Lake Victoria Goldfields, Nyanzaga is positioned to become one of the country's major new gold mines.

For the November–December 2026 edition of *Mining Developments Magazine*, Nyanzaga presents a timely story of investment, construction, resource growth and Tanzania's continuing emergence as a major African mining destination.

Perseus Mining made the Final Investment Decision to develop Nyanzaga in April 2025, committing approximately **US$523 million** to the project. By 31 March 2026, overall project progress had reached **48%**, with US$220 million already spent. The company reported more than 3,162 people working on the project, predominantly from the local workforce

From development project to producing mine

Nyanzaga has evolved considerably since Perseus acquired the project through its takeover of OreCorp. The company subsequently advanced engineering, resource drilling, resettlement and feasibility work before committing to a large-scale open-pit development.

The project is being built around the **Tusker and Kilimani deposits**, with conventional open-pit mining and a large processing facility forming the foundation of the operation.

The construction programme includes the processing plant, grinding circuit, carbon-in-leach



facilities, tailings storage facilities, accommodation, roads, power and supporting infrastructure.

Construction of the permanent camp and major processing infrastructure has been progressing alongside early mining preparation. In January 2026, Perseus reported that the first concrete lift for the Ball and SAG mills had been completed, while installation of carbon-in-leach tanks was progressing.

A growing gold resource

One of the most significant developments during 2026 was the substantial expansion of Nyanzaga's Ore Reserve.

Perseus reported an updated Ore Reserve of approximately **90.9 million tonnes grading 1.38 grams per tonne gold, containing about 4.0 million ounces of gold**. The reserve expansion significantly strengthened the long-term potential of the project.

The enlarged resource base provides Perseus with greater flexibility as it moves toward production and establishes Nyanzaga as a potentially long-life asset within its African portfolio.

The company currently describes Nyanzaga as a major development within its strategy of building a diversified African gold business. First gold is expected in **January 2027**.

Construction momentum

Construction activity at Nyanzaga has accelerated across multiple fronts.

Major works have included:

- Processing plant construction
- Ball and SAG mill foundations and installation
- Carbon-in-leach tank installation
- Tailings storage facilities
- Permanent accommodation
- Site roads and earthworks
- Mining-area preparation
- Power and water infrastructure
- Community and resettlement infrastructure

The scale of construction is reflected in the project's workforce. By March 2026, Nyanzaga had recorded more than **5.4 million worked hours without a Lost Time Injury**, while the workforce had grown to more than 3,162 people.

The project is therefore not simply an investment in a future mine; it is already generating significant economic activity through construction employment, procurement and local contracting.

Engineering the processing plant

The processing plant represents one of the most important components of the development.

Engineering and project management work has been undertaken as construction progresses, with major equipment and structural components being delivered to site. Mill installation and construction of the processing facilities are central to achieving the commissioning schedule ahead of first gold.

The January 2026 construction update showed the project moving





beyond basic site preparation into the installation of major process infrastructure, including the grinding circuit and CIL tanks.

This transition—from earthworks and foundations to mechanical installation and commissioning—will be one of the defining stories of Nyanzaga during the final months of 2026.

Community development alongside mine construction

Nyanzaga's development also involves a significant community component.

The project has implemented resettlement programmes and associated social infrastructure as part of the development process. Schools, a local clinic and other community facilities have formed part of the programme supporting communities affected by the project.

The project's local workforce provides another important economic benefit. Perseus reported that more than **US$180 million in economic value had been distributed across Tanzania between July 2024 and March 2026**, demonstrating that economic benefits are already flowing before commercial gold production begins.

For Mwanza and the wider Lake Victoria region, the arrival of a large modern mining operation could create opportunities extending beyond direct employment, including transportation, engineering, equipment supply, construction, hospitality, accommodation and other support services.

A new chapter for Tanzania's gold industry

Nyanzaga is significant within the broader Tanzanian mining story.

Tanzania already hosts several

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major gold mines, particularly around the Lake Victoria Goldfields, but Nyanzaga represents one of the country's major new mine developments and one of the most substantial investments in a new Tanzanian gold operation in many years.

The project is also strategically important to Perseus. Once operational, Nyanzaga will become the company's **fourth African operating mine**, complementing its existing operations in Ghana and Côte d'Ivoire.

With first gold scheduled for January 2027, the final months of 2026 will therefore be critical.

THE NYANZAGA COUNTDOWN

NOVEMBER–DECEMBER 2026

US$523M
Development investment

90.9 Mt
Updated Ore Reserve

~4.0 Moz
Contained gold in updated reserve

48%
Project progress reported at March 2026



3,162+
Construction workforce at March 2026

5.4M+
Worked hours without Lost Time Injury at March 2026

JANUARY 2027
Target first gold

Looking ahead to first gold

As *Mining Developments Magazine* goes to press for its November–December 2026 issue, Nyanzaga stands at an important point in its journey.

The focus is shifting from project construction toward **commissioning, operational readiness and first production**. If the development remains on schedule, January 2027 will mark the transformation of Nyanzaga from a major construction project into a producing gold mine.

For Tanzania, the project represents new investment, employment, government revenues and regional economic opportunities. For Perseus Mining, it represents the next major step in its strategy to build a significant African gold-production portfolio.





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WEST KENYA GOLD PROJECT



Kenya's Next Major Gold Mine Moves Toward Development

Mining Developments Magazine — November–December 2026 Issue

The **West Kenya Gold Project (WKGP)** is emerging as one of Kenya's most important gold-development stories, with the project moving beyond exploration toward mine development and construction readiness.

Located within the highly prospective **Lake Victoria Goldfields of western Kenya**, the project covers approximately **556 km²** and includes the **Isulu–Bushiangala** and **Ramula–Mwibona** deposits. Shanta Gold is advancing the project, with its Kenyan subsidiary responsible for development activities.

A high-grade gold opportunity

The West Kenya project is particularly notable for its high-grade mineralisation. Shanta's published project information identifies **722,000 ounces of indicated resources grading 11.45 g/t gold**, within a broader resource inventory reported at approximately **1.719 million ounces at 5.21 g/t**.

The project lies within the Lake Victoria greenstone geological environment, one of East Africa's established gold-producing regions. Its location places it within a broader mineral belt that includes major Tanzanian gold operations such as Geita and North Mara.

Historically, exploration around the project has returned high-grade intersections, helping establish the geological potential of the Liranda Corridor.

From exploration to mine development

A major change in the project's story occurred during **2025**, when Shanta reported completing the feasibility study, obtaining key regulatory approvals and formally commencing the project-financing process. Early works were also initiated.

According to Shanta's current project information, the **2026 programme** is focused on advancing project financing, progressing the **Resettlement Action Plan (RAP)** and undertaking further early works required to prepare the project for construction. Exploration is continuing on satellite deposits that could potentially provide additional resources beyond the current life-of-mine plan.

This makes the November–December 2026 period particularly important for the project.

The story is no longer simply about whether western Kenya has commercially significant gold. The focus is increasingly on **how and when the deposits can be developed into large-scale mining operations**.

Two major development areas

The project incorporates two principal development areas.

Isulu–Bushiangala

The Isulu and Bushiangala deposits form the core of the underground mining component of the West Kenya development.

The feasibility documentation submitted to Kenya's National Environment Management Authority describes an **underground mining project** at Isulu–Bushiangala. The project represents one of the country's most significant attempts to develop a modern, large-scale underground gold operation.

The deposits are characterised by high-grade mineralisation, making underground extraction particularly relevant.

Ramula–Mwibona

Ramula–Mwibona represents another important component of the wider West Kenya portfolio.

The feasibility study covers development of an **open-pit gold mine and processing centre** serving the Ramula–Mwibona resource across **Siaya and Vihiga counties**.

This combination of open-pit and underground development gives West Kenya the potential to develop into a substantial multi-deposit mining complex rather than a single standalone mine.

Kenya's emerging gold-mining hub

The project has significance well beyond the individual deposits.

Western Kenya has a long history of artisanal and small-scale gold mining, particularly around Kakamega. Large-scale development at West Kenya could introduce modern mining technology, formal employment, professional geological services, larger-scale processing and structured supply chains into the region.

In 2026, the **Kakamega County Assembly cleared the way for the proposed large-scale Shanta Gold operation in Ikolomani** following public scrutiny and consultations concerning land, compensation and relocation.

These developments highlight both the opportunity and the responsibility associated with building a major mine in a densely settled agricultural region.

The project's success will therefore depend not only on geology and engineering, but also on **community engagement, resettlement, environmental management and local economic participation**.

A project with significant economic potential

West Kenya could become a transformational project for Kenya's mining industry.

Development of a large-scale gold operation would generate demand for:

- Mining contractors
- Civil and infrastructure contractors
- Heavy equipment
- Engineering services
- Transport and logistics
- Security services
- Accommodation and hospitality
- Local suppliers
- Environmental and laboratory services
- Skilled and semi-skilled employment

The project could also strengthen the country's domestic gold value chain and demonstrate the potential of Kenya's greenstone belts.





The development challenge

The transition from a defined resource to a producing mine is complex.

For West Kenya, several milestones remain critical as the project moves through 2026 and beyond. These include finalising financing, completing resettlement processes, progressing early works, securing construction readiness and establishing the infrastructure required for mining and processing.

The project's environmental and social framework will be equally important.

The feasibility studies submitted to NEMA specifically address environmental and social impacts associated with the proposed mining developments.

For communities in Kakamega, Siaya and Vihiga, expectations are high. Employment, compensation, infrastructure, environmental protection and opportunities for local businesses will all influence the project's long-term relationship with its host communities.



Exploration provides additional upside

One of the most attractive aspects of West Kenya is that the current development plan may not represent the project's ultimate potential.

Shanta states that exploration across its West Kenya licences has **more than doubled the total mineral resources since the company acquired the portfolio in late 2020**. Exploration continues on satellite deposits that are currently outside the life-of-mine plan.

This creates the possibility that additional discoveries could extend mine life or increase future production.

The broader **Liranda Corridor** remains an important exploration target. The region contains several historical mining areas and gold prospects, providing a substantial geological exploration opportunity beyond the deposits currently being advanced.







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MAHENGE GRAPHITE PROJECT

Tanzania's High-Grade Graphite Project Enters the Construction Phase

Mining Developments Magazine — November–December 2026 Issue

Location: Ulanga District, Morogoro Region, Tanzania
Developer: Black Rock Mining Limited
Project company: Faru Graphite Corporation
Government interest: 16% free-carried interest
Mining method: Open pit
Resource: 213.1 million tonnes at 7.8% TGC
Ore Reserve: 70.5 million tonnes at 8.5% TGC
Target production: Up to approximately 340,000 tonnes of graphite concentrate per year at full four-module development
Planned mine life: Approximately 26 years

A new chapter for Tanzania's critical-minerals industry

The **Mahenge Graphite Project** is positioning Tanzania to become an important supplier of natural graphite to the rapidly expanding global battery and advanced-materials markets.

Located in the **Ulanga District of Tanzania's Morogoro Region**, approximately 70 km south of Ifakara, Mahenge is being developed by Australia's **Black Rock Mining Limited**, through Faru Graphite Corporation, in partnership with the Tanzanian Government. The project has a large-scale graphite resource and is being advanced as a modular open-pit mining and processing operation.



For *Mining Developments Magazine's* November–December 2026 edition, Mahenge is particularly timely. **Early works commenced in October 2025**, and during 2026 the project has been advancing site preparation, access infrastructure, resettlement and other activities designed to position the project for full construction following financing and a Final Investment Decision.

A world-class graphite resource

Mahenge's greatest attraction is its scale.

Black Rock reports a **JORC-compliant Mineral Resource of 213.1 million tonnes grading 7.8% total graphitic carbon**, containing approximately **16.6 million tonnes of graphite**. The Ore Reserve stands at **70.5 million tonnes grading 8.5% TGC**, equivalent to approximately **6.0 million tonnes of contained graphite**.

The resource provides the foundation for a potentially multi-generational mining operation.

Rather than developing the entire resource at once, Mahenge is designed around a **four-stage modular development strategy**. At full development, the project is expected to mine up to approximately 4 million tonnes of ore annually and produce as much as **340,000 tonnes of graphite concentrate per year**. The current focus is on **Module 1**.

MAHENGE BY THE NUMBERS

Project feature	Key figure
Mineral Resource	**213.1 Mt @ 7.8% TGC**
Ore Reserve	**70.5 Mt @ 8.5% TGC**
Contained graphite in Reserve	**~6.0 Mt**
Mine life	**~26 years**
Development	**4 modules**
Full-scale concentrate production	**Up to ~340,000 tpa**
Mining method	**Open pit**
Project area	**~35 km² Special Mining Licence**
Developer	**Black Rock Mining**
Project company	**Faru Graphite Corporation**

From groundbreaking to construction readiness

A major milestone was reached on **9 October 2025**, when Tanzania's Minister of Minerals, Anthony Mavunde, officially launched the Mahenge Early Works programme.

The groundbreaking ceremony brought together Tanzanian officials, Black Rock Mining, POSCO International and representatives of the Korean and Australian governments. The event underlined Mahenge's growing strategic importance within international critical-minerals supply chains.

By 2026, the project had moved deeper into early works.

In February 2026, Black Rock awarded a **US$11 million bulk-earthworks contract** to Tanzanian contractor Taifa Mining and Civils. The contract includes early works as well as a second component intended to proceed following Final Investment Decision. One of the key activities is construction of a **Mdindo stream diversion channel**, designed to provide unrestricted access to the plant-site area and enable construction to accelerate following FID.

The company subsequently reported that the early-works programme was nearing completion during the June 2026 quarter. Community compensation for the Faru John Road area had been completed, while final earthworks and access-road resettlement activities were planned for the second half of 2026

For the November–December issue, this gives the project a strong editorial narrative:

Mahenge is transitioning from a feasibility-stage project into a construction-ready critical-minerals development.



Power infrastructure — a strategic advantage

One of Mahenge's important competitive advantages is its planned access to Tanzania's hydro-dominated electricity network.

Faru Graphite Corporation and **TANESCO** have entered into agreements supporting development of a new **220 kV transmission line between Ifakara and Mahenge**.

Preliminary work, including tower surveys, had been completed during 2026.

Access to relatively low-carbon grid electricity is expected to be an important component of Mahenge's operating strategy.

The project company highlights hydro-dominated power as one of the reasons Mahenge could achieve a comparatively low carbon footprint while maintaining competitive operating costs.

Graphite and the global battery supply chain

Graphite has become one of the most strategically important minerals in the energy-transition economy.

Natural graphite is a major component of **lithium-ion battery anodes**, making secure supplies increasingly important as electric-vehicle and energy-storage markets expand.

The global graphite supply chain remains highly concentrated, creating a strategic incentive for battery manufacturers and governments to develop alternative sources.

Mahenge has attracted international attention partly because of its relationship with **POSCO International** and the wider Korean battery-materials supply chain. POSCO International has agreements to receive graphite from the project, with commercial production targeted for **2028** and planned annual supply of approximately **60,000 tonnes** over roughly 25 years.

This relationship gives Mahenge a potentially important position between African mineral production and Asian battery-material manufacturing.

POSCO partnership strengthens market position

POSCO Group has been involved with Mahenge since 2020, when a strategic alliance was established with Black Rock Mining.

The relationship has subsequently expanded through equity investment and offtake agreements.

In 2024, POSCO agreed to invest **US$40 million** in Black Rock Mining in connection with an offtake arrangement for Mahenge's second development module. The partnership has helped establish a potential long-term customer base for the project's graphite products.

Mahenge's product mix is also important.

The project is expected to produce several graphite products with different flake-size distributions, including higher-value large-flake material. This diversification can potentially allow the operation to serve multiple market segments rather than relying entirely on battery-anode applications.



Financing and the road to FID

One of the central issues for Mahenge during 2026 remains project financing.

The company has established significant financing relationships. In 2024, Black Rock signed a **US$179 million facilities agreement** involving the Development Bank of Southern Africa, Industrial Development Corporation and CRDB Bank. In May 2025, the facilities were increased by **US$25 million to US$204 million**.

The project's development strategy nevertheless remains linked to securing the complete funding package and reaching **Final Investment Decision**.

The company has deliberately undertaken early works so that critical site activities can proceed and the project can transition rapidly into larger-scale construction once funding and FID are secured.

This approach could shorten the construction ramp-up and reduce the amount of preparatory work remaining after FID.

Community development and local participation

Mahenge is also becoming an important regional development project.

The project has progressed its **Resettlement Action Plan**, with compensation processes forming part of the early-works programme. The bulk-earthworks contract awarded to Taifa Mining and Civils also demonstrates the project's emphasis on Tanzanian contractors and local-content requirements.

The Tanzanian Government has described the project as more than a mining investment, highlighting its potential to stimulate **employment, business activity, industrial development and community welfare** in the Mahenge area.

As construction advances, opportunities are expected across civil works, transportation, equipment supply, accommodation, engineering, environmental services and other supporting sectors.

A strategic project for Tanzania

Mahenge sits at the intersection of several major trends shaping African mining.

First is Tanzania's continued effort to expand its mineral-processing and mining sector.

Second is the rapid growth of demand for critical minerals associated with electrification.

Third is the international push to diversify graphite supply chains away from excessive dependence on a small number of producing and processing jurisdictions.

Mahenge's participation in the **Minerals Security Partnership framework** reinforces its strategic relevance. The project has attracted support and interest from Tanzania, Australia, South Korea and other international stakeholders seeking more resilient critical-mineral supply chains.

THE ROAD AHEAD — 2026 AND BEYOND

For the remainder of 2026, the key milestones to watch include:

Early works completion
Final earthworks, access-road works and resettlement activities.

Project financing
Progress toward securing the funding package required for full construction.

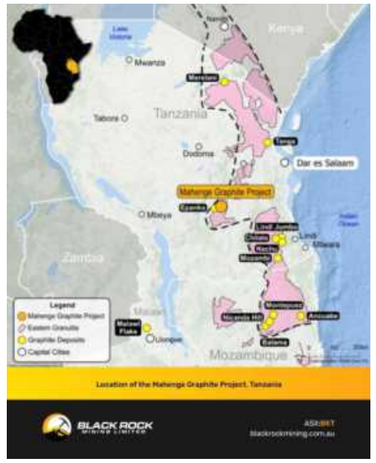
Final Investment Decision
The critical milestone that unlocks the next major phase of development.

Module 1 construction
The first processing module is the immediate development priority.

220 kV power connection
Continued development of the Ifakara–Mahenge transmission infrastructure.

Future modules
Expansion toward the project's planned four-module configuration.

Commercial production
Currently targeted for **2028**.





NGUALLA RARE EARTH PROJECT: POWERING THE GLOBAL MAGNET ECONOMY

Tanzania's Strategic Rare Earth Development Enters a New Era

Mining Developments Magazine — November–December 2026 Issue

Location: Songwe Region, southern Tanzania
Developer/owner: Shenghe Resources Holding / Ngualla project company
Government of Tanzania interest: 16%
Commodity: Rare earth elements, particularly Neodymium and Praseodymium (NdPr)
Mining method: Open pit
Development stage: Advanced development / financing and construction planning

A strategically important rare earth project

The **Ngualla Rare Earth Project** is one of Tanzania's most significant critical-minerals developments and one of the world's major undeveloped sources of **neodymium and praseodymium (NdPr)**.

Located approximately **147 kilometres from Mbeya in southern Tanzania**, on the edge of the East African Rift Valley, Ngualla is designed as a large-scale open-pit mine and beneficiation operation. More than 90% of the expected value of its rare-earth concentrate is attributable to NdPr—materials essential for the permanent magnets used in electric vehicles, wind turbines, robotics and other advanced technologies.

For the November–December 2026 issue, Ngualla offers a particularly strong critical-minerals feature because its development is closely connected to the global push to establish rare-earth supply chains outside China.

A world-class NdPr resource

Ngualla is distinguished by the size and grade of its rare-earth mineralisation.

The project has been described as one of the world's largest and highest-grade undeveloped NdPr projects. The deposit also contains potentially valuable **fluorspar, niobium and phosphate**, providing additional exploration and development potential.

The project's mineralisation is hosted predominantly within the **Weathered Bastnaesite Zone**, which forms the basis of the development plan.

A key advantage identified during the project's feasibility studies is the relatively low level of uranium and thorium compared with many rare-earth deposits. This is important because radioactive elements can add significant processing, environmental and permitting challenges to rare-earth projects.



From Peak Rare Earths to Shenghe

One of the biggest developments affecting Ngualla's story occurred in **2025**.

Chinese rare-earth company **Shenghe Resources Holding** completed its acquisition of Peak Rare Earths. The transaction became legally effective in September 2025, with Peak subsequently delisted from the Australian Securities Exchange in October 2025. The Ngualla project is now held through a structure in which Shenghe has an **84% interest**, while the Government of Tanzania holds **16%**.

This ownership change is highly significant.

Shenghe is a major participant in the global rare-earth industry, giving Ngualla a developer with direct experience in rare-earth processing and supply chains.

It also potentially strengthens the project's ability to connect Tanzanian mineral resources with downstream international markets.

A mine designed around NdPr

The significance of Ngualla extends beyond simply producing rare-earth concentrate.

Neodymium and praseodymium are essential components in high-performance permanent magnets. These magnets provide the strong magnetic fields required in compact, high-efficiency motors and generators.

Applications include:

- Electric vehicles
- Wind turbines
- Industrial motors
- Robotics
- Aerospace
- Defence technologies
- Consumer electronics

As governments seek to reduce dependence on concentrated rare-earth supply chains, projects such as Ngualla have become strategically important.

The global rare-earth market is currently experiencing renewed geopolitical attention as the United States, Europe, Japan, Australia and other economies seek alternative sources and processing capacity.

This gives Ngualla significance far beyond Tanzania's borders.

An integrated development concept

Ngualla's development strategy has evolved over several years.

Earlier plans envisaged an integrated mine, beneficiation plant and downstream separation/refining operation, including the proposed **Teesside refinery in the United Kingdom**.

However, Peak subsequently adopted a staged development strategy, prioritising the Tanzanian mining and beneficiation operation before committing to downstream refining.

The approach was intended to reduce initial capital requirements and technical risk while preserving the option of downstream processing in the future.

The project's Bankable Feasibility Study Update has provided the basis for an open-pit operation producing a high-purity rare-earth concentrate.

A Front-End Engineering and Design study was subsequently completed in 2023, covering optimisation of the processing plant, airstrip, road infrastructure and tailings-storage facility, together with a contracting-mining model and hybrid power solution.



Tanzania's critical-minerals opportunity

Ngualla fits directly into Tanzania's broader ambition to increase the country's role in the global critical-minerals industry.

Tanzania is already recognised internationally for gold and other mineral resources, but rare earths offer the country an opportunity to participate in the rapidly expanding clean-energy and advanced-manufacturing supply chain.

Developing Ngualla could create demand for:

Mining and engineering
Large-scale open-pit mining, earthworks, plant construction and specialist engineering.

Transport and logistics
Road infrastructure, concentrate transportation and regional supply chains.

Processing
Beneficiation and potentially downstream rare-earth processing.

Employment
Direct mine employment alongside thousands of indirect and induced jobs.

Local procurement
Opportunities for Tanzanian contractors, suppliers and service companies.

Infrastructure will be critical

Ngualla's remote location means infrastructure is an important component of the development.

The project requires access roads, power, water, accommodation and other supporting infrastructure to establish a modern mining operation in southern Tanzania.

The FEED work specifically included optimisation of the project's **road, airstrip and tailings-storage infrastructure**, reflecting the importance of building a complete operating system around the mine rather than simply developing the orebody.

Community and environmental considerations

Like other major mining developments, Ngualla's long-term success will depend on responsible environmental and social management.

The project has undergone extensive environmental and social assessment during its development history. The International Finance Corporation previously assessed the project under its environmental and social framework during the earlier Peak Resources development phase.

For the next phase of Ngualla, community engagement, land access, employment, local procurement and environmental management will remain important issues.

The development also provides Tanzania with an opportunity to demonstrate that critical minerals can be developed while increasing local economic participation and value addition.

Why Ngualla matters in 2026

The November–December 2026 issue arrives at an important point in the project's history.

The project has moved through:

Exploration → Feasibility → Special Mining Licence → Framework Agreement → FEED → Strategic ownership change → Development planning

The 2025 acquisition by Shenghe represents a major reset in the project's corporate structure.

The next major question is therefore **how quickly the new ownership structure can convert Ngualla's advanced development status into a financed construction project.**

That makes the project particularly relevant for a year-end mining developments issue.

NGUALLA RARE EARTH PROJECT — AT A GLANCE

Project featureDetailsCountry Tanzania**Region**Songwe**Nearest major city**Mbeya**Distance from Mbeya**~147 km**Commodity**Rare earth elements**Key products**NdPr rare earths**Mining method**Open pit**Project owner**Shenghe Resources / project company**Tanzanian Government interest**16%**Special Mining Licence**Granted**Key development study**Bankable Feasibility Study + FEED**Main deposit**Weathered Bastnaesite Zone**Additional minerals**Fluorspar, niobium, phosphate**Development significance**Strategic non-China rare-earth supply

THE BIGGER STORY: BUILDING A NON-CHINA RARE-EARTH SUPPLY CHAIN

Ngualla's importance is best understood within the rapidly changing global rare-earth market.

China remains overwhelmingly dominant across the rare-earth supply chain, while governments and manufacturers elsewhere are seeking alternative sources. Reuters reported in August 2026 that the United States, Europe and allies are actively working to diversify rare-earth supply chains because of their dependence on China for rare-earth products and magnets.

Ngualla could therefore become more than another Tanzanian mining operation.

It could become an important link between **African mineral resources and the global permanent-magnet industry**.

The combination of a large NdPr-rich deposit, an established mining licence, completed feasibility work and a new strategic owner with rare-earth expertise gives the project a strong platform from which to advance.





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PLATREEF PROJECT — LIMPOPO

South Africa's Next-Generation PGM and Critical-Metals Mine Takes Shape

Mining Developments Magazine — November–December 2026 Issue

Location: Limpopo Province, South Africa
Developer: Ivanhoe Mines / Ivanplats
Ownership: Ivanhoe Mines 64%; B-BBEE partners 26%; Japanese consortium led by ITOCHU 10%
Metals: Platinum, palladium, rhodium, nickel, copper and gold
Mining method: Underground mechanised mining
Phase 1 concentrator: 0.8 Mtpa
Phase 2 capacity: 4.1 Mtpa combined
Phase 2 target: Q4 2027 completion
Future Phase 3: 10.7 Mtpa processing capacity

A new giant emerges in South Africa's Bushveld

The **Platreef Project**, now operating as the **Platreef Mine**, is rapidly moving from major mine development into large-scale production in Limpopo Province.

Developed by **Ivanhoe Mines**, the project is located on the Northern Limb of South Africa's world-renowned **Bushveld Igneous Complex**, the geological region that hosts some of the planet's most important platinum-group-metal resources.

What makes Platreef particularly significant is its combination of **platinum, palladium, rhodium, nickel, copper and gold** in a thick, high-grade orebody. Ivanhoe describes it as the world's largest undeveloped precious-metals project and one of the world's major future primary PGM producers.

For the **November–December 2026 issue of Mining Developments Magazine**, Platreef provides a compelling story of a project transitioning from construction into production while simultaneously preparing for a much larger second phase.

FROM CONSTRUCTION TO PRODUCTION

A major milestone was achieved on **18 November 2025**, when the Phase 1 concentrator produced its first batch of platinum-palladium-nickel-rhodium-gold-copper concentrate.

The achievement marked the beginning of Platreef's transition into an operating mine.

During the first quarter of 2026, the Phase 1 concentrator processed **27,512 tonnes of ore**, producing 1,428 ounces of platinum, palladium, rhodium and gold. At that stage, the operation was still in ramp-up and using predominantly development ore.

However, the latest 2026 update is important for the magazine's year-end positioning: Ivanhoe now expects **commercial production from Phase 1 in Q4 2026**, following the resolution of identified materials-handling and processing bottlenecks.

That means the November–December edition can present Platreef as:
A major South African mine entering commercial production while simultaneously expanding toward one of the world's largest PGM operations.



SHAFT 3 CHANGES THE SCALE OF THE OPERATION

One of the most important infrastructure milestones during 2026 was completion of **Shaft #3**.

Construction was completed in late March 2026, with the first ore hoisted to surface on **1 April 2026**. Commissioning of the shaft and its underground infrastructure was completed in June.

Shaft #3 dramatically increases Platreef's ability to move material to surface.

The shaft is designed to increase available hoisting capacity to approximately **5 million tonnes per year**, around five times the mine's previous level. Its commissioning allows the operation to handle significantly greater quantities of ore and waste while supporting the ramp-up of Phase 1 and development of Phase 2.

This is a critical milestone because Platreef's future production profile depends on being able to move large volumes of ore efficiently from its deep underground workings to the surface.

THE FLATREEF OREBODY

At the heart of Platreef is the exceptionally thick **Flatreef** orebody.

The deposit's thickness and geometry are among the characteristics that distinguish Platreef from many conventional PGM operations. The orebody contains a valuable basket of metals, allowing nickel and copper revenues to provide significant by-product credits against PGM production costs.

The resource scale is substantial.

Ivanhoe reports a mineral resource base of approximately **93 million ounces of platinum, palladium, rhodium and gold**, together with approximately **2.7 million tonnes of nickel**.

This resource base provides the foundation for the project's planned multi-stage expansion.

PHASE 2: A FIVE-FOLD PRODUCTION STEP-UP

Platreef's Phase 2 expansion is already underway.

The expansion will increase total processing capacity to approximately **4.1 million tonnes per year** and is targeted for completion in **Q4 2027**.

Once Phase 2 is operational, annual production is expected to rise to approximately:

450,000 ounces

of platinum, palladium, rhodium and gold

alongside approximately:

9,000 tonnes of nickel

and

6,000 tonnes of copper

The scale-up represents a dramatic increase over Phase 1.

Ivanhoe has already commenced development work on the Phase 2 concentrator, with earthworks for the Phase 2 concentrator site commencing in early 2026.



PHASE 3 COULD TRANSFORM PLATREEF

The longer-term vision is even more ambitious.

Ivanhoe's 2025 Preliminary Economic Assessment considers a **Phase 3 expansion to approximately 10.7 million tonnes per year**.

At this scale, annual production could exceed:

1 million ounces

of platinum, palladium, rhodium and gold

alongside approximately:

22,000 tonnes of nickel

and

13,000 tonnes of copper

The Phase 3 expansion is expected to become possible once **Shaft #2** reaches its expanded hoisting capability, with the major shaft expansion expected to support the project's future growth.

If fully developed, Platreef would rank among the world's largest primary PGM producers on a platinum-equivalent basis.

A MULTI-METAL MINE FOR THE ENERGY TRANSITION

Platreef is strategically important because it is not dependent on a single commodity.

Its production basket includes:

PLATINUM
Important for catalytic technologies, hydrogen applications and industrial uses.

PALLADIUM
Widely used in automotive catalytic converters and other industrial applications.

RHODIUM
A high-value metal used primarily in emissions-control technologies.

NICKEL
A major industrial metal with applications including stainless steel and batteries.

COPPER
Essential for electrification, power infrastructure and renewable-energy systems.

GOLD
Provides an additional valuable revenue stream.

This diversified production profile provides Platreef with exposure to multiple global markets.

POWERING A MODERN MINE

Energy infrastructure is another important component of Platreef's development strategy.

Ivanhoe completed construction of a **5 MW solar power facility in early 2025**. The solar installation provides electricity for development activities and operations, alongside other energy sources.

The project is being developed with an emphasis on mechanisation and modern underground mining techniques.

Its thick orebody is particularly suited to highly mechanised underground mining, potentially allowing high productivity while reducing unit operating costs as production expands.

A MAJOR INVESTMENT IN LIMPOPO

The development of Platreef is also significant for the local and provincial economy.

The project is located near **Mokopane** in Limpopo, an established mining region with extensive experience in platinum-group metals and other mineral resources.

As Platreef expands, it will require:

- Mining contractors
- Underground equipment
- Engineering services
- Construction contractors
- Processing specialists
- Transport and logistics
- Maintenance services
- Technical professionals
- Local suppliers
- Environmental services

The continued development of the mine therefore has the potential to support a broad regional supply chain.

PLATREEF — BY THE NUMBERS

Project feature	Key figure
Location	Limpopo, South Africa
Developer	Ivanhoe Mines
Ivanhoe ownership	64%
B-BBEE partners	26%
Japanese consortium	10%
Phase 1 capacity	0.8 Mtpa
Phase 2 capacity	4.1 Mtpa
Phase 3 potential	10.7 Mtpa
Mineral Resource	93 Moz 3PE+Au
Nickel Resource	2.7 Mt
Phase 2 production	~450 koz 3PE+Au
Phase 2 nickel	~9,000 tpa
Phase 2 copper	~6,000 tpa
Phase 2 completion target	Q4 2027
Phase 3 potential production	>1 Moz 3PE+Au

Figures based on Ivanhoe Mines' current published project information.









When Good Oils Go Bad Part 7
Additive Depletion: When Oil Runs on Empty

By Steven Lumley, technical manager, WearCheck



Specialist condition monitoring company, WearCheck, continues the discussion around oil condition - the latest topic is additive depletion.

Tell me if this sounds familiar - you glance at your phone and see 12% battery remaining. Not ideal, but surely enough to reply to one more message, check the weather and use the map for “just five minutes”.

Then the screen dims, the battery icon turns red and panic sets in. Suddenly that very clever little device with all its apps, contacts and computing power becomes a very expensive rectangle of glass.

The phone is still there; the hardware has not disappeared, but the reserve that allows it to function has run out.

Lubricants are not quite as dramatic - they don't flash a red battery icon, but additive depletion follows a surprisingly similar logic.

Modern lubricants are carefully formulated blends of base oil and additives. The base oil provides the lubricating film, and the additives provide much of the protection needed to survive real-world operating conditions. They help resist oxidation, reduce wear, control foam, neutralise acids, keep contaminants suspended and protect against corrosion. But there is a catch.

Most additives are sacrificial in nature. They protect the oil and the machine by being used up, altered, adsorbed onto surfaces or removed from circulation. That is not a formulation failure, it is exactly how they are designed to work.

This is additive depletion - the point where the oil may still be present, but its protection is running on empty.

What Are Lubricant Additives?

Lubricant additives are organic or inorganic compounds dissolved or suspended in oil. They help the finished lubricant do more than the base oil could achieve on its own.



Base oils provide the foundation of lubrication, particularly film formation, heat transfer and fluid movement, but additives build on that foundation by enhancing useful properties, suppressing unwanted ones or adding new performance characteristics.

The exact additive package depends on the application. A lightly additised turbine oil is very different from a heavily additised diesel engine oil. Your oil, in other words, is not just “oil”. It is a carefully balanced chemical recipe, and exhausting one ingredient can affect the whole dish.

How Additives Get Depleted

Additive depletion can appear complicated, because many individual mechanisms are involved, including neutralisation, shear-down, hydrolysis, water washing, particle scrubbing, surface adsorption, filtration, evaporation and centrifuging.

A simpler way to make sense of them is to group them into three broad pathways: additives can be chemically used up, attach to surfaces, or be physically removed from the oil. These pathways are often described as decomposition, adsorption and separation, with the individual mechanisms simply being examples of each category.

Additives Can Be Chemically Used Up

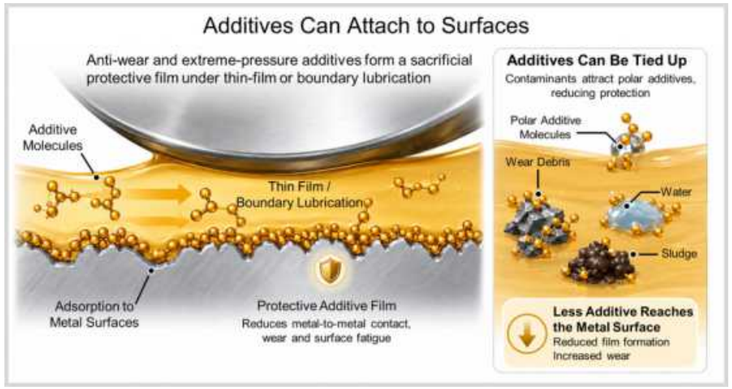
The first pathway is chemical depletion, or decomposition. This occurs when an additive molecule is consumed, transformed or broken down so that it can no longer perform its original function.

Antioxidants are a good example. They interrupt oxidation by reacting with free radicals before those radicals attack the base oil; but in doing so, the antioxidant sacrifices itself. Once that reserve is depleted, oxidation can accelerate rapidly.

Detergents in engine oils work in a similar way. Overbased calcium or magnesium detergents neutralise acidic combustion by-products, gradually consuming the oil's alkaline reserve. Once that reserve is exhausted, acids can accumulate rapidly, increasing the risk of corrosion and deposit formation.

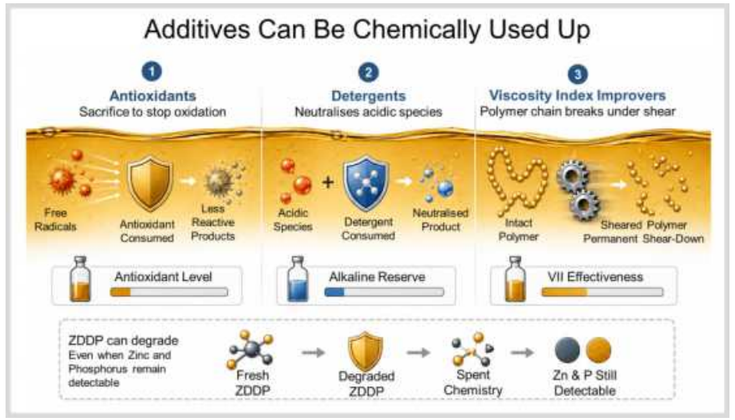
Other additives can also be changed by heat, water or severe operating stress. Zinc dialkyldithiophosphate, or ZDDP, is a common anti-wear and antioxidant additive that can degrade through several pathways. Importantly Zinc and Phosphorus can still appear in an oil analysis report even though the original ZDDP molecule no longer behaves like fresh additive. This is why additive depletion cannot always be judged by elemental analysis alone.

Shear-down is another example. Viscosity index improvers are large polymer molecules that can break into shorter pieces under severe mechanical shear, causing permanent viscosity loss. In each case, the additive is not simply missing, it has been spent, changed or broken.





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Additives Can Attach to Surfaces

The second pathway is adsorption. Many additives are polar, meaning they are naturally attracted to surfaces - a property that allows them to form protective films where they are needed.

Anti-wear and extreme-pressure additives react with, or adsorb onto, metal surfaces, especially under boundary lubrication conditions where the oil film is thin. They form sacrificial films that reduce wear and scuffing, but these films are continually worn away and replenished from the additive reserve. Like sunscreen, they protect by taking the punishment themselves, but once used up or washed away, the protection is gone.

Adsorption becomes a problem when additives attach where they are not useful. Fine wear debris, sludge, water droplets and other suspended material can attract polar additives, stripping active chemistry from the oil before it reaches the surfaces that actually need protection. This is known as particle scrubbing or additive stripping.

Water can have a similar effect, carrying some polar additives away from where they are needed. We will return to water and other unwanted guests in the next instalment, but for now, the key point is simple - contaminants can tie up additive chemistry before it can do its job.

Additives Can Be Physically Removed

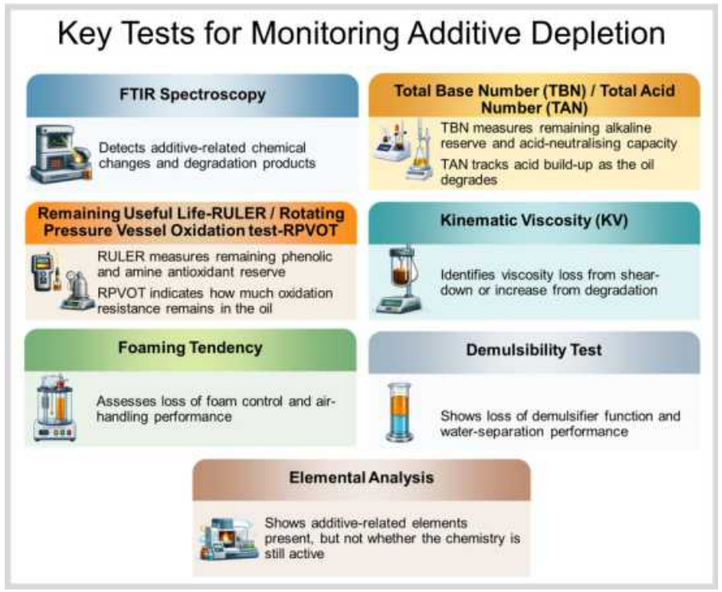
The third pathway is separation, or physical removal. In this case, additives or additive-containing materials leave the oil or are removed from circulation.

This can happen when additives become insoluble and settle to the bottom of a sump, or when spent additives attach to sludge, wear debris or other particles that are removed by filtration. In some systems, centrifuges may also separate dense, additive-containing material along with contaminants.

Filtration often raises the question of whether filters can remove additives from oil. In a properly formulated lubricant, normal filtration does not simply strip out dissolved additives, because most additive molecules are far smaller than filter pores. However, additives that are insoluble, degraded, agglomerated, attached to particles, or present as larger suspended material, may be removed. Silicone antifoam additives are a common exception, because they may exist as dispersed droplets rather than fully dissolved molecules.

So, the filter is not usually the villain. In many cases, it is removing material that is already spent or no longer properly dissolved.





Why Additive Depletion Matters

Additive depletion matters because the base oil may still look serviceable, while its protection system is quietly running down.

Once antioxidants are depleted, oxidation accelerates. Once detergents are consumed, acids are no longer neutralised. Once anti-wear additives are exhausted, metal surfaces lose boundary protection. Once dispersants, foam inhibitors or demulsifiers are depleted, sludge, foaming and poor water separation can follow.

In service, this can mean increased wear, corrosion, varnish, filter plugging, viscosity changes and - ultimately - shortened oil life. The lubricant may still be circulating, but it is no longer fully doing the job it was selected to do.

Detecting Additive Depletion Through Oil Analysis

Oil analysis plays a critical role in monitoring additive health, but interpretation requires care. Additive depletion is rarely understood from a single result in isolation, and one test seldom tells the whole story. The key is trending - comparing the used oil to the correct new oil baseline, then watching how the additive profile, degradation markers and machine-wear indicators change together over time. In oil analysis, as in life, context is everything.

The key tests used to assess additive depletion are summarised below:

Final Thought

Additives are the quiet workers inside a lubricant, constantly defending the oil and machine against heat, acids, wear, foam, corrosion and deposits. But every defence has a limit.

When additive reserves are healthy, the lubricant can absorb stress and protect critical components. When those reserves are depleted, the oil may still be present, but its protective chemistry has been spent.

Additive depletion is therefore an early warning that the lubricant's built-in defence system is being consumed. And many of the things that accelerate that consumption arrive as unwanted guests: water, dirt, soot, fuel, coolant and other contaminants.

In the final instalment of this series, we look at Contamination - Oil's Dirty Little Secret.



Steven Lumley technical manager WearCheck.

Steven Lara-Lee Lumley oversees technical development and training for condition monitoring specialists WearCheck. She holds an N6 mechanical engineering diploma (HND N6) as well as Honeywell aerospace and ICML III accreditations.

Steven joined WearCheck in 2008 as a diagnostician and worked her way up to the position of senior diagnostician, during which time she diagnosed her millionth used-oil sample in addition to running oil analysis training courses for customers in several countries. In 2015, Steven was promoted to the position of technical manager.

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