

CASE STUDY:
A JORC RESERVE BACKED BY OUR OWN LIFE-OF-MINE PLAN

VBKOM acted as independent Competent Person for a 13.3 Mtpa bauxite export operation in Guinea's Boké region. We declared 476 Mt of Mineral Resources and 263.7 Mt of Ore Reserves under JORC (2012). We also built the Life-of-Mine plan behind the Reserve, from cut-off optimisation to a production schedule running to 2044.

CLIENT
Bauxite export operation (confidential)

LOCATION
Boké Region, Guinea

COMMODITY
Metallurgical-grade bauxite

SCALE
13.3 Mtpa, twelve plateaus

SCOPE
JORC (2012) Competent Person's Report and Life-of-Mine plan

EFFECTIVE DATE
31 December 2023

TOOLS
Deswik.CAD, Deswik.Sched, Deswik Blend

SOLUTION
Technical Consulting: Explore and Define the Asset; Design and Plan the Mine

THE PROJECT IN BRIEF

THE CHALLENGE

An annual, independently signed JORC declaration that had to absorb a lower product specification, two new plateaus and environmental buffer zones.

THE THINKING

A Reserve is only as good as the mine plan behind it, so VBKOM built and scheduled that plan itself, block by block.

THE OUTCOME

263.7 Mt of Ore Reserves at 46.0% Al_2O_3, about 20 years of production, and a clear view of how specification drives Reserve size.

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THE CHALLENGE

A Reserve that has to hold up every year

Guinea holds the world's largest bauxite reserves, and the Boké region in the north-west is the centre of its export industry. Our client mines lateritic bauxite from twelve separate plateaus across a 690 km² concession. Ore is trucked to a central crusher, then railed about 100 km to the Atlantic coast for export.

Every shipment has to meet an alumina specification to satisfy offtake. The operation's shareholder also needs an annual, independently signed JORC (2012) statement of Mineral Resources and Ore Reserves.

The 2023 declaration had three changes to absorb. Product specification dropped from 46.5% to 46.0% Al_2O_3, two plateaus were newly modelled, and resources inside chimpanzee critical-habitat buffer zones had to be excluded.

An Ore Reserve can only be declared if a credible, scheduled mine plan shows it can be mined to specification.

THE OPERATION

Concession
690 km², Boké Region

Deposit
Lateritic bauxite capping twelve plateaus

Production
13.3 Mtpa of export product

Logistics
Truck to crusher, ~100 km rail to the coast

Specification
46.0% Al_2O_3 (from 46.5%)

Reporting code
JORC (2012), annual

THE QUESTION

How much of this deposit can be mined, **to specification, year after year**, and can we prove it to the shareholder?

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THE METHOD

An independent review, combined with in-house mine planning

VBKOM combined an independent resource review with its own mine planning. The Ore Reserve therefore rests on a Life-of-Mine plan we built and can defend, not one taken on trust.

01 **Mineral Resource review**

Site visits by both Competent Persons. The work covered validation of the auger drilling, QA/QC and XRF assay data, and a review of every plateau's geological model. Operating plateaus were depleted to survey, and sterilised and buffer-zone material was removed.

02 **Cut-off optimisation**

Grade-tonnage curves for every plateau, used to find the variable Al_2O_3 cut-off that delivers a 46.0% diluted average while making the most of the Resource.

03 **Block-by-block modifying factors**

Ore roof and floor defined for every 20 m × 20 m column. Each column carries roof dilution from thin overburden, 0.2 m floor over-mining, internal sub-grade dilution and a 0.3 m mining loss.

04 **Mine design**

Pit limits in Deswik.CAD, restricted to Measured and Indicated material outside the buffer zones. Mining areas under 1,600 m^2 were excluded as impractical.

05 **Life-of-Mine scheduling**

The site fleet modelled in Deswik.Sched and Deswik Blend to target 13.3 Mtpa at 46.0% Al_2O_3. The schedule prioritises direct crusher feed and minimum rehandle, uses four grade-segregated stockpiles and dumps waste in-pit.

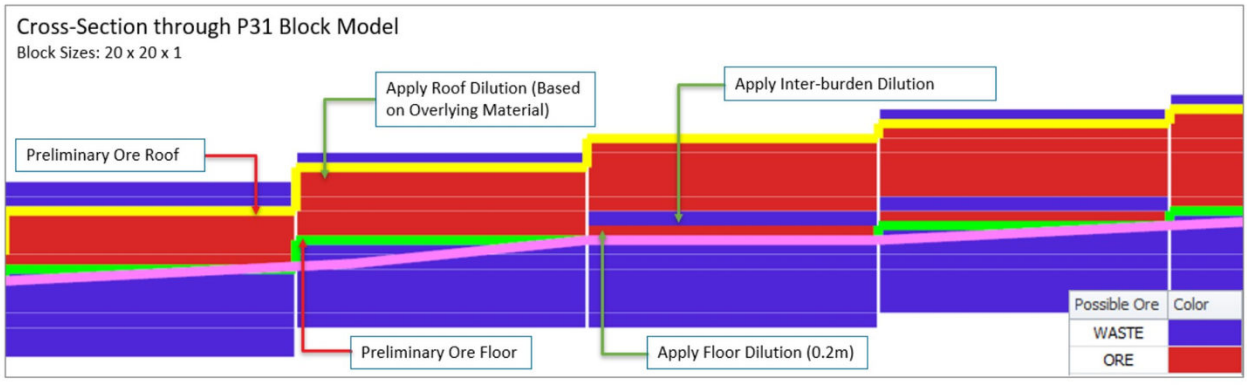


Fig 1. Block-model cross-section showing how roof, internal and floor dilution were applied to each mining column.

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THE THINKING

Specification drives the Reserve

In a deposit like this, the product specification sets the cut-off, and the cut-off sets the Reserve. VBKOM built a diluted grade-tonnage curve for every plateau. It shows exactly where the tonnes sit and how quickly they fall away as the cut-off rises.

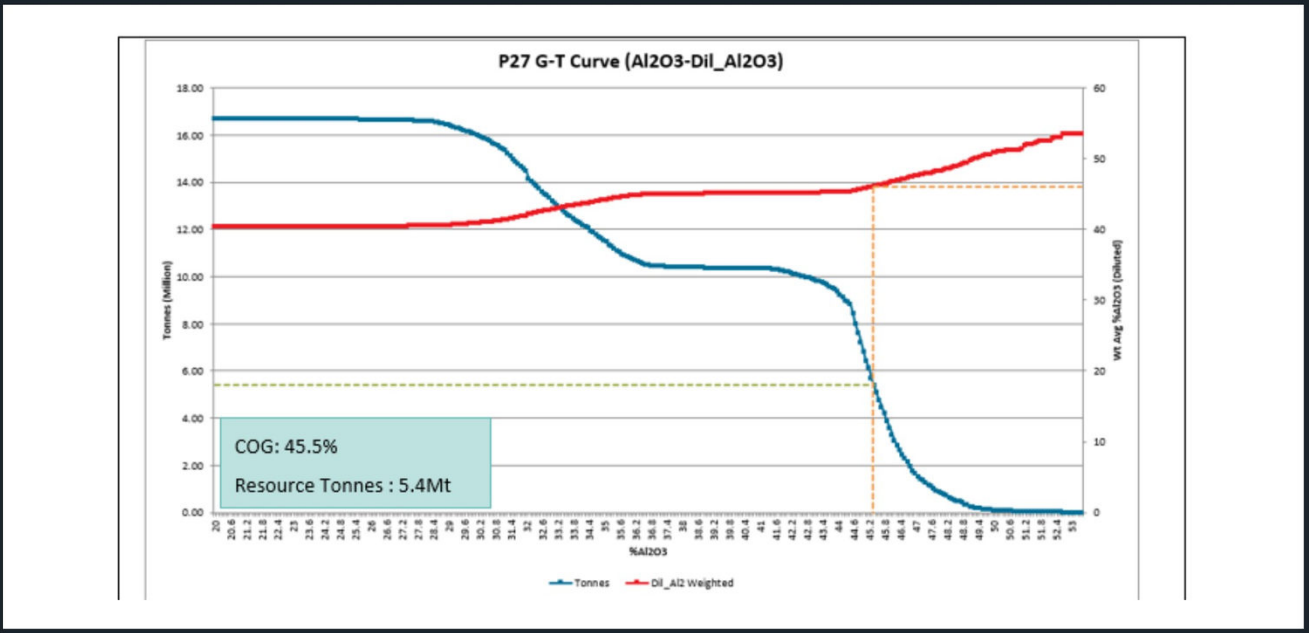


Fig 2. Diluted grade-tonnage curve used to set one plateau's cut-off grade.

40.7–45.5%	3.5%	4.8%	+48.3 Mt
Plateau Al_2O_3 cut-off grades	Overall dilution	Mining losses	Added by moving from 46.5% to 46.0% Al_2O_3

A COMMERCIAL LEVER

The same work turned specification into a decision management could weigh. A 45.0% Al_2O_3 product would grow the Reserve to 364.8 Mt. That is 101 Mt or 28% more, and seven more years of mine life.

Lower specification also narrows the margin for error. That is why our recommendations put grade control, floor control and reconciliation first.

The quality of a decision depends on **the quality of what informs it.**

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THE OUTCOME

A JORC (2012) declaration with a positive material change, as at 31 December 2023

MINERAL RESOURCES

Category	Mt	Al_2O_3 %
Measured + Indicated	429.2	46.1
Total incl. Inferred	**476.2**	**46.0**

ORE RESERVES

Category	Mt	Al_2O_3 %
Proved	195.9	46.5
Probable	67.9	44.6
Total Ore Reserve	**263.7**	**46.0**

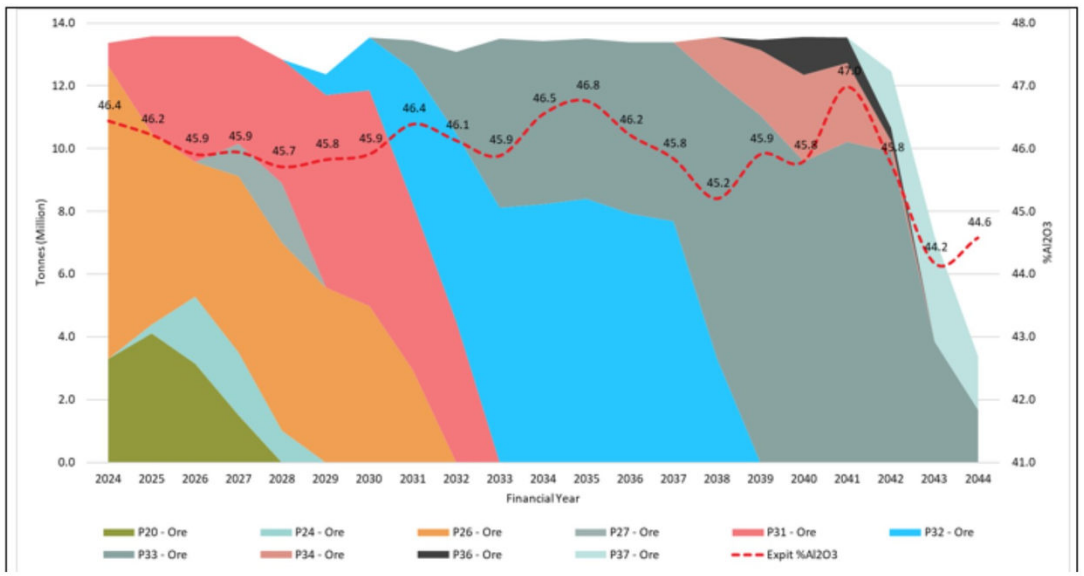


Fig 3. Life-of-Mine ROM ore tonnes by plateau, with the average Al_2O_3 grade.

The schedule delivers a steady 13.36 Mtpa of plant feed at 46.0% Al_2O_3 every year to 2044, about 20 years of production. The two operating plateaus are mined together for the first four years, supported by three nearby plateaus, before mining moves to the more distant ones. The stripping ratio of about 0.5 lets all waste go back into the pits, with no waste dumps outside them.

PRACTICAL RECOMMENDATIONS

01 Tighten grade control, floor control and reconciliation as product tolerance narrows.

02 Resolve low-grade stockpiles, as future feed or as a closure provision.

03 Investigate crusher relocation or alternative ore transport as haul distances grow.

04 Trial ground-penetrating radar for infill drilling, and measure in-situ density routinely.

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By unearthing opportunities, our solutions have the power to improve lives.

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RELATED CAPABILITIES

Explore and Define the Asset

Mineral Resource and Reserve estimation, reconciliation auditing, 3D block modelling and Competent Persons' reporting.

vbkom.com/solutions/explore-and-define-the-asset

Design and Plan the Mine

Mine design and planning, pit optimisation, equipment selection and cost modelling, and mine technical services.

vbkom.com/solutions/design-and-plan-the-mine

Let's talk about the numbers behind your next decision.

ABOUT VBKOM

We bring together multidisciplinary engineering expertise, practical mining experience and commercial perspective to help our clients move from complexity to clarity.

AFRICA
Centurion, South Africa
info@vbkom.com
+27 (0) 12 654 0004

AMERICAS
Ontario, Canada
info@vbkom.com

ASIA PACIFIC
Perth, Australia
info@vbkom.com

vbkom.com

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