

My experience during my attachment at Base Titanium Limited

I am an Associate working at JMiles & Co., a legal consultancy specialising in international arbitration, fraud investigations and asset recovery, legal consulting and mediation. We regularly represent clients in Africa and internationally in matters pertaining to energy and natural resources. I wanted to develop a deeper understanding of these areas, and after encountering Base Titanium Limited at the Kenya Mining Forum and learning about their unmatched reputation in the extractives sector, I was keen to learn from them. As such, I undertook a two week attachment at their Kwale Mine.

My experience was nothing short of surreal. I spent my time being rotated in the community, environment, mining, production and port operation departments; I learnt about Base Titanium's exceptional approach to CSR; and I had the opportunity to experience Base Titanium's extraordinary workplace culture.

The aim of this blogpost is to share what I learnt during my attachment experience. My blogpost begins by providing an overview of the

company and the minerals it produces, followed by an explanation of the mining process and export operations, and it concludes by highlighting Base Titanium's contribution to the Kenyan economy and explaining why the company is so successful.



Company overview

Base Titanium Limited is a wholly-owned subsidiary of Australian and UK-listed resources company, Base Resources Limited (ASX and AIM: BSE). Located in Kwale County, 50km south of Mombasa, it operates Kenya's largest mine, which was officially awarded flagship project status under Kenya's Vision 2030 national development blueprint.

Base Resources acquired the mine from Tiomin Resources Limited (now called Vaaldiam Mining), a Canadian company, in 2010. Project development commenced in November 2011 was successfully completed in November 2013.

The mine development was estimated to be around USD298 million. The support infrastructure includes an 8km access road, a 14km long 132KV power supply line, tailings storage facility, a water storage dam on the Mukurumudzi River and a marine facility for facilitating export.



Minerals produced

Base Titanium is considered a world-class mineral sands project. It is involved in the production of three minerals: ilmenite, rutile and zircon. Save for zircon, these minerals contain different levels of titanium: ilmenite (50%), rutile (90%).

The project is expected to be one of the top producers of ilmenite and rutile in the world, with production amounting to nearly 10% and 14% of the global supply of these minerals respectively.

Mining Process

Broadly speaking, the mining process involves four stages:

- 1) Exploration
- 2) Mining
- 3) Processing
- 4) Production

Exploration

This is a process used to identify mineral deposit in the ground. From my understanding, in order to determine whether an area is worth exploring, Base Titanium uses an “airborne geophysical and radiometric survey”. This survey collects magnetic data (which is used to detect ilmenite, as it is magnetic) and radiometric data (which is used to detect zircon, as it has some radioactive properties). Once this survey is done, Base Titanium then attains samples from the ground using a process called “aircore drilling”.

A couple of points to note regarding the drilling procedure:

- Drilling is not mining, the two activities are very different and have very different impacts.
- The work area around each drill hole covers just a few square metres.
- The diameter of the drill hole is 70mm and only a few kilos of sample are extracted from each hole.
- The drill rig used for this work is a Toyota Landcruiser-mounted unit. It is versatile and manoeuvrable, creating minimal impact on the ground.
- Each hole is completed in about one hour, backfilled and the immediate area returned to its original condition.



These samples from the drilling are then analysed for two reasons: first, to confirm that the mineral exists; and second, to ensure that it is commercially viable to mine it (i.e. the amount of mineral must be sufficient to ensure it justifies the cost of mining it).

Mining

Base Titanium has two mining units. The Dozer Mining Unit ('DMU') and the Hydraulic Mining Unit ('HMU').

I learnt two very interesting things about the mining process: firstly, the Dozer Base Titanium uses is a D11 which is the largest machine Caterpillar makes and Base Titanium is the only company in East and Central Africa to use it; secondly, Base Titanium uses no chemicals in the mining process itself.

Process

Utilising 3 HMUs, mined ore is fed by slurry pipeline into Base Titanium's wet concentrator plant ('WCP') where the barren slimes and sand are removed to produce a heavy mineral concentrate ('HMC').



Hydraulic Mining Unit



Wet Concentrator plant



Heavy Mineral Concentrate

Production

The HMC then passes through the mineral separator plant ('MSP'). This plant uses the physical properties of the minerals to separate them.

	Small	Heavy	Magnetic	Non-Magnetic	Conductive	Non-Conductive
Ilmenite	✓	✓	✓	✗	✓	✗
Rutile	✓	✓	✗	✓	✓	✗
Zircon	✓	✓	✗	✓	✗	✓

Physical properties of minerals

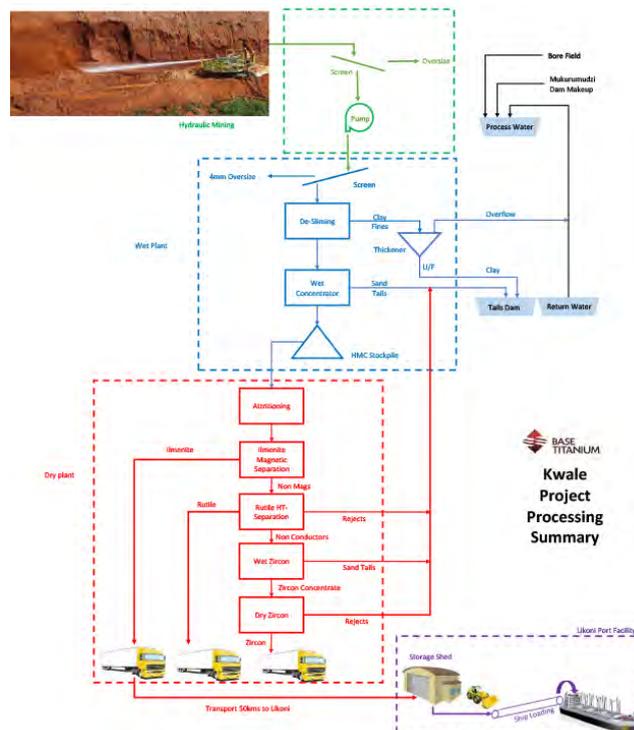
Ilmenite is separated using a magnet as it is magnetic. Rutile is conductive, so an electrostatic current is passed through it to separate it. Zircon is left behind as it is neither magnetic nor conductive. However, Zircon is extremely marketable, and as such, it goes through another stage of processing. This involves passing it through the wet part of the plant and the dry part of the plant again.

Port operations



Base Titanium does both bulk and container shipments and has set up a dedicated bulk storage and shipping terminal in Likoni. The storage facility has a capacity to 80,000 tonnes of ilmenite and rutile. A conventional 30-tonne road truck transports these products from the mine site to the storage shed. A mobile ship loader then uses conventional conveyor technology (i.e. conveyor belts) which loads at a rate of 800 tonnes per hour into bulk carrier vessels moored alongside the dedicated wharf. Zircon and some rutile are containerised on site and exported through the container terminal in the Port of Mombasa.

The diagram below summarises the mining and port operations:



Base Titanium's contribution to the economy

Base Titanium spent KES 26 billion in investment during the construction phase of the project of which KES 9 billion has been spent on Kenyan contractors. They have created 764 direct jobs, 1430 indirect jobs in supply chain and 1360 induced jobs in consumer spending. They have built a supply chain of KES 3.7 billion (84%) annually in purchases from Kenyan businesses and are expected to contribute KES 23 billion to government revenue over the mine life. They contribute KES 16-20 billion annually in export revenues, and are expected to make a contribution of KES 100 billion in GDP contribution from 2015 to 2023.

Why is Base Titanium so successful?

In my opinion, it is because of their community engagement approach.

Base Titanium has a deep understanding of community impacts during the design, construction, operational and ultimately decommissioning phases of the project. Through each of these phases, Base Titanium has placed, and continues to place, a thorough emphasis on the value of local community participation, especially since they recognise the local communities' cultural heritage.

For example, before carrying out exploration of the land, Base Titanium ensures they sit down with community members to inform them of the procedure and address any misconceptions they may have. They ask members of local communities to form sub-committees to represent the views of those committees. If the communities feel that exploration is not in their best interests, Base Titanium will not proceed with it. If the members agree to exploration, Base Titanium pays KES 10,000 for each hole they drill on an individual's land. This is not a requirement by the law, but Base Titanium's own initiative to compensate land owners for any disturbance. Their approach regarding community engagement is so exceptional, that the Mining Act 2016 has been modelled after it.



Exploration meeting in Vanga

Base Titanium has also invested KES 1.5 billion in different community development projects (such as social infrastructure, livelihood enhancement, health and education programmes), and 250 of the 764 direct jobs created by Base are in the community and environment departments.



Some of Base Titanium's community development projects

In conclusion, my experience at Base Titanium was mind blowing. I met some of the most skilled, knowledgeable and approachable people. The energy embodied and displayed by every single one of them made it so exciting to come to work every day. I also learnt that investing heavily in CSR as best practice yields greater returns and Base Titanium is a prime example of that. I now understand why Base Titanium has an unmatched reputation in the extractives sector.