

# Alkane Resources Limited

Good things come to those who wait

December 2016

**Recommendation: BUY**

- **Momentum builds as milestones reached**
- **Staged approach reduces upfront funding requirement**
- **Binding offtake agreements the next big catalyst**

ASX: ALK

Share Price: \$0.33

Target Price: \$0.61/share

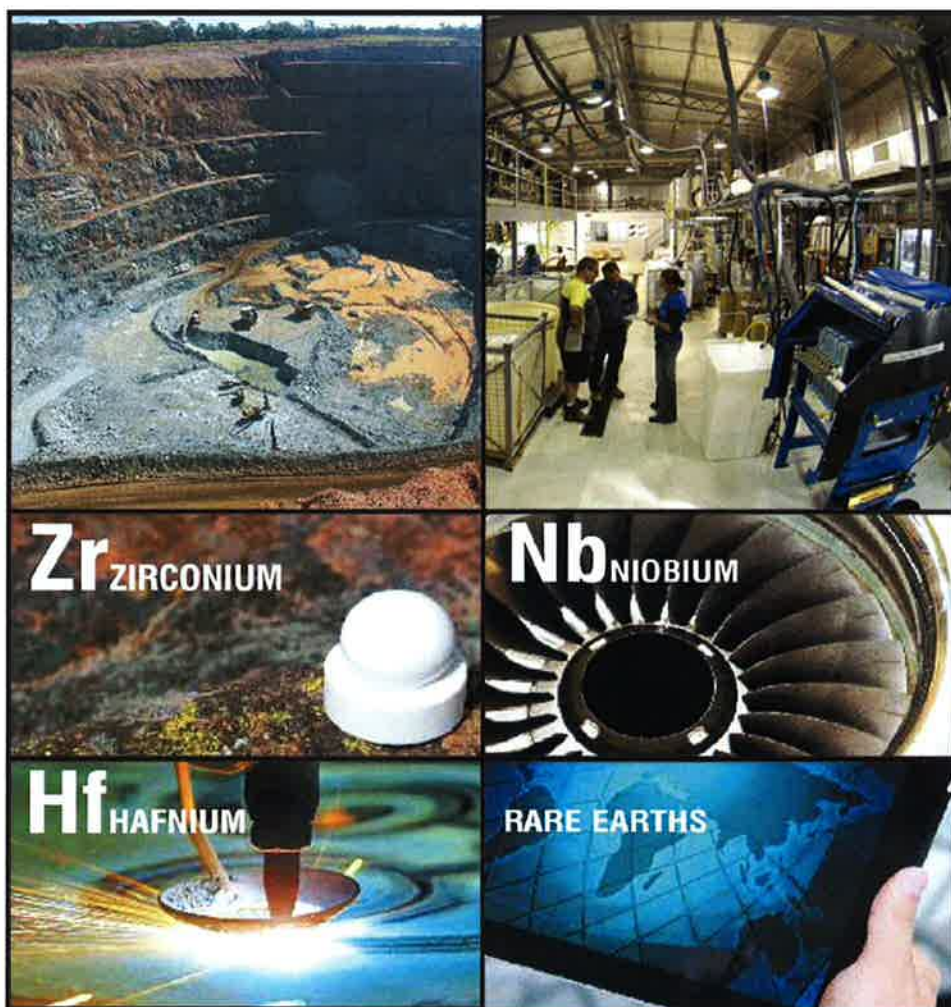
M/Cap.: \$167M

Valuation: \$0.61/share

Valuation: \$671M

Shares: 505M

Monthly T/over: \$30M



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**Petra Capital Pty Ltd**

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# Alkane Resources Limited (ALK) **BUY** Share Price: **A\$0.33**

**Good things come to those who wait**

**Target Price: A\$0.61**

We update our coverage on ALK with a BUY rating and a A\$0.61/sh target price. The share price performance experienced year to date had been underpinned by the delivery of a number of key milestones for the Dubbo Zirconia Project (DZP) and the expectation of more to come. The modular approach to develop the project makes for easier funding (~A\$750m vs A\$1,300m) and will help ALK to deliver the remaining key milestones more rapidly. We see binding offtake agreements for the key product streams acting as near term catalysts. Our DZP valuation of A\$0.35/sh incorporates a 12% discount rate to reflect the remaining funding and execution required to deliver each of the project stages.

## Recent Milestones Achieved

- Mar-16: Environmental Protection Licence granted.
- Apr-16: LOI with VTRE to toll treat REE concentrate.
- Aug-16: Marketing, sales and distribution agreement for Zr.
- Oct-16: MOU with Siemens for offtake and equipment purchase.
- Oct-16: Staged development approach.

## Near Term Catalysts

- Binding REE toll treatment agreement.
- Binding offtake agreements for the key product streams (Zr, Nb, REE and Hf) to derisk the project and attain financing.

## Financing Hurdle Remains

- Financing the A\$676m stage 1 capex + A\$100m working capital remains a challenge but far more achievable than previous funding requirement.
- Project level investment, export credit agencies and commercial bank debt are likely to be considered as key sources of funding, along with equity capital markets.

## Tomingley Gold Operation (TGO)

- FY17 guidance of 65-72koz (AISC to be revised in Dec Q).
- Open pits have 2.5yrs reserves remaining. The underground reserve underpins a further 2.75yrs.
- Underground DFS underway and expected to increase reserves and improve economics.

## Revised Price Target of A\$0.61/sh, Buy

- Assumes 10% discount rate at TGO and 12% at DZP, A\$300m capital raising, US\$1,300/oz Au, US\$19.3/kg DZP basket & 0.70 AUDUSD.

## Company Data

Shares – ordinary (M)	505M
Dilution (M)	600M
Total (fully diluted) (M)	1105M
Market cap. (M)	167M
12 month low/high (\$)	A\$0.18 / A\$0.66
Average monthly turnover (\$M)	A\$30M
GICS Industry	Materials / Gold

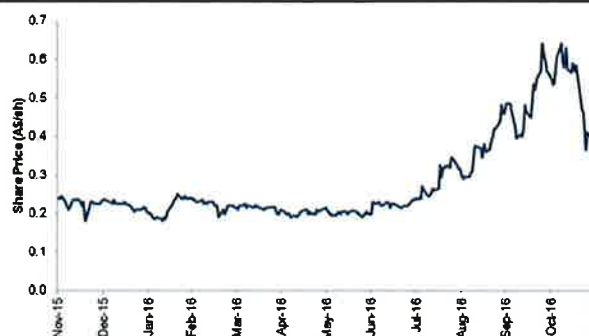
## Financial Summary (fully diluted/normalised)

Year end June	2016A	2017F	2018F	2019F	2020F
Revenue (\$M)	110	105	133	88	61
Costs (\$M)	-73	-95	-97	-64	-110
EBITDA (\$M)	37	10	37	24	-50
NPAT (\$M)	5	-11	6	-2	-70
EPS (¢ps)	1	-1	1	0	-6
PER (x)	35.9	N.M	N.M	N.M	N.M
Cashflow (\$M)	37	11	44	27	-35
CFPS (¢ps)	8	1	4	2	-3
PCFPS (x)	5	41	11	17	-13
Enterprise Value (\$M)	190	-100	54	380	599
EV / EBITDA (x)	5.2	N.M	1.5	15.8	N.M
Dividends (¢ps)	0	0	0	0	0
Yield (%)	0.0	0.0	0.0	0.0	0.0

## Board

Director	Position	Executive
John Dunlop	Chairman	Non-Executive
Ian Chalmers	Managing Director	Executive
Ian Gandel	Director	Non-Executive
Tony Lethlean	Director	Non-Executive

## ALK (A\$/sh) – performance over one year



## Disclosure and Disclaimer

This report must be read with the disclosure and disclaimer on the final page of this document. On 25<sup>th</sup> October, Petra Capital was appointed as a financial advisor, with Credit Suisse and Sumitomo, in relation to the financing of the Dubbo Zirconia Project. On 1<sup>st</sup> July 2016 Petra Capital Pty Ltd was a broker to placing the shortfall of a rights issue of 82.6M shares at \$0.20/sh, raising \$16.5m. A fee was received.

## Executive Summary

### Milestones Being Achieved

ALK is making significant progress in the path to commercialising the DZP and we believe that 2016 will be seen as a pivotal year as ALK moves the project towards construction and production. A number of key milestones have recently been achieved including;

- Aug-15 – FEED (Front End Engineering Design)
- Mar-16 – EPL (Environment Protection Licence) granted
- Apr-16 – REE toll processing LOI (Letter of Intent) signed with Vietnam Rare Earth JSE (VTRE)
- Jun-16 – Final land acquisitions complete
- Aug-16 – Zirconium marketing, sales and distribution agreement signed with Minchem
- Oct-16 – MOU with Siemens, both parties to explore purchase of each other's product
- Oct-16 – Staged development approach to lower capex and bring forward production

Notably, completion of the FEED, finalisation of the flow sheet and the staged development approach which lowers the pre-production capex from A\$1,300m to A\$676m. These two factors lead to a significant de-risking of the project.

### Catalysts Close

ALK has made considerable progress toward de-risking the DZP, which provides the end market with confidence the project will; (a) reach production and; (b) produce a desirable product specification. This should facilitate the next set of milestones including;

- Binding REE toll treatment agreement with VTRE.
- Binding offtake agreements for the key product streams (Zr, Nb, REE and Hf).
- Financing.

The finalisation of toll treatment agreements and offtake agreements are crucial to the financing and therefore development of the DZP. We believe these agreements are close to being finalised and will be considered positive catalysts for the share price, in our view.

### TGO Remains Important

The TGO remains an important source of free cash flow for ALK and its proximity to the DZP helps provide a social licence to operate in regional NSW. FY'17 guidance is 65-72koz with ore sourced from Caloma, Caloma Two and Wyoming One open pits. AISC previously set at A\$1,200-1,300/oz will be revised in the DQ following weather related production disruptions in the Sep Q. Open pit operations will continue until mid FY'18 when the project will transition to an underground operation blended with low grade stockpiles.

### Valuation upside to our A\$0.61/sh price target (1xP/NPV)

Our A\$0.61/sh price target is set in-line with our NPV for our base case production plan. Our share count is on a fully diluted basis which assumes A\$300m of new equity is raised at 50¢/sh, with the cash proceeds accounted for in the valuation.

The discount rate (real) used for TGO is 10% and for the DZP is 12%. DZP is the main driver of value contributing A\$383m or A\$0.35/sh. TGO contributes A\$65m or A\$0.06/sh.

### Key Risks

Key risks associated with companies operating in the resources sector include exposure to commodity price and currency fluctuations, technical and operating risks, litigation and political risks and funding and equity/debt market risk. Risks to achieving our target valuation include (a) offtake and pricing risk for DZP products (b) funding for DZP (c) the unique flow sheet at DZP and (d) mine life at TGO.

## Investment Thesis

Alkane's two principle assets are the Tomingley Gold Operation (TGO) and the Dubbo Zirconia Project (DZP), both located in regional NSW, Australia.

The **Dubbo Zirconia Project** is the prime driver of value for Alkane. It is a large scale polymetallic, rare metal ore deposit which aims to produce zirconium, ferro-niobium, hafnium and rare earths that have strategic applications in permanent magnets, steels, ceramics and super alloys. Development of the project has begun to generate momentum following approvals, signing of agreements with partners for collaboration, sales, marketing and distribution and the recent decision to build the project in two stages.

The staged development approach reduces capex to first production to A\$676m (A\$1,300m prior) by developing the project as a two stage, four train plant. Each stage will operate at 500ktpa, versus the 1Mtpa project previously envisaged. Other benefits to modularisation include reduced costs and shorter lead times from offsite fabrication, smaller required commitments from offtake and reduced impact to the various product markets.

As an operating asset, **Tomingley Gold Operation** is an important source of cash flow for ALK. It is located in the same region as the DZP and is therefore helping develop the company's social licence to operate. Near term, the operation will average ~75kozpa before declining to 20-45kozpa when the open pits are depleted in two years' time. The operation has a remaining mine life of 6.5 years including the underground operation which is forecast to begin production in FY18.

**Near term catalysts** for ALK are associated with further de-risking of the DZP, including;

- **Binding rare earth toll treatment agreement:** a LOI is in place between ALK and VTRE to toll process ALK's rare earth concentrate produced by the DZP into individual rare earth elements. The conversion into a binding agreement could act as a precursor to binding offtake agreements for this product stream.
- **Binding offtake agreements:** no quantifiable offtakes are yet in place for zirconium, ferro-niobium, rare earths or hafnium. We would expect the announcement of binding offtake agreements with/without prepayments to be a significant catalyst for the stock. They would signify the health of the underlying rare metals markets and indicate the acceptability of DZP products in the downstream markets.

Once these two components are in place, we believe financing will become more straightforward;

- **Financing:** the reduction in capex from A\$1,300m to A\$676m adds credibility to the project which will greatly reduce the financing risk. Alkane continue to pursue funding from; a) project level investment b) ECA (Export Credit Agency) investment c) commercial bank debt and d) equity capital markets.

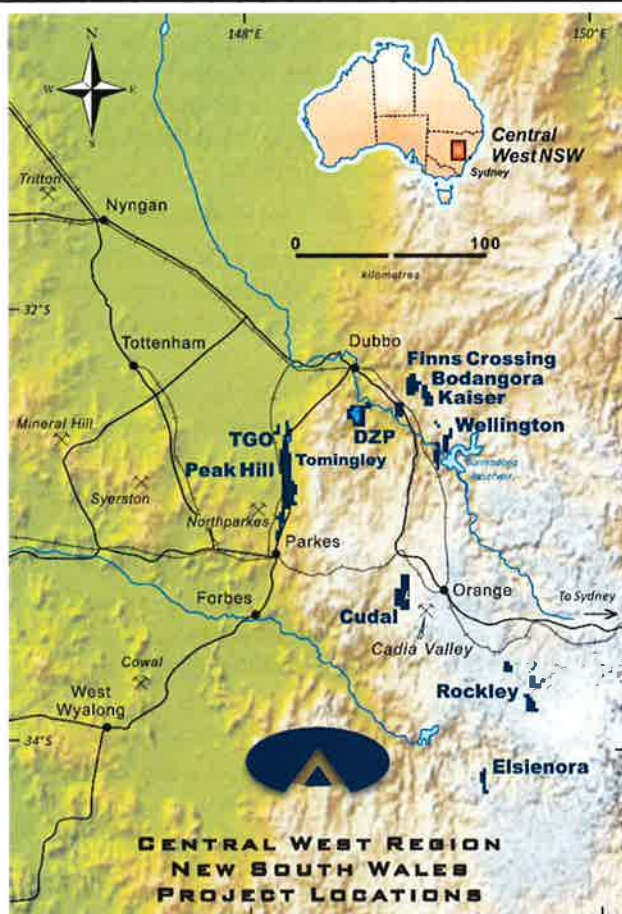
The strategic nature of the DZP as a material supplier into the rare metals market gives confidence to the construction of the project. We see the near term catalyst adding value to ALK and update our valuation with a A\$0.61/sh target price.

## Dubbo Zirconia Project (DZP)

The DZP is located approximately 400km north west of Sydney and 30km south of Dubbo in NSW, Australia (Figure 1 & Figure 2). The project is accessed by sealed road and is close to substantial infrastructure including rail, power, gas and skilled labour. The project resides on a granted mining lease covering 2,390ha, with the company owning ~3,400ha of surrounding land to provide a significant biodiversity offset area and residual agricultural land.

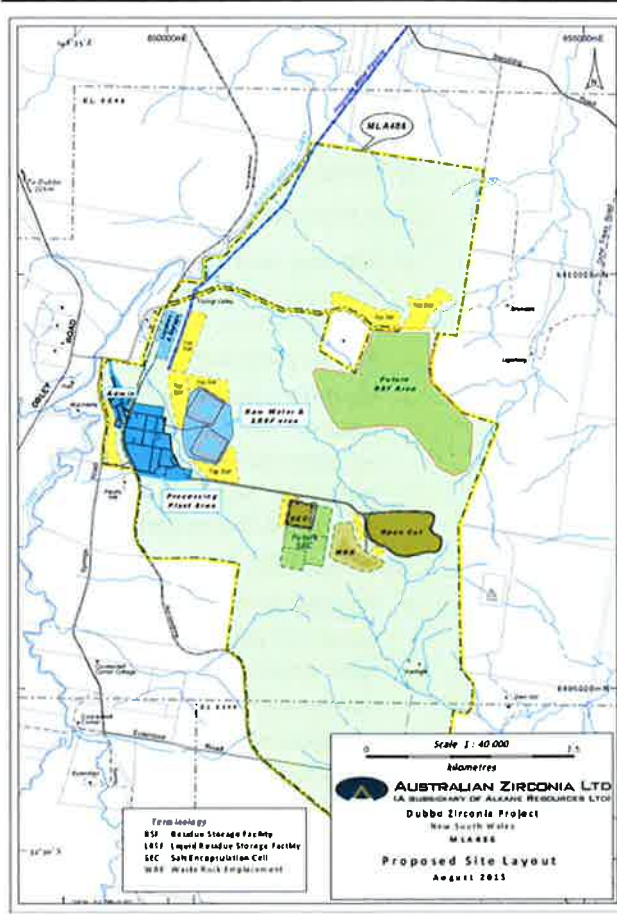
The DZP is a complex but unique polymetallic asset. ALK discovered the deposit in 1987 and has pursued a number of strategies to develop the asset over the years. This period has allowed ALK to define the design and product suite for DZP and we now believe the flow sheet has been finalised and a staged development configuration will be taken into production.

Figure 1: Location Map of DZP



Source: Company Reports

Figure 2: Proposed Site Layout of DZP



Source: Company Reports

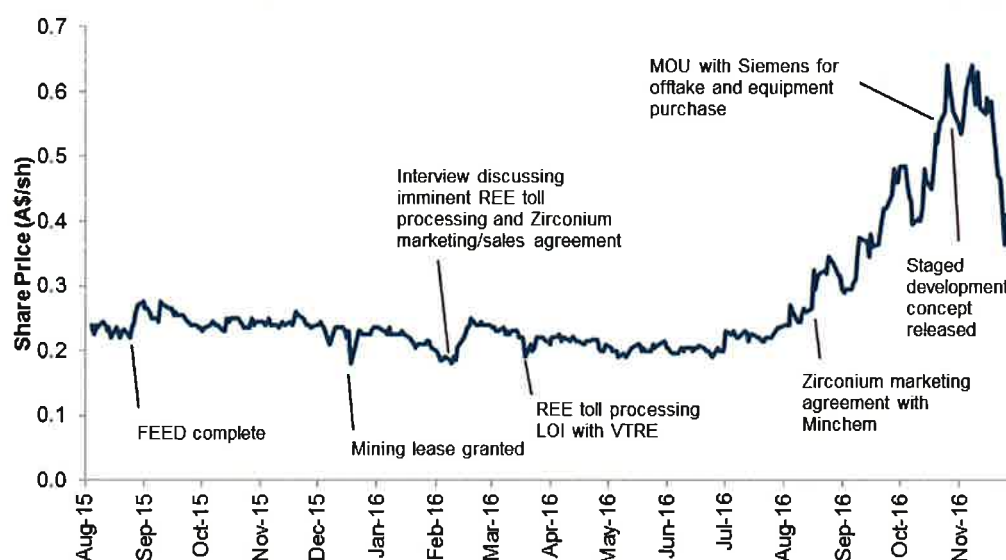
## DZP Milestones Achieved

ALK has achieved a number of significant milestones over the last 18 months which have progressively de-risked the DZP (Figure 3). In particular the completion of FEED, and execution of a number of agreements with downstream customers including the REE toll processing agreement, the initial marketing, sales and distribution agreements, and the MOU with Siemens and the decision to build the project in two stages.

### Recent Milestones Achieved;

- Aug-15 – FEED (Front End Engineering Design)
- Aug-15 – Federal approval under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999
- Sep-15 – Hafnium concentrate produced from mini pilot plant at ANSTO
- Sep-15 – ECI (Early Contractor Involvement) agreement signed with Outotec
- Dec-15 – Mining Lease granted
- Mar-16 – EPL (Environment Protection Licence) granted
- Apr-16 – REE toll processing LOI (Letter of Intent) signed with Vietnam Rare Earth JSE (VTRE)
- Jun-16 – Final land acquisitions complete
- Aug-16 – Zirconium marketing, sales and distribution agreement signed with Minchem
- Oct-16 – MOU with Siemens, both parties to explore purchase of each other's product
- Oct-16 – Staged development approach

**Figure 3: Key milestones achieved**



Source: Company Reports, Petra Capital

## DZP Near Term Milestones

Momentum in the DZP is beginning to build as the company delivers on key project milestones. We believe the market will continue to allocate value to the DZP as key milestones are achieved. These milestones are tabulated in Figure 4 and we see the finalisation of the tolling agreement and binding offtake agreements further derisking the placement of all key products (and therefore building investor confidence) in the project.

**Figure 4: Milestone Checklist**

- = complete
- = near term
- = remaining

Milestone	Status	Complete
<b>Project Resources</b>		
<span style="color: green;">●</span> Acquire project land	Complete	Jun-16
<span style="color: green;">●</span> Secure water resources for DZP1	Complete	Oct-16
<span style="color: green;">●</span> Powerline easements	Complete	Sep-16
<b>Agreements</b>		
<span style="color: green;">●</span> LOI rare earth tolling agreement	Complete	Apr-16
<span style="color: orange;">●</span> Binding rare earth tolling agreement	Target 2Q-2017	
<span style="color: green;">●</span> MOU with Siemens	Complete	Oct-16
<b>Marketing Agreements</b>		
<span style="color: green;">●</span> Zr	Complete	Aug-16
<span style="color: green;">●</span> FeNb	Complete	Jul-13
<b>Binding Offtake Agreements</b>		
<span style="color: orange;">●</span> Zr	Target 2Q-2017	
<span style="color: red;">●</span> Hf	Target 2017	
<span style="color: orange;">●</span> REE	Target 2Q-2017	
<span style="color: orange;">●</span> FeNb	Target 2Q-2017	
<b>Engineering / Design</b>		
<span style="color: green;">●</span> FEED	Complete	Aug-15
<span style="color: green;">●</span> Hf pilot plant testing	Complete	Nov-16
<span style="color: red;">●</span> Improvements from ECI	In Progress	
<span style="color: red;">●</span> BFS on staged develop approach	Target early-2017	
<b>Construction / Production</b>		
<span style="color: red;">●</span> Detailed engineering & design	Target early-2017	
<span style="color: red;">●</span> Financing	Mid-2017	
<span style="color: red;">●</span> Construction (stage 1 only)	Target 2Q-2017	
<span style="color: red;">●</span> Production	Target late-2019	

Source: Company Reports, Petra Capital

### Marketing Agreements

Sales, marketing and distribution agreements are already in place for zirconium and ferro-niobium. Rare earth and hafnium product streams are likely to be sold by ALK directly to end customers and will not need marketing agreements with third parties.

- Ferro-niobium (FeNb) – a marketing and production agreement was signed in Jul-13 in the form of a joint venture framework agreement with Austrian company Treibacher Industrie AG (TIAG). TIAG will provide support and plans for the construction of the FeNb plant and will have the right to purchase 50% of the joint venture which includes the FeNb plant within 3 years of plant commissioning.
- Zirconium (Zr) – a marketing and sales agreement was signed in Aug-16 exclusively to UK company Minchem Ltd which was formed from the management buyout of the mineral & chemical division from RioTinto company Palabora Mining Co Ltd. Minchem has a 5 year (+5 year by mutual agreement) exclusive marketing, sales and distribution agreement of all zirconium materials produced from DZP and they will also assist in the identification and creation of higher value zirconium products.
- Rare Earth Elements (REE) – a toll treatment LOI has been signed with Vietnamese company VTRE to toll treat and allow Alkane to take equity in VTRE. Prior to DZP production a joint marketing company is envisaged whereby ALK will market VTRE's production. This will help build customer relationships on the final product to be sold from the VTRE plant.

### Offtake Agreements

No binding offtake agreements are yet in place for zirconium, ferro-niobium, rare earths or hafnium. We would expect the announcement of offtake agreements with/without prepayments to be a significant catalyst for the stock. They would signify the health of the underlying rare metals markets and indicate the acceptability of DZP products in the downstream markets. ALK would like to secure 50-60% of the offtake under binding agreement before proceeding with development for stage one.

- Ferro-niobium – TIAG will be responsible for identifying customers of ferro-niobium products. Whilst TIAG continues to have offtake discussions with potential customers no agreements have been publicly disclosed since the announcement of the joint venture framework agreement in Jul-2013.
- Zirconium – offtakes will be put together by Minchem in the form of individual contracts that vary from a few hundred up to 1,000 tonnes per annum.
- Rare Earth Elements – the formation of a joint marketing company with between ALK and VTRE will allow the development of offtake arrangements. Siemens have expressed interest through a MOU for the procurement of DZP offtake including rare earth elements. Reciprocally ALK have expressed interest in acquiring Siemens equipment for the plant.
- Hafnium – the hafnium circuitry was added in 2015 to provide both a new product stream plus a higher quality zirconium product. The underlying market for this product stream remains immature but growing and as a consequence no marketing or offtake agreements are yet in place. The DZP could produce up to 200tpa of Hf but we assume small volumes are sold in early years (17t in year one) as the market develops. Any additional offtake would provide upside to our valuation.

## Engineering and Design

The completion of FEED allowed ALK to finalise the flow sheet for the DZP and begin early contractor involvement to extract further value from the project. A BFS on the staged development approach is expected in early 2017 which should provide further details on the project in its final form.

- FEED – completed in Aug-15, this allowed ALK to finalise the overall design of the DZP. Key changes from the previous plan included revised capex, improved rare earth recoveries, addition of a hafnium circuit and initiatives to reduce water consumption.
- Improvements from ECI – Early contractor involvement by Outotec in Sep-15 will focus on defining further value from equipment supply, technology, application and construction methodology. Alkane intends for Outotec to build and commission the process plant on a fixed price EPC (Engineering, Procurement and Construction) basis.
- BFS – a BFS is underway following the adoption of staged development approach consisting of a 4 train, 2 stage plant. This study will provide improved details on the economics of the project including costs and timeline.

## Construction/Production

It is expected that the detailed engineering and design will be complete in early 2017, construction could then commence upon receipt of funding in 2Q'2017 and production in 2019. Petra's forecasts are more conservative and expect construction to commence in 2018 and first production in 2020.

- Detailed design and construction – following on from FEED, further detailed design will be undertaken in parallel with finalising the project finance package.
- Financing – Alkane continue an unchanged strategy to pursue four sources of funding;
  - a) project level investment
  - b) ECA (Export Credit Agency) debt
  - c) commercial bank debt
  - d) equity capital markets.
- Production – Petra take a conservative view anticipating production to commence in mid 2020 versus company guidance of 2H'18-2H'19.

## Processing Plant

### Staged Development Approach

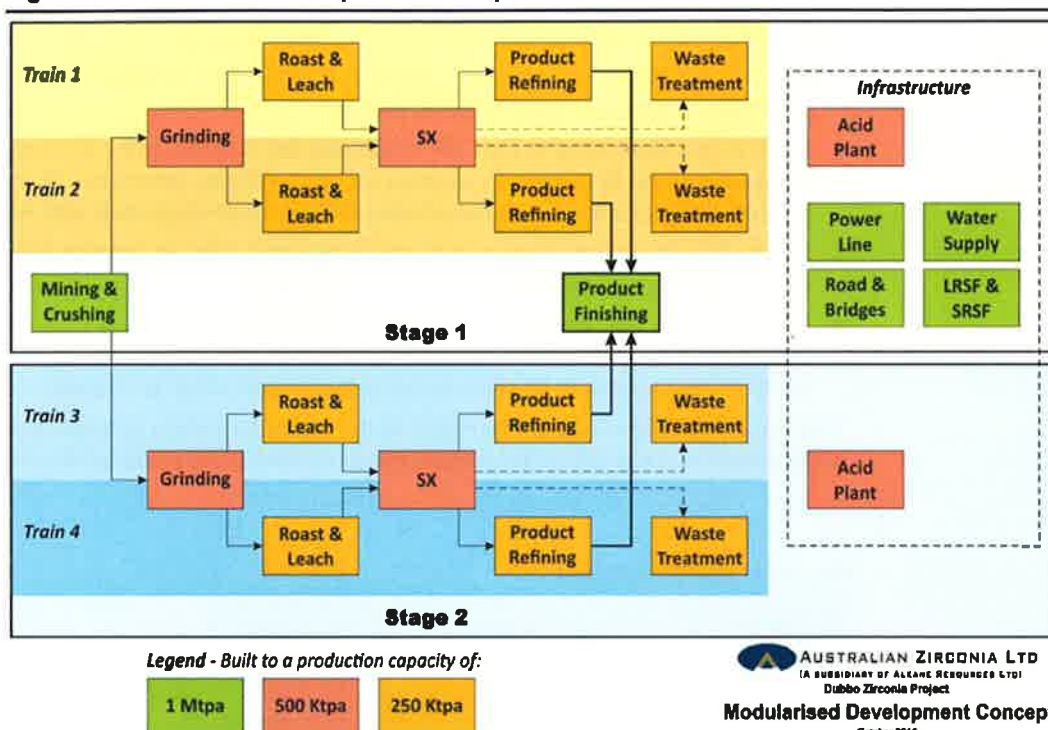
The modularised development concept takes the flow sheet that was finalised in FEED and splits it into a 2 stage, 4 train plant (Figure 5 & Figure 6). Each stage has a 500ktpa capacity and integrates two trains. The key benefits are;

- **Reduced funding hurdle.** The capex required to reach first production reduces from US\$970m for the 1Mtpa to US\$480m for stage 1.
- **Overall capex reduction.** Smaller componentry of the plant allows pre-fabrication offsite which reduces the overall capex by 13% from US\$970m to US\$840m (exc working capital).
- **Reduced market risk.** Offtake required to underpin initial funding is halved. This reduces the required number and magnitude of customer pre-commitments. It also reduces the impact on the various end markets, allowing smaller volumes to be introduced into markets which are typically opaque with limited visibility on the supply and demand.

**Figure 5: DZP Timetable**

	Stage 1	Stage 2	Combined
Capacity	500ktpa	500ktpa	1Mtpa
Construction Start (est)	2017	2022	2017
Construction Complete (est)	2019	2023	2023
Capex (exc working capital)	US\$480m	US\$360m	US\$840m

Source: Company Reports

**Figure 6: Modularised Development Concept**

Source: Company Reports

## Flow Sheet

The metallurgy of the DZP is complex, with recovery relying on hydrometallurgy rather than traditional concentrating. The plant can be conceptualised in three parts; a common front end, a product refining module and a product finishing module

(Figure 7).

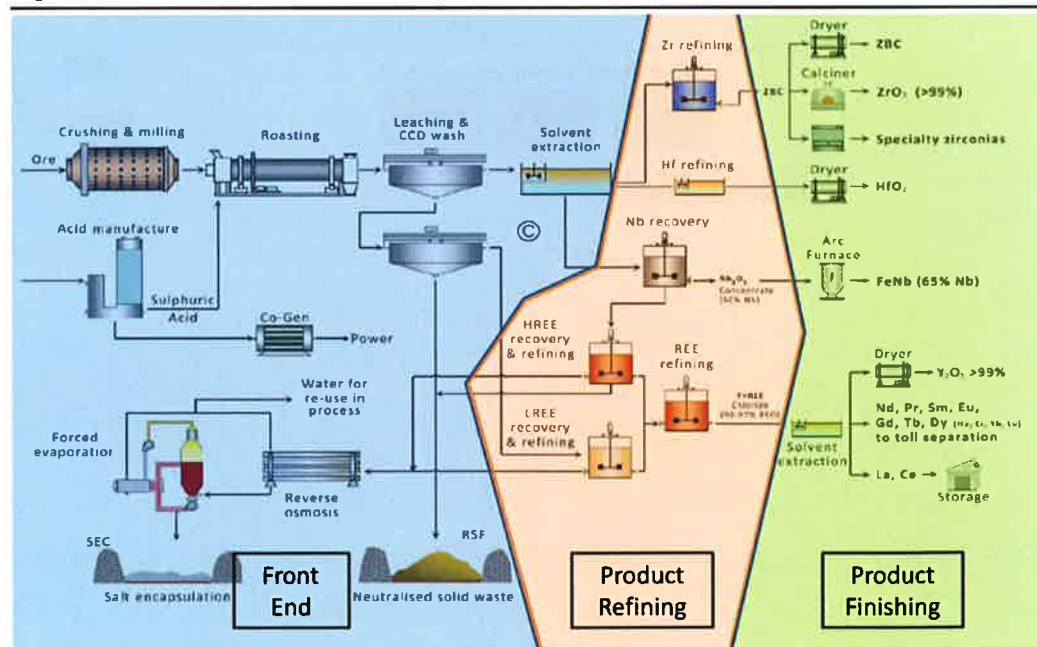
**Front End;** the front end is common across all product groups, it consists of the comminution circuit, roasting, leaching, counter-current decantation (CCD) and solvent extraction circuits. They are capital intensive components of the plant accounting for ~70% of the plant spend. Once in operation they are power intensive but have low reagent consumption meaning they account for 40% of the operating costs.

**Back End;** the back end consists of four streams for the different product groups; Zr, Hf, FeNb and REE.

- **Zr;** The Zr circuit will produce chemical zirconia and zirconium basic carbonate with the optionality to produce higher value Zr products.
- **Hf;** This is a new circuit to the DZP which was not included in the DFS. It aims to help improve the quality of the Zr (Hf and Zr naturally co-exist) with the advantage of producing an additional saleable product stream. The circuit has completed pilot stage trials with ANSTO.
- **FeNb;** This circuit was developed in conjunction with TIAG to produce FeNb. TIAG will have the option to purchase equity in this component of the plant under the 2013 JV agreement.
- **REE;** Once at full production, the DZP will produce 6,664tpa of REE. A total of 72% of the individual REE will be processed and separated on site (La, Ce, Y<sub>2</sub>O<sub>3</sub>). The remaining 28% will be in concentrate form, to be shipped and processed at VTRE in Vietnam.

The backend streams account for ~30% of the capex and when operational will account for ~60% of the operating costs due to the reagent intensive nature of the treatment process.

**Figure 7: DZP Flow Sheet**



Source: Company Reports

## Modelled Assumptions

In our modelled assumptions we adopt company capex estimates for the modular plant configuration and modify FEED operating cost assumptions proportionally for the purposes of modelling the modular configuration (Figure 8).

- Capital expense;
  - Stage 1; A\$676m
  - Stage 2; A\$507m
- Annual revenue;
  - Stage 1 & 2; A\$328mpa (per stage) (A\$27.5/kg)
- Operating expense;
  - Stage 1 & 2; A\$148mpa (per stage) (A\$12.5/kg)
- EBITDA;
  - Stage 1 & 2; A\$181mpa (per stage)
- Milling Rate; 0.5Mtpa (per stage)
- Production of;
  - Rare earth concentrate; 3,332tpa (REO units) (per stage)
  - Zirconium (Zirconium basic carbonate (ZBC) & chemical zirconia); 8,187tpa (ZrO<sub>2</sub> units) (per stage)
  - Hafnium (HfO<sub>2</sub>); 100tpa (Hf units) (per stage)
  - Niobium (FeNb); 984tpa (Nb units) (per stage)
- Assumed pricing;
  - Rare earth oxide basket price; US\$25/kg
  - ZBC / chemical zirconia; US\$6/kg / US\$9/kg
  - Hafnium (HfO<sub>2</sub>); US\$500/kg
  - Niobium (FeNb); US\$40/kg
- Resource of 73.2Mt @ 1.96% ZrO<sub>2</sub>, 0.04% HfO<sub>2</sub>, 0.46% Nb<sub>2</sub>O<sub>5</sub> and 0.75% REO
- Reserve of 35.9Mt @ 1.93% ZrO<sub>2</sub>, 0.04% HfO<sub>2</sub>, 0.46% Nb<sub>2</sub>O<sub>5</sub> and 0.74% REO
- Mine life; 30 years

**Figure 8: Petra Assumptions vs FEED**

	FEED	Modular (Stg 1) (Est)	% of FEED	Modular (Stg 2) (Est)	% of FEED	Modular (Stg 1 + 2) (Est)	% of FEED
Capital expense	A\$1,300m	A\$676m	52%	A\$507m	39%	A\$1183m	91%
Annual revenue	A\$580m	A\$328m	57%	A\$328m	57%	A\$656m	113%
Operating expense	A\$260mpa	A\$148mpa	57%	A\$148mpa	57%	A\$295mpa	114%
EBITDA	A\$320mpa	A\$181mpa	57%	A\$181mpa	57%	A\$362mpa	113%
Milling Rate	1Mtpa	0.5Mtpa	50%	0.5Mtpa	50%	1Mtpa	100%
Production of;							
Rare earth elements	6,664tpa	3,332tpa	50%	3,332tpa	50%	6,664tpa	100%
Zirconium (ZrO <sub>2</sub> & ZBC)	16,374tpa	8,187tpa	50%	8,187tpa	50%	16,374tpa	100%
Hafnium (Hf)	200tpa	100tpa	50%	100tpa	50%	200tpa	100%
Niobium (FeNb)	1,967tpa	984tpa	50%	984tpa	50%	1,967tpa	100%

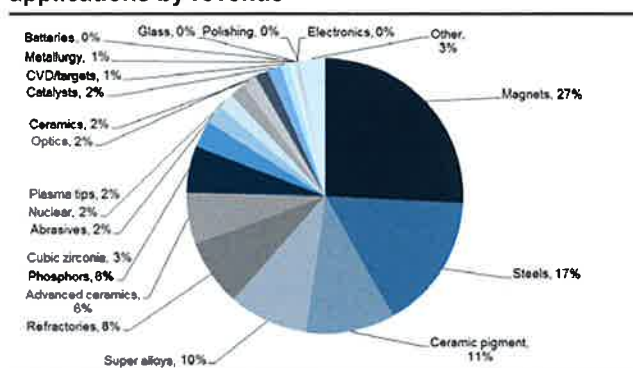
Source: Company Reports

## End Use Applications

Consumption of the DZP's production is relatively concentrated with more than half of demand coming from magnets (27%), steels (17%) and ceramic pigments (11%) (Figure 9 & Figure 10). The remaining half is split across a further 18 applications, with major components including super alloys, refractories and ceramics.

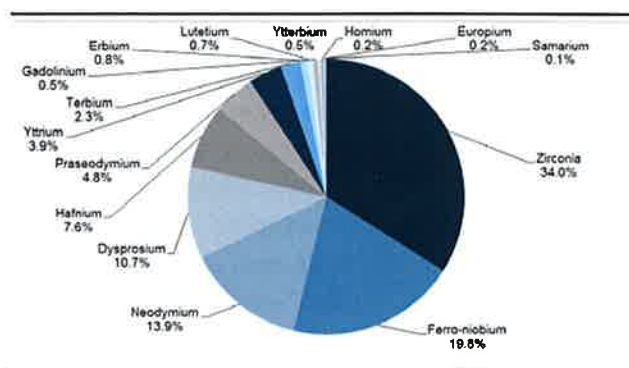
- **Magnets (27%)** dominate the end use application for DZP products. This is expected as magnets are the top end use for a number of rare earths including; neodymium, dysprosium and praseodymium.
- **Steel (17%)** is the second largest application by revenue due to the ~19% niobium product revenue stream, of which 83% of the niobium market is for steel.
- **Ceramic pigment (11%)** is the dominant application of zirconium, it can be combined with other elements to make coloured pigments for glazing applications.

**Figure 9: Overall weighted average end use applications by revenue**



Source: Company Reports, European Commission (SETIS)

**Figure 10: Revenue by product**



Source: Company Reports

## Pricing

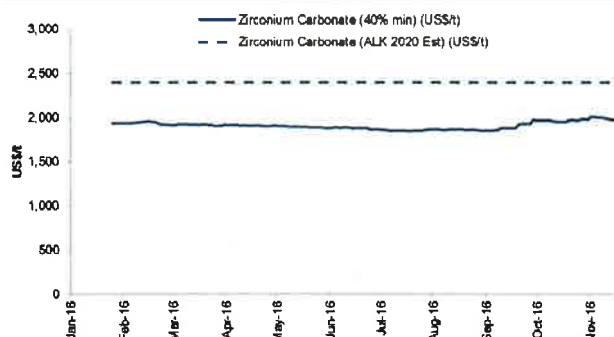
Products produced by the DZP generally have opaque pricing with limited visibility on supply and demand characteristics. Petra adopt ALK's pricing forecasts which have been derived from analysis by Industrial Minerals Company of Australia (IMCOA), a conservative and highly regarded industrial minerals research firm (Figure 11).

The major products produced by the DZP have shown historical pricing volatility but have remained relatively stable over the last 12 months (Figure 12 to Figure 17) with the exception of ferro-niobium which has fallen 5% year to date.

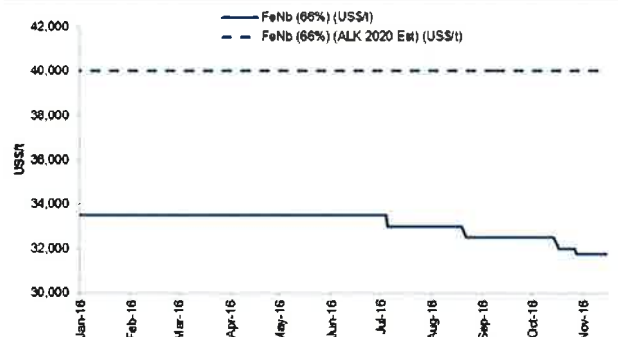
**Figure 11: Spot Pricing and Price Forecasts**

Product	% of Rev	Spot Price	1 Wk Chng	1 Mth Chng	YTD	ALK 2020 Est	vs Spot
Zircon Sand (65% min) (US\$/t)		915	0%	0%	-3%		
Zirconium Carbonate (40% min) (US\$/t)	6.0%	1,976	-1%	1%	2%	2,400	21%
Chemical Zirconia (US\$/t)	28.0%	4,500-15,000				9,000	n/a
FeNb (66%) (US\$/t)	19.8%	31,750	0%	-2%	-5%	40,000	26%
Hf (US\$/t)	7.6%	n/a				500,000	n/a
CeO <sub>2</sub> (99% min) (US\$/t)	0.0%	1,625	0%	9%	-3%	2,000	23%
LaO <sub>2</sub> (99% min) (US\$/t)	0.0%	2,025	1%	7%	16%	2,000	-1%
PrO <sub>2</sub> (99% min) (US\$/t)	4.8%	48,200	0%	0%	-3%	80,000	66%
NdO <sub>2</sub> (99% min) (US\$/t)	13.9%	38,700	1%	1%	-2%	60,000	55%
DyO <sub>2</sub> (99% min) (US\$/t)	10.7%	188,000	0%	0%	-13%	350,000	86%
EuO <sub>2</sub> (99% min) (US\$/t)	0.2%	62,500	0%	0%	-32%	300,000	380%
TbO <sub>2</sub> (99.99% min) (US\$/t)	2.3%	425,000	1%	1%	11%	650,000	53%
SmO <sub>2</sub> (99% min) (US\$/t)	0.1%	1,925	0%	0%	0%	3,000	56%
YO <sub>2</sub> (99.999% min) (US\$/t)	3.9%	3,350	-3%	-6%	-17%	15,000	348%
Gd (99% min) (US\$/t)	0.5%	9,622	0%	-2%	-12%	20,000	108%

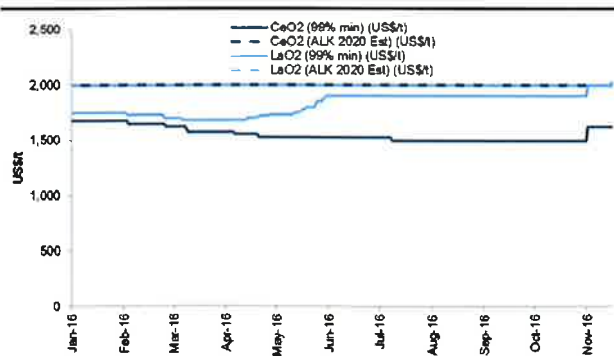
Source: Asian Metals, Petra Capital

**Figure 12: Zirconium carbonate pricing (US\$/t). ~6% of forecast revenue respectively.**

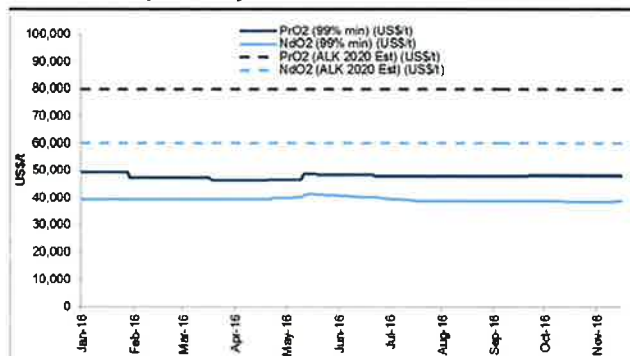
Source: Asian Metals, Petra Capital

**Figure 13: Ferro-niobium pricing (US\$/t). ~20% of forecast revenue.**

Source: Asian Metals, Petra Capital

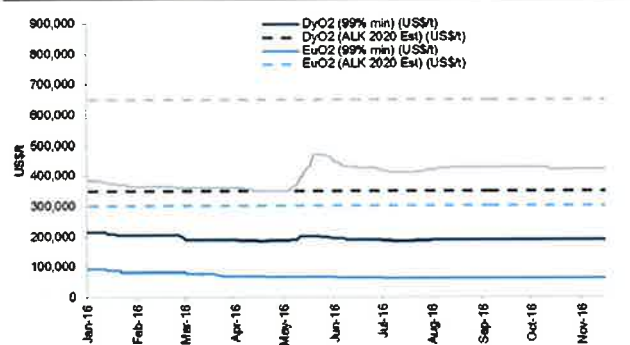
**Figure 14: Cerium Oxide and Lanthanum Oxide Pricing (US\$/t). No initial contribution to revenue.**

Source: Asian Metals, Petra Capital

**Figure 15: Praseodymium Oxide and Neodymium Oxide Pricing (US\$/t). ~5% and ~14% of forecast revenue respectively.**

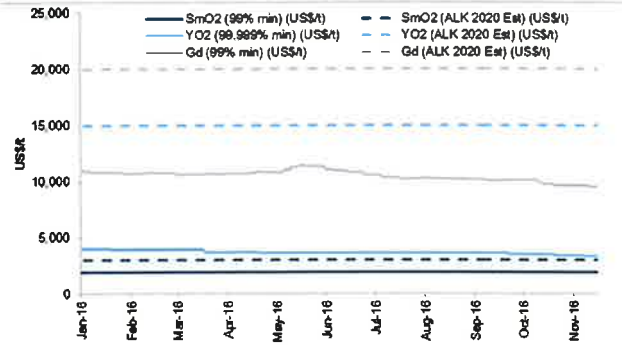
Source: Asian Metals, Petra Capital

**Figure 16: Dysprosium Oxide, Europium Oxide and Terbium Oxide Pricing (US\$/t). ~11%, ~0.2% and ~2% of forecast revenue respectively**



Source: Asian Metals, Petra Capital

**Figure 17: Samarium Oxide, Yttrium Oxide and Gadolinium Oxide Pricing (US\$/t). ~0.1%, ~4% and 0.5% of forecast revenue respectively.**



Source: Asian Metals, Petra Capital

## Tomingley Gold Operations (TGO)

TGO is located 1km south of the town of Tomingley and 50km south west of the city of Dubbo in regional NSW. It consists of four deposits (Wyoming One, Wyoming Three, Caloma and Caloma Two) and a 1Mtpa CIL processing plant which was commissioned in Jan-14 (Figure 18). Operations are currently focused on open pit mining however underground operations below Wyoming One and Caloma have recently been incorporated into the life-of-mine schedule (Figure 19).

**Figure 18: TGO site layout**



Source: Company Reports

**Figure 19: TGO underground design**



Source: Company Reports

## Mining Schedule

### FY'17

FY'17 guidance is 65-72koz with ore sourced from Caloma, Caloma Two and Wyoming One open pits. AISC was previously set at A\$1,200-1,300/oz and will be revised in the Dec Q following heavy rain in the Sep Q.

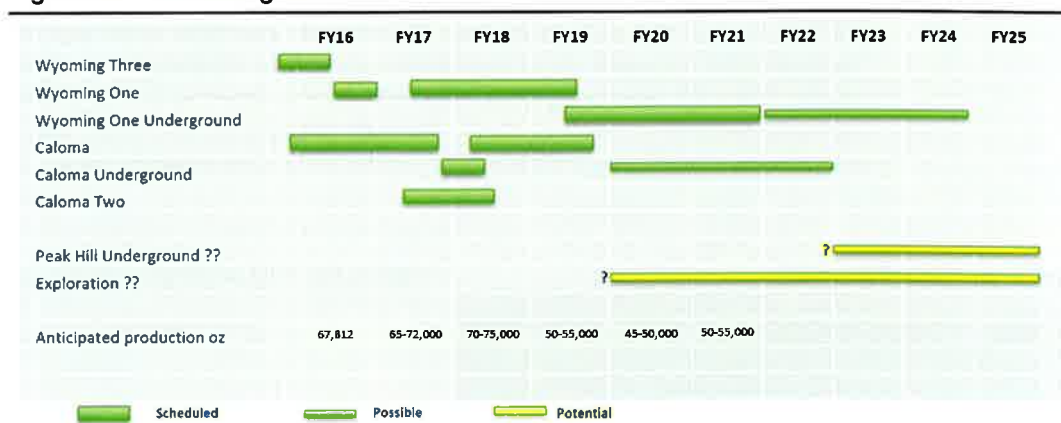
### Near Term

Production from Caloma Two open pit will commence in 2H'FY17 and deplete by mid FY'18. Current open pit mining from Wyoming One and Caloma will continue until mid-FY'19. A small cluster of underground stopes beneath Caloma are expected to be producing in late FY'17 and early FY'18 with the Wyoming One underground producing from mid-FY'19 (Figure 20).

### Underground

A PFS outlined key parameters for a new underground at TGO in Dec-15. A DFS is aiming to refine these estimates with a formal development decision expected in 2HFY'17. The current plan assumes the development of a portal and decline from the Caloma open pit, with a number of small stopes extracted within the Caloma orebody before the main underground operation begins below Wyoming One (Figure 21). The preliminary studies outlined development capital expenditure of A\$37m with a 9 month lead time. The PFS outlined an overall C1 cash cost of A\$725/oz for the underground operation.

**Figure 20: TGO Mining Schedule**



Source: Company Reports

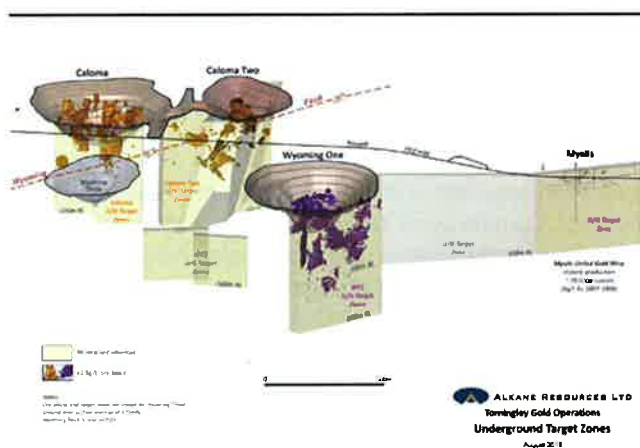
## Underground Growth Opportunity

Alkane has only defined underground reserves below Wyoming One despite strong potential also existing under Caloma and Caloma Two (Figure 21 and Figure 22). A drilling program was initiated in Sep-16 to test for continuity within the mineralised zones at Caloma and Wyoming One deposits. The results from this program are being incorporated into a DFS expected to be completed in 2H'FY17.

Our expectation is that economic mineralisation will show further continuity below Caloma and Caloma Two. We therefore incorporate 2.75 years of underground mine life based on reserves plus another 2.25 years from resource conversion in our base case valuation for Tomingley of A\$65m (5.9¢/sh). Additional underground mine life adds ~A\$3m / 0.3¢/sh per year of additional life;

- Reserve Only: A\$57m / 5.1¢/sh
- Base case (+2 yrs): A\$65m / 5.9¢/sh
- +3 year: A\$68m / 6.1¢/sh
- +4 year: A\$70m / 6.4¢/sh
- +5 year: A\$71m / 6.4¢/sh

**Figure 21: TGO Underground Opportunity**



Source: Company Reports

**Figure 22: Underground Resource and Reserve prior to inclusion of new drilling**

Deposit	U/G Reserve	U/G Resource
Wyoming One	0.5Mt @ 3.7g/t for 62koz	0.7Mt @ 4.4g/t for 104koz
Wyoming Three	n/a	0.02Mt @ 3.4g/t for 2koz
Caloma	n/a	0.02Mt @ 2.9g/t for 2koz
Caloma Two	n/a	0.2Mt @ 3.3g/t for 17koz

Source: Company Reports

## Modelled Assumptions

TGO is a 1Mtpa open pit operation with a LOM average production rate of 60kozpa. The open pit operations are expected to deplete in FY19 whereby the project will become dependent on a 190ktpa underground blended with low grade stockpiles accumulated during open pit mining. We assume the underground is able to extend the 2.75 years of reserves into a 5 year mine life through the conversion of resources and further inclusion of mineralisation at depth as drilling progresses. Our key project assumptions and parameters are highlighted below and in Figure 23 to Figure 26.

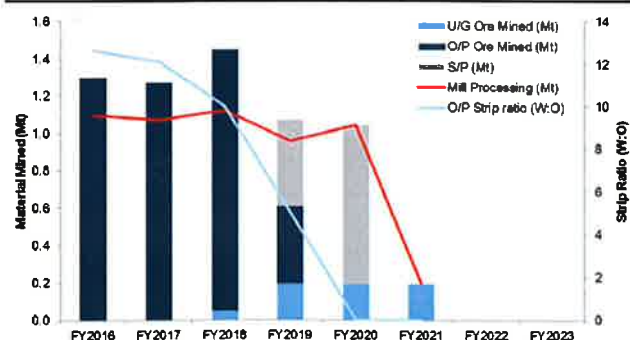
Open Pit parameters include;

- Milling Rate; 1Mtpa
- LOM Mill Feed; 1.9g/t
- Recoveries; 91% CIL
- LOM gold production remaining; 260koz (base case)
- FY17 Production Guidance; 65-72koz (Petra 61koz)
- FY17 AISC Cost Guidance; revised guidance to be released in DQ (previously A\$1,200-1,300/oz) (Petra A\$1,492/oz)
- O/P Resource (30-Jun-16); 9.4Mt @ 1.5g/t for 454koz
- O/P Reserve (30-Jun-16); 3.8Mt @ 1.5g/t for 191koz
- Hedging (30-Jun-16); 63.9koz @ A\$1,690/oz

Underground parameters include;

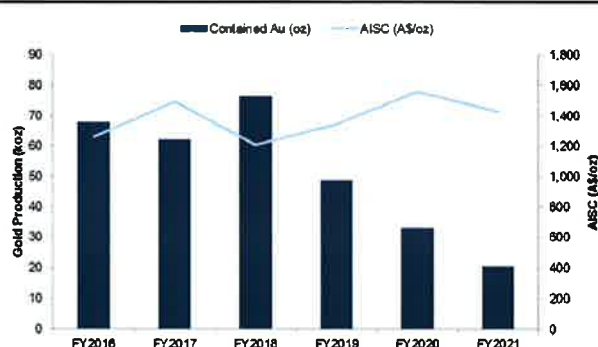
- Mining Rate; ~190ktpa LOM average
- Project Capex; A\$20m
- Sustaining Capex and ongoing mine development; A\$7mpa
- Development Time; 9 months
- Mine Life; 5 years (2.75 years reserves + 2.5 years extension)
- Mining Method; long-hole open stoping and Avoca type stoping
- C1 Cash Costs; A\$725/oz
- U/G Resource (30-Jun-16); 0.9Mt @ 4.2g/t for 125koz
- U/G Reserve (30-Jun-16); 0.5Mt @ 3.7g/t for 62koz
- First Production in 4Q'FY18

Figure 23: Production and Milling Rates



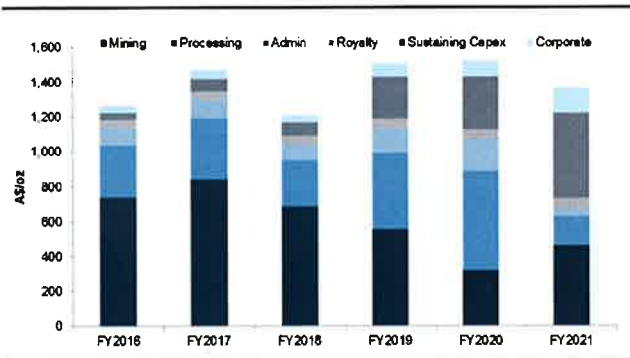
Source: Petra Capital

Figure 24: Gold Production and AISC



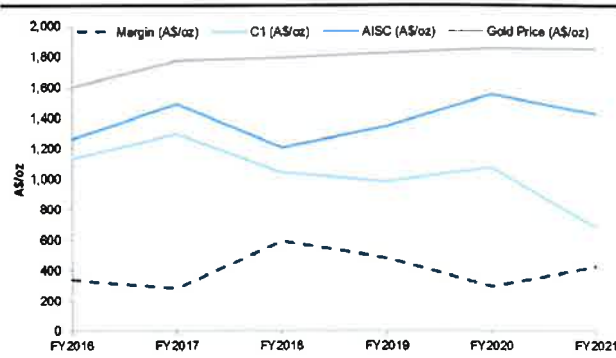
Source: Petra Capital

Figure 25: Breakdown of AISC



Source: Petra Capital

Figure 26: Margin Chart



Source: Petra Capital

## Group Cash Flow Analysis

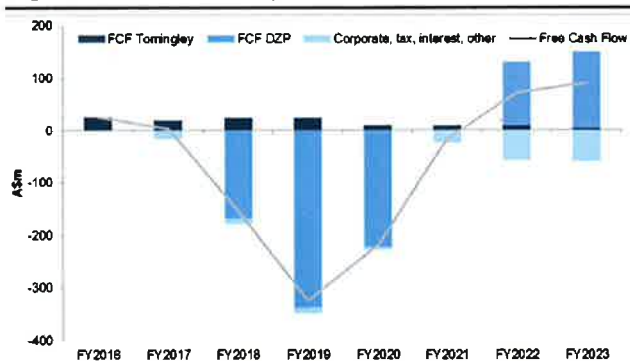
We forecast ALK to remain FCF positive from TGO's contribution prior to the significant expenditure required to start construction of DZP in FY18 (Figure 27 & Figure 28).

At TGO, we expect A\$15m of FCF in FY17 based on guidance of 65-72koz and our AISC estimate of A\$1,492/oz. Underground development capital expenditure is guided to A\$20m and expected to commence in FY18; we expect this to be funded from existing cash reserves. We expect the open pit operations to deplete in FY19 reducing FCF to ~A\$8mpa for the remainder of the operation as underground production is blended with low grade stockpiles.

We take a conservative view on the start of construction, first production and the ramp up of the DZP. We assume that construction for DZP starts in 2H'FY18 with Stage 1 taking two years to construct at a cost of A\$676m (US\$480m). Production commences in 2H'FY20 ramping up to nameplate capacity over three years (60%/80%/90%). At nameplate production, the operation is forecast to generate over A\$180mpa in EBITDA.

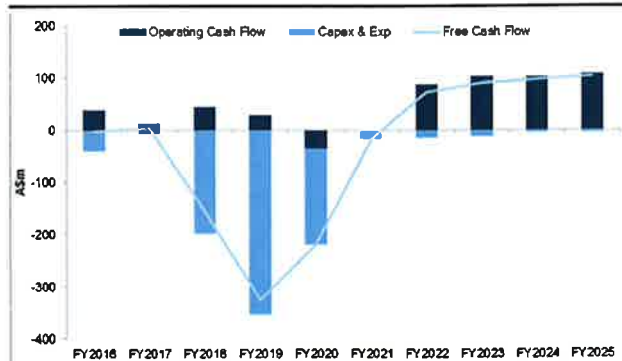
Our funding assumptions have a 60/40 debt equity split, raising A\$300m @ 50¢ps in FY18 and regular bank debt totalling A\$450m. We note however, this funding structure could take many forms. We forecast net debt to peak in FY21 at A\$400m, with a gearing ratio of 58% (nd/(nd + e)). In FY22, once the operation is in commercial production, this is a ND / EBITDA of 3x (Figure 29 & Figure 30).

Figure 27: Cash flow by asset



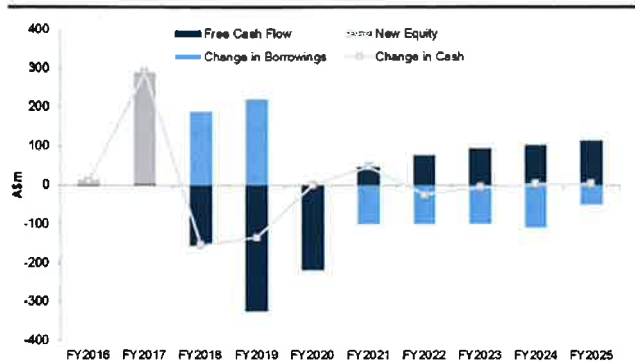
Source: Petra Capital

Figure 28: Net free cash flow



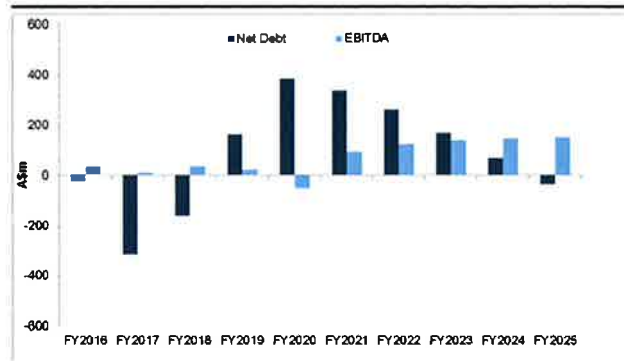
Source: Petra Capital

Figure 29: Cash flow forecasts inc debt &amp; equity



Source: Petra Capital

Figure 30: Net Debt and EBITDA



Source: Petra Capital

## Funding

The modularisation of the DZP has significantly decreased the funding risk of first production from the project. DZP1 requires ~A\$750m including working capital, at a high level we assume a 60:40 debt equity split, although this could be derived from a range of funding sources (Figure 31).

Figure 31: Funding Options for DZP1

Funding Type	Comprising	Proportion (%)	Value (A\$m)
<b>Equity</b>		<b>40%</b>	<b>A\$300m</b>
Strategic Partner	Project Equity/Offtake/Royalty	10-20%	A\$75-150m
Equity Market		20-30%	A\$150-225m
<b>Debt</b>		<b>60%</b>	<b>A\$450m</b>
	ECA's	20-40%	A\$225-375m
	Commercial Debt	20-40%	A\$75-225m
<b>Total</b>		<b>100%</b>	<b>A\$750m</b>

Source: Petra Capital

### Equity

Our base case assumes 40% equity funding of ~A\$300m which could be derived from:

- **Project level investment** – a party, potentially with strategic interest in the offtake could take direct equity in the DZP. On a 100% basis we value DZP1 at A\$147m and DZP2 at A\$236m assuming full value can be attained, a 10-20% sell down of the total project could raise A\$38-77m for ALK. The sales proceeds combined with the proportionally reduced project capital would reduce funding requirements for stage one by A\$113m to A\$227m.
- **Offtake/Royalty** – a party could offer a prepayment to access a proportion of one or many of the product streams (FeNb, Zr, REE, Hf) or a proportion of the gross revenue generated by the project. The former would appeal to a consumer of the products and the latter to an investor in the sector.
- **Equity Markets** – for modelling purposes this is our base case assumption, whereby we assume a A\$300m raising at A\$0.50/sh, of which, A\$75-150m of this amount could be sourced from a strategic partner.
- **Sale of Tomingley** – we value Tomingley at A\$65m which could be sold to help fund the DZP however this is an unlikely scenario in our view. Tomingley's operational record and its proximity to the DZP is a key contributor to ALK's social licence to operate in the region, we therefore don't believe ALK would risk this responsibility to a third party.

## Project Debt

Our base case assumes 60% debt funding for ~A\$450m which could be derived from;

- **Commercial bank debt** – in our view the project will become attractive to commercial lenders once it is sufficiently de-risked by: a) completing sales, marketing and distribution agreements and; b) securing binding offtake arrangements for 50-60% of production from DZP1. We expect this to occur through late 2016 and early 2017.
- **Export credit agencies (ECA)** – an export credit agency is a private or quasi-governmental institution that acts as an intermediary between national governments and exporters to issue export financing. Effectively, the agency's role is to support domestic industry by providing finance. A foreign ECA may provide funding to the DZP in exchange for ALK purchasing equipment or supplying product to their host country. Official ECA's include:
  - Australia – Export Finance and Insurance Corporation (EFIC)
  - China – Export-Import Bank of China
  - Japan – Japan Bank for International Cooperation (JBIC), Nippon Export and Investment Insurance (NEXI)
  - South Korea – Korea Trade Insurance Corporation (K-SURE), The Export-Import Bank of Korea (KEXIM)
  - Germany – Euler Hermes Kreditversicherungs-AG
  - US – Export Import Bank of the United States (Ex-Im Bank, currently impacted by the lapse in its authority).

## Case Studies:

- **Sirius Minerals** – launched a comprehensive stage 1 (of 2) financing solution for the US\$2.9b, North Yorkshire Polyhalite project. Despite a market capitalisation of ~US\$600m in June, the London listed mine developer is expected to raise US\$1.2b through:
    - ~US\$300m (25%) – Royalty Financing from a subsidiary of Hancock Prospecting Pty Ltd for a 5% royalty of gross revenue for the first 13mtpa (of ~20mtpa) and 1% of any incremental tonnes for the life of mine. Included is a US\$50m payment for ordinary shares.
    - ~US\$456m (39%) – Placement and Open Offer.
    - ~US\$425m (36%) – Convertible Bond at 8-8.5% coupon rate with conversion premium of 25-30% of the concurrent placement price.
  - **Roy Hill** – one of the largest involvements of ECA's in Australian mining where ~40% of the total project financing and ~60% of the debt financing was ECA derived. The project is 70% owned by Hancock, 15% Marubeni (Japan), 12.5% POSCO (Korea) and 2.5% China Steel Corp (2.5%). The ~US\$10b project received US\$7.2b in debt financing of which ~US\$4.4b was ECA financing from 5 organisations;
    - Korean EXIM – US\$550M in loans, plus US\$450M in loan guarantees
    - Korea Trade Insurance Corporation (K-SURE) – US\$1,200M
    - US Ex-Im Bank – US\$700M
    - Japan Bank for International Co-operation – US\$900M
    - Nippon Export and Investment Insurance Corporation (NEXI) – US\$750M
- The process from debt launch to closure in April 2014 was ~18 months.

## Valuation

We model ALK on a 12 month forward looking basis using Petra and ALK commodity price and currency forecasts. We calculate individual valuations for mining assets, net debt/cash and corporate costs. The discount rate (real) for TGO is 10% and for the DZP is 12%. The higher discount rate reflects the ongoing de-risking still required and the initial A\$750m funding hurdle.

Our share count is on a fully diluted basis with the assumption of a A\$300m @ 50¢/sh capital raising with the cash proceeds accounted for in the valuation.

**Figure 32: Valuation Split (NPV @ 10% & 12%)**

	Discount Rate	A\$M (+1 Yr)	A\$/sh (+1 Yr)
TGO	10%	65	\$0.06
DZP (Stg 1)	12%	147	\$0.13
DZP (Stg 2)	12%	236	\$0.21
Corporate		-88	-\$0.08
Hedging		-3	\$0.00
Net Cash*		315	\$0.29
<b>Total</b>		<b>671</b>	<b>\$0.61</b>

Source: Petra Capital \*capital raising expected 2H'FY17

## Risks

Key risks associated with companies operating in the resources sector include exposure to commodity price and currency fluctuations, technical and operating risks, litigation and political risks and funding and equity/debt market risk. Risks to achieving our target valuation include:

- **Offtake and Pricing;** the DZP will be producing rare metals that are not traditionally exchange traded, they have much lower liquidity than exchange traded metals and are reliant on the formation of offtake contracts with end users. The spot markets that are present for these metals tend to demonstrate greater volatility than exchange traded metals.
- **Funding;** DZP1 requires A\$750m of capex and working capital which will be challenging to acquire through traditional financing channels.
- **Processing Plant;** the type of deposit at the DZP has never been commercially exploited before. Despite extensive pilot scale testing there will be cost/quality/recovery risk in scaling up from the successful experience at the pilot scale to the full 1Mtpa operation.
- **Mine Life;** we assume significant resource to reserve conversion at the TGO underground. Our valuation incorporates a 5 year mine life versus a 3 year reserve, with conversion reliant on further drilling success and revised mine planning.

## Analysis



### Alkane Resources (ALK)

P&L (A\$M)	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F	FY22F
Revenues	110	105	133	88	61	246	294
Operating Costs	-65	-95	-97	-64	-110	-153	-169
Other	-8	0	0	0	0	0	0
<b>EBITDA</b>	<b>37</b>	<b>10</b>	<b>37</b>	<b>24</b>	<b>-50</b>	<b>93</b>	<b>125</b>
D&A	-30	-26	-37	-29	-35	-44	-57
EBIT	7	-16	0	-5	-85	49	68
Net Interest	0	1	9	2	-16	-24	-21
Taxes	-2	5	-3	1	30	-7	-14
Adjustments	0	0	0	0	0	0	0
Net Profit	5	-11	6	-2	-70	17	33
EPS (\$)	1	-1	1	0	-6	2	3
DPS (\$)	0	0	0	0	0	0	0

Analyst: Matthew Schembri & Brett McKay

Rating	BUY		
Target Price (A\$)	0.61	TSR	84%
Price (A\$)	0.33	Price (US\$)	0.24
NPV (A\$)	0.61	NPV (US\$)	0.45
Shares (M)	1,105		
Mcap (A\$M)	167	Mcap (US\$M)	123
EV (A\$M)	152	EV (US\$M)	112
Year End	June	Discount Rate	
		TGO	10%
		DZP	12%

Cash Flows (A\$M)	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F	FY22F
Receipts	109	105	133	88	61	246	294
Payments	-70	-95	-96	-63	-110	-152	-168
Net Interest	0	1	9	2	-16	-24	-21
Taxes	0	1	-3	1	30	-7	-14
Other	-2	0	0	0	0	0	0
<b>Op Cash Flows</b>	<b>37</b>	<b>11</b>	<b>44</b>	<b>27</b>	<b>-35</b>	<b>62</b>	<b>90</b>
Capex	-34	-4	-194	-348	-179	-10	-10
Disposals	0	0	0	0	0	0	0
Exploration	-7	-5	-5	-5	-5	-5	-5
Other	0	0	0	0	0	0	0
<b>Inv Cash Flows</b>	<b>-40</b>	<b>-9</b>	<b>-199</b>	<b>-353</b>	<b>-184</b>	<b>-15</b>	<b>-15</b>
Change in Borrowings	0	0	0	190	220	0	-100
Dividends	0	0	0	0	0	0	0
Equity	12	288	0	0	0	0	0
Other	0	0	0	0	0	0	0
<b>Fin Cash Flows</b>	<b>12</b>	<b>288</b>	<b>0</b>	<b>190</b>	<b>220</b>	<b>0</b>	<b>-100</b>

Assumptions	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F	FY22F
Gold (US\$/oz)	1,167	1,320	1,305	1,300	1,300	1,300	1,300
AUD/USD	0.73	0.74	0.73	0.71	0.70	0.70	0.70
Zirconia Basic Carbonate (US\$/kg)			6	6	6	6	6
Hafnium (US\$/kg)			500	500	500	500	500
Niobium (US\$/kg)			40	40	40	40	40

Key Ratios	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F	FY22F
PE (x)	27.8	N.M.	N.M.	N.M.	N.M.	20.9	11.0
EV/EBITDA (x)	3.9	N.M.	0.2	13.8	N.M.	5.4	3.4
EPS Growth (%)	<-100	<-100	<-100	<-100	>100	<-100	89.6
ROE (%)	2.5	-2.3	1.4	-0.4	-17.8	4.2	7.4
Net Debt to Equity (%)	-12.9	-68.3	-34.2	35.5	97.5	81.2	58.5
Net Debt to EBITDA (x)	-0.7	-32.7	-4.4	6.9	-7.7	3.6	2.1
Dividend Yield (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
FCF Yield (%)	-1.9	0.8	-42.4	-89.3	-60.1	0.0	0.0

Production & Costs	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F	FY22F
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#### Tomingley

Group Gold Production (oz)	67,134	61,430	75,598	48,273	32,616	20,364	20,364
AISC Gold Cash Costs (US\$/oz)	1,262	1,492	1,206	1,344	1,557	1,428	1,428

Resources (Contained Au, Moz)	579
Reserves (Contained Au, Moz)	301

#### Dubbo Zirconia Project

Throughput (kt)	0	0	0	0	150	350	425
Zirconium (ZrO <sub>2</sub> , t)	0	0	0	0	2,403	5,607	6,808
Hafnium (HfO <sub>2</sub> , t)	0	0	0	0	8	21	34
Ferro-Niobium (t)	0	0	0	0	295	689	837
Light rare earths - La, Ce, Nd, Pr, Sm (t)	0	0	0	0	733	1,710	2,076
Heavy rare earth - Y, Dy, Tb, Gd, Eu (t)	0	0	0	0	192	447	543

Revenue (A\$/kg)	0	0	0	0	0	25	25
Costs (A\$/kg)	0	0	0	0	15	14	13

EBITDA (A\$M)	FY16A	FY17F	FY18F	FY19F	FY20F	FY21F	FY22F
Tomingley	27	23	48	33	19	18	18
Dubbo Zirconia Project	0	0	0	0	-54	90	122
Corporate & Other	-9	-13	-12	-9	-16	-16	-16

NPV +1yr	(A\$M)	Per Share
Tomingley	65	\$0.06
DZP Stage One	147	\$0.13
DZP Stage Two	236	\$0.21
Corporate and other	-91	-\$0.08
Investments	0	\$0.00
Net Cash	315	\$0.29
<b>Total</b>	<b>671</b>	<b>\$0.61</b>

Note: base case assumes ALK issues A\$300M of new equity at A\$0.50/share

Source: Petra Capital

## The Board & Top Shareholders

**John Dunlop** (Non-Executive Chairman) is a consultant mining engineer with over 45 years surface and underground mining experience in both Australia and overseas, he is a certified arbitrator and mineral asset valuer. He is currently the chairman of MICA (Mineral Industry Consultants Association) and a non-executive chairman of Alliance Resources Limited (appointed 30 November 1994). Recent board positions include director of the Australasian Institute of Mining and Metallurgy, non-executive director of Copper Strike Limited and a director of Gippsland Limited.

Mr Dunlop is a member of the Audit Committee and chairman of the Remuneration and Nomination Committees

**Ian Chalmers** (Managing Director) is a geologist with over 40 years of experience across multiple facets of the industry. He is a graduate of the Western Australia Institute of Technology (Curtin University) and has a Master of Science degree from the University of Leicester in the United Kingdom. Mr Chalmers was Technical Director and appointed as Managing Director in 2006, overseeing the group's minerals exploration efforts across New South Wales, Western Australia, Indonesia and New Zealand and the development and operations of the Peak Hill Gold Mine (NSW). He has been instrumental in constructing and developing the Tomingley Gold Operations and the development of the Dubbo Zirconia Project.

Mr Chalmers is a member of the Nomination Committee.

**Ian Gandel** (Non-Executive Director) is a successful Melbourne based businessman with extensive experience in retail management and retail property. Through his private investment vehicles, Mr Gandel has been an investor in the mining industry since 1994. Mr Gandel is currently a substantial holder in a number of publicly listed Australian companies and now holds and explores tenements in his own right in Victoria, Western Australia and New South Wales. Mr Gandel is also a non-executive director of Alliance Resources Ltd, non-executive chairman of Gippsland Limited and non-executive chairman of Octagonal Resources Limited.

Mr Gandel is a member of the Audit, Remuneration and Nomination Committees.

**Tony Lethlean** (Non-Executive Director) is a geologist with over 10 years' mining experience, including 4 years underground on the Golden Mile in Kalgoorlie. In later years, he has worked as a resources analyst with various stockbrokers and investment banks including CIBC World Markets. He was a founding director of Helmsec Global Capital Limited which seeded, listed and funded a number of companies in a range of commodities. He retired from the group in 2014. He is also a non-executive director of Alliance Resources Ltd (appointed 15 October 2003).

Mr Lethlean is senior independent director, chairman of the Audit Committee and a member of the Remuneration and Nomination Committees.

**Figure 33: Directors Interests (Number of shares)**

Director	Total (M)
John Dunlop	1.1
Tony Lethlean	0.5
Ian Chalmers	2.8
Ian Gandel	109.9

Source: Company Reports

**Figure 34: Top 20 Shareholders (Dated 20<sup>th</sup> September 2016)**

	Name	Amount (M)	%
1	Abbotsleigh Pty Ltd	102.7	20.7
2	JP Morgan Nominees Australia Limited	64.4	13.0
3	Citicorp Nominees Pty Limited	28.9	5.9
4	HSBC Custody Nominees (Australia) Limited	13.2	2.7
5	HSBC Custody Nominees (Australia) Limited – A/C 2	13.2	2.7
6	National Nominees Limited	6.8	1.4
7	Choice Investments Dubbo Pty Ltd	6.7	1.4
8	Sandhurst Trustees Ltd	6.2	1.2
9	Washington H Soul Pattinson	5.5	1.1
10	Funding Securities Pty Ltd	3.7	0.7
11	Bac Kao Investment Pty Ltd	2.8	0.6
12	Leefab Pty Ltd	2.8	0.6
13	ABN Amro Clearing Sydney Nominees Pty Ltd	2.7	0.5
14	Mandel Pty Ltd	2.5	0.5
15	Mr Richard Mitchell Dimond & Mrs Denise Rosslyn Dimond	2.4	0.5
16	Ms Jillanne Homewood	2.4	0.5
17	Mr David Hanbury Edmonds	2.3	0.5
18	Ms Kathryn Jane Swan	2.0	0.4
19	S Mass Holdings Pty Ltd	2.0	0.4
20	Berne No 132 Nominees Pty Ltd	1.8	0.4
	<b>Total</b>	<b>274.8</b>	<b>55.3</b>

Source: Company Reports

## Appendix 1

### Resources and Reserves

**Figure 35: TGO Open Pit Resources**

Deposit	Measured		Indicated		Inferred		Total		Total Gold
	Tonnes(kt)	Au (g/t)	Tonnes(kt)	Au (g/t)	Tonnes(kt)	Au (g/t)	Tonnes(kt)	Au (g/t)	Au(koz)
<b>Open Pittable Resources (cut off 0.50g/t Au)</b>									
Wyoming One	1,980	1.7	416	1.6	671	1.1	3,067	1.6	153
Wyoming Three	86	2.0	16	1.3	33	1.4	135	1.7	8
Caloma	604	1.3	1,892	1.4	1,204	1.4	3,700	1.4	163
Caloma Two			1,085	2.4	704	1.3	1,789	2.0	112
Stockpiles							701	0.8	18
<b>Sub Total</b>	<b>2,670</b>	<b>1.6</b>	<b>3,409</b>	<b>1.7</b>	<b>2,612</b>	<b>1.3</b>	<b>9,392</b>	<b>1.5</b>	<b>454</b>
<b>Open Pittable Resources (cut off 2.50g/t Au)</b>									
Wyoming One	169	4.8	206	4.4	363	4.2	738	4.4	104
Wyoming Three	10	3.6	6	3.1	4	3.1	20	3.4	2
Caloma			1	2.9	18	2.9	19	2.9	2
Caloma Two			92	3.5	63	3.2	155	3.3	17
<b>Sub Total</b>	<b>179</b>	<b>4.7</b>	<b>305</b>	<b>4.1</b>	<b>448</b>	<b>4.0</b>	<b>932</b>	<b>4.2</b>	<b>125</b>
<b>TOTAL</b>	<b>2,849</b>	<b>1.8</b>	<b>3,714</b>	<b>1.9</b>	<b>3,060</b>	<b>1.7</b>	<b>10,324</b>	<b>1.8</b>	<b>579</b>

Source: Company Reports

**Figure 36: TGO Open Pit and Underground Reserves**

Deposit	Proved		Probable		Total		Total Gold
	Tonnes (kt)	Au (g/t)	Tonnes(kt)	Au (g/t)	Tonnage (kt)	Au (g/t)	Au (koz)
Open Pittable Reserves (cut off 0.50g/t Au)							
Wyoming One	1,297	1.7	150	1.5	1,447	1.6	78
Wyoming Three	0	0	0	0	0	0	0
Caloma	116	1.7	722	1.6	838	1.6	43
Caloma Cut Back	233	1.4	251	1.1	484	1.2	19
Caloma Two	-	-	318	3.2	318	3.2	33
Stockpiles	701	0.8	-	-	701	0.8	18
Sub Total	2,347	1.4	1,441	1.9	3,788	1.5	191
Underground Reserves (cut off 2.50g/tAu)							
Wyoming One	224	4.0	301	3.4	524	3.7	62
Sub Total	224	4.0	301	3.4	524	3.7	62
TOTAL	2,571	1.6	1,742	2.2	4,312	1.8	253

Source: Company Reports

**Figure 37: DZP Resources**

Toongi	Tonnes (Mt)	ZrO <sub>2</sub> (%)	HfO <sub>2</sub> (%)	Nb <sub>2</sub> O <sub>5</sub> (%)	Ta <sub>2</sub> O <sub>5</sub> (%)	Y <sub>2</sub> O <sub>3</sub> (%)	REO(%)
Measured	35.70	1.96	0.04	0.46	0.03	0.14	0.75
Inferred	37.50	1.96	0.04	0.46	0.03	0.14	0.75
<b>Total</b>	<b>73.20</b>	<b>1.96</b>	<b>0.04</b>	<b>0.46</b>	<b>0.03</b>	<b>0.14</b>	<b>0.75</b>

Source: Company Reports

**Figure 38: DZP Reserves**

Toongi	Tonnes (Mt)	ZrO <sub>2</sub> (%)	HfO <sub>2</sub> (%)	Nb <sub>2</sub> O <sub>5</sub> (%)	Ta <sub>2</sub> O <sub>5</sub> (%)	Y <sub>2</sub> O <sub>3</sub> (%)	REO (%)
Proved	8.07	1.91	0.04	0.46	0.03	0.14	0.75
Probable	27.86	1.93	0.04	0.46	0.03	0.14	0.74
<b>Total</b>	<b>35.93</b>	<b>1.93</b>	<b>0.04</b>	<b>0.46</b>	<b>0.03</b>	<b>0.14</b>	<b>0.74</b>

Source: Company Reports

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