

## Alkane Resources Limited ALK

### Eye-balling 5 mill. oz at McPhillamys, maybe much more

*"All the benefits of excellent location in NSW, Newmont management and economies of scale"*

#### Market Data

Share Price	34¢
12 Mth High/Low	25-51¢
Market Cap'n	\$82m (undiluted for options)
ASX Listed Shares	242.4 million ordinary
Escrowed Shares	Nil
Unlisted Options	20.3 mill. various
Cash Balance	\$9.7m (30/6/08)
Largest Shareholders	Gandel Metals 29%

**Investment Perspective:** Alkane Resources Ltd ("ALK") is a very interesting junior resource company with two gold projects and a zirconia/rare earths project in central west NSW, benefitting from sound infrastructure, a supportive community and minimal sovereign risk.

The McPhillamys gold project could be of seriously enormous proportions. It is one of the highest priority projects for Newmont, worldwide. The Tomingley gold project is much smaller, but it is shaping up a worthwhile gold project with resources approaching a million ounces. The Dubbo Zirconia project offers potential for a long life, exotic development project in a sector that is gaining more attention. In an ideal world, Tomingley could be producing in two years time, the Zirconia project a year later, and McPhillamys a year or two after that.

Without detracting from the merit of the smaller projects, the magnitude of the McPhillamy gold project and its potential will be the main share price driver ... once people wake up to it. We expect the share price to rise with further drill results and increasing confidence levels.

The shares offer outstanding value and growth potential.

#### Huge Gold Intercept Reported – 366m at 1.85 gpt

The announcement of a huge 366m intercept at 1.85 gpt at McPhillamys fell on deaf ears on 18/8/08, showing just how tight the grip of the bear market has been.

ALK commenced a four-hole program in June 2008, and has reported results from the first three to date;

KPD 003	103m at 3.24 gpt from 396m incl. 60m at 5.14 gpt, and 22m at 10.5 gpt
KPD 004	78m at 1.04 gpt from 70m, and incl. 23m at 2.11 gpt from 80m, and
KPD 005	99m at 0.75 gpt from 56m

It is important to note that KPD 003 was a re-entry hole, extending the total intercept to 366m at 1.85 gpt.

KPD 004 tested the anomaly at Kings Plains, 2 km south of the Central Zone at McPhillamys, confirming a similar type of mineralisation.

KPD 005 was drilled to test the northern end of the Central Zone. Results have only been received to a depth of 196m down hole, but these confirm the continuity of the 0.5 gpt envelope.

#### 1. McPhillamys Gold Project (reducing to 25%)

##### Description of the Project

McPhillamys is ideally located 35 km SE of Orange in NSW, surrounded by excellent infrastructure and importantly, grid power. Newmont Mining is funding the first \$5m of expenditure to earn 51%, and it can move to 75% by completing a Bankable Feasibility Study. Thereafter ALK can choose to dilute to a 20% interest and have Newmont secure funding for the mine.

Significant outcropping gold mineralisation was first identified in 2006, within altered volcanics and sediments. The dimensions started to become apparent with an intercept of 123m at 1.96 gpt. Then, late in 2007, ALK reported two deep core holes with intercepts of 225m at 1.16 gpt and 263m at 1.3 gpt.

##### You Can Quickly Calculate > 5 Mill Ounces ...

The Central Zone is defined by a large 0.5 gpt envelope with a 600m strike length that is 200m wide at the middle. While it daylight there is minimal oxidation. Assuming an average width of 160m, and a specific gravity of 2.8, it seems to host approximately 270,000 tonnes per vertical metre (TPVM). It now appears to extend to a depth of at least 450m, implying a 120 mill. tonne size that is still open at depth. The grade is likely to approach 1.5 gpt on average, which implies 5.7 mill. oz of gold.

##### ... but it Could Triple in Dimension

Depth extension and the potential of adjacent anomalies could triple the potential, taking the total to 15-20 mill. oz on an optimistic view.

A pole-dipole geophysical survey conducted in May 2008, has shown similar anomalies to the north and south of McPhillamys Central itself. Each of these anomalies show a 300m strike length. Given their similarity to the Central anomaly, there is a strong possibility for repeats of the mineralisation in the north and the south.

## Ballpark Economics

Given that McPhillamy outcrops, it would commence as a large open pit operation. The geometry of the orebody suggests a low waste to ore ratio of no more than 2-3:1, to a depth of 200-300m. Mining ore at the rate of 5 mtpa would only require the pit to sink by 20m p.a. – so there is no reason why the rate couldn't be greater. If the head grade were to be 1.5 gpt, 5 mtpa would enable gold production in the order of 220,000 oz p.a.

Mining costs would be less than \$10 pt, and treatment costs might be \$8 pt on simple CIL recovery. All-up cash costs would then be in the order of \$425-\$450/oz. A major advantage would be the good infrastructure and grid power.

Later in the mine life, as the depth extends beyond 300m, efficient bulk underground mining methods such as various forms of caving could be used. These can be very low cost (\$5/t) if they eliminate much of the underground drilling and development, but it is very dependent upon favourable geometry. It simply becomes an earth moving exercise. The further away we get from true caving, to methods such as sub-block caving, the higher the operating cost. The other end of the scale would be a progression to an open stoping method, which would cost in the order of \$20/t. A caving method would work with a 1.5 gpt head grade, but an open stoping method would need more selective mining.

The following table provides some comparisons with the Ridgeway Deeps underground development being undertaken by Newcrest. While McPhillamy would initially be an open pit, it is interesting to see the comparisons on capital and operating costs. If the project is large enough, even a very low grade can be economical.

	<u>Ridgeway Deeps</u>	<u>McPhillamy</u>
Start of orebody	850m depth	Outcropping
Dimensions	450m x 250m	600m x 160m
TPVM	315,000 t	270,000 t
Grade	0.7 gpt, 0.16% Cu (i)	1.5 gpt
Capex	\$545m	\$250m
Treatment Method	Flotation/gravity	CIL
Capacity	5.6 mtpa	5 mtpa
Production p.a.	233,000 AuEq	220,000 oz
Mine Life	12 years	20 years
Total Cash Costs	A\$120/oz (ii)	A\$450/oz
Gross Cash Flow p.a.	\$193m	\$110m
Alkane Equity (25%)		\$27.5m

(i) NCM ASX Release 9/8/08. Ore reserve Ridgeway Underground

(ii) Assuming A\$950/oz gold price, copper credits at US\$1.50/lb

Another project which you could compare McPhillamys to is the Ayanfuri gold project in Ghana, owned by Perseus Mining Ltd ("PRU). That company is looking at a 4.5 mtpa open pit operation with a capital cost of US\$150m and

cash operating costs of US\$400/oz. The head grade is expected to be around 1.5 gpt.

## 2. Tomingley Gold Project

### Background and Description of the Project

Tomingley created a stir a few years back when some excellent drill results pointed to a new gold discovery in central west NSW, but at the time the 606,000 oz resource fell short of the magic million ounce level. An economic study suggested that it wouldn't provide a sufficient return to justify a \$40m development under the prevailing economics of a US\$600/oz gold price.

Undeterred, ALK has continued to explore at Tomingley in order to increase the critical mass of the project. The Caloma prospect has been shaping up as an attractive, higher-grade addition to the project with the potential to add 200-400,000 oz. Whilst this is in the same host rocks, it is structurally different.

The earlier discovered W1 orebody comprises a large alteration zone within a porphyry. While there is a series of high-grade zones running 5 gpt, the average grade is 2 gpt, under 30m of overburden. The geometry lends itself to a 1 mtpa open pit to a depth of 150m, mining a zone 50-80m wide with a strike length of 200m. A waste to ore ratio of 8:1 is expected. There is a 30m layer of clay at the surface, followed by 20m of saprolite.

W3 is a sheeted quartz vein deposit that is smaller, and 2.2 gpt. The limit of an economic pit is probably 80m depth.

Caloma is a series of stacked, shallow-dipping lenses of very visible alteration zones in the porphyry, seemingly running at a grade of 3 gpt. It has about 30-40m of oxidised saprolite within which many of the high-grade intersections have been recorded.

These are not typical NSW-style deposits. They are part of a volcanic stratigraphy that provides a conduit for mineralising fluids up large regional structures and a brittle host for a classic orogenic gold deposit.

The metallurgy of the W1 deposit is suitable to standard CIL recovery at a 75 micron grind. It is essentially free milling all the way to a depth of 450m.

### W1 and W3 Gold Resource at 0.75 gpt Cut-Off

Measured	4.835 mt at 2.24 gpt for 358,350 oz
Indicated	1.025 mt at 2.76 gpt for 91,000 oz
Inferred	<u>1,270 mt at 4.09 gpt for 167,000 oz</u>
Total	7.130 mt at 2.70 gpt for 606,350 oz

### Potential for a 1 mtpa Operation for 70,000 oz p.a.

Numbers are constantly being reworked to take into account new drilling results, but there does seem the possibility that the addition of the higher grade ore at Caloma could warrant a 1 mtpa operation producing 70,000 oz p.a. at a cost of A\$550/oz. The capital cost could be \$50m for an operation being fed from open pits for 4-5 years, then underground extensions. Under current economics this could provide a free cash flow of \$30m p.a., giving a mine payback period of less than two years.

### Feasibility Studies are Progressing

ALK reported the further results from a 22,000m RC and diamond drilling program that focussed on a 400m long central section of Caloma. The RC program has been completed on a 20m x 20m pattern to provide measured and indicated resources to a depth of 150m, with a view to completing a feasibility study by April 2009.

The initial resource at the Wyoming deposits is 606,000 oz at open pit grades of about 2.0 gpt. Caloma could boost this to 800,000 oz in total, with the incremental ounces coming with a 3 gpt head grade. Another beneficial feature of Caloma is that there is only a shallow 5m clay cover. Higher grades at the top of Caloma would ensure the first two years should be very profitable, enabling rapid mine payback.

## 3. Dubbo Zirconia Project

### Background and Description of the Project

The Zirconia Project is located 30 km south of Dubbo in NSW. It involves Toongi, one of the world's largest resources of zirconium, hafnium, niobium, tantalum, yttrium and rare earth elements. ALK has been working the project for nine years on a limited budget and it is now closing in on the confirmation of a process route, which may lead to its commercialisation. ALK has spent \$8m to date with the Company benefiting from a \$3.3m AusIndustry grant that was awarded in mid 2006.

Back in 2002, following encouraging bench-scale results, two Japanese companies took an option over 40% of the project at an exercise price of \$40m, but they withdrew following a completion of an ultra conservative pre-feasibility that suggested a very high capital cost.

The current testing program is designed to enable the completion of a feasibility study by mid 2009, for a 200,000 tpa operation which would add 5-6% to the world supply of zirconium chemicals. Four basic zirconium products are targeted; zirconium sulphate, zirconium hydroxide, zirconium carbonate and zirconia. A niobium-tantalum concentrate will also be produced, as will yttrium heavy rare earths and a light rare earth product.

### Encouraging Testing Program at ANSTO Facilities

ALK developed the flow sheet over several years and has been working in the ANSTO facilities at Lucas Heights to develop a flow sheet that comprises sulphuric acid leaching followed by solvent extraction. Products recovered include a suite of zirconium chemicals, zirconia, a niobium-tantalum concentrate and a yttrium-rare earth concentrate.

A 100 tonne bulk sample of ore is being assessed. The demonstration pilot plant is a 1 in 400 scale of the proposed 200,000 tpa commercial facility.

### “Unlimited” Ore Supply

Toongi ore reserves will not be a problem for this project as there is enough ore for a 200,000 tpa open pit for 400 years. It lies in a near vertical, elliptical pipe with surface

dimensions of 1000m x 600m. There is slight weathering in the top 10m; thereafter it is primary ore. The host alkaline rocks are fine-grained magmatic intrusives that haven't vented to the surface.

The ASX-released resource is 73.2 mill. tonnes at 1.96% ZrO<sub>2</sub>, 0.04% HfO<sub>2</sub>, 0.14% Y<sub>2</sub>O<sub>3</sub>, 0.46% Nb<sub>2</sub>O<sub>5</sub>, 0.03% Ta<sub>2</sub>O<sub>5</sub>, 0.014% U<sub>3</sub>O<sub>8</sub>, 0.75% REO.

Significantly, this is not a refractory orebody. The products are largely in unnamed zirconium and niobium minerals and the rare earths are largely in basnaestite. This means the minerals are soluble in sulphuric acid and can be selectively leached from the rock. (Usually you can't dissolve zircon or refractory niobium minerals unless you have very strong acids and high temperatures to crack the compounds).

### The Process Route

ALK has developed a process based on the uniquely favourable features of the orebody. A mechanical method of concentration is unsatisfactory due to the minerals being so fine – less than 10 microns in size – so a chemical concentration process is being developed.

It starts with crushing and grinding, then sulphuric acid is added prior to a kiln roast. The product is cooled and mixed with water and pumped into a slurry leach tank. It then passes through a filter press to remove 90% of the material (the country rock), leaving the metals suspended in solution as sulphates. Solvent extraction with an organic solution (a kerosene) is used to recover the metals. Zirconium is recovered first as a sulphate complex. It is then washed with a saline solution to achieve a sulphate, which can be precipitated and thickened. The end commercial product is zirconium basic sulphate (ZBS), which is >99% ZrO<sub>3</sub> i.e. 35% ZrO<sub>2</sub> (zirconia), suitable for all but the most sensitive electronic uses.

Niobium and other light rare earths are recovered from the solution after the zirconia has been recovered. The pH is adjusted and niobium precipitates as a sulphate powder, and the light rare earths are washed from the niobium concentrate. The final process for the recovery of commercially saleable light rare earths is still being developed. Heavy rare earth recovery, for products such as yttrium, dysprosium and terbium is still being tested.

### There is Even Uranium in the Deposit

Although it is not talked about, the deposit has an in-situ uranium grade of 140 ppm. Thus, in the top 100m, there is about 10,400 t of U<sub>3</sub>O<sub>8</sub>, with over 40,000 t down to 400m depth. This may be a valuable by-product.

### Zirconia Product Recovery Techniques

There are two established methods of recovering zirconia products;

- i) Fused Zirconia (ZrO<sub>2</sub>) – material is heated at several thousand degrees in an electric arc furnace. The end product is used in thermal ceramics, insulation, glazes etc, and
- ii) Chemical Leaching – material is mixed with hydrochloric acid to form zirconium oxy-chloride, which is a saleable product. The Chinese specialise in this method and pricing is relative to the zircon price. ALK will compete with the Chinese, but it will also go to the next step and remove the chlorine to produce the suite of zirconium chemicals – a more acceptable product.

### Pricing of Zirconia and Niobium

The ZBS price has been stable for several years at US\$4/kg but recently it has improved to US\$4.50/kg. Industry sources are suggesting that the increasing zircon price and new environmental constraints in China could see the price near US\$6/kg by the end of the year. Value-added products such as hydroxide and carbonate sell for up to \$7/kg and chemical grade zirconias sell for US\$10/kg. Electronic grade sells for US\$20/kg.

Niobium pricing is based on ferro-niobium product, which is mainly used in the steel industry. The price has lifted from US\$16-18/kg three years ago to US\$65/kg last year, but it has fallen back to US\$55/kg today. The long-term price has been estimated at US\$25-35/kg.

The rare earth prices depend upon the exact suite in a concentrate, but ALK thinks it might achieve US\$15/kg.

### Some Thoughts on Project Economics

It is still early in the piece, but we can draw together some numbers. The \$100m capital cost that was estimated in 2003, for a 200,000 tpa project, was certainly excessive back then. We could assume that it is still on the high side today after allowing for inflation.

Mining costs will be very low due to an absence of overburden in the first few years. A figure of \$5/t would be sufficient. Treatment costs are less easy to estimate, but we believe that the biggest single cost will be sulphuric acid.

This could account for 35% of operating costs if 60-100,000 tpa is required. At \$700/t, the recent spot price, this may be prohibitive, but long-term estimates suggest a price of less than half of this.

ALK is investigating other potential sources of sulphuric acid, such as roasting of pyrite from its Peak Hill gold mine site.

Under current market conditions ALK expects to receive 30% of its revenue from zirconium products, 40-45% from niobium and 30% from the rare earths. Annual revenue may be in the order of US\$50-55m p.a. All up operating costs may be in the order of \$200/t, which would leave a cash operating margin in the order of A\$15-20m p.a. Much work needs to be done to optimise the project during the course of the feasibility study, so these numbers should be seen as guesstimates only.

### Corporate and Finance

ALK is well-funded for the time being with over \$9m in the bank. The work at McPhillamys is being funded by Newmont, with it expecting to have earned its initial 51% by December 2008, having spent \$5m. It can then elect to move to 75% by funding all expenditure to the completion of a bankable feasibility study. We don't expect to see any near term share issues at current prices.

### Disclosure The author does not own shares in ALK

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