

September 2014

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### Company Information

ASX Code	AVI
Share Price	A\$0.007
Ord Shares	1,437m
Options & Performance Rights	37.12m
Market Cap (FD)	A\$10.32m
Cash (August 31, 2014)	A\$1.90m
Total Debt	A\$0.00m
Enterprise Value	A\$8.42m

### Directors & Management

Non-Exec Chairman	Graham Ascough
CEO & Managing Director	Malcolm Norris
Non-Exec Director	Crispin Henderson
Non-Exec Director	Don Hyma
Non-Exec Director	Paul Niardone

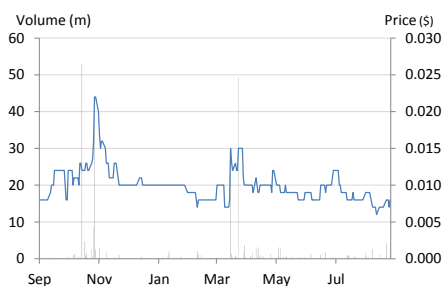
### Company Details

Address	65 Park Road Milton QLD 4064
Phone	+617 3368 9888
Web	www.avalonminerals.com.au

### Top Five Shareholders

Tan Sri Abu Sahid Bin Mohamed	15.56%
Acorn Capital Limited	12.66%
Phoenix Copper Limited	8.70%
Dato Lim Heng Suan	6.88%
Tan Sri Datuk Ta Kin Yan	6.50%

### 1 Year Price Chart



Source: IRESS

# Avalon Minerals Ltd. (AVI)

## Overlooked Northern Star

*Recommendation: Speculative BUY*

### Key Points

- **Recently updated Scoping Study delivers robust results, with exceptional upside potential and a solid basis for advancement**
- **Board and Management changes bring in a clear strategy for advancement of the Viscaria Copper-Iron Project in Sweden**
- **Infrastructure in place – potential for third party access**
- **Simple mining and beneficiation using off the shelf methods**
- **Produces readily marketable, high quality copper and magnetite concentrates**
- **Modelling indicates potential to produce up to \$US110m free cash flow per year**
- **Risked base case valuation of \$0.068/share**

*The change in Board and Management has brought a fresh set of eyes to the Viscaria Copper-Iron Project in northern Sweden. The project, located next door to LKAB's Kiruna fines and pellet operations, is ideally served by infrastructure, a vital factor in any bulk commodities project. Transport facilities include rail to the Port of Narvik, 170km away, which currently handles over 20Mt of iron ore products per year.*

*Mineralisation in the four orebodies defined thus far is simple and easily treated, and should produce readily marketable products – a clean chalcopyrite copper concentrate, and a high grade, low contaminant magnetite concentrate. Our base case modelling indicates an NPV of ~\$US280m, and the potential to produce an annual free cash flow of around \$US110 million, with upside through gold production and additional mine life.*

*The Company has a clear well considered strategy in place for advancing the project, with feasible timelines in place.*

### Company Overview

Avalon is an ASX-listed minerals developer with its key project being the Viscaria Copper-Iron Project in northern Sweden. The Company is working towards development of the project, with an expected timeframe to project approval of two to three years.

Following recent Board and Management changes, an updated Scoping Study has been recently completed, with the Company now progressing to a Pre-Feasibility Study.



## Investment Thesis

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### Quality Project, Quality Personnel

*Board and Management changes to reinvigorate Viscaria, a robust project in a proven mining jurisdiction*

Avalon Minerals Limited (ASX: AVI, “Avalon” or “the Company”) has recently had a management change, with experienced mining executives being brought in to take a fresh look at the Viscaria Copper-Iron Project (“Viscaria”).

The project is located in a known mining jurisdiction, adjacent to LKAB’s (a Swedish State owned company) Kiruna underground iron ore mine, which produces a large proportion of LKAB’s +25Mtpa output of magnetite fines and pellets.

### Clear Strategy

*Clear strategy towards development in place*

Since their appointment, the new personnel have put in place a clear and well considered strategy to advance Viscaria towards development. Steps completed to date have included a review and upgrading of mineral resources, and an upgrade of the Scoping Study and mineral resource estimates.

### Supportive Shareholders

*Major shareholders are supportive*

Major shareholders are supportive of the Board and Management’s strategy and vision, with good relationships between all parties.

### Large Resource Base

*Quality copper and magnetite resources*

Current copper resources stand at 63.86Mt @ 1.05% copper, with a magnetite resource of 35.3Mt at 29.1% iron and a mass recovery of 37.1%. Resources are included in two copper (A and B Zone) and two copper-iron (D and Discovery Zone) orebodies.

### Robust Economics

*Scoping Study and our modelling indicate robust economics*

Although very sensitive to metals prices, the Scoping Study indicates robust economics for the scoped 3.5Mtpa, 10.4 year scenario, with a relatively modest (for a play which includes magnetite production) life of mine capital expenditure in the order of \$US270 million, due to there being no need to build transport infrastructure. The Scoping Study considers only open pit resources at this stage (see ‘Upside’ below).

In addition the production of two different products, copper and magnetite, produces a natural hedge against price falls in any one of the two, reinforcing the robustness of the project.

### Ready Access To Infrastructure

*Ready access to existing infrastructure – a key to any successful bulk commodities project*

A key to any bulk commodities project is transport infrastructure – building new infrastructure such as rail and port facilities requires significant capital, and requires a very large scale project to be able to carry the capital. Avalon are fortunate in that they are within a kilometre of a rail that already hauls +20Mt of iron ore and pellets per year (with spare capacity), and within 170km of one port, and 340km of another, with shiploading facilities, including capesize facilities in Narvik. The cost of power is very low in northern Sweden (hydro power) and this has a significant positive impact on operating costs.

### Excellent Metallurgy – Premium Products

*Simple metallurgy, high quality concentrates*

A further strength of the project is that it will produce premium, readily marketable products. Our modelling suggest that it will produce around 725kt of a clean, 25% copper



concentrate over the life of mine and approximately 9,100kt of a premium magnetite fines product. Metallurgical testwork indicates that a fines product of ~69% Fe, with low contaminants can be produced, suitable for DRI pellet production.

## Simple Mineralisation - It's Not Rocket Science

*Simple mineralisation, lending itself to industry standard mining and beneficiation techniques*

The proposed operation involves standard and well proven mining and beneficiation techniques. The mineralisation is simple, and lends itself to low strip ratio open cut mining (and there is the scope to go underground at a later stage). Beneficiation includes two stage crushing, grinding and an initial two stage float to produce a copper concentrate. Tails from the first float stage will be treated by a two stage low intensity magnetic separation ("LIMS") to produce the magnetite fines concentrate.

## Upside

*Upside from existing mineralisation and exploration*

The Company's holdings include prospective exploration ground, with previous work outlining geophysical, geochemical and drillhole anomalism requiring follow up. These areas have the potential to significantly increase resources. There is also the opportunity to go underground in all orebodies, and the possibility of extracting gold from the Discovery Zone.

## Mining Friendly Jurisdiction

*Sweden ranked 1<sup>st</sup> in the 2013 Fraser Institute survey*

Sweden is a mining friendly jurisdiction, having recently been ranked at number one in the Fraser Institute's 2013 survey of mining companies. The country has a well-developed, clear and rigorous legal framework for mining projects, with clear steps to development. World-class operations include LKAB's iron ore operations and Boliden's Aitik Copper Mine.

In addition Sweden has a low company tax rate of 22% (although a VAT of 25%), and an annual fee of 0.2% of the average value of the minerals mined, of which 0.15% goes to the landowners and 0.05% goes to the state for R&D in mineral resources.

## Project Valuation....

Our project valuation, as of an estimated 2017 date of construction is as follows.

### Viscaria Base Case Pre-Tax, Pre-Financing Valuation

Project	Unrisked Value (\$US)	Unrisked Value (\$A @ 0.90)	Notes
<b>Viscaria Base Case</b>	\$281m	\$312m	DCF, 10% DR, Valuation as of start of construction. Midpoint of \$142 to \$419m range
<b>Gold Upside</b>	\$25m	\$28m	DCF, 10% DR
<b>Additional Life</b>	\$100m	\$111m	DCF, 10% DR, 5 years @ \$100mpa FCF
<b>Total</b>	<b>\$406m</b>	<b>\$451m</b>	

Source: Breakaway Analysis

*Project valuation midpoint of \$US281m. with an additional \$125m upside*

## .....and Company Valuation

### Company Base Case Valuation – Risked – 100% of Viscaria

Project	Risked Value (\$A, 2017)	Risked Value (\$A, 2015)	Risked Value (\$A, 2015)	Notes
<b>Viscaria Base Case</b>	\$104m	\$86m	\$0.060	67% discount to NPV
<b>Gold Upside</b>	\$6m	\$5m	\$0.003	80% discount to NPV
<b>Additional Life</b>	\$11m	\$9m	\$0.006	90% discount to NPV
<b>Discovery Liability</b>	-\$3m	-\$3m	-\$0.002	Current Value
<b>Cash</b>	\$2m	\$2m	\$0.001	Current Value
<b>Total</b>	<b>\$120m</b>	<b>\$99</b>	<b>\$0.068</b>	

Source: Breakaway Analysis

*Risked Company valuation of A\$0.068/share*



We have arrived at a risked base case company valuation of \$0.068/share as shown in the above table. We have discounted the project NPV's firstly by a risk factor, and secondly by 10% per annum over two years to reflect the difference between now and the 2017 figure used as the start of our project valuation model.

## Avalon Minerals Peer Group

*Unique in potentially producing both copper and magnetite concentrates*

Avalon is unique amongst ASX-listed companies in having the potential to produce both a copper and magnetite concentrate from the same operation. There are no identical peers, however we note two other ASX listed companies operating in northern Scandinavia with iron and/or copper and/or gold projects – Northern Iron (ASX: NFE), producing iron ore in Norway, and Hannan's Reward (ASX: HNR), with Cu/Fe/Au assets near Kiruna. Talga Resources (ASX: TLG) also have Cu/Au assets, however as they are divesting these assets to concentrate efforts on their graphite projects we have not considered them further.

*Peer comparison based on current metals prices and exchange rate*

The table below lists a number of ASX-listed developers and producers, with broadly similar in-ground values ("IGV") per resource tonne. Given the different resource mixes, we have calculated a copper equivalent grade, using current metal prices of US\$6,750/t copper, US\$1217/oz gold and a US\$80/tonne 62% iron fines price (or US\$89/tonne 69% iron fines price for Avalon's high Fe grade concentrate product without any premium consideration). In our valuation (detailed later) we have used similar copper and gold prices, however a forecast 62% iron ore fines price of \$103.50/tonne, equivalent to a 69% magnetite fines price of \$US115.20/tonne without any premium consideration.

We have used an exchange rate of 1 AUD = 0.89 USD.

The table compares the enterprise value ("EV") with the IGV, to elucidate relative valuations between the companies. What has to be noted is that this is an indicative comparison only – a number of factors will affect the metrics, and care needs to be taken in drawing comparisons.

Equivalent grades are based on overall resources for all company projects, not just the relevant company's "key" project, and doesn't take account of potential recoveries.

*Avalon has a relatively high IGV/tonne, but low EV/t*

What is noticeable here are the values for Avalon – the Company has the fourth highest IGV/t and third lowest EV/t figures for the peer group. If our forecast iron ore price is used the IGV/t of resource increases to A\$95.

### Avalon Minerals Peer Comparison

Company	Location	Last Price AUD	EV Diluted (\$m)	Equity Resource (Kt)	CuEq Grade (%)	IGV/t resource	EV/t Resource	EV/IGV	Key Project Stage	Metals (all resources)
Finders Resources	Indonesia	\$0.160	\$273.0	14,515	1.73%	\$132	\$18.81	14.30%	Production, Expansion	Cu, Au, Ag
Tiger Resources	DRC	\$0.285	\$389.9	49,000	1.38%	\$105	\$7.96	7.59%	Production	Cu, Co
Hillgrove Resources	South Australia	\$0.620	\$110.8	31,290	0.90%	\$68	\$3.54	5.18%	Production	Cu, Au, Ag
Avanco Resources	Brazil	\$0.098	\$139.9	63,280	1.45%	\$110	\$2.21	2.01%	Development	Cu, Au
Altona Mining	Queensland	\$0.220	\$99.2	265,800	0.60%	\$45	\$0.37	0.82%	DFS	Cu, Au
Hot Chili	Chile	\$0.210	\$71.4	227,215	0.53%	\$40	\$0.31	0.78%	DFS	Cu, Au, Mo
Northern Iron	Norway	\$0.100	\$107.2	475,000	0.58%	\$44	\$0.23	0.51%	Production	Fe
Rex Minerals	South Australia	\$0.265	\$37.9	337,000	0.98%	\$74	\$0.11	0.15%	DFS	Cu, Au, Fe
Avalon Minerals	Sweden	\$0.007	\$8.4	76,560	1.18%	\$89.3	\$0.11	0.12%	PFS	Cu, Au, Fe
Hannans Reward	Sweden	\$0.008	\$4.4	398,300	0.76%	\$58	\$0.01	0.02%	Scoping	Cu, Au, Fe

Source: IRESS, Company reports, Breakaway analysis

Notes:

Altona Mining – EV does not take in account net cash from sale of Finnish project and return of cash

Avalon Resources – Total resource includes an estimation from combining Discovery and D Zone iron and copper resources



## Risks

As in any resources stock there are a number of risks involved, with what we consider key risks discussed below.

*Short term funding is critical*

*Risks include permitting, mainly with relation to timeframes*

*A key risk is the iron ore price – the project is highly geared to this*

- **Funding** – Short term funding is a critical risk for Avalon – there is an expected \$3 million payment to Hannan’s Reward for the Discovery Zone deposit due on approval of the Mineral Exploitation Concession (“MEC”), expected in H2 2015. In addition the Company expects that it will require around \$18 million over the next three years to progress to completion of permitting. The Company is considering options to ensure adequate funding to progress the project.
- **Permitting** - Permitting is a key risk for any resources project. In our view, the main consideration at Viscaria will be in the timeframe, rather than on whether the project will be permitted or not. Sweden does have a clear but very rigorous permitting process, with the distinct potential for appeals against pro-development decisions. This risk, particularly the timing aspect, is being sensibly managed by the Company, who are being conservative on development timelines, and also being cognizant of dealing with all stakeholders in a fair and timely manner. In addition all resources are located in an area of “National Interest For Mining”, which will be viewed favourably in the permitting process.
- **Development** – There are a number of risks involved in taking a project from scoping through development to operation, although in the case of Avalon this is well down the track. These include cost blowouts and plants not performing as designed. Given that the proposed operation uses off the shelf technology does help mitigate these risks.
- **Operating Costs** – Given that Viscaria has a relatively low in-ground metal value (our base case valuation indicates life of mine revenues of ~US\$69/tonne of ore mined) the project is sensitive to any adverse changes in operating costs. Costs will need to be managed in any future operation.
- **Price and Market Risk** – This is a key risk for any resources project, and one which companies have little or no control over. This is particularly topical for Avalon, with the recent dramatic falls in the iron ore price. Valuation is highly geared to the iron ore price. Although the project is similarly geared to the copper price, given past price history we do not see similar volatility going forward, and view the copper as buffering potential adverse movements in the magnetite price.



## Project and Activities Review

### Introduction

*Key Project is the Viscaria Copper-Iron Project in Sweden*

*This is adjacent to LKAB's Kiruna operations*

Avalon's key project is the Viscaria Copper-Iron Project in northern Sweden. The project, located adjacent to LKAB's Kiruna Iron Mine is ideally situated with respect to infrastructure, and has the potential to produce a clean marketable copper concentrate and a high quality magnetite iron fines product.

The LKAB Kiruna operations include the world's largest underground iron ore mine, a concentration plant and pelletising facilities. LKAB produced 23.1Mt of blast furnace and direct reduction pellets, and 2.1Mt of magnetite fines concentrate in 2013 from Kiruna and its other operations at Malmberget and Svappavaara. LKAB rail product to Narvik (~20Mtpa) and Lulea on the Gulf of Bothnia (~5Mtpa).

Having recently completed a revised Scoping Study, Avalon is looking to complete a Pre-Feasibility Study by mid-2015, and then progress to a Definitive Feasibility Study. Current strategy is aiming at commencement of construction in 2017.

### Project Location Map



Source: Avalon Minerals

### Viscaria Copper-Iron Project (AVI 100%)

#### Introduction and Tenure

*Viscaria comprises four defined resources and a large area of exploration tenements*

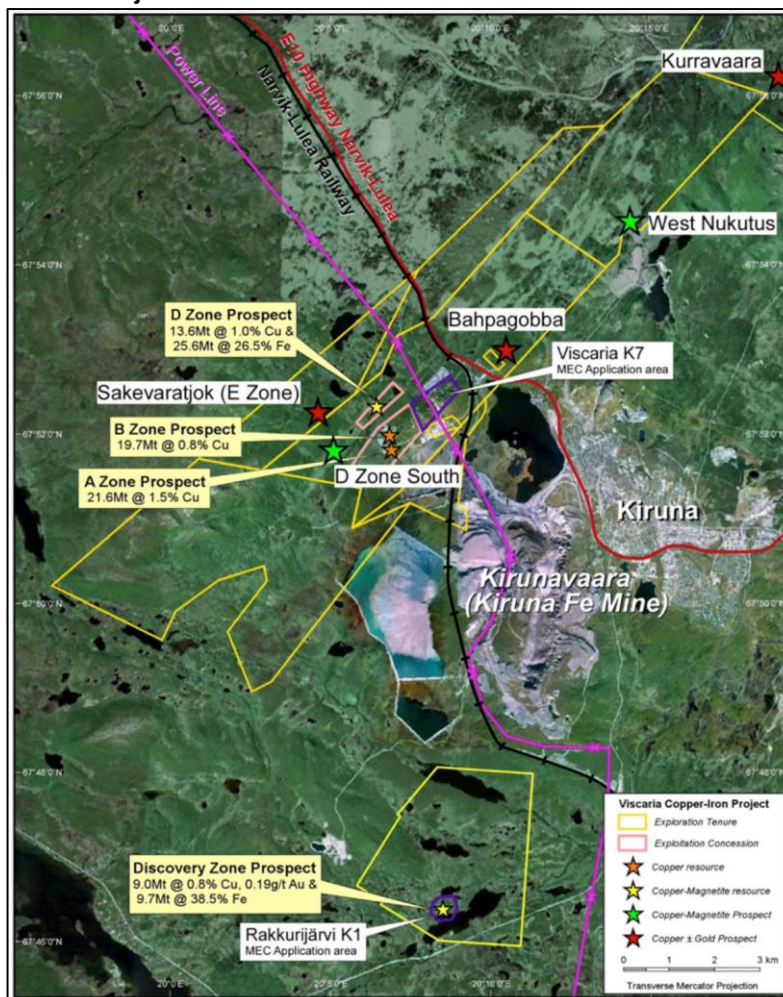
The Viscaria Project comprises four defined resources – the bulk of the A, B and D Zones are located on granted Mineral Exploitation Concessions ("MEC"); and the Discovery Zone is currently on an Exploration Permit. The Discovery Zone resource is currently being acquired from Hannan's Reward (ASX: HNR), with a final A\$3 million payment due on grant of an MEC that is currently under application, with grant expected in H2 2015.





Granted MEC's include Viscaria K3 and Viscaria K4, which cover the D Zone and southern parts of the A and B Zones (both expire on 16/1/2037). Applications include Viscaria K7, which covers the northern part of the A and B Zones. A decision on granting of this is expected before the end of 2014 – this had been delayed until a recent decision on changes to the Kiruna town planning act was approved.

### Viscaria Project Area



Source: Avalon Minerals

The second MEC application, Rakkurijarvi K1, covers the Discovery Zone, with additional factors, including stakeholder engagement relating to reindeer herding activities and its location adjacent to an EU NATURA 2000 environmental area being considered in this application. The Company expects a decision on the application in H2 2015.

Thirteen exploration permits are held 100% by Avalon, and a fourteenth was included as part of the Discovery Zone acquisition from HNR.

### Previous Mining

#### Previous mining on the A Zone

Outokumpu mined the A Zone from 1982 to 1997, extracting 12.5Mt @ 2.3% Cu from an underground operation, and producing 19.5ktpa copper in concentrate.

### Strategy

#### Clear strategy, with an aim to make a decision to mine and commence construction by 2017.

The strategy is to progress the project studies, with an aim to start a one to two year construction period in 2017. The recently revised Scoping Study was predicated on a 10.4 year mine life, with LOM production of around 9Mt of 69% magnetite concentrate and 725kt of 25% copper concentrate.

The Company is looking at various marketing options. For copper concentrates, the ideal option is to sell to a Nordic smelter, which will result in relatively low freight rates. For



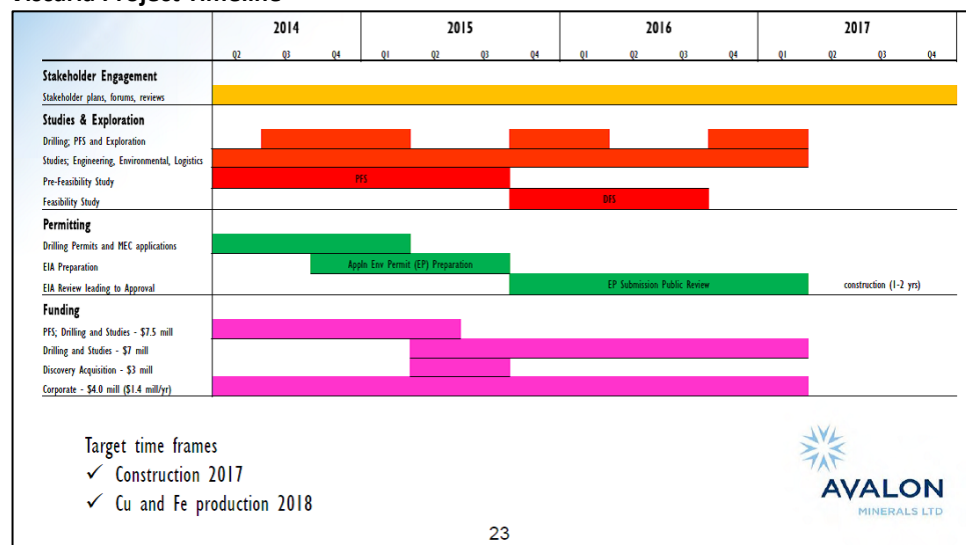
*Company investigating transport and marketing options*

magnetite concentrate, there is the possibility of selling at the mine gate as pellet feed, else export through Narvik to ideally Europe or the Middle East. Both LKAB and Northland (who operate the Tivuni iron ore mine, approximately 150km from Kiruna) use rail adjacent to the Viscaria Project, and have port facilities capable of loading capesize vessels in Narvik.

Another export port with rail connections is Lulea on the Gulf of Bothnia, however this can accept only up to Handymax size ships. Both ports have year round access – Narvik is naturally ice free, and Lulea employs icebreakers to keep it clear.

Avalon is currently investigating sales and transport options, including rail and port access for magnetite concentrate sales.

### Viscaria Project Timeline



Source: Avalon Minerals

### Geology and Mineralisation

Mineralisation is hosted in Paleoproterozoic (2.2-2.0Ga) units of the Kiruna Greenstone Group, which comprises an up to 4km thick series of mid-ocean ridge type basalts ("MORB"), felsic tuff and graphitic sediments.

Mineralisation at the A and B zones has been interpreted as volcanic-hosted-massive sulphide in style, forming NE striking, steeply east dipping tabular stratiform lenses up to 20m thick, comprised largely of pyrite and chalcopyrite. These have been attenuated by subsequent shearing.

Both the D and Discovery Zones show copper/pyrite mineralisation overprinting a pre-existing magnetite body, with oxidation of the sulphidic hydrothermal fluid by the magnetite causing the precipitation of pyrite and chalcopyrite.

This later event is interpreted as being the same VHMS event that led to the formation of the A and B lenses, overprinting oxide facies exhalative iron mineralisation. The Discovery and D Zones are of broadly similar style, however there are more breccia zones at Discovery.

Given the multi-stage paragenesis at the Discovery and D Zones these are zoned, with copper rich and copper poor areas.

### Resources and Reserves

Resources at Viscaria have been updated throughout 2014 by HDR Salva, as summarised in the tables below. These have been classified to the JORC 2012 standard. It needs to be noted that, given the overlapping nature of mineralisation at the Discovery and D Zones,

*The mineralisation includes VHMS copper and exhalative oxide facies iron mineralisation.*

*The two styles overprint at the D and Discovery Zones*





iron and copper resources have been estimated separately, with overlap in the resource tonnages.

Resources are robust, with 60% of the copper and 42% of the iron resources in the Measured and Indicated categories.

#### JORC 2012 Viscaria Copper Resources – 0.4% Copper Cutoff

Resource	Classification	Tonnage (t)	Cu Grade (%)	Cu Metal (t)
A Zone Copper	Measured	14,439,000	1.70	240,000
	Indicated	4,690,000	1.20	57,200
	Inferred	2,480,000	1.00	25,500
	<b>Subtotal</b>	<b>21,609,000</b>	<b>1.50</b>	<b>322,700</b>
B Zone Copper	Measured	123,000	1.30	1,600
	Indicated	4,118,000	0.70	29,700
	Inferred	15,410,000	0.80	118,700
	<b>Subtotal</b>	<b>19,651,000</b>	<b>0.80</b>	<b>149,000</b>
D Zone Copper	Measured	1,000,000	1.25	12,000
	Indicated	4,200,000	1.02	43,000
	Inferred	8,500,000	0.96	81,000
	<b>Subtotal</b>	<b>13,600,000</b>	<b>1.00</b>	<b>136,000</b>
Discovery Zone Copper	Indicated	2,800,000	0.89	25,000
	Inferred	6,100,000	0.75	46,000
	<b>Subtotal</b>	<b>9,000,000</b>	<b>0.80</b>	<b>71,000</b>
Overall Cu	Measured	15,562,000	1.63	253,600
	Indicated	15,808,000	0.98	154,900
	Inferred	32,490,000	0.83	271,200
	<b>Total</b>	<b>63,860,000</b>	<b>1.05</b>	<b>680,000</b>

Recently updated resources include 63.9Mt @ 1.05% copper

Source: Avalon Minerals

#### JORC 2012 Viscaria Iron Resources – 15% Mass Recovery Cut-off

Resource	Classification	Tonnage (t)	Fe Grade (%)	Mass Recovery (%)	Estimated Recoverable Iron (t)
D Zone Fe Resources	Measured	2,000,000	28.7	35.1	500,000
	Indicated	9,700,000	27.2	33.1	2,200,000
	Inferred	13,900,000	25.7	31	3,000,000
	<b>Subtotal</b>	<b>25,600,000</b>	<b>26.5</b>	<b>32.1</b>	<b>5,700,000</b>
Discovery Zone Fe Resources	Indicated	3,000,000	40.6	53.2	1,100,000
	Inferred	6,700,000	37.7	49	2,300,000
	<b>Subtotal</b>	<b>9,700,000</b>	<b>38.5</b>	<b>50.3</b>	<b>3,400,000</b>
Total Fe Resources	Measured	2,000,000	28.7	35.1	500,000
	Indicated	12,700,000	30.4	37.8	3,300,000
	Inferred	20,600,000	29.6	36.9	5,300,000
	<b>Subtotal</b>	<b>35,300,000</b>	<b>29.8</b>	<b>37.1</b>	<b>9,100,000</b>

Iron resources include 35.3Mt @ 29.8% Fe, with a mass recovery of 37.1%. Tonnages overlap those of the copper resource

Source: Avalon Minerals

For the purposes of the Scoping Study, discussed later, in-pit resources combining iron and copper were calculated, as shown below.



## Viscaria In-Pit Resources – 2014 Scoping Study

*In-pit resources as used in the Scoping Study include 31.9Mt @ 0.67% Cu, 23% Fe*

Source	Tonnes (Mt)	Grade		Waste (Mt)	Strip Ratio (W:O)	Meas. %	Ind. %	Inf %
		%Cu	%Fe					
A Zone	4	1.25	-	37	9.30:1	72%	24%	4%
B Zone	3.2	0.67	-	8	2.50:1	2%	78%	20%
D Zone	15.3	0.52	25	64	4.20:1	14%	61%	25%
Discovery Zone	9.4	0.66	39	43	4.60:1	0%	38%	62%
<b>Total Project</b>	<b>31.9</b>	<b>0.67</b>	<b>23</b>	<b>152</b>	<b>4.80:1</b>	<b>16%</b>	<b>51%</b>	<b>33%</b>

Source: Avalon Minerals

In addition, the Discovery Zone resource estimate contains 0.19g/t gold – this gives potential value upside, however this has not been accounted for in the Scoping Study.

### Metallurgy

*Metallurgy is simple, including two stage flotation for copper, and two stage LIMS for iron*

Avalon undertook metallurgy on the A, B (copper) and D (copper and iron) Zones in 2010 and 2011, with the studies reviewed by Ausenco as part of the revised Scoping Study. No studies have been completed on the Discovery Zone, however it is interpreted that this zone may have similar metallurgical characteristics to the D Zone, due to the distinctly similar mineralisation styles.

*Testwork to date indicates clean, ready marketable products*

Results to date have indicated the production of clean concentrates for both copper and magnetite, with the magnetite potentially producing a premium concentrate suitable for direct reduction pellet feed.

### Viscaria Metallurgical Results

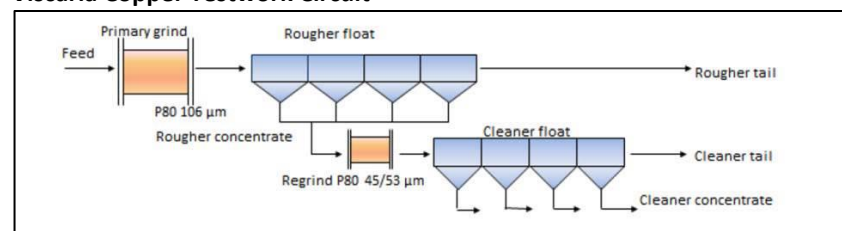
Copper Resource	Recovery	Concentrate Grade	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	S%	P%
A Zone Copper Sulphide	80%	23%	N/A	N/A	N/A	N/A
B Zone Copper Sulphide	80%	23%	N/A	N/A	N/A	N/A
D Zone Copper Sulphide	94%	26%	N/A	N/A	N/A	N/A
Magnetite Resource	Mass Recovery	Concentrate Grade	SiO <sub>2</sub> %	Al <sub>2</sub> O <sub>3</sub> %	S%	P%
D Zone Iron Fresh	41.4%	70.9%	1.0%	0.08%	0.004%	0.01%
D Zone Iron Transitional	42.7%	69.9%	1.2%	0.08%	0.01%	0.01%

Source: Avalon Minerals

The testwork has indicated that industry standard methods can be used – a two stage flotation to recover a copper concentrate, followed by a two stage LIMS of the tails to produce a magnetite concentrate. The regrind size after the first LIMS stage is 38µm.

Again, gold in the Discovery Zone has not been considered in the metallurgical testwork.

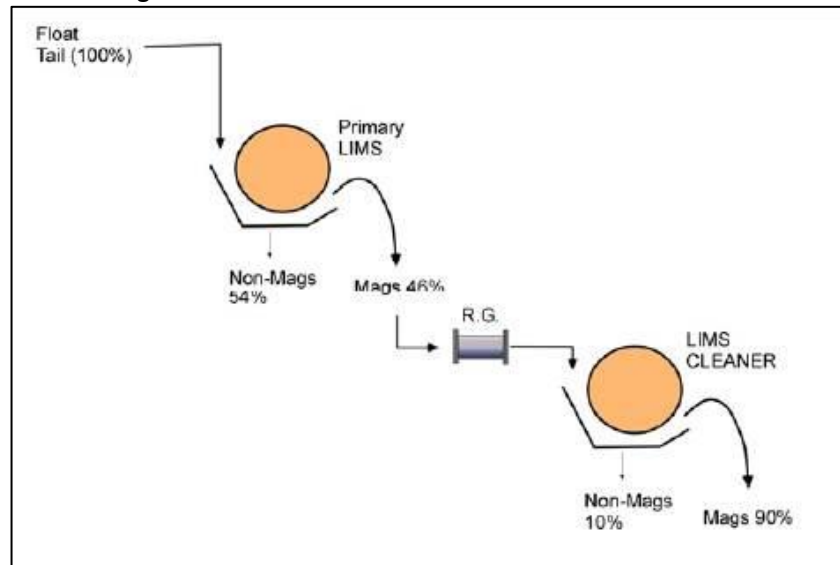
### Viscaria Copper Testwork Circuit



Source: Avalon Minerals



### Viscaria Magnetite Testwork Circuit



Source: Avalon Minerals

### Mining

*Simple open cut mining, with an overall strip ratio of 4.8:1 is envisaged*

Proposed mining of all deposits is by conventional open pit methods up to 250m deep. The overall life of mine strip ratio, as used in the Scoping Study, is 4.8:1, with this also using overall pit-wall angles of 60°.

### Infrastructure

*Viscaria is located adjacent to existing infrastructure*

A factor to be considered in any resources project, and particularly bulk resources projects is infrastructure. A key positive of Viscaria is that it is exceptionally well-served by infrastructure. The project is located near the town of Kiruna, which has a population of 20,000 and a strong mining heritage. Mining has been carried out in the district since the late 1800's.

Avalon is currently undertaking infrastructure studies as part of the PFS. Potential infrastructure options include the confirmed ability to access the rail network to both Narvik and Lulea.

### Power

*Low cost grid power is available*

The Viscaria-Kiruna area is well served by power, with availability on the Swedish national grid. Power generation is hydro-electric, and hence power is relatively cheap at around US\$0.08/kWh.

### Water

Water is readily available, as evidenced by the Kiruna Mine, which has a positive water balance.

### Road

The region is connected to the rest of the country by sealed road.

### Rail

*Adjacent to public access rail, which is currently used by LKAB and Northland*

Kiruna is connected to the ports of Narvik (170km) and Lulea (340km) by publically accessible rail, which is owned by Trafikverket, the Swedish Transport Administration. Currently, LKAB rails pellets and concentrate to both Narvik (20Mtpa) and Lulea (5Mtpa). Northland Resources rail from their Svappavaara loading facility (45km from Kiruna) to Narvik, with the line passing within a kilometre of the proposed Viscaria operations.

The rail has a 30t axle limit – LKAB currently rail using 68 wagon, 6,800t payload train sets.



## Port

*There is currently around 30Mt of capacity at Narvik Port, including Northlands underutilised shiploader*

Both the ports of Narvik and Lulea are readily accessible by rail. Both LKAB and Northland have shiploaders at Narvik – LKAB currently has a single pier and loader with an annual capacity of 20Mt, however they are adding a second facility to increase their capacity to 30Mtpa as part of the LKAB-37 capacity increase programme.

Northland have recently installed a 3,600tph radial shiploader at their Narvik facility. They are currently shipping concentrate at an annualised rate of 2Mtpa, however are expanding their Tivuni operations to 4Mtpa, with planned future expansions (2016) at their Sappavaara property expected to take total shipments to 5Mtpa.

Both these port facilities are capable of loading capesize vessels.

## Permitting

It is expected that permitting will be the constraining factor on any project development. Key permits include:

- Drilling permits – metallurgical, geotechnical and resource upgrade drilling
- Discovery Zone Mineral Exploitation Concession – application lodged August 29, 2014, with grant expected in H2 2015
- Environmental Permit (Environmental, including baseline studies underway, expected submission late 2015)

*Permitting forms the main time constraint on progress – Sweden has a well-established and clear legal framework for mining projects however this does take time to work through with potential for delays*

Although there is a clear permitting process associated with the well developed mining and environmental legal framework these do take time, and, in the case of the Environmental Permit, require extensive public consultation.

A number of issues are involved, including reindeer herding areas, EU NATURA 2000 areas (particularly in the case of the Discovery Zone MEC application) and recreational issues. However, on the other hand the strong mining heritage is a definite positive, and all resources are located within an area of “National Interest For Mining”, which will be viewed favourably in the permitting process.

The Company is working its way through the permitting process, and engaging closely with all stakeholders. There is the potential for delays in the permitting process, including due to appeals by stakeholders against decisions made in favour of the planned operations.

Recent experience of permitting is positive however, including the re-zoning of the area covering the northern parts of the A Zone and B Zone resources to accommodate the MEC application.

Potential NATURA 2000 issues relate to Lake Rakkurijarvi adjacent to the Discovery Zone. The lake, however is part of the runoff system for the LKAB Kiruna Mine, and hence our view is that this is a mitigating factor, and effective and appropriate environmental planning and management will allow granting of the MEC.

## Scoping Study

*Updated Scoping Study completed in 2014 – baseline project NPV of \$US248 million*

An original Scoping Study was completed by Xstract Mining Consultants (“Xstract”) in 2012, and subsequently revised in 2013. Following the 2014 resource upgrades, HDR Salva updated the Scoping Study, with this released to the market in September 2014.

The study resulted in a baseline NPV for Viscaria of \$US248 million, based on a mine gate magnetite concentrate price of \$US100/tonne (equivalent to a 62% CFR hematite fines price of ~\$US89/tonne without allowance for a premium for quality), and a copper price of \$US3.00/lb.

Parameters and results from the study are presented below.



## Viscaria Scoping Study Parameters and Results

Item	Base Case	Comments
<b>Undiluted In-Pit Resource</b>	31.9Mt @ 0.67% Cu, 23% Fe	Resources cover the four deposits
<b>Ore Mined</b>	31.9Mt/33.6Mt	Undiluted/Diluted
<b>Mining Rate</b>	3.5Mtpa	First eight years – decreases in last three years
<b>Mining Factors</b>	5% dilution, 95% mining recovery	Assumed dilution at zero grade
<b>LOM Plant Recovery</b>	Cu – 85% Fe – 85% Au – 0%	This is variable between the four deposits Au in Discovery Zone only
<b>LOM Concentrate Production</b>	723kt @ 25% Cu 8.9Mt @ 69% Fe	
<b>Metal Prices LOM</b>	Cu – \$US3.00/lb Fe – \$US100/t con	Sensitivity analysis included with study.
<b>Transport</b>	\$US15.75/t Cu con \$US1.50/t Fe con	Cu con to local smelter Mine gate sales assumed for magnetite concentrate sales
<b>Site Opex/t Ore</b>	\$US31/t con	Our analysis suggests this is reasonable
<b>Smelter Charges</b>	Cu TC – \$US90/t Cu RC – \$US0.09/lb	
<b>Royalties</b>	A, B, D Zones – 1% Disc. Zone – 1.5%	Net Smelter Return to third parties
<b>Mine Life</b>	10.4 years	
<b>Pre-Production Capital</b>	\$US199m	Our analysis suggests this is reasonable
<b>Life of Mine Capital</b>	\$US271m	Includes \$US20 m closure costs. Our analysis suggests this is reasonable
<b>LOM Strip Ratio</b>	4.8: 1	Variable between four pits
<b>Discount Rate</b>	10% Real	
<b>Net Present Value</b>	\$US248m	Base case – considerable upside with increased product prices
<b>Basis</b>		Pre-tax, pre-financing

Source: Avalon Minerals, Breakaway analysis

We have carried out an analysis of these figures and in our view they are reasonable, taking into account our comments on iron ore pricing later in this report. Operating costs may be conservative, given the published costs of Northland and Northern Iron, both regional producers. We have largely used HDR Salva's inputs in our DCF modelling.

### Blue Sky

There is considerable blue sky potential at Viscaria –including extensions to the current resources and the scope for further discoveries in the Company's tenement holdings.

This includes down dip and along strike potential in all currently defined deposits – the Company (but not Breakaway) has carried out a preliminary analysis of underground mining of down-dip extensions, with this returning positive cash margins.

Included in our valuation below is the potential to extract gold from the Discovery Zone – published resources include 0.19g/t gold, which is expected to report largely to the chalcopryite concentrate, and therefore provide a credit.

Other upside includes the potential to treat D Zone oxide resources through low opex leaching, and to extend oxide resources – the D Zone resource is open to the south.

Historic exploration in the Company's tenements has resulted in a number of geophysical targets and drillhole intersections that require follow up – targets include near mine (within 15km of the proposed operation) and in the broader tenement area.

*Considerable potential for addition mineralisation along strike and down dip at all four deposits*

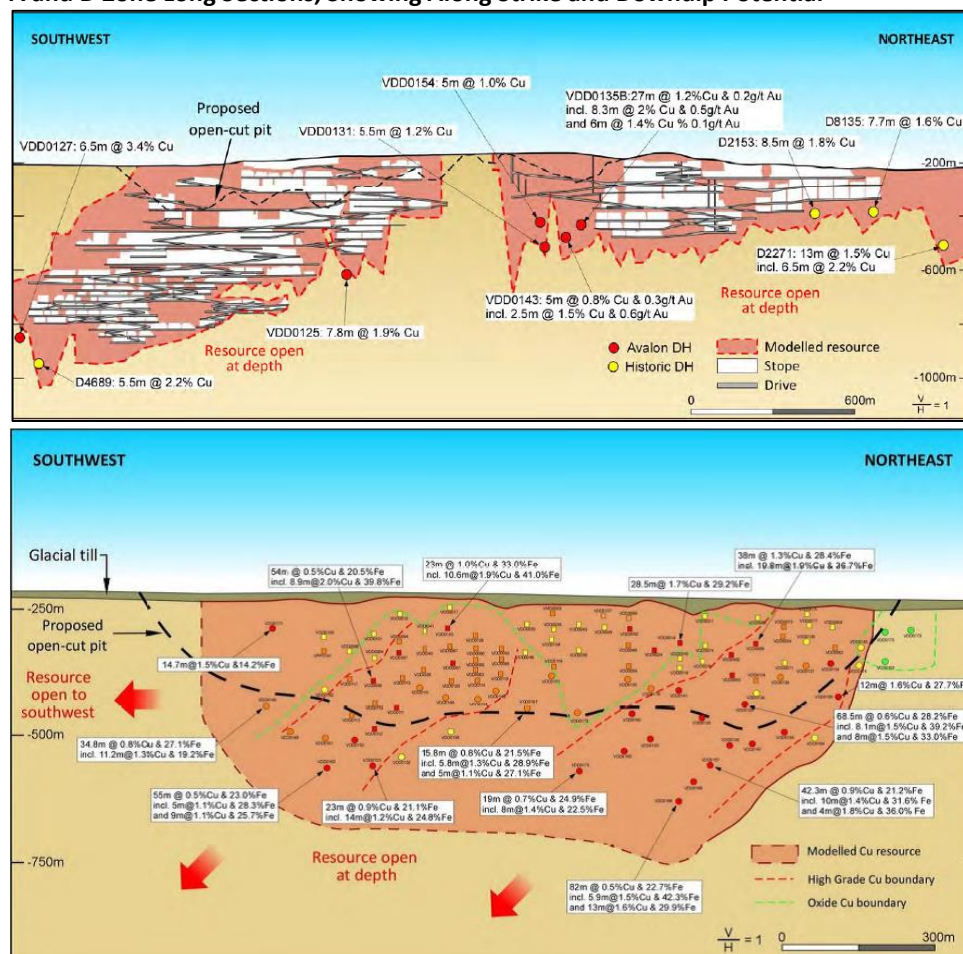
*Gold credit potential at the Discovery Zone*

*Historic exploration has outlined targets requiring follow up*





## A and D Zone Long Sections, Showing Along Strike and Downdip Potential



Source: Avalon Minerals

## Corporate

*Change of Board and Management in late 2013/2014*

Late 2013/early 2014 saw a change of Board and Management in Avalon. This included the appointment of Graham Ascough as Chairman, and Malcolm Norris as Managing Director. Both have extensive experience at the executive level of listed resource companies. In addition, the appointment of Mr Don Hyma as a Non-Executive Director brings extensive iron ore (and copper) knowledge to the Board.

*Good relationships amongst key stakeholders*

Relationships between the board, management and major shareholders is positive, and the vision to move the Viscaria project to development is well understood by shareholders.

## Project and Company Valuation

*We have undertaken a DCF valuation of Viscaria*

We have undertaken a DCF valuation of the Viscaria Project, with results as presented below. As stated above we have largely used inputs as used in the Scoping Study, including costs and mining parameters.

### Viscaria Base Case Pre-Tax, Pre-Financing Valuation

Project	Unrisked Value (\$US, 2017)	Unrisked Value (\$A @ 0.90)	Notes
<b>Viscaria Base Case</b>	\$281m	\$312m	DCF, 10% DR, Valuation as of start of construction. Midpoint of \$142 to \$419m range
<b>Gold Upside</b>	\$25m	\$28m	DCF, 10% DR
<b>Additional Life</b>	\$100m	\$111m	DCF, 10% DR, 5 years @ \$100mpa FCF
<b>Total</b>	<b>\$406m</b>	<b>\$451m</b>	

Source: Breakaway Analysis

*Base case pre-tax, pre-financing valuation of \$US281m, with \$125m upside potential*



We have based this valuation on the midpoint of potential valuations as discussed in our transport and iron ore price sensitivity section below, with the valuation being pre-tax and pre-financing. The project value is as of the start of construction, and allows for a two year construction period.

We have arrived at a risked base case company valuation of \$0.068/share as shown in the following table. In arriving at this value we have discounted the project based NPV's by risk factors which we believe reflect the risk in each stage. In addition, the project valuations have been further discounted at 10% per annum to reflect the estimated two year time lag between now and the date (2017) used as start of the valuation.

*We have a risked  
Company valuation of  
A\$0.068/share*

#### Company Base Case Valuation – Risked – 100% of Viscaria – \$US

Project	Riskd Value (\$A, 2017)	Riskd Value (\$A, 2015)	Riskd Value (\$A, 2015)	Notes
Viscaria Base Case	\$104m	\$86m	\$0.060	67% discount to NPV
Gold Upside	\$6m	\$5m	\$0.003	80% discount to NPV
Additional Life	\$11m	\$9m	\$0.006	90% discount to NPV
Discovery Liability	-\$3m	-\$3m	-\$0.002	Current Value
Cash	\$2m	\$2m	\$0.001	Current Value
<b>Total</b>	<b>\$120m</b>	<b>\$99</b>	<b>\$0.068</b>	

Source: Breakaway Analysis

The following table present the parameters and key outcomes from our modelling.

#### DCF Model Parameters and Outcomes – 100% basis, Pre-Tax, Pre-Financing – \$US

Parameter	Result	Notes
<b>PRODUCTION PARAMETERS</b>		
Total Mined	33.6 Mt	Includes 5% dilution
Mining Rate	3.5mtpa	
LOM Head Grade	0.63% 22% Fe	Weighted average of four zones
Metallurgical Recovery	85% - Cu 85% - Fe	Cu – Company figures Fe – variable in Scoping – metallurgy indicates up to 88%
LOM Concentrate Production	725kt Cu 9,100kt Fe	
Metals Prices	Cu - \$3/lb Fe Con \$127.5/t	Magnetite con price is midpoint of our potential magnetite CFR price range of \$105 to \$150/t, equating to a 62% CFR price of \$81 to \$126/tonne
LOM (years)	10.4 yrs	Company
Strip Ratio	4.8:1	
<b>UNIT FINANCIALS (All Figures in \$US)</b>		
Opex/tonne of ore	\$40	Based on \$4/tonne ore mining, \$3/tonne waste mining, \$3.08/ROM tonne G & A, \$9.50/ROM tonne processing Copper concentrate transport – \$15.75/tonne Magnetite concentrate transport - \$25/tonne Copper treatment charge - \$90/tonne, refining charge - \$0.09/lb
Royalties and Taxes/t ore	\$1	A, B, D Zones – 1% NSR Royalty Discovery Zone – 1.5% NSR Royalty
LOM Capex/t ore	\$7	Based on Company estimate of \$US199 million initial capex, \$US19m pit establishment, \$US20 million closure costs
Sustaining Capex/t ore	\$1	\$33m – Company estimate
Total Cost/t ore	\$49	
Revenue/t ore	\$69	Based on copper price of \$3/lb, Magnetite fines price of \$100/tonne
Margin/t ore	\$20	
Copper cash cost of production	\$0.48/lb	After magnetite credits



LOM revenue of  
\$2.3Bn, peak EBITDA of  
\$119m

Project IRR of 37%

We estimate \$US25m  
upside from gold

We have upside from  
additional mine life

#### OVERALL FINANCIALS – UNGEARED, 100% BASIS – \$US

LOM Revenue	\$2,315m	Split 50:50 copper: iron
Peak EBITDA	\$119 m	
Total FCF	\$629 m	
Real NPV, 10% DR	\$281 m	
Payback Period	2.5 years	
IRR	37%	
<b>UPSIDE</b>		
Discovery Zone Gold	\$25 m	Based on a grade of 0.19g/t, 85% recovery (assumed all in chalcopyrite), smelter deduction of 1g/t, refining charge of \$5/ounce
Additional Mine Life	\$100m	Five years additional mine life - \$100m FCF per year

Source: Avalon Minerals, Breakaway analysis

#### Gold Upside

The Scoping Study did not allow for recovery of gold from the Discovery Zone, which contains 0.19g/t. We have modelled the potential upside, based on a recovery of 85%, reporting to the copper concentrate. Our figures indicate that this adds \$25 million to the NPV.

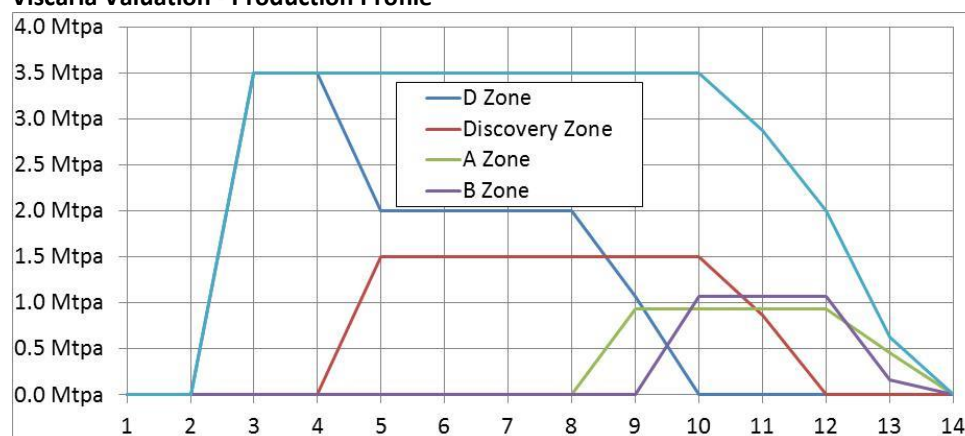
#### Additional Mine Life

Our estimate for additional mine life is based on a free cash flow of \$US100 million per year additional to the current mine life. As discussed earlier additional mine life could come from new discoveries, also underground mining of existing resources.

#### Production Profile

We have used the production profile as used by Avalon in their Scoping Study. Initially the D Zone and Discovery Zone resources are mined, and produce around the 90% of the value. The two smaller copper only resources, A Zone and B Zone are mined near the end of the operation.

#### Viscaria Valuation - Production Profile



Source: Avalon Minerals, Breakaway analysis

#### Magnetite Pricing and Transport Costs

One key consideration in our valuation are transport costs and magnetite fines prices – particularly important in the current climate of falling iron ore prices. The project financials are very sensitive to these factors.

As part of our valuation we have included a sensitivity analysis using a range of CFR prices and transport costs. We have calculated magnetite fines prices using a premium of \$US3 per percentage point increase in iron content above the 62% CFR fines price – for a 69% product this equates to a \$US21 premium.



## Sensitivity Analysis – Magnetite Fines Price and Transport Cost – \$US

*Magnetite pricing and transport costs are key inputs – we have included a sensitivity analysis of these factors*

*Our valuation reflects the mid-point of what we consider a reasonable range of inputs*

62% CFR Equivalent	CFR 69% Magnetite Fines	Total Transport (Rail, Port, Shipping)			
		\$0	\$10	\$20	\$30
\$39 /t	<b>\$60 /t</b>	\$74 m	\$22 m	-\$30 m	-\$83 m
\$54 /t	<b>\$75 /t</b>	\$149 m	\$97 m	\$45 m	-\$8 m
\$69 /t	<b>\$90 /t</b>	\$224 m	\$172 m	\$120 m	\$67 m
\$84 /t	<b>\$105 /t</b>	\$299 m	\$247 m	\$194 m	\$142 m
\$99 /t	<b>\$120 /t</b>	\$374 m	\$322 m	\$269 m	\$217 m
\$114 /t	<b>\$135 /t</b>	\$449 m	\$397 m	\$344 m	\$292 m
\$129 /t	<b>\$150 /t</b>	\$524 m	\$472 m	\$419 m	\$367 m
\$144 /t	<b>\$165 /t</b>	\$599 m	\$546 m	\$494 m	\$442 m

Source: Avalon Minerals, Breakaway analysis

Our view is that any current forecasts for iron ore prices from 2018/9 will be unreliable to say the least, hence the inclusion of the sensitivity with a broad range of potential prices.

Avalon will be looking at selling into the European and Middle East markets - these are globally important importers of magnetite fines (and pellets), with annual iron ore demand of around 100Mt and 20Mt respectively, and are also cheaper to ship to than China.

Our estimates include rail and port costs (Narvik) of around \$US15/tonne (using 3<sup>rd</sup> party infrastructure), shipping rates to Europe of ~\$US5/tonne and to the Middle East of ~\$US15/tonne. These result in total transport costs of \$US20 to \$US30/tonne, hence the range in our sensitivity table above.

Another option is to negotiate to sell to LKAB – LKAB have an aggressive expansion programme in place, and may be amenable to buying fines to feed their pellet plant. The potential downside here is that LKAB would most likely try to negotiate a price close to their cost of production, which we estimate at around \$US60/tonne of fines. Given the low modelled NPV for this option, we consider that it would be a difficult case to attract project financing for.

There are some points to note in the above table:

- This shows the equivalent 62% CFR fines price to the left of the magnetite fines price – this is based on a premium/discount of \$3 per percentage change in concentrate grade
- Figures with a transport cost of \$0 equate to mine gate sales – given earlier comments we would expect mine gate sales to be at the lower end of the price range (top left hand red box)
- The current 62% CFR price of around \$80/tonne equates to a potential magnetite fines CFR price of \$105/tonne
- The average 62% fines price through 2013 was \$131/tonne, equivalent to a magnetite price of \$155/tonne
- The bottom right hand red box contains what we consider could be a reasonable range of scenarios – exports to Europe and the Middle East with CFR prices of \$105 to \$150/tonne – this gives a midpoint valuation of \$US281 million, which we have used as our base case.

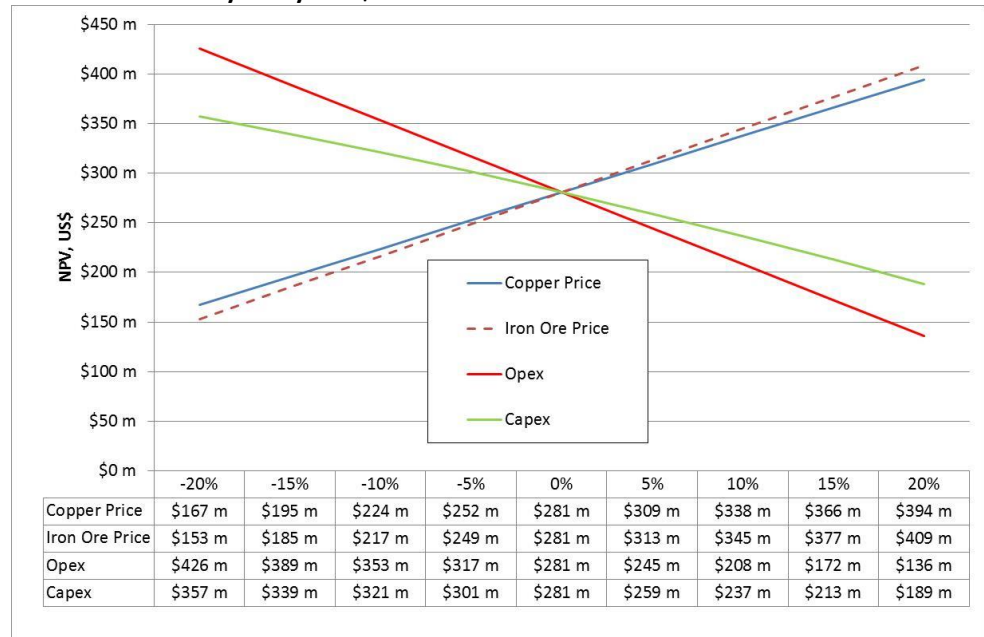


*In addition to the magnetite price, the project is sensitive to changes in opex, capex and copper price, however can comfortably absorb 20% adverse changes in these parameters*

### General Sensitivity

The table below presents the base case project sensitivity to a number of factors. As can be seen the project is moderately sensitive to all factors, however still retains a positive NPV with 20% adverse changes to our base case inputs.

### Viscaria – Sensitivity Analysis – \$US



Source: Breakaway Analysis

### Breakaway's View

*We consider Viscaria a quality but overlooked project*

In Viscaria, Avalon has what we consider a quality, and more crucially, overlooked project. It is located in a known mining district, and vitally, for a potential bulk commodities project, has readily accessible infrastructure that has spare capacity – this is key to the success of Viscaria.

The recent management shakeout has brought a fresh set of very experienced eyes to the project, and the new personnel are carrying out a thorough appraisal, and have set a clear, methodical strategy to progress through to a decision to mine. The Company has what we believe a conservative timeframe, allowing for potential delays, particularly in permitting..

*Technically we consider Viscaria largely de-risked*

Technically, we consider Viscaria to be largely derisked, with simple and well proven mining and treatment methods. There is also good scope to increase resources, and hence extend the potential life of mine. As we have said, technically the project is not rocket science.

*The key risk is the iron ore price*

The key risk (and unknown) here is the iron ore price – 2014 has seen significant falls in the benchmark 62% CFR fines price. However, given the potential time frame to development we could expect to see a recovery and potential stabilisation in the price. The project valuation is highly geared to the iron ore price, so there is considerable upside when prices improve.

We have valued the project using the midpoint of a range of iron ore prices, with a lower value based on the current price, and an upper value approximately 5% below the 2013 average price. The other unknown is marketing, and hence transport costs. Here we have used a base case with a split of 50:50 between the Middle East and Europe. Current regional producers are selling into these markets.

Our valuation of \$0.068/share is at a considerable premium to the current price, and includes some potential production upside.





Short term funding will be critical, and is a key risk for the Company – A\$3 million will be due to Hannan's Reward on the granting of the Discovery Zone MEC, expected in H2 2015, and further funds will be required for progressing the PFS. The Company is currently considering funding options.

*The project and company seem to have flown under the radar*

This project and Company seems to have flown under the radar for some time – this, and past corporate issues have resulted in a depressed share price since mid 2013. We note that the share price has remained reasonably stable since the beginning of 2014, despite the dramatic drop in the iron ore price.

Is this reflecting adverse investor reaction to past events? These events include the withdrawal of a potential partner from an MoU in May 2013, which precipitated a two month price fall from around \$0.05/share to near current levels. In our view this confirms that the Company is fundamentally undervalued.

*We consider Avalon a medium to long term SPECULATIVE BUY*

Given the above we rate Avalon as a medium to long term SPECULATIVE BUY. We view the company as significantly undervalued – even using highly risked project valuations.

Key price drivers will include material progress on project studies and permitting.



## Directors and Management

*Non-Executive Chairman*  
**Graham Ascough**  
*BSc, PGeo, MAusIMM*

Appointed November 2013. Mr. Ascough is a senior resources executive with more than 23 years of industry experience evaluating mineral projects and resources in Australia and overseas. He is currently non-executive Chairman of three ASX listed companies: Phoenix Copper Limited, Mithril Resources Limited and Musgrave Minerals Limited.

*CEO and Managing Director*  
**Malcolm Norris**  
*MSc, Grad Dip App Fin, FAusIMM*

Appointed April 2014. Mr. Norris is a senior mining industry professional with extensive experience in mineral exploration, business management, development of new business opportunities and asset transactions. His roles have covered a wide range of commodities, geographic locations and management of global portfolios of projects in both large and small organisations. He led the team which discovered the 2Bt Tujuh Bukit copper-gold deposit.

*Non-Executive Director*  
**Crispin Henderson**  
*FCA, FCCA, FCIM*

Appointed March 2013. Mr. Henderson has more than 45 years of experience in the financial services and fund management sectors, principally with PricewaterhouseCoopers and Threadneedle Investments. Crispin is based in London and now works as a consultant to the financial services sector.

*Non-Executive Director*  
**Don Hyma**  
*MSc, PEng, IED*

Appointed March 2014. Mr. Hyma is a mining industry executive with more than 25 years of progressive capital project experience in the resource sector in Canada, Chile, New Caledonia and Australia. His experience includes direct involvement in delivering numerous major projects, taking them from studies through to implementation, for several multi-national resource companies in the nickel, copper and iron ore industries.

*Non-Executive Director*  
**Paul Niardone**  
*MBA*

Appointed February 2012. Mr. Niardone was the Executive Director and founder of Professional Public Relations (WA), the largest PR and communications firm in Western Australia. He was the founding Chairman of Bellevue Resources Limited and has experience in marketing, investor relations and strategic planning in both the Government and private sectors.



### **Analyst Verification**

We, Grant Craighead and Mark Gordon, as the Research Analysts, hereby certify that the views expressed in this research accurately reflect our personal views about the subject securities or issuers and no part of analyst compensation is directly or indirectly related to the inclusion of specific recommendations or views in this research.

### **Disclosure**

Breakaway Investment Group (AFSL 290093) may receive corporate advisory fees, consultancy fees and commissions on sale and purchase of the shares of Avalon Minerals and may hold direct and indirect shares in the company. It has also received a commission on the preparation of this research note.

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