

AVALON MINERALS LTD (AVI)

Getting in position for copper's next run

Avalon Minerals Limited (AVI) owns 100% of the Viscaria Copper project in Sweden. Extension drilling in 2015 showed Viscaria's D Zone was strengthening at depth, and has the potential to be developed on a similar scale to the historically mined A Zone, which yielded 300kt of copper prior to 1997.

Subject to funding, Avalon has plans to drill up to 15,000m at Viscaria in an effort to expand resources from the present estimate of 55Mt at 1.1% Cu. The focus will be on the D Zone (11Mt at 1.2% Cu in resource) where step out 2015 intercepts included 27m at 2.6%, 38m at 1.1% and 14m at 1.4% Cu, spread over 800 metres of strike length. D Zone is one of five close spaced, parallel VMS/IOCG zones at Viscaria, each extending over 6km of strike.

Viscaria is 4km from the Kiruna townsite and operating iron ore mine. Transport, service and labour costs are accordingly less than industry averages. AVI's scoping studies indicate a 2Mtpa mine and concentrator can be built on site for US\$130M. Target annual copper output is 25,000 to 30,000 tonnes over an initial 8-10 year mine life. Avalon plans to submit an EIA in 2018 for a permit to mine at Viscaria from 2019.

Finnish gold could lend a hand

Avalon is earning an 80% interest in a portfolio in Finland containing a number of gold and lithium prospects. Some impressive intercepts were returned in 2016 from gold prospect Satulinmaki, including 148m at 0.8 g/t. Mineralisation at Satulinmaki is complex, but open at either end, and there is a nearby processing option. More work in 2017 could lead to a windfall in 2017 through development or prospect sale, or better still, a new discovery.

In Dec '16 AVI raised A\$2.5M with which 2,000m drilling is planned at Satulinmaki by April 2017. Extension of the program and resumption of drilling at Viscaria depends on additional funding.

Subject to exploration, returns hinge on US\$3/lb

From Hartleys' modelling Viscaria's viability depends on a higher copper price, and extension of the D Zone. Avalon's 2015 drilling brought the D Zone potential into play with promise of consistent +10m wide +1.5% lodes occurring over 800m of strike. Hartleys considers that a target D Zone mining inventory of 8Mt at 2.2% Cu between 400 and 800m depth would put Viscaria in a good position on the supply cost curve, with total (C3) costs of about US\$2.10/lb.

Assuming a reasonable run of exploration results at D Zone, Viscaria still needs +US\$2.80/lb long term copper to be confident of development funding, on Hartleys' numbers. AVI is a straw hat in winter investment that makes sense because Viscaria is well located, has the potential to be a relatively low cost producer and it has exploration upside. There is precious little interest in the small copper sector now but should copper move back toward US\$3.00/lb money will return to this end of the market, with AVI picked to be ahead of the pack. AVI is recommended as a Speculative Buy, providing a cheap long dated call option on copper.

16 Jan 2017

Share Price	\$0.017
Valuation	\$0.030
Price Target (12 month)	\$0.030

Brief Business Description:
Copper and gold explorer

Hartleys Brief Investment Conclusion
Large, marginal copper resource holder with excellent potential to improve its position in 2017. Highly leveraged to copper price.

Chairman & MD
Graham Ascough (Non-Exec Chairman)
Malcolm Norris (Executive Director and CEO)

Top Shareholders

Valbonne II	10.0%
Marilei International Limited	6.5%
Potezna Gromadka Ltd	5.7%
Mohd Faiq Abu Sahid	5.2%

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Issued Capital 649m
- fully diluted 822m

Market Cap A\$11m
- fully diluted A\$14m

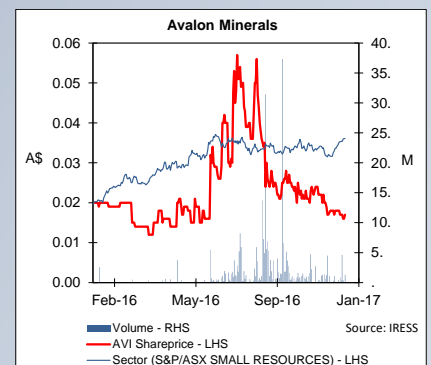
Cash (pro forma) A\$2.6m

Debt (30 Sept 16) A\$0m

EV A\$8m

	Prelim. (A\$m)	FY19e	FY20e	FY21e
Prod (kt Cu)		5	25	25
Op Cash Flw (A\$m)		-4	47	42
Norm NPAT (A\$m)		-8.9	13.5	9.6
CF/Share (cps)		-0.5	5.8	5.1
EPS (cps)		-1.1	1.6	1.2
P/E			1.0	1.4

	Cu	
Resources (kt)	616	kt
Reserves (kt)	0	kt



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Hartleys has completed capital raisings in the past 12 months for Avalon Minerals Limited ("Avalon") for which it has earned fees. Hartleys has provided corporate advice within the past 12 months and continues to provide corporate advice to Avalon for which it may earn fees in the future. Hartleys has a beneficial interest in 10 million options in Avalon and expects to be issued up to a further 12.5m options.

BUSINESS OVERVIEW

AVI acquired Viscaria, in Sweden, in 2008 and has since advanced exploration and development studies of the region's VMS copper lodes. Viscaria remains AVI's principal asset after diversification into Finnish mineral assets in 2016.

VISCARIA COPPER PROJECT (100%)

Viscaria produced 300,000t Cu prior to 1997 from A Zone to 600m depth.

The Viscaria VMS copper deposits were discovered in the 1970s, within 4km of the established Kiruna iron ore mine in northern Sweden. Outokumpu mined 12.5Mt of sulphide ore at an average grade of 2.3% copper from Viscaria's tabular A-zone lode between 1982 and 1997, producing 300kt of copper in concentrate. Underground, open stope mining of the steeply dipping lodes extended from surface to a maximum vertical depth of 600m along 3km strike length. Mined widths in the A Zone averaged about eight metres and in places extended to 30 metres.

Viscaria was a successful 16 year project. The lodes were wide and consistent and copper grades above average. The concentrate product was clean and keenly sought by European smelters. The infrastructure established for the giant Kiruna iron ore mine kept Viscaria's freight, labour and power costs well below industry averages.

Outokumpu closed the mine, removed the surface facilities and rehabilitated the site in 1997 as copper prices fell back below US\$90c/lb. Avalon acquired Viscaria and its extensive drilling, production, surveying and geological mapping records in 2008. Avalon estimated total Viscaria resources of 40 million tonnes at 1.3% copper in September 2008. Current management assumed control of Avalon in March 2014.

Fig. 1: Avalon share price and LME copper (common base). Avalon acquired Viscaria in Feb 2008.



Source IRESS

Avalon drilling at Viscaria

Avalon’s drilling between 2009 and 2015 identified the unmined D Zone as a priority target at Viscaria. D Zone is parallel and 800 metres north-west of the A Zone. Current interpretation has the A Zone pinching at depth while the D Zone appears to be opening up at depth. In September 2015 Avalon intersected 27m at 2.6%Cu from 565m down hole, at D Zone. Other down-hole copper intercepts from the deepest holes drilled into the D Zone include 22m at 1.5%, 38m at 1.1%, and 14m at 1.4%. These intersections are between 400 and 700m vertical depth, over a strike length of 800 metres.

Avalon’s last drilling campaign at Viscaria, completed in 2015, highlighted the depth potential of the D Zone beneath the 2015 resource (11Mt @ 1.23% Cu). A copper price recovery in November 2016 enabled Avalon to revitalise its exploration and pre-feasibility programs at Viscaria. A program of up to 15,000 metres of drilling is planned in 2017, subject to funding.

Fig. 2: Sections showing D Zone at Viscaria.

Estimated resources at Viscaria are 55Mt at 1.1% Cu, containing 616,000 tonnes of copper.

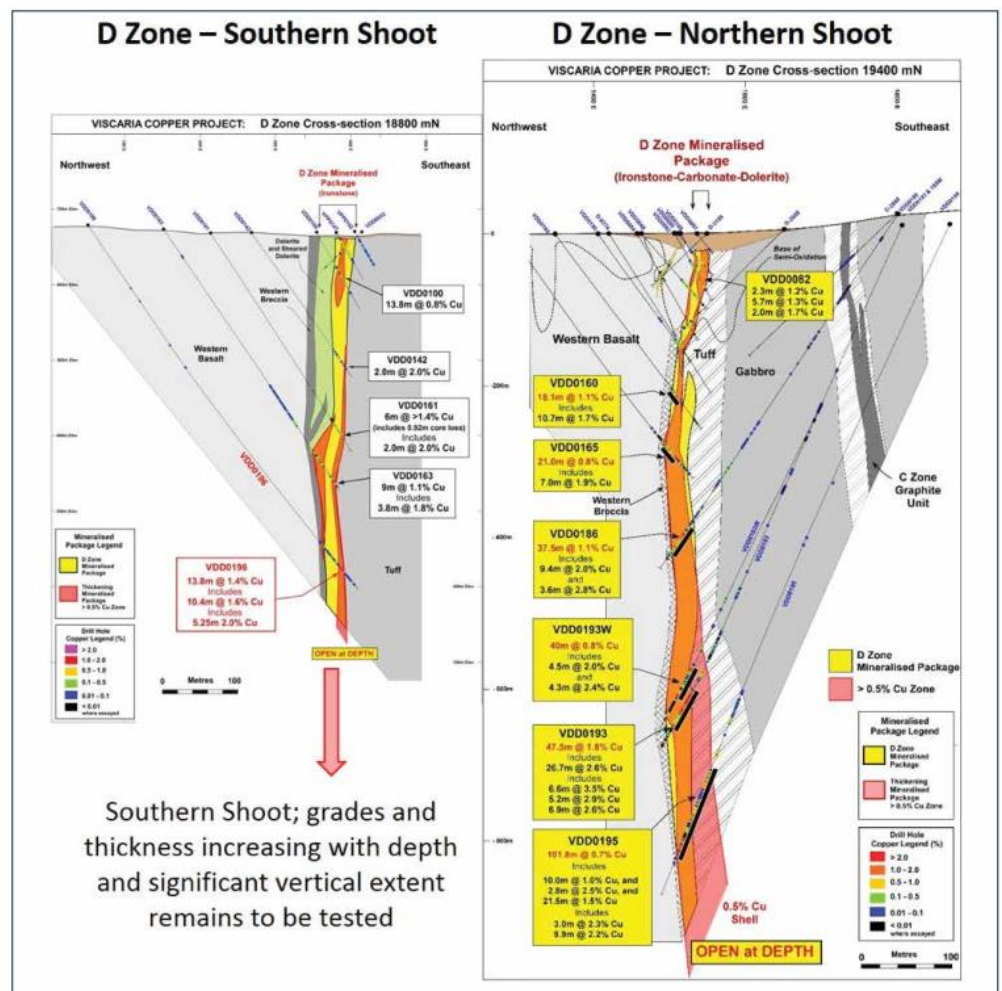


Figure 6: D Zone drill hole cross sections showing results from VDD 195 and 196 and the developing higher grade southern and northern shoots.

Source AVI

Viscaria - Development considerations

Viscaria is 4km from LKAB's Kiruna underground iron ore mine and its associated infrastructure. In April 2016 Avalon scoped a 2.0Mtpa combined open pit and underground operation producing 21,000tpa Cu in concentrate at Viscaria. Pre-production capex was estimated at US\$130 million, to build a concentrator and set up the D Zone underground mine.

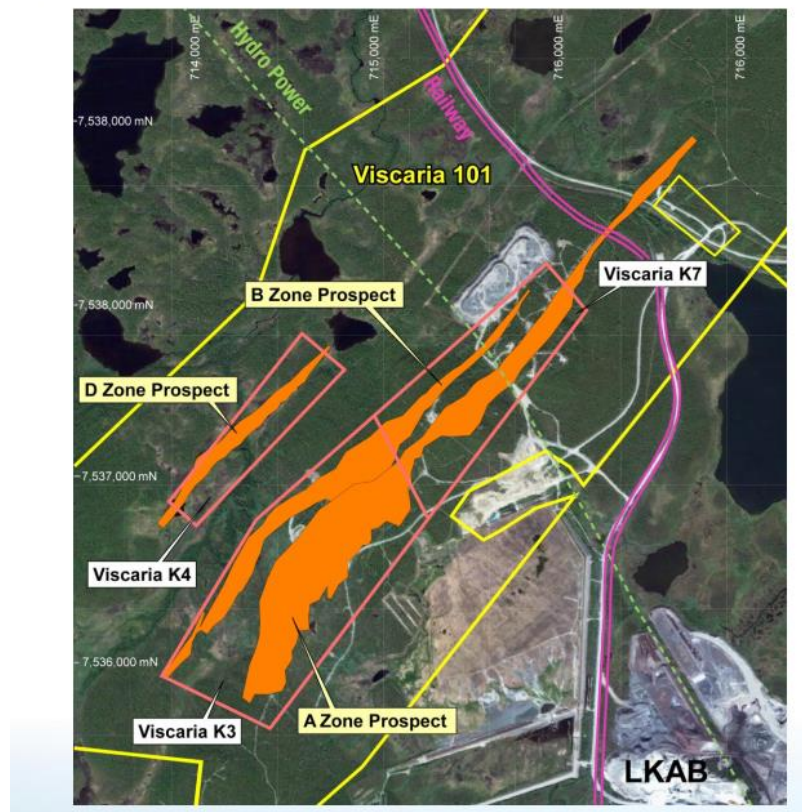
Avalon's scoping study showed positive returns at US\$2.75/lb Cu, although a longer mine life and better ore grades are needed to comfortably cover capital repayment and equity return hurdles. The study did not include D Zone's depth potential outside the resource. Hartleys' modelling suggests a mining inventory discovery for D-Zone, of 8Mt at 2.2% Cu, between 400 and 800m vertical depth, with an average lode width of 5-7 metres, would make Viscaria viable at +US\$2.80/lb Cu. Average unit (C3) costs under this assumption are estimated at \$US2.10/lb, which is mid-supply cost curve for global copper.

Viscaria's parallel lodes have been traced over a minimum 6km strike length. Numerous targets within Avalon's project area are defined by elevated copper in near surface sampling and/or a geophysical signature.

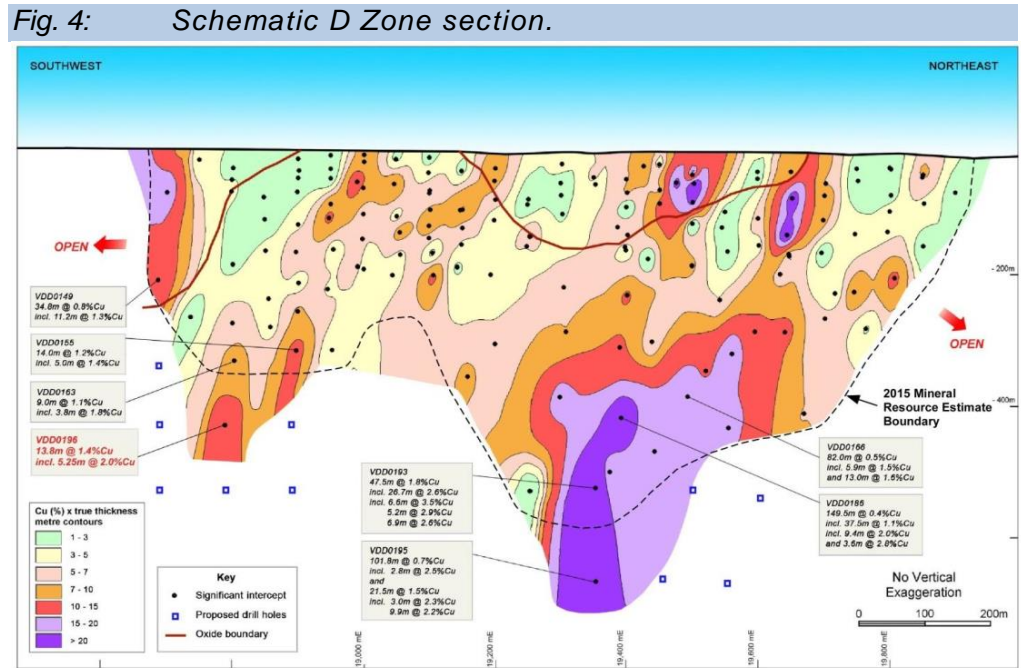
Swedish exploitation concessions are subject to approval by the land and environment court. As an old mine on the edge of a mining town, Viscaria is well placed to get approval for its tailings and water management plans. Avalon plans to have approvals in hand in order to make a decision to mine by 2019. In the meantime Avalon hopes to drill out an 8-10 year mine plan at Viscaria, perhaps with cash flow or asset sale assistance from its Finnish gold and lithium prospects.

Fig. 3: Plan showing surface projection of A, B and D Zones at Viscaria. LKAB's Kiruna operations are bottom right.

Figure 1: Location of D Zone at the Viscaria Copper Project



Avalon's drilling has shown wider D Zone intercepts at depth.



Source AVI

SOUTHERN FINLAND

In May 2016 Avalon agreed to earn up to 80% of several mineral projects in Finland by funding exploration of EUR1.5M over 3 years from Canadian company Nortec Minerals. An original objective was lithium bearing pegmatites in the southern project area. Subsequently, 7 holes drilled at the Satulinmaki gold prospect extended an earlier (2001-2005) gold discovery made by the Geol. Survey of Finland. Avalon's core hole intercepts included 147m at 0.8g/t Au (incl. 24m at 3.3g/t). A complex system of narrow veins has been drilled over 300m of strike, within a broad, +1,000m long zone of alteration.

AVI plans to complete an IP survey at Satulinmaki in January 2017, to be followed up with a program of short holes.

The Scandinavian drilling season is winter when access improves and ground disturbance is minimised. A deeper drilling program at Satulinmaki is scheduled for March-April, when cheaper, off season drilling rates are available as the rigs come south at season's end. The scale of the program, and its continuation in Sweden at Viscaria, depends on AVI's finance arrangements. AVI raised A\$2.5M in December 2016, with which 2,000 metres of drilling at Satulinmaki has been budgeted.

Satulinmaki is 70 km from the underutilised Vammala processing plant operated by Dragon Mining Limited.

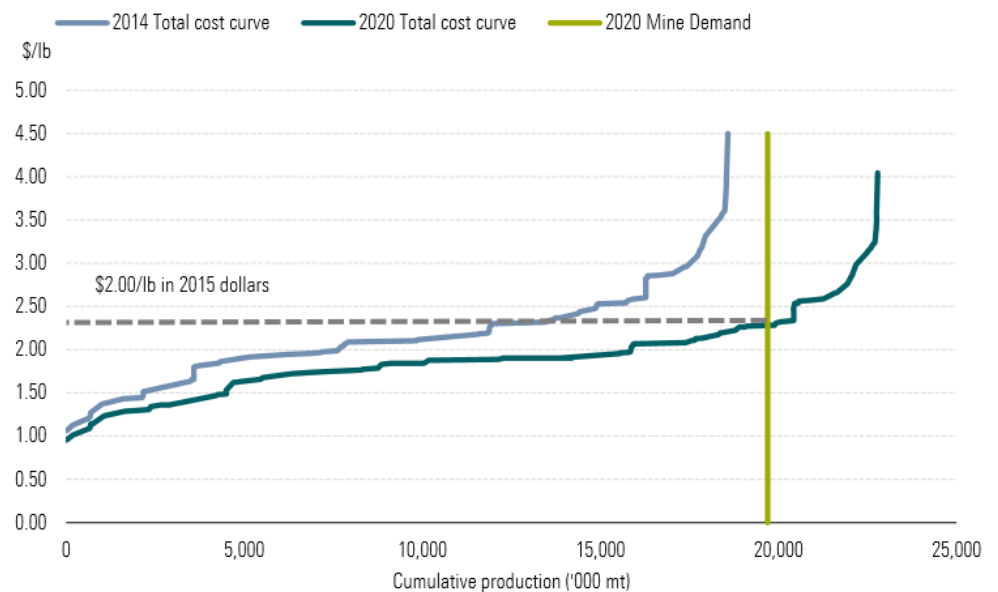
AVI drilled 6 holes in the September 2016 quarter directed at lithium bearing pegmatites within the Nortec JV. A 15-20m wide, 1-2% Li₂O dyke was intersected within an interpreted dyke swarm. The pegmatite dykes look small to Hartleys on given information and no value is attributed to them, but activity in this sector raises the possibility that some value will be realised.

INDUSTRY EXPOSURE

The value of AVI's main asset is sensitive to the copper price. Copper has deep primary and secondary markets with clear price visibility. Copper demand is sensitive to global economic activity, particularly through automotive, construction, power, telecom and whitegoods sectors. China accounts for about half of global copper demand. Copper supply is geographically diverse and concentrated in the hands of major miners.

Fig. 5: Copper cost curves 2014.

Exhibit 1 Morningstar Copper Price Forecast (2020F)
Nominal cost curves for 2014 and 2020F



Source: Morningstar

Source Morningstar

GEOGRAPHIC EXPOSURE

AVI's principal asset is in Sweden.

In 1992 the Swedish government introduced a raft of reforms designed to encourage private sector mineral exploration. State funding of mineral exploration ceased, the state's right to a free 50% share of newly discovered ore deposits was relinquished, the corporate income tax rate was reduced to 28%, and the mining industry was exempted from further state taxes or royalties (landowner royalties may still apply). Foreign companies were invited to obtain either exploration permits or exploitation concessions on an equal basis with local firms, stipulating only the establishment of a local office.

Mines at Storliden and Svartliden have since been developed by foreign firms. Many major mineral companies have tenement holdings and active exploration programs in Sweden.

PEERS AND COMPETITORS

Fig. 6: Australian listed copper exploration companies, 2017.

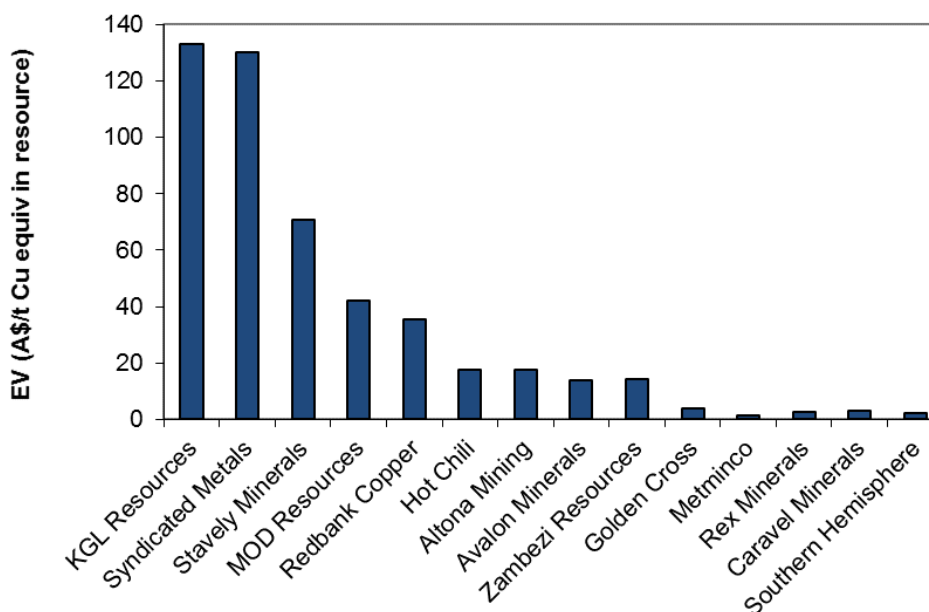
		Mkt cap	Price	Net cash	Project	t'put	capex	Resource		cont Cu	cont Au	Cu equiv.	Ann prod	Ann Au	EV	EV/tCu	EV/t Cu eq
		\$M	Last	\$AM	\$AM	ktpa	\$USM	Mt	%Cu	kt	kozs	kt	kt Cu	ozs	\$AM	\$A	\$A
KGL Resources	KGL	45	25.50	1.5	Jervois	2200	134	31	1.07	326		326	21		43	133	133
Syndicated Metals	SMD	13	2.30	2.2	Barbara	400	23	5	1.59	76	23	80	9	1200	10	139	130
Stavely Minerals	SVY	20	17.50	3.5	Ararat/Stavely			29	0.47	138	471	239			17	123	71
MOD Resources	MOD	16	4.00	5.5	T3	2000	135	20	1.24	246		246	20		10	42	42
Redbank Copper	RCP	4	0.10	0.2	Redbank			6	1.50	93		93			3	36	36
Hot Chili	HCH	17	3.10	-5.7	Productora			237	0.48	1138	762	1302			23	20	18
Altona Mining	AOH	70	13.00	39.4	Cloncurry	7000	232	287	0.58	1650	369	1730	39	17200	30	18	18
Avalon Minerals	AVI	11	1.70	2.6	Viscaria	2000	130	52	1.16	608		608	25		8	14	14
Zambezi Resources	ZRL	5	3.70	0.3	Kangaluwi			46	0.67	308		308			4	14	14
Golden Cross	GCR	2	1.90	0.1	Copper Hill	3000	116	56	0.55	309	904	504	21	28000	2	6	4
Metminco	MNC	9	8.30	4.5	Los Calatos			352	0.76	2675		2675			4	2	2
Rex Minerals	RXM	11	5.50	4.9	Hillside	6000	341	337	0.60	2022	1517	2349	35	24000	6	3	3
Caravel Minerals	CVV	5	7.00	1.5	Calingiri	15000	321	251	0.34	853	807	1027	38		3	4	3
Southern Hemisphere	SUH	2	3.00	0.5	Llahuin			169	0.28	473	652	614			1	3	2

Source ASX, IRESS, Hartleys

- Only fully paid ordinary shares are used in market cap and enterprise value figures.
- Copper equivalence accounts for by product gold only
- AUDUSD: 0.73
- Net cash as at Sep 30 2016, before subsequent capital raisings.

Fig. 7: Australian listed copper exploration companies, 2017.

Copper developers by EV/t Cu equiv in total resource.



Source ASX, IRESS, Hartleys

KEY SUPPLIERS & CUSTOMERS

Avalon uses local drilling contractors, assay labs and consultants. Target concentrate customers are European copper smelters.

MANAGEMENT, DIRECTORS AND MAJOR SHAREHOLDERS

Fig. 8: AVI Management exposure, 2017.

Economic exposure of Board and key management		Opts	Perf. rights	shares	Exposure	Rank
	Position	M	M	M	M	
G Ascough	Non exec Chair			6.1	6.1	4
M Norris	CEO, MD	4.0	4.1	6.9	15.0	1
C Henderson	NED			2.9	2.9	6
D Hyma	NED			0.7	0.7	7
R Robinson	GM Studies	2.0	3.8	1.2	7.0	2
G Leicht	CFO, Coy Sec.	2.0	3.6	1.3	6.9	3
N Rohrlach	GM Geology	1.6	3.6	0.0	5.2	5

Source AVI 2016 Ann. report

Graham Ascough appointed Chairman November 2013

Geophysicist. Mr Ascough was the Managing Director of Mithril Resources Ltd from October 2006 until June 2012. Prior to joining Mithril in 2006, he was the Australian Manager of Nickel and PGM Exploration at the major Canadian resources house, Falconbridge Limited. He is currently non-executive Chairman of Phoenix Copper Limited, Mithril Resources Limited and Musgrave Minerals Limited. Councillor of the South Australian Chamber of Mines and Energy and Chair of its Exploration Committee from 2006 ~ 2012 and has strong ties to the SA Resources industry.

Malcolm Norris CEO and Managing Director.

MSc in Geology and a Masters in Applied Finance. More than 30 years of industry experience and in the last 15 years has focused primarily on corporate roles. Previous experience has included 23 years with WMC Resources, followed by roles with Intrepid Mines and SolGold.

Crispin Henderson Non-Executive Director

London based consultant to the financial services sector. More than 45 years of experience in the financial services and fund management sectors, principally with PricewaterhouseCoopers and Threadneedle Investments. Formerly Vice Chairman of Ameriprise Financial's Global Asset Management business and Chief Executive of Threadneedle.

Don Hyma Non-Executive Director

BSc in Mining Engineering and an MSc in Mineral Processing. 25 years' experience in the resource sector, principally in copper, nickel and iron ore in Canada, Chile, New Caledonia and Australia. Currently Chief Technical Officer with Mitsui & Co and previously Vice-President Projects for the Iron Ore Company of Canada and General Manager Mine and Infrastructure Projects for Rio Tinto Iron Ore.

MAJOR SHAREHOLDERS

Top Shareholders	m shares	%
Valbonne II	82	10
Marilei International Limited	54	7
Potezna Gromadka Ltd	47	6
Mohd Faiq Abu Sahid	42	5

Source IRESS

OPTIONS AND PERFORMANCE RIGHTS

Unpaid Capital					
Expiry year	No. (M)	\$M	Avg ex.	% ord	% ord
31-Aug-19	147	4.4	0.03	22.7%	0.7%
Various	26	1.8	0.07	4.0%	0.3%
Total	173	4.4	0.04	26.7%	1.0%

Source IRESS

VALUATION CONSIDERATIONS AND METHODOLOGY

Viscaria has value as a large, marginal, undeveloped copper resource with exploration upside, near developed infrastructure.

Viscaria is modelled here with open pit inventories as indicated in AVI’s scoping studies (8Mt at 0.9% Cu, with a waste:ore ratio of 6:1). An underground inventory of 8Mt at 2.2% is included for D Zone, from 400 to 800 metres vertical depth, with an average mining width of 6m. Operating and capital cost assumptions are in line with Viscaria’s scoping study, and in general with rates achieved at other developed mining centres.

At current spot price (US\$2.50/lb), returns from Viscaria, as modelled, are insufficient to attract development funding. Other things being equal a real future copper price of US\$2.80/lb produces an after tax NPV of A\$50M (6cps, 10% discount rate) and an IRR of 19%. For Viscaria, this is an estimated minimum hurdle for development.

Despite moderate returns at prevailing copper prices, Viscaria has value as a large, undeveloped inventory of near commercial copper, in an area well serviced by infrastructure. Current copper price settings are generally too low to encourage investment in new copper capacity. Avalon’s share price and market capitalisation (1.8 cps and \$12M undiluted) reflect that reality. A successful exploration campaign at Viscaria in 2017 is likely to put Viscaria near the front of the queue for the next round of copper capacity development. Avalon is investable as a long dated call option on the copper price. Exploration results in 2017 will be important in raising Viscaria’s copper inventory and bringing down total forecast unit costs.

Fig. 9: LME copper price 2007-2017.



Source IRESS

Fig. 10: Assumptions and Risks for valuation

Assumption	Risk of not realising assumption	Downside risk to valuation if assumption is incorrect	Comment
The D Zone resource will be extended.	Moderate	High	D Zone is the best base load deposit candidate at Viscaria. Failure to extend D Zone would render Viscaria sub-economic for some time.
The copper price will increase in the next two years	High	High	Hartleys assumes copper demand remains strong through this period, which depends largely on continued economic growth in China.
AVI can obtain capital at reasonable prices	Moderate	High	Avalon is heavily dependent on new equity for future project funding. Existing share value may be diluted by raisings completed at less than valuation.

*Conclusion**Avalon shares are a high risk, speculative investment.*

Source: Hartleys

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Hartleys Recommendation Categories

Buy	Share price appreciation anticipated.
Accumulate	Share price appreciation anticipated but the risk/reward is not as attractive as a "Buy". Alternatively, for the share price to rise it may be contingent on the outcome of an uncertain or distant event. Analyst will often indicate a price level at which it may become a "Buy".
Neutral	Take no action. Upside & downside risk/reward is evenly balanced.
Reduce / Take profits	It is anticipated to be unlikely that there will be gains over the investment time horizon but there is a possibility of some price weakness over that period.
Sell	Significant price depreciation anticipated.
No Rating	No recommendation.
Speculative Buy	Share price could be volatile. While it is anticipated that, on a risk/reward basis, an investment is attractive, there is at least one identifiable risk that has a meaningful possibility of occurring, which, if it did occur, could lead to significant share price reduction. Consequently, the investment is considered high risk.

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