

# ASX ANNOUNCEMENT

## Viscacia Copper Iron Project NPV now US\$373M Significantly Exceeding Expectations

### HIGHLIGHTS

- **Scoping Study results indicate that the potential NPV<sub>10% REAL</sub> (pre-tax) of an Open Pit Mining Scenario on the Viscacia Project is now US\$373 million dollars (using US\$3.00/lb copper price, US\$150/t iron ore pellet price), greatly exceeding the target project NPV of US\$300M announced following the Scoping Study of October 2012;**
- **Increased Project NPV is due to recently announced upgrade of the D Zone Mineral Resource (see ASX Announcement 26 June 2013), Discovery Zone Mineral Resource and revised mining cost assumptions;**
- **Pre-production CAPEX is estimated at US\$180M, with a total Life-of-Mine CAPEX of US\$231M;**
- **Internal Rate of Return (IRR) = 56.6% and the C1 Cash Cost, net of iron credits, for the Open Pit Mining Scenario is US\$0.49/lb copper;**
- **At US\$3.25/lb copper price, the Open Pit Mining Scenario has a NPV<sub>10% REAL</sub> (pre-tax) of US\$423M;**
- **At US\$2.75/lb copper price, the Open Pit Mining Scenario has a NPV<sub>10% REAL</sub> (pre-tax) of US\$323M;**
- **Scoping Study results indicate that the Open Pit Mining Scenario produces between 15,000 to 22,000t of copper and 625kt to 1.25Mt of magnetite concentrate per annum over a 10.3 year mine life;**
- **The portion of the D Zone Mineral Resource that could be mined by underground methods could potentially add US\$34M net cash margin.**

### ASX: AVI

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Australian resources company Avalon Minerals Limited ('Avalon' or 'Company') (ASX: AVI) is pleased to announce the results of a Scoping Study completed on the Viscaria Project by Xstract Mining Consultants. The Scoping Study assessed an open pit mining scenario using the upgraded Mineral Resources currently defined on the Viscaria Project with the addition of the Discovery Zone Copper-Iron Mineral Resource (see ASX Announcement 6 May 2013). The economic assessments used price assumptions of US\$3.00/lb copper and US\$150/t iron ore pellets.

The Company's Managing Director, Mr Jeremy Read, said "By recalculating the Open Pit Mining Scenario using the upgraded D Zone Mineral Resource announced two weeks ago, the Discovery Zone Mineral Resource, as well as some revised cost assumptions, the Project NPV has increased by US\$276 million dollars to US\$373 million dollars, demonstrating the value created by the drilling program recently completed at the D and A Zone prospects at Viscaria."

"The significantly increased Mineral Resources considered by the Scoping Study has allowed for the Optimum Mining Rate to be expanded to 3.5Mtpa, the mine life to be extended to 10.3 years and C1 Cash Cost to be reduced to \$US0.49/lb Copper."

"This result is the culmination of several significant company milestones achieved over the last year. The most significant being the highly successful D Zone Mineral Resource extension drill program, which has produced a robust copper-iron project, as evidenced by the fact that the project NPV is still in excess of our target \$300M NPV, when the long term copper price of US\$2.75/lb is used to economically model the project" Mr Read said.

"The Viscaria Project is one of a select few copper projects which are economically robust across the copper price cycle, but which only requires moderate amounts of capital expenditure to put into production" Mr Read commented.

## Open Pit Mining Scenario

The Scoping Study Open Pit Mining Scenario assessed the viability and potential value of the currently defined Mineral Resources on the Viscaria Copper Project with the addition of the Discovery Zone Mineral Resource. The Viscaria Copper Project is based upon the updated Mineral Resources announced to the ASX on 26 June 2013 (see Table 1). The Discovery Zone Prospect has a current JORC Inferred Mineral Resource of 10.9Mt @ 0.31% Cu, 38.7% Fe and 0.08g/t Au, reported above a 20% Fe cut-off. These Mineral Resources were subjected to open pit optimisations using the parameters and revenue assumptions outlined in Table 2. Using these parameters, a series of optimised open pit shells were generated along the near-surface trends of the A Zone, B Zone and D Zone Mineral Resources at Viscaria (Figure 1) and the Discovery Zone (Figure 2). Figure 3 and Table 3 show the production profile developed for the optimised open pit mining scenario.

Table 1: Currently Defined Mineral Resources on the Viscaria Project.

Resource Name	Classification	Tonnes (t)	Cu Grade (%)	Cu Metal (t)
A Zone*	Measured	14,439,000	1.66	240,000
	Indicated	4,690,000	1.22	57,000
	Inferred	2,480,000	1.03	26,000
	<b>Subtotal</b>	<b>21,609,000</b>	<b>1.49</b>	<b>323,000</b>
B Zone*	Measured	123,000	1.33	2,000
	Indicated	4,118,000	0.72	30,000
	Inferred	15,410,000	0.77	118,000
	<b>Subtotal</b>	<b>19,651,000</b>	<b>0.76</b>	<b>150,000</b>
D Zone Cu Resource	Indicated**	5,100,000	1.07	55,000
	Inferred**	8,500,000	0.96	81,000
	<b>Subtotal</b>	<b>13,600,000</b>	<b>1.00</b>	<b>136,000</b>
<b>Overall Cu</b>	<b>Total</b>	<b>54,860,000</b>	<b>1.11</b>	<b>609,000</b>

Resource Name	Classification	Tonnes (Mt)	Fe Grade (%)	Mass Recovery (%)	Contained Iron (Mt)	Estimated recoverable iron (Mt)
D Zone Fe Resource	Indicated***	11.7	27.5	33.4	3.2	2.7
	Inferred***	13.9	25.7	31.0	3.6	3.0
<b>Overall Fe</b>	<b>Total</b>	<b>25.6</b>	<b>26.4</b>	<b>32.1</b>	<b>6.8</b>	<b>5.7</b>

\* 2011 Mineral Resources for A Zone and B Zone are reported above a cut-off grade of 0.4% Cu.

\*\* 2013 Copper Mineral Resource for D Zone above a cut-off grade of 0.4% Cu.

\*\*\* 2013 Iron Mineral Resource for D Zone above a cut-off grade of 15% Mass Recovery.

Note that the total D Zone Indicated and Inferred Mineral Resource reported for the Copper and Iron above 15% Mass Recovery (Table 1) are not mutually exclusive; the Mineral Resource for Iron above 15% Mass Recovery excludes 4.4 million tonnes at 0.89% Cu above a cut-off grade of 0.4% Cu.

Contained iron is tonnes x Fe%, which may include iron content in silicates that could not be recovered. Estimated recoverable iron is based on Davis Tube Recovery test work at a 75 micron grind size. Estimated contained iron is tonnes x mass recovery % x Fe % in concentrate (69% Fe).

Table 2: Pit Optimisation Parameters and Revenue Assumptions

Parameter	Unit	Value	Comments
Overall pit slope angle	Degrees	60	
Copper Price	US\$/t	US\$6,614	US\$3.00/lb Cu
Fe Price	US\$/t	US\$150	Iron ore pellet price
Mining Cost (ore)	US\$/t	US\$4.00	
Mining Cost (waste)	US\$/t	US\$3.00	
Mining Recovery	%	95%	
Mining Dilution	%	5%	
Metallurgical Recovery	% Cu	85%	
	% Fe	76%	
Concentrate Grade	% Cu	25%	
	% Fe	69%	
Processing Costs	US\$/t ore	US\$9.39	
Admin Costs	US\$/t ore	US\$3.08	
Payable Copper	% Cu contained	98%	
Payable Magnetite	% Fe contained	98%	
Copper Conc. Treatment charge	c/lb Cu	90	
Copper Conc. Refining charge	c/lb Cu	9	
Magnetite Conc. Treatment charge	US\$/dmt	28	



Figure 1: Site overview showing pit optimisation shells at Viscaria

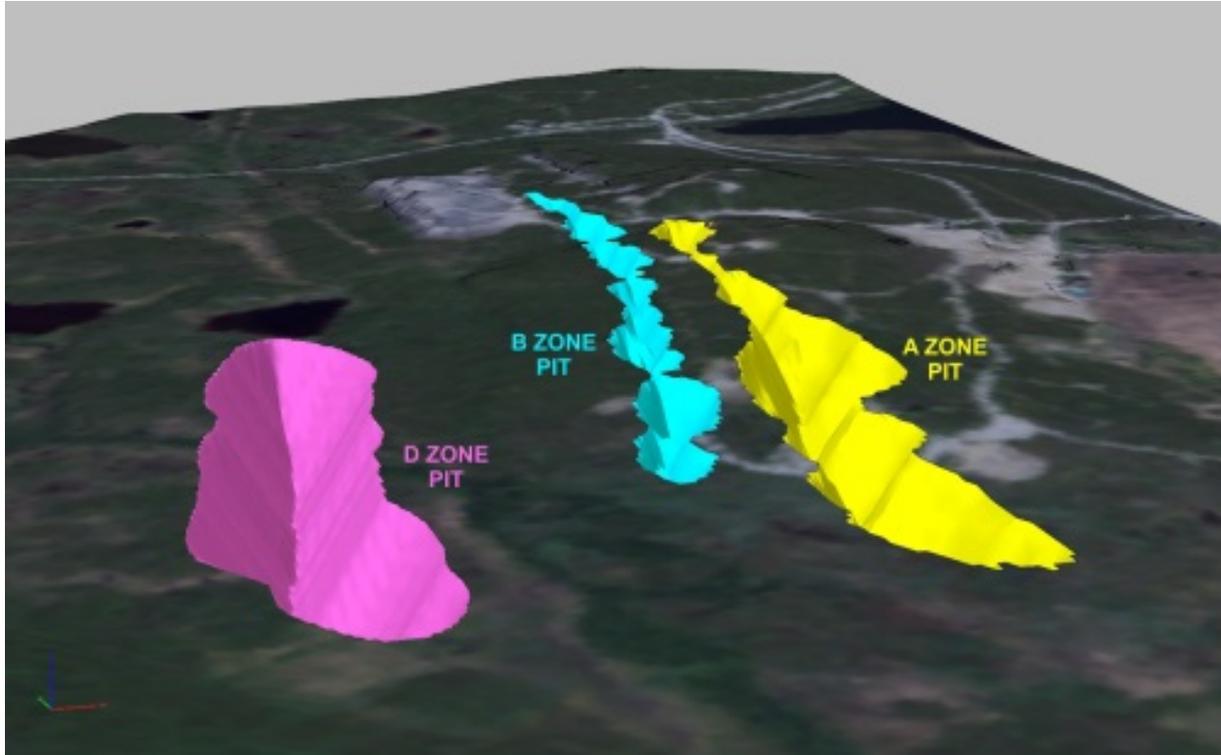


Figure 2: Site overview showing pit optimisation shell at the Discovery Zone

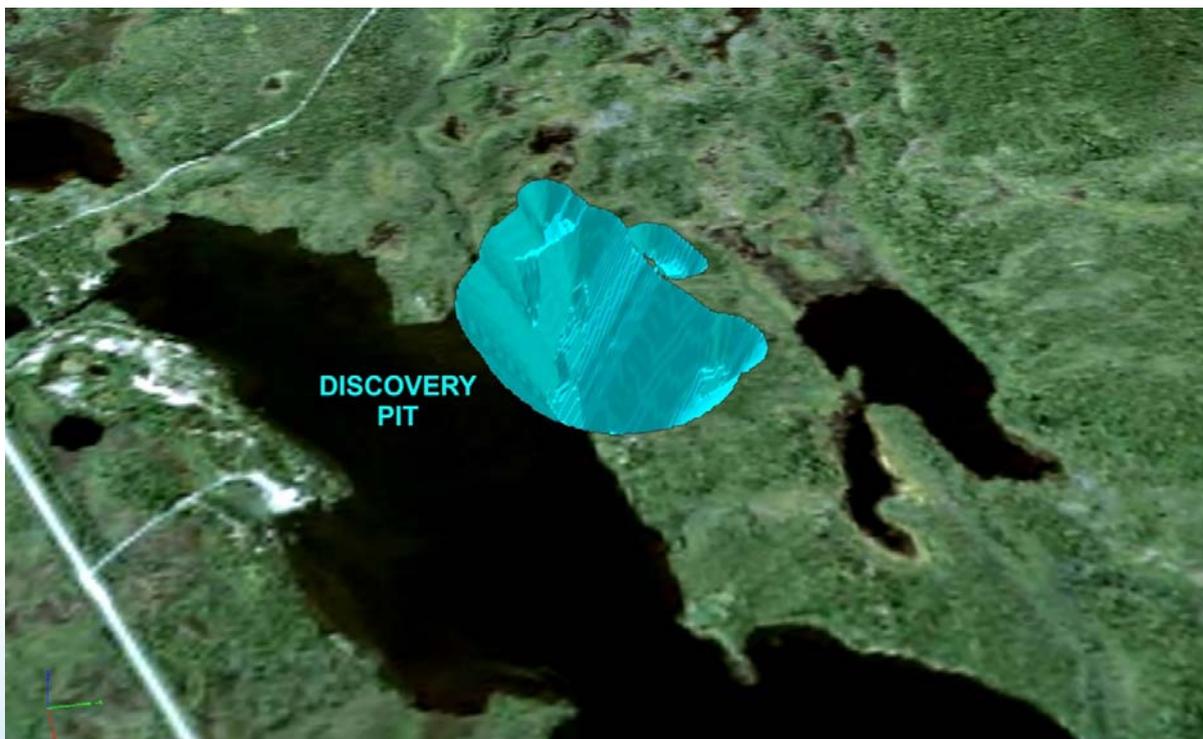


Figure 3: Open Pit Mining Scenario Production Profile

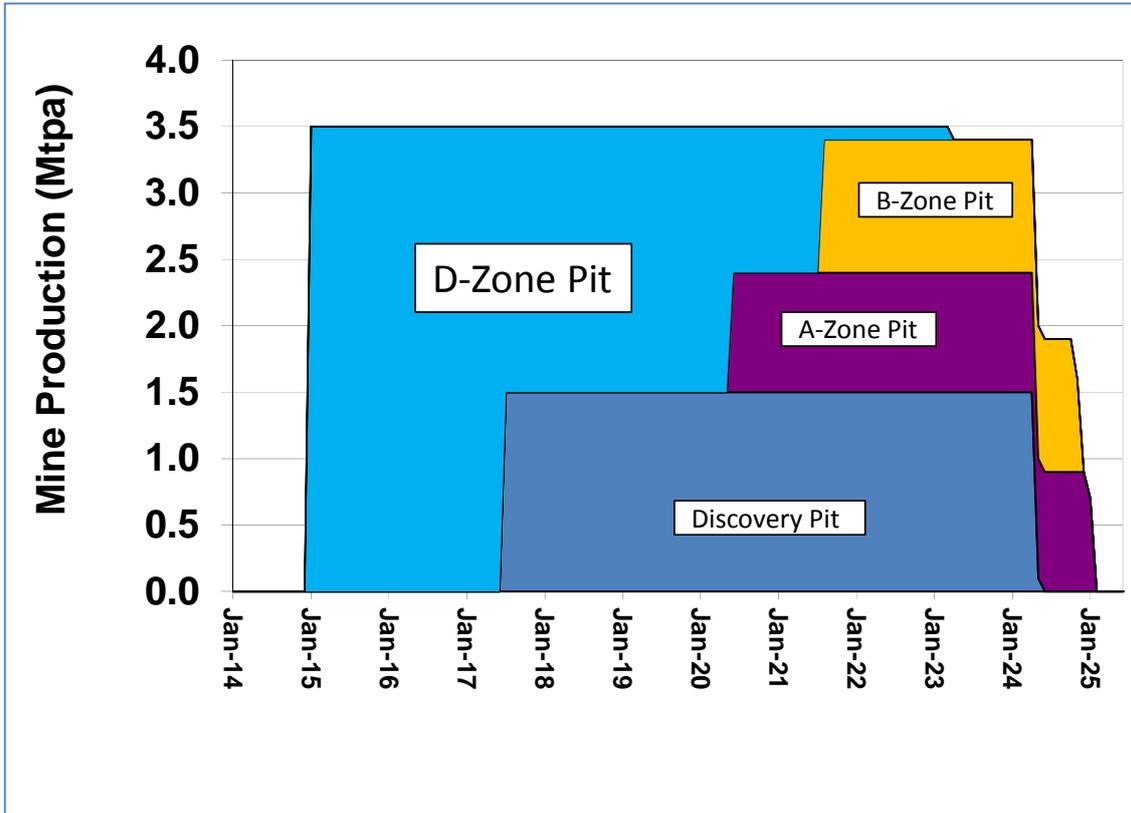


Table 3: Open Pit Mining Scenario Production Summary

Year	Tonnes Mined (kt)	% Cu	% Fe	Copper Conc Produced (kDMT)	Contained Copper (kt)	Magnetite Conc Produced (kDMT)	Contained Iron (kt)
FY2014							
FY2015	1750	0.50	23.5	29.5	7.4	488	339
FY2016	3500	0.50	23.5	59.0	14.7	976	678
FY2017	3500	0.50	23.5	59.0	14.7	976	678
FY2018	3500	0.52	29.0	62.3	15.6	1246	866
FY2019	3500	0.52	29.0	62.3	15.6	1246	866
FY2020	3500	0.54	28.5	64.1	16.0	1221	849
FY2021	3500	0.70	23.0	83.5	20.9	950	660
FY2022	3500	0.74	17.0	87.6	21.9	661	459
FY2023	3465	0.74	16.4	87.4	21.8	625	434
FY2024	2833	0.78	12.5	75.6	18.9	385	267
FY2025	1104	0.89		33.4	8.4		
	<b>33,652</b>	<b>0.61</b>	<b>22.0</b>	<b>704</b>	<b>176</b>	<b>8,772</b>	<b>6,097</b>

A summary of the economic assessment of the Open Pit Mining Scenario is given in Table 4.

Table 4: Summary of the Economic Assessment of the Open Pit Mining Scenario

Open Pit Mining Scenario	Viscaria Project Mineral Resources + Discovery Zone Mineral Resource	
Tonnage and grade	33.7 Mt @ 0.61% Cu and 22% Fe	
Optimum Mining Rate	3.5 Mtpa	
Mine Life	10.3 years	
Pre-Production Capex	US\$180 M	Includes US\$20.6M pre-strip
Life-of-Mine Capex	US\$231 M	Excludes closure costs
<b>NPV<sub>10% REAL</sub> (pre-tax)</b>	<b>US\$373 M</b>	US\$3.00/lb Cu US\$150/t iron ore pellets

### Price Sensitivity

In order to understand the sensitivity of the Project NPV to changes in the prices of copper and iron, an economic analysis was completed using varied price scenarios, as outlined in Table 5.

Table 5: Price Sensitivity (NPV<sub>10% real</sub>)

Project NPV <sub>10% real</sub> (Pre-Tax)		Fe Price (for 69% Fe iron ore pellets)		
		US\$130/t	US\$150/t	US\$170/t
Cu Price	US\$3.50/lb Cu	\$371	\$474	\$578
	US\$3.25/lb Cu	\$321	\$423	\$527
	US\$3.00/lb Cu	\$270	<b>\$373</b>	\$477
	US\$2.75/lb Cu	\$219	\$323	\$426

### Cost and Revenue Assumptions

The capital costs used in the Open Pit Mining Scenario have been summarised in Table 6, with the operating costs assumptions in Table 7. The C1 copper cash operating costs, net of iron credits, for the Open Pit Mining Scenario is predicted to be \$0.49/lb Cu, which is in the lower quartile of copper producers. The breakdown of the project value minus the various capital and operating cost assumptions is shown in Figure 4.

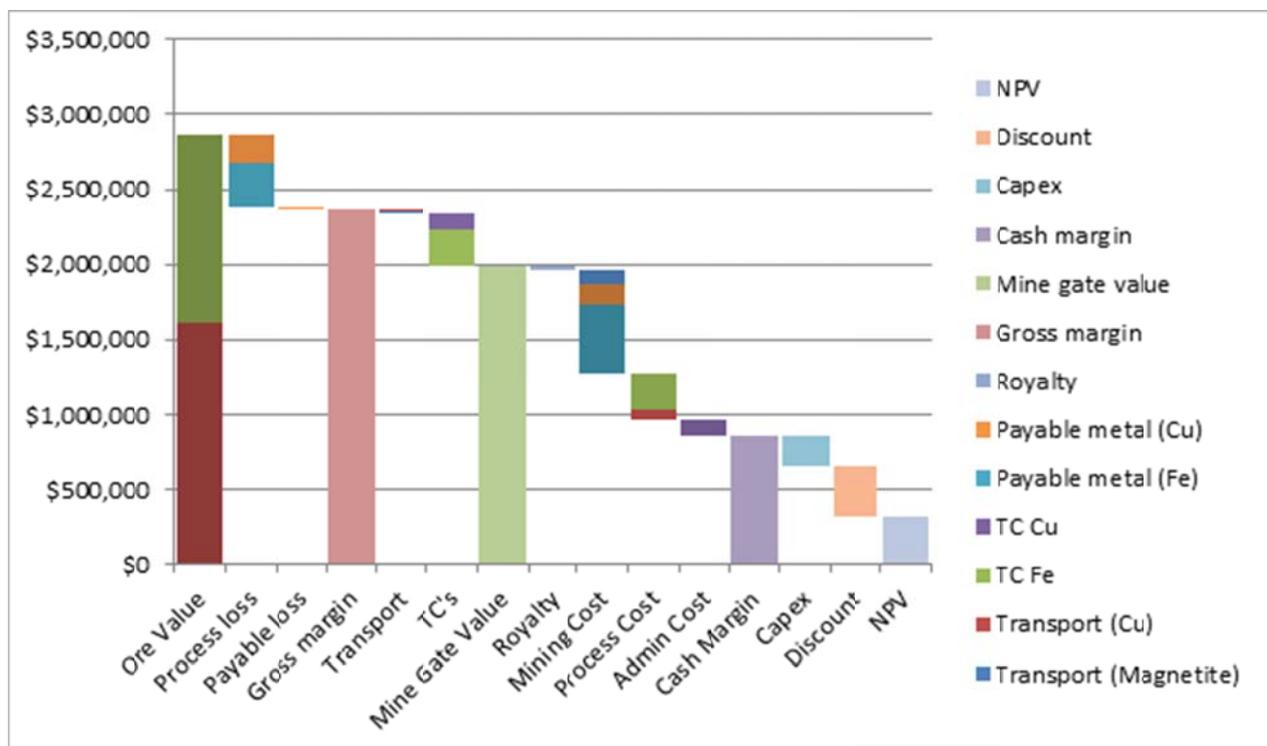
Table 6: Capital Cost assumptions

Item	Open Pit Mining Scenario (US\$M)	Comments
Process Plant	151.7	Scalable on production capacity
Pit D site establishment	2.5	Includes provision of site services and access roads
Pre-Strip	20.6	
Tailings Storage Facility	5.0	
<b>Pre-Production Total</b>	<b>180</b>	
Pit A site establishment	1.7	Includes provision of site services and access roads
Pit B site establishment	1.5	Includes provision of site services and access roads
Discovery Zone site establishment	15.0	Includes provision of site services, access roads, surface water berm
Replacement Capital	33.0	
Closure Costs	-	Not Included
<b>Life of Mine Total</b>	<b>231</b>	

Table 7: Operating Cost assumptions

Parameter	Unit	Value	Comments
Mining Cost (ore)	US\$/t	\$4.00	
Mining Cost (waste)	US\$/t	\$3.00	
Processing Costs	US\$/t ore	\$9.39	Variable – assumes 40% fixed costs and 9.39/t @ 3.5Mtpa
Admin Costs	US\$/t ore	\$3.08	
Copper Conc. Transport	US\$/DMT conc	15.75	Assumes local smelter
Magnetite Conc. Transport	US\$/DMT conc	1.50	Assumes slurry pipe to LKAB

Figure 4: Project Value Breakdown (at US\$3/lb Cu, US\$150/t iron ore pellets)



### Comparison with previous Open Pit Mining Scenario result

The economic summary of the previous Open Pit Mining Scenario as announced in March 2013 is displayed in Table 8 and was only based on open pit mining the D Zone and A Zone Mineral Resources. In contrast, the current Open Pit Mining Scenario economic summary has a significantly increased resource base due to the inclusion of the upgraded D Zone Mineral Resource (announced 26 June 2013), the addition of the B Zone Mineral Resource and the addition of the Discovery Zone Mineral Resource (announced 6 May 2013). This has allowed for the Optimum Mining Rate to be expanded to 3.5Mtpa, the mine life to be extended to 10.3 years and the NPV to be increased by US\$276 million dollars to US\$373 million dollars.

Table 8: Summary of the economic assessment of the March 2013 open pit mining scenario

March 2013 Open Pit Mining Scenario	D Zone Open Pit and A Zone Open Pit-A	
Tonnage and grade	13.3.0 Mt @ 0.54% Cu 22.2% Fe	
Optimum Mining Rate	2.1 Mtpa	
Mine Life	7 years	
Pre-Production Capex	US\$138.7 M	Includes US\$17.9M pre-strip
Life-of-Mine Capex	US\$152.2 M	Excludes closure costs
NPV <sub>10% REAL</sub>	US\$97 M	US\$3.25/lb Cu US\$150/t iron ore pellets

### Review of Costs and Revenue Assumptions

As a part of the Scoping Study the costs and revenue assumptions used in previous economic assessments were also reviewed. One of the most significant findings of this review was that the open pit mining costs used previously were too high in comparison to several operating mines in Scandinavia. The review recommended that the open pit mining costs should be lowered to US\$4.00/t for ore and US\$3.00/t for waste, in comparison to US\$4.55/t for ore and waste that was previously used.

Other costs and revenue assumptions from previous economic assessments that were adjusted are shown in Table 9. These include: lowering the copper price to US\$3.00/lb Cu from US\$3.25/lb Cu to represent a wider view of copper price forecasts; decreasing the overall Metallurgical Recovery of the copper to 85% from 90% due to presence of copper oxides in some areas; and increasing the copper treatment (TC) and refining (RC) charges to reflect increases in these costs since the 2010 Pre-Feasibility Study.

Table 9: Summary cost and revenue assumptions adjusted in the July 2013 open pit mining scenario, in comparison to previous open pit mining scenarios.

Parameter	Unit	March 2013 Scoping Study	July 2013 Scoping Study	Comments
Copper Price	USD/t	\$7,165	\$6,614	Decreased to US\$3.00/lb Cu due to lower copper price forecasts
Open Pit Mining Cost (ore)	USD/t	\$4.55	\$4.00	Decreased due to review of Scandinavia mining costs
Open Pit Mining Cost (waste)	USD/t	\$4.55	\$3.00	Decreased due to review of Scandinavia mining costs
Metallurgical Recovery	% Cu	90%	85%	Reduced due to uncertainty around processing some areas of oxide copper
Copper Conc. Treatment Charge	USD/dmt	\$45	\$90	Increased to reflect 2013 TC prices
Copper Conc. Refining Charge	c/lb Cu	4.5	9	Increased to reflect 2013 RC prices
Royalty Viscaria	%	0.75	1.00	Increased due to Discovery Zone royalty

## Potential Value Opportunities and Risks

### Mine design

All of the scenarios have included some Inferred Mineral Resource estimates. Ongoing exploration drilling and subsequent re-estimation may result in changes to the economically minable portions of the resource. This may result in an increase or decrease in the tonnage and/or grade estimates.

When undertaking final designs from an optimised pit shell, practical mining considerations may require additional waste to be mined and/or ore to be left behind. In the absence of any geotechnical study into pit wall stability, reasonably conservative pit angles have been assumed (60 degrees). Any change in pit wall angles is likely to materially impact on the strip ratio and pit economics.

The D-Zone pit has been optimised as a standalone pit, on the assumption that there will be no underground mining. A preliminary assessment has shown that part of the remaining resource below the pit may be economic to mine by underground methods. If ongoing work substantiates this, then a combined open pit and underground optimisation is recommended. This is likely to result in a smaller pit with additional material mined from underground.

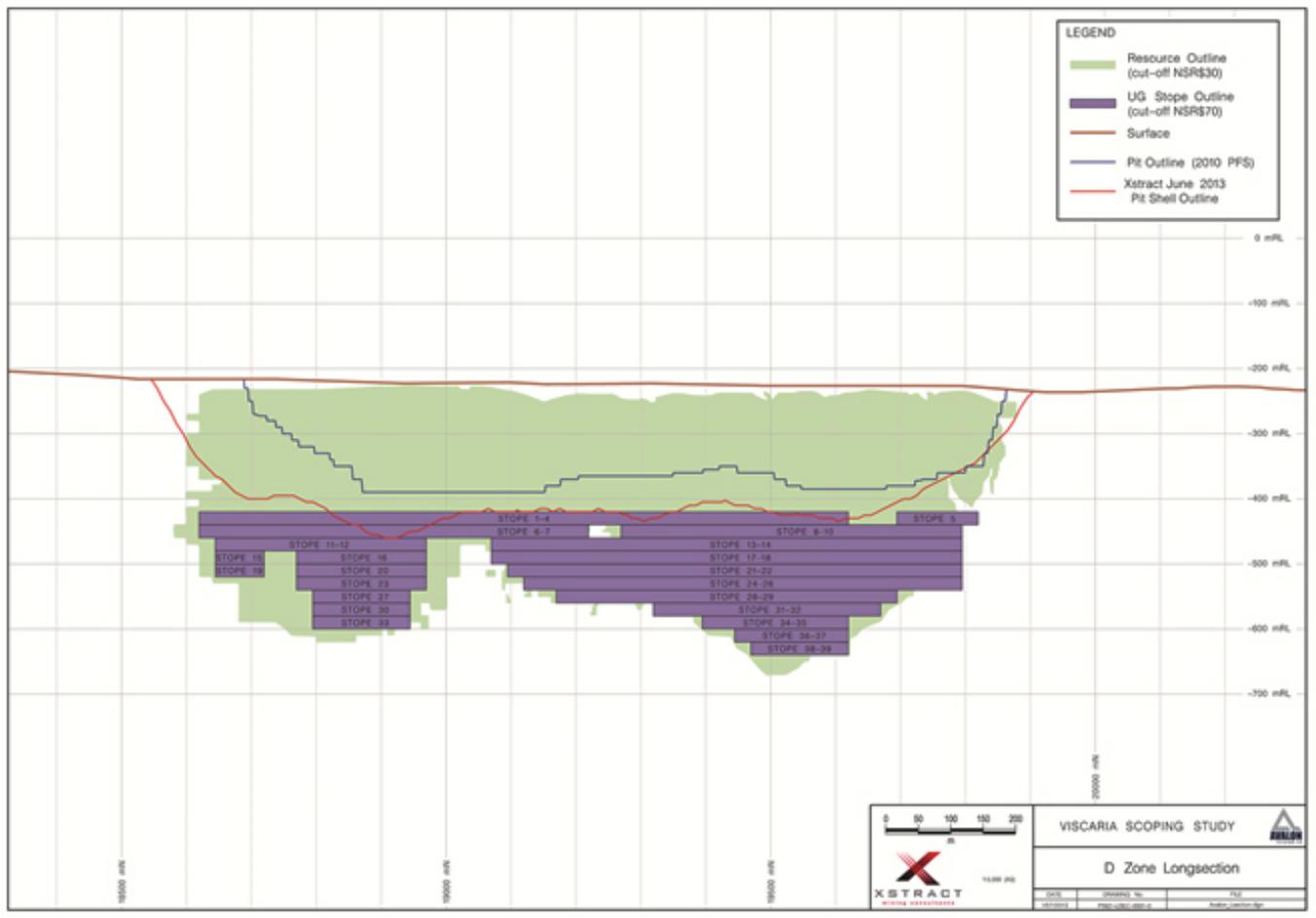
**D Zone Underground Mining Potential**

A preliminary assessment was completed on the portion of the D Zone Mineral Resource under the open pit shell that could be extracted by underground mining methods. Wireframes were constructed around high grade areas based on a cut-off value of US\$70 Net Smelter Return (NSR) to simulate underground stopes with a minimum mining width of 4.0m (Figure 5). These stopes contained a total of 4.7 million tonnes @ 0.92% Cu and 25% Fe.

Additional CAPEX for the underground development has been estimated at US\$30M and includes the ramp development (two declines 560m in length), access cross cuts, mine establishment, pumping, ventilation and egress. The average NSR is US\$81/ tonnes of ore at a copper price of US\$3.25/lb and an iron price of US\$150/tonne. The operating costs have been estimated using US\$65/tonne of mined material and \$4500/m for underground development for a total OPEX of US\$64M. Accounting for both the CAPEX and OPEX, this gives a net cash margin of US\$34M.

The value of the underground mining potential at D Zone has not been included in the NPV calculation as it does not materially impact the NPV calculation. This is due to the fact that underground mining cannot begin until the D Zone open pit has finished and will require some higher value ore (from lower cost open pits) to be displaced in order to maintain mill throughput. However, it is very likely that the D Zone underground would be mined near the end of the mine life and therefore remains an upside of US\$34M to the project.

Figure 5: D Zone Long Section Underground Mining Wireframes



### *Scheduling and stockpiling*

At this level of concept mining study, the production scheduling undertaken has been set at a fixed rate and average grades with no allowance for production ramp-up or build-up of stockpiles ahead of the process plant. Open pit waste material is scheduled at a constant rate six months in advance of ore production. In reality, there would be a ramp-up period as the process plant is commissioned, operators trained, recoveries and throughput optimised. A three-month ramp-up period would be typical for an operation of this scale.

An operating mine would normally optimise the mining schedule by targeting higher grade ore early in the mine life in order to increase revenue in the early years, with the stockpiling of lower grade ore as required. Optimising the ore mining sequence would be expected to add further value.

### *Processing*

In this Scoping Study it has been assumed that all ore types will be treated through the same process plant configuration with an average ore blend. All material has been assumed to pass through the comminution and copper flotation stages of the plant before passing through the magnetic separation section to recover the magnetite as documented in the 2010 Pre-Feasibility Study.

There may be opportunity to add further value by optimising the plant by batch processing different ore types with the plant configured specifically for each ore type, rather than a blend. In addition to maximising payable metal recovery, there may be savings in plant operating and capital costs.

In our economic evaluation we have applied a fixed recovery for copper. In practice, the recovery will improve with head grade and applying a fixed recovery will tend to overstate recovery for low-grade ore and understate recovery for high-grade ore.

Also, the 2010 Pre-Feasibility Study assumed some revenue from small amounts of gold, silver and zinc. No revenue has been assumed for these metals in this Scoping Study.

### *Discovery Zone*

The Company has included in its calculation of the NPV the assets being acquired under the binding Heads of Agreement between Hannans Reward Ltd (Hannans) and Avalon (HOA). The fundamental terms of the HOA were announced by Avalon on 6 May 2013. The Company also refers to the announcement made by Hannans on 4 July 2013 in relation to the Statutory Demand issued by Hannans to Avalon and Avalon's announcement on 4 July 2013 outlining the Company's response to the Statutory Demand. Again, the Company disputes the validity of the Statutory Demand and intends to vigorously protect its rights under the HOA and apply to have the Statutory Demand set aside by the Court. The Company intends to proceed in accordance with the correct legal interpretation of the terms of the HOA.

### *Satellite deposits*

There may be opportunity to process ore from other deposits within trucking distance of the proposed plant. This may result from Avalon's ongoing exploration efforts in the area and/or negotiation with third parties to toll treat ore, or purchase/joint venture separately owned resource assets. Value adding options would be to extend the operating life of the project and/or increase the processing capacity to achieve cost savings due to economies of scale.

**For further information please visit [www.avalonminerals.com.au](http://www.avalonminerals.com.au) or contact:**

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**Competent Persons Statement**

The information in this report that relates to Mineral Resources and exploration targets is based upon information reviewed by Mr Jeremy Read BSc (Hons) who is a Member of the Australasian Institute of Mining and Metallurgy. Mr Read is a full time employee of Avalon Minerals Ltd and has sufficient experience which is relevant to the style of mineralisation and type of deposit under consideration and to the activity which he is undertaking to qualify as a Competent Person as defined in the 2004 Edition of the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves". Mr Read consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

The Mineral Resource estimate for the D Zone Prospect was compiled and prepared by Matthew Readford (MAusIMM) of Xstract Mining Consultants who is a Competent Person as defined by the Australasian Code for the reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code) 2004 Edition and who consents to the inclusion in this report of the matters based on the information in the form and context in which it appears.

The mineral resource estimate for the Discovery Zone is effective from 13 January 2012 and has been prepared by Mr Thomas Lindholm, MSc of GeoVista AB, Luleå, Sweden acting as an independent "Competent Person". Mr Lindholm is a Fellow of the Australasian Institute of Mining and Metallurgy (Member 230476). Mineral resources of the Rakkuri iron deposits have been prepared and categorised for reporting purposes by Mr Lindholm, following the guidelines of the JORC Code. Mr Lindholm is qualified to be a Competent Person as defined by the JORC Code on the basis of training and experience in the exploration, mining and estimation of mineral resources of gold, base metal and iron deposits.

The Scoping Study results were compiled and prepared by Tim Horsley (MAusIMM) of Xstract Mining Consultants who is a Competent Person as defined by the Australasian Code for the reporting of Exploration Results, Mineral Resources and Ore Reserves (JORC Code) 2004 Edition and who consents to the inclusion in this report of the matters based on the information in the form and context in which it appears.

The Scoping Study referred to in this announcement is based on low level technical and economic assessments and is insufficient to support Ore Reserves or to provide assurance of an economic development case at this stage or to provide certainty that the conclusions of the Scoping Study will be realised.

**Open Pit Mining Scenario** includes some material from Inferred Mineral Resources and therefore, exploration drilling and re-estimation may result in changes to the economically minable portion of the resources.