

This document provides profiles of NSW metallic mineral mines that are operational or non-operational, and projects that are in pre-production development. Each profile was compiled from publicly available information in the second half of calendar year 2019. Future updates to these profiles will be made on an annual basis using available public information.

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1 Operational metallic mineral mines

1.1 Broken Hill Operations

Perilya owns and operates the iconic Broken Hill zinc, lead and silver mine in NSW. The Broken Hill ore body is "world class", having produced more than 200 million tonnes of ore over the 120 years since mining commenced in 1885. This long history in mining has endowed Perilya with well developed infrastructure that has the capacity and flexibility to operate at higher volumes and with a range of ore sources. Development of the North Mine, the Potosi decline and Flying Doctor deposit (subject to feasibility) will provide additional ore streams to fill spare concentrator capacity.

Table 1.1-a Operation Overview

Attribute	Details
Location:	Broken Hill, NSW
Commodities produced:	Lead, zinc, silver
Ownership:	100%
Company name (ASX code):	Perilya Broken Hill Limited
Website:	www.perilya.com.au
Operations Commenced:	1885
Mining method:	Underground

Table 1.1-b Resources & Reserves

Category	Ore (Kt)	Contained commodity			
		Lead (t)*	Zinc (t)*	Silver (t)*	
Resource	Measured	7,100	639,000	702,900	845
	Indicated	8,000	552,000	688,000	728
	Inferred	6,600	336,600	600,600	370
Reserve	Proved	5,400	318,600	394,200	319
	Probable	6,400	243,200	326,400	262

* Calculated figures

Table 1.1-c Production

	Ore Treated Rate (ktpa)	Lead (t)	Zinc (t)	Silver (t)
Plant Capacity	2,800 **			
Actual (2013-2019)	public information not available			
Actual (CY2012)	1,693	54,100	76,900	49
Actual (CY2011)	1,749	51,500	70,100	44.8

** Southern Operations Plant. Data source: 2013 New South Wales minerals industry profile

1.2 Cadia Valley Operations

Cadia is made up of the Cadia East underground panel cave mine and the Ridgeway underground mine (currently in care and maintenance). Mineralisation recognised to date in the Cadia Province is porphyry related gold and copper. Orebodies are typically large tonnage, low-grade gold with strong copper by-product and minor base metal associations. Cadia East is the one in production. Ridgeway were put on care and maintenance in 2016. Cadia Hill open pit has been used for tailings storage. Work has continued on the Cadia Expansion Feasibility Study. Early works on the next Cadia East block cave PC2-3 (to the east of the current mining operations) continued.

Table 1.2-a Operation Overview

Attribute	Details
Location:	21km south-south-west of Orange
Commodities produced:	copper, gold
Ownership:	100%
Company name (ASX code):	Newcrest Mining Limited (ASX:NCM)
Website:	www.newcrest.com.au
Operations Commenced:	January 2013
Mining Method:	Underground

Table 1.2-b Resources & Reserves

Category	Ore (Mt)	Contained Commodity			
		Copper (t)	Gold (t)	Silver (t)	
Resource	Measured	33	42,900	10	
	Indicated	3,090	8,022,000	1,135	1,972
	Inferred	52	221,200	23	18
Reserve	Proved				
	Probable	1,480	4,424,000	701	1,092

Table 1.2-c Production

	Ore Treated Rate (Mtpa)	Copper (t)	Gold (t)	Silver (t)
Plant Capacity	32.00			
Actual (FY2019)	29.30	90,841	28.40	17.22
Actual (FY2018)	21.15	61,764	18.65	11.18
Actual (FY2017)	24.03	63,8050	19.28	11.90
Actual (FY2016)	22.02	64,130	20.80	
Actual (FY2015)	23.14	73,697	20.77	

1.3 Cowal Mine

The Cowal gold operation is a open pit gold operation located 37km north of West Wyalong, 350km west of Sydney. Cowal Mine commenced production in the first half of 2006. The Cowal operation is a sustainable and low-cost production gold operation. Cowal currently has a mine life through to 2032 and several significant opportunities are being assessed to increase production and further extend mine life.

Table 1.3-a Operation Overview

Attribute	Details
Location:	37 km north of West Wyalong, NSW
Commodities produced:	gold, silver
Ownership:	100%
Company name (ASX code):	Evolution Mining Ltd (ASX:EVN)
Website:	www.evolutionmining.com.au
Operations Commenced:	April 2006
Mining method:	Open cut

Table 1.3-b Resources & Reserves

	Category	Ore (Mt)	Contained Commodity	
			Gold (t)	Copper (t)
Resource	Measured	47	32	
	Indicated	295	181	551,218
	Inferred	22	51	7,536
Reserve	Proved	47	33	
	Probable	70	62	

Table 1.3-c Production

	Ore Treated Rate (Mtpa)	Gold (t)	Silver (t)
Plant Capacity	9.80		
Actual (FY2019)	7.94	7.82	7.79
Actual (FY2018)	7.80	8.02	9.16
Actual (FY2017)	7.17	8.18	8.81
Actual (FY2016)	6.66	7.40	
Actual (FY2015)	7.20	8.55	

1.4 CSA Mine

With a mining history spanning over 140 years, CSA Mine is Australia's highest grade copper mine, and at 1600 metres deep, it is also the second deepest underground copper mine in the country. Since 1965 the mine has extracted substantial quantities of zinc, lead, silver and copper, but today, CSA Mine focuses on mining copper, with a silver co-product. At expected mining rates, the minimum mine life would therefore be approximately 10 years of operation.

Table 1.4-a Operation Overview

Attribute	Details
Location:	11 km north of Cobar, Central Western NSW
Commodities produced:	copper, with a silver co-product
Ownership:	100%
Company name (ASX code):	Glencore Australia Holdings Pty Ltd
Website:	www.glencore.com.au
Operations Commenced:	1967
Mining method:	Underground

Table 1.4-b Resources & Reserves

	Category	Ore (Mt)	Contained commodity	
			Copper (t)*	Silver (t)*
Resource	Measured	3.6	204,840	79
	Indicated	2.8	145,040	64
	Inferred	5.1	269,790	102
Reserve	Proved	4.1	165,640	62
	Probable	2.6	88,660	36

* Calculated figures

Table 1.4-c Production

	Ore Treated Rate (ktpa)	Silver (t)	Copper (t)
Plant Capacity	1,200**		
Actual (CY2018)	1,004	15.40	48,047
Actual (CY2017)		17.54	53,400
Actual (CY2016)		16.89	53,900
Actual (CY2015)		15.43	50,800
Actual (CY2014)		13.84	49,600

** Data source: 2013 New South Wales minerals industry profile

1.5 Endeavor Mine

Commissioned in 1983 as the Elura Mine, the site has been operated by CBH since 2003 at which time the site was renamed Endeavor. The Endeavor orebody is similar to others in the Cobar Basin in that it has the form of massive vertical pillars.

Media Release dated on 17 July 2019 announced that CBH to cut production as the orebody comes towards the end of its current reserve. Production will be reduced to a minimum level of approximately 17,000 t/month for the remainder of 2019 while at the same time partially completing infill of the inferred Deep Zinc Lode Resource to better appraise its future viability. On 13 December 2019 CBH announced that the operation will be placed into Care and Maintenance. This comes as a result of the depletion of the current known reserve and the time and cost required to obtain access to deeper known resources.

Table 1.5-a Operation Overview

Attribute	Details
Location:	46 km north of Cobar, NSW
Commodities produced:	silver, lead, zinc, copper
Ownership:	100%
Company name (ASX code):	CBH Resources Ltd
Website:	www.cbhresources.com.au
Operations Commenced:	1983
Mining method:	Underground

Table 1.5-b Resources & Reserves

	Category	Ore (Mt)	Contained Commodity			
			Copper (t)*	Lead (t)*	Zinc (t)*	Silver (t)*
Resource	Measured	10.0	19,000	390,000	660,000	610
	Indicated	15.7	28,260	659,400	1,067,600	973
	Inferred	0.5	950	25,500	37,500	45
Reserve	Proved	1.8	90,000	90,000	138,600	119
	Probable	5.8	278,400	278,400	435,000	626

* Calculated figures

Table 1.5-c Production

	Ore Treated Rate (ktpa)	Lead (t)	Zinc (t)	Silver (t)
Plant Capacity	1,200			
Actual (2010-2019)	public information not available			
Actual (FY2009)	725	21,300	41,900	17.0
Actual (FY2008)	1,033	21,300	46,100	26.5

1.6 Ginkgo Mine

The mineral sand deposits are relict beaches from an inland sea that existed ~7 Million years ago. Cristal commenced mining these deposits in 2005 at Ginkgo then adding Snapper site in 2010. Both mines utilise conventional tractor scoops for topsoil handling, truck and shovel operation for overburden and wet dredge mining and floating concentrator plants to recover and separate the heavy minerals in the ore deposit. Cristal mining was renamed to Tronox Mining Australia Limited (Tronox) following the acquisition by Tronox in 2019.

Table 1.6-a Operation Overview

Attribute	Details
Location:	85 km north of Mildura, western NSW
Commodities produced:	ilmenite, leucoxene, rutile, zircon
Ownership:	100%
Company name (ASX code):	Tronox Mining Australia
Website:	www.tronox.com
Operations Commenced:	December 2005
Mining method:	Open cut

Table 1.6-b Resources & Reserves

	Category	Ore (Mt)
Resource	Measured	135.2 Mt @ 2.9% Heavy Minerals
	Indicated	43 Mt @ 1.99% Heavy Minerals
	Inferred	
Reserve	Proved	99 Mt @ 3.2% Heavy Minerals
	Probable	52 Mt @ 1.0% Heavy Minerals

Table 1.6-c Production

	Ore Treated Rate (Mtpa)	Zircon (t)	Rutile (t)	Ilmenite (t)	Leucoxene (t)
Plant Capacity	19.9				
Actual (2015-2019)	public information not available				
Actual (FY2014)	0.18	13,900	23,350	49,831	60,635

1.7 Hera Mine

Aurelia purchased the Hera Project as an undeveloped gold-lead-zinc-silver deposit from CBH Resources in September 2009. Commercial production announced from April 2015. Hera Mine is a relatively steady-state operation with incremental improvements in throughput and gold recovery. AMI's strategic imperative at Hera is to increase the currently identified mine life of 3.0-3.5 years. This may be delivered through the successful delivery of the Nymagee copper/lead/zinc project, which has potential to add 3-4 years to the mine life profile, or through successful exploration.

Table 1.7-a Operation Overview

Attribute	Details
Location:	100 km south-east of Cobar, NSW
Commodities produced:	Gold, zinc, lead, silver
Ownership:	100%
Company name (ASX code):	Aurelia Metals Ltd (ASX:AMI)
Website:	www.aureliametals.com.au
Operations Commenced:	April 2015
Mining method:	Underground

Table 1.7-b Resources & Reserves

	Category	Ore (Mt)	Contained Commodity				
			Gold (t)*	Lead (t)*	Zinc (t)*	Silver (t)*	Copper (t)*
Resource	Measured	0.98	2.15	27,356	41,034	22.5	
	Indicated	2.37	1.34	39,033	63,258	67.5	32,430
	Inferred	0.17	0.29	2,096	3,728	5.3	640
Reserve	Proved						
	Probable	1.56	2.96	46,710	70,065	52.9	

* Calculated figures

Table 1.7-c Production

	Ore Treated Rate (tpa)	Gold (t)	Silver (t)	Lead (t)	Zinc (t)
Plant Capacity	505,000				
Actual (FY2019)	468,358	1.80	4.53	6,599	10,129
Actual (FY2018)	407,131	1.86	4.81	9,609	13,031
Actual (FY2017)	368,086	1.61	4.08	8,466	1,141
Actual (FY2016)	308,118	1.44	3.73	6,997	7,218
Actual (FY2015) ¹	223,215	0.40	0.23		

¹ Production started in FY2015, ramping up

1.8 Northparkes

Northparkes is a copper and gold mine located 27 km north-west of Parkes, in the Central West of New South Wales. The operation is made up of an underground block cave mine, a sub-level cave and an ore processing plant. The ore deposits are typical copper-gold porphyry systems; the highest grades are associated with the most intense stockwork veining. The porphyry copper deposits at Northparkes are typically narrow but extend to great depths. Northparkes was the first mine in Australia to use the highly efficient block cave mining method. The operational mine life is currently 31 December 2032.

Table 1.8-a Operation Overview

Attribute	Details
Location:	27 km north-northwest of Parkes, NSW
Commodities produced:	copper, gold
Ownership:	Joint Venture
Company name (ASX code):	China Molybdenum Co. Ltd (80%) & Sumitomo Groups (20%)
Website:	www.northparkes.com
Operations Commenced:	September 1995
Mining method:	Underground

Table 1.8-b Resources & Reserves

Category	Ore (Mt)	Contained Commodity	
		Gold (t)*	Copper (t)*
Resource Total	482	87	2,697,000
Reserve Total	121	27	703,000

*Calculated figures

Table 1.8-c Production

	Ore Treated Rate (Mtpa)	Gold (t)*	Copper (t)*
Plant Capacity	8.5		
Actual (FY2019)	6.5	1.4	49,000
Actual (FY2018)	6.5	1.3	49,000
Actual (FY2017)	6.1	1.2	47,800
Actual (FY2016)	6.0	1.4	51,000
Actual (FY2015)	6.0	1.8	55,000

*Calculated figures

1.9 Peak Gold Mines

Aurelia acquired The Peak mines from Canadian mining company New Gold Inc. on 10 April 2018, with the key focus on delivering a long and productive mine life through imbedding operational efficiencies to lower unit costs, expanding the processing circuit to enable the production of separate lead and zinc concentrates and deliver long term growth through the development of the Great Cobar copper/lead/zinc/gold project. Peak Gold Mines commenced production in 1992, the operation now comprises a group of five underground mines situated near Cobar in NSW.

Table 1.9-a Operation Overview

Attribute	Details
Location:	Cobar, NSW
Commodities produced:	Gold, copper, silver
Ownership:	100%
Company name (ASX code):	Aurelia Metals Ltd (ASX:AMI)
Website:	www.aureliametals.com.au
Operations Commenced:	October 1992
Mining method:	Underground

Table 1.9-b Resources & Reserves

Category	Ore (Kt)	Contained Commodity					
		Gold (t)*	Copper (t)*	Lead (t)*	Zinc (t)*	Silver (t)*	
Resource	Measured	1,919	3.26	24,947	11,514	13,433	21
	Indicated	7,402	11.8	96,226	81,422	96,226	74
	Inferred	4,889	6.36	78,224	24,445	39,112	34
Reserve	Proved	376	0.45	6,392	1,128	2,256	4.1
	Probable	2,458	5.16	24,580	49,160	51,618	39

* Calculated figures

Table 1.9-c Production

	Ore Treated Rate (tpa)	Gold (t)	Copper (t)	Silver (t)	Lead (t)	Zinc (t)
Plant Capacity	750,000					
Actual (FY2019)	452,501	1.85	4,267	3.35	11,248	3,356
Actual (FY2018) ¹	135,345	1.17	1,968	2.68	1,551	251
Actual (CY2017) ²	468,000	2.14	4,627			
Actual (CY2016)	736,000	3.34	6,804			
Actual (CY2015)	723,000	3.08	7,711			

¹ From the date of acquisition only 10 April 2018

² Nine months to September 2017

1.10 Pinnacles Mine

Pinnacles Mine is owned and operated by Pinnacle Mines Pty Ltd. The Pinnacles Mine has been active since 1884. It has an expected mine life of 70 years at current mining rate. Mining operations within the Pinnacles Mine Site comprises of open cut mining and minor subsurface workings within the Edwards pit.

Table 1.10-a Operation Overview

Attribute	Details
Location:	10 km south-west of Broken Hill, NSW
Commodities produced:	lead, zinc
Ownership:	100%
Company name (ASX code):	Pinnacles Mine Pty Ltd
Website:	
Operations Commenced:	Jan 2007
Mining method:	Open cut mining and minor subsurface workings

Table 1.10-b Resources & Reserves

	Category	Ore (Mt)	Contained commodity		
			Lead (t)*	Zinc (t)*	Silver (t)*
Resource	Measured				
	Indicated				
	Inferred	14	406,000	574,000	1,652
Reserve	Proved				
	Probable				

* Calculated figures

Table 1.10-c Production

	Ore Treated Rate (tpa)	Lead (t)	Zinc (t)	Silver (t)
Plant Capacity	30,000			
Actual	public information not available			

1.11 Rasp Mine

CBH Resources acquired the Rasp tenements from Normandy in 2001 (CML7) and commenced surface exploration activities and then the development of the Rasp underground exploration decline. Project approval was gained in 2011 and the mine was officially opened in July 25, 2012. The mine is uniquely located centrally within the City of Broken Hill and occupies the central region of the historic Broken Hill Line of Lode orebody. The ore deposits at RASP Mine are hosted by a sequence of Proterozoic meta-sedimentary rocks. Current mining operations are primarily focused on the extraction of the Western Mineralisation (WM), combined with lesser quantities of high-grade remnants of 2 and 3 Lens, and Zinc Lodes that are associated with the original Main Lode.

Table 1.11-a Operation Overview

Attribute	Details
Location:	Broken Hill, NSW
Commodities produced:	zinc, lead, silver
Ownership:	100%
Company name (ASX code):	CBH Resources Ltd
Website:	www.cbhresources.com.au
Operations Commenced:	May 2012
Mining method:	Underground

Table 1.11-b Resources & Reserves

	Category	Ore (Mt)	Contained commodity		
			Lead (t)*	Zinc (t)*	Silver (t)*
Resource	Measured				
	Indicated	6.9	345,400	428,300	582
	Inferred	9.6	502,800	661,100	886
Reserve	Proved				
	Probable	3.2	145,800	190,100	202

* Calculated figures

Table 1.11-c Production

	Ore Treated Rate (ktpa)	Lead (t)	Zinc (t)	Silver (t)
Plant Capacity	750			
Actual	public information not available			

1.12 Snapper Mine

The mineral sand deposits are relict beaches from an inland sea that existed ~7 Million years ago. Cristal commenced mining these deposits in 2005 at Ginkgo then adding Snapper site in 2010. Both mines utilise conventional tractor scoops for topsoil handling, truck and shovel operation for overburden and wet dredge mining and floating concentrator plants to recover and separate the heavy minerals in the ore deposit. Cristal mining was renamed to Tronox Mining Australia Limited (Tronox) following the acquisition by Tronox in 2019.

Table 1.12-a Operation Overview

Attribute	Details
Location:	85 km north of Mildura, western NSW
Commodities produced:	ilmenite, leucoxene, rutile, zircon
Ownership:	100%
Company name (ASX code):	Tronox Mining Australia
Website:	www.tronox.com
Operations Commenced:	July 2010
Mining method:	Open cut

Table 1.12-b Resources & Reserves

	Category	Ore (Mt)
Resource	Measured	117.0 Mt @ 5.4% heavy minerals
	Indicated	
	Inferred	
Reserve	Proved	117.0 Mt @ 5.0% heavy minerals
	Probable	

Table 1.12-c Production

	Ore Treated Rate (Mtpa)	Zircon (t)	Rutile (t)	Ilmenite (t)	Leucoxene (t)
Plant Capacity	14				
Actual	public information not available				

1.13 Tomingley Gold Operations

The gold operations at Tomingley are located approximately 50 km south-west of Dubbo in Central West NSW. Mining at Tomingley is based on four gold deposits (Wyoming One, Wyoming Three, Caloma and Caloma Two). Open pit mining continued through until early 2019 and the operation began transitioning to underground mining from the bottom of the Wyoming One pit.

Table 1.13-a Operation Overview

Attribute	Details
Location:	50 km south-west of Dubbo, NSW
Commodities produced:	Gold
Ownership:	100%
Company name (ASX code):	Alkane Resources Ltd (ASX:ALK)
Website:	www.alkane.com.au
Operations Commenced:	January 2014
Mining method:	Open cut and underground

Table 1.13-b Resources & Reserves

	Category	Ore (Kt)	Contained commodity
			Gold (t)*
Resource	Measured	1,317	2.37
	Indicated	3,869	8.51
	Inferred	1,253	1.88
Reserve	Proved	722	1.30
	Probable	688	1.31

* Calculated figures

Table 1.13-c Production

	Ore Treated Rate (tpa)	Gold (t)
Plant Capacity	1,500,000	
Actual (FY2019)	998,703	1.52
Actual (FY2018)	1,092,602	2.64
Actual (FY2017)	1,087,983	2.40
Actual (FY2016)	1,096,000	2.11
Actual (FY2015)	1,140,704	2.17

1.14 Tritton Mine

The Tritton Copper Operations located near the town of Nyngan in central New South Wales is operated by Tritton Resources Pty Ltd, a 100 per cent owned subsidiary of Aeris Resources Limited. There are two underground mines, Tritton Underground Mine (Tritton) and Murrawombie Underground Mine (Murrawombie).

The combined ore production from both mines is treated at the 1.8 million tonnes per annum Tritton processing plant. There are four additional advanced mining projects (Avoca Tank, Budgerygar, Budgery and Murrawombie Open Pit) scheduled for future production, which together with Tritton and Murrawombie form the current Life of Mine plan (LOM). These projects will supplement and then replace production from Tritton and Murrawombie underground mines as the ore reserves from these are exhausted.

Table 1.14-a Operation Overview

Attribute	Details
Location:	Nyngan, central NSW
Commodities produced:	copper
Ownership:	100%
Company name (ASX code):	Aeris Resources Limited (ASX:AIS)
Website:	www.aerisresources.com.au
Operations Commenced:	2005
Mining method:	Underground

Table 1.14-b Resources & Reserves

	Category	Ore (Mt)	Contained commodity		
			Copper (t)*	Gold (t)	Silver (t)*
Resource	Measured	4.7	68,000	0.47	21.5
	Indicated	8.3	130,000	2.39	40.7
	Inferred	6.9	89,000	1.15	30.2
Reserve	Proved	2.4	37,000		
	Probable	4.3	65,000		

* Calculated figures

Table 1.14-c Production

	Ore Treated Rate (ktpa)	Copper (t)
Plant Capacity	1,800	
Actual (FY2019)	1,669	26,852
Actual (FY2018)	1,592	26,686
Actual (FY2017)	1,467	23,404
Actual (FY2016)	1,701	30,425
Actual (FY2015)	1,641	30,059

1.15 Woodlawn Mine

Heron's primary focus is on its 100% owned, high grade Woodlawn Zinc-Copper Project located 250km southwest of Sydney – one of the few new zinc projects that is fully-funded to production. Production of base metal concentrates has recently commenced placing the Company on track to participate in a strong pricing environment. Based on the current Ore Reserves mine plan, the project is expected to produce three concentrates at an average annualised gross production rate at steady-state over an initial mine life of 9.3 years.

Table 1.15-a Operation Overview

Attribute	Details
Location:	250 km south-west of Sydney, NSW
Commodities produced:	zinc, copper, lead, silver, gold
Ownership:	100%
Company name (ASX code):	Heron Resources Ltd (ASX:HRR)
Website:	www.heronresources.com.au
Operations Commenced:	May 2019
Mining method:	Underground

Table 1.15-b Resources & Reserves

		Contained commodity					
	Category	Ore (Mt)	Zinc (t)*	Copper (t)*	Lead (t)*	Gold (t)*	Silver (t)*
Resource	Mea + Ind	14.3	508,100	139,980	235,400	5.29	543
	Inferred	4.0	176,100	57,370	71,200	1.73	146
Reserve	Proved	6.2	136,400	31,000	80,600	1.80	192
	Probable	6.2	226,300	65,100	96,100	2.26	217

* Calculated figures

Table 1.15-c Production

	Ore Treated Rate (Mtpa)	Zinc (t)	Copper (t)	Lead (t)	Gold (t)	Silver (t)
Plant Capacity	1.50					
Actual	Production commences in May 2019 (Heron ASX Release 8 May 2019), first high-grade underground ore processed December 2019					

2 Non-operational metallic mineral mines

2.1 Adelong Gold Mine

Challenger Mines Pty Ltd (CML), a wholly owned subsidiary of Macquarie Gold Ltd (MGL) and International Base Metals Limited (IBML). The Adelong Gold Field remains largely unexplored. The projected mine life is six years but there is considerable potential to extend this for another six years following the confirmation and development of additional orebodies.

Table 2.1-a Operation Overview

Attribute	Details
Location:	15 km west of Tumut, southern NSW
Commodities contained:	gold
Ownership:	100%
Company name (ASX code):	Challenger Mines Pty Ltd
Website:	www.interbasemetals.com
Project Status:	Care and Maintenance / Site Preparation
Mining method:	Underground
Proposed Plant Capacity:	144 (ktpa)

Table 2.1-b Resources & Reserves

	Category	Ore (t)	Contained commodity
			Gold (t)
Resource	Measured	459,000	1.41
	Indicated	374,000	0.97
	Inferred	522,000	1.55
Reserve	Proved		
	Probable		

2.2 Hillgrove

The Hillgrove Project is located approximately 30km from Armidale in New South Wales. Historic mining activity commenced at the site in 1857 and ceased in 1921 and recommenced in 1969. Mining operations commenced in late 2013, and then was placed on care & maintenance in 2016 due to low prevailing antimony prices.

Table 2.2-a Operation Overview

Attribute	Details
Location:	30 km east of Armidale, NSW
Commodities contained:	gold, antimony
Ownership:	100%
Company name (ASX code):	Red River Resources Limited (ASX:RVR)
Website:	redriverresources.com.au
Project Status:	Care and Maintenance
Mining method:	Underground
Proposed Plant Capacity:	250 (ktpa)

Table 2.2-b Resources & Reserves

	Category	Ore (kt)	Contained commodity	
			Gold (t)*	Antimony (t)*
Resource	Measured	1,021	5.21	19,399
	Indicated	3,540	14.16	53,100
	Inferred	1,788	7.69	28,608
Reserve	Proved	386	1.17	9,264
	Probable	1,809	5.72	37,989

* Calculated figures

2.3 Manuka Silver

The Manuka Mine was formerly operated as the Wonawinta Mine. The plant is currently on care and maintenance. An opportunity was identified to utilise the existing processing infrastructure at the Manuka Mine to process Mt Boppy ore to create operational efficiencies that ensure the longevity of both operations.

Table 2.3-a Operation Overview

Attribute	Details
Location:	80 km south of Cobar, NSW
Commodities contained:	silver
Ownership:	100%
Company name (ASX code):	Manuka Resources Ltd
Website:	
Project Status:	Care and Maintenance
Mining method:	Open cut
Proposed Plant Capacity:	850 (ktpa)

Table 2.3-b Resources & Reserves

	Category	Ore (kt)	Contained commodity	
			Silver (t)*	Lead (t)*
Resource	Measured	900	41	6,300
	Indicated	8,500	417	67,150
	Inferred	29,400	1,176	161,700
Reserve	Proved	475	45.5	
	Probable	132	12	

* Calculated figures

2.4 Mineral Hill

The project is situated within the prolific and world class Cobar Basin within the Lachlan Fold Belt. Mineral Hill is a structurally controlled, epithermal system containing multiple known high grade, low tonnage poly-metallic ore bodies. Its geology is characterised by distinct metal zonation across the mineralised system.

Table 2.4-a Operation Overview

Attribute	Details
Location:	65 km north of Condobolin, NSW
Commodities contained:	copper, zinc, lead, gold, silver
Ownership:	100%
Company name (ASX code):	KBL Mining Ltd
Website:	
Project Status:	Care and Maintenance
Mining method:	Underground
Proposed Plant Capacity:	500 (ktpa)

Table 2.4-b Resources & Reserves

	Category	Ore (kt)	Contained commodity				
			Copper (t)*	Zinc (t)*	Lead (t)*	Gold (t)*	Silver (t)*
Resource	Measured	976	8,901	3,017	3,306	3.13	27
	Indicated	3,063	34,943	26,619	59,509	2.58	128
	Inferred	1,004	13,119	12,184	20,474	1.38	35
Reserve	Proved	244				1.47	15
	Probable	514				1.00	23

* Calculated figures

2.5 Mount Boppy

Mineralisation at Mount Boppy is hosted by brecciated, highly silicified, fine-grained sediments of the Devonian Baledmund Formation and associated quartz veins. The mineralisation consists predominantly of gold with minor zinc, copper and lead. An opportunity was identified to utilise the existing processing infrastructure at the Manuka Mine to process Mt Boppy ore to create operational efficiencies that ensure the longevity of both operations.

Table 2.5-a Operation Overview

Attribute	Details
Location:	55 km east of Cobar, NSW
Commodities contained:	gold
Ownership:	
Company name (ASX code):	Mt Boppy Resources Pty Ltd
Website:	
Project Status:	Care and Maintenance
Mining method:	Open cut
Proposed Plant Capacity:	

Table 2.5-b Resources & Reserves

Category	Ore (t)	Contained commodity Gold (oz)
Resource		40,000

3 Development projects for metallic minerals

3.1 Atlas-Campaspe

Atlas-Campaspe Project is being developed by Cristal Mining Australia Limited, which was renamed Tronox Mining Australia Limited (Tronox) following the acquisition by Tronox in 2019. The deposit consists of over 6.5Mt of contained heavy mineral to be concentrated and processed into ilmenite, leucoxene, zircon and rutile end products. The mine has a potential mine life of 20 years.

Table 3.1-a Project Overview

Attribute	Details
Location:	90 km north of Balranald, NSW
Commodities contained:	ilmenite, leucoxene, zircon, rutile
Ownership:	100%
Company name (ASX code):	Tronox Mining Australia
Website:	www.tronox.com
Project Status:	Construction activities on site
Mining method:	Open cut (dry mining)
Proposed Plant Capacity:	7.2 Mtpa

Table 3.1-b Resources & Reserves

Resource		Reserve	Contained Heavy Mineral sands
Campaspe	Atlas	Atlas	Total
97.37 Mt @ 4.72 % HM	21.8 Mt @ 9.6% HM	11.3 Mt @ 15.4% HM	6.5 Mt

3.2 Balranald

Balranald and Nepean are two rutile-rich deposits in the northern Murray Basin, New South Wales. A drilling programme to provide more detailed understanding of the deposit mineralisation was completed in late 2018. The results were positive and have increased Iluka's confidence. The proposed final trial is currently being planned and is designed to determine whether the underground mining and backfilling technology is economically viable in a continuous mining and processing environment.

Table 3.2-a Project Overview

Attribute	Details
Location:	12 km north west of the town of Balranald, NSW
Commodities contained:	ilmenite, zircon, rutile
Ownership:	100%
Company name (ASX code):	Iluka Resources Limited (ASX:ILU)
Website:	www.iluka.com
Project Status:	Approved - awaiting final investment decision
Mining method:	Underground
Proposed Plant Capacity:	

Table 3.2-b Resources & Reserves

Resource	Contained Heavy Mineral sands
45.5 Mt @ 31% HM	14.4 Mt

3.3 Bowdens Silver Project

The Bowdens Silver Project is the largest known undeveloped silver deposit in Australia with substantial mineral resources. Located on the eastern margin of the Lachlan Orocline/Macquarie Arc the resource covers an area of approximately 113 hectares hosted in the Permian Rylstone Volcanics where it occurs as tabular, flat-lying to gently north dipping zone sub-parallel to stratigraphy. In June 2018, the Company completed a Feasibility Study comprising a single open-cut mine with an initial mine life of 16 years.

Table 3.3-a Project Overview

Attribute	Details
Location:	26 km east of Mudgee, NSW
Commodities contained:	Silver, zinc, lead
Ownership:	100%
Company name (ASX code):	Silver Mines Limited (ASX:SVL)
Website:	https://www.silvermines.com.au
Project Status:	Prepare EIS
Mining method:	Open cut
Proposed Plant Capacity:	2 Mtpa

Table 3.3-b Resources & Reserves

	Category	Ore (Mt)	Contained commodity		
			Lead (t)	Silver (t)	Zinc (t)
Resource	Measured	76	190,000	3,420	281,200
	Indicated	29	72,500	899	110,200
	Inferred	23	64,400	713	920,00
Reserve	Proved	28.6	91,430	1,992	125,110
	Probable	1.3	3,910	71	5,740

3.4 BPL Murray Basin HM Project

Broken Hill Prospecting (BPL) has built a substantial portfolio of Heavy Mineral Sands (HMS; titanium & zirconium) projects within the world-class Murray Basin. BPL's Mineral Sands business model involves applying low capex/low opex mobile, modular mining technology to develop and operate multiple smaller mining operations across a broad project area.

Table 3.4-a Project Overview

Attribute	Details
Location:	200 km south of Broken Hill, NSW
Commodities contained:	ilmenite, rutile, zircon, leucoxene
Ownership:	100%
Company name (ASX code):	Broken Hill Prospecting Limited (ASX:BPL)
Website:	www.bhpl.net.au
Project Status:	
Mining method:	
Proposed Plant Capacity:	

Table 3.4-b Resources & Reserves

Resource (Jaws & Gilligans)	Contained HM
113 Mt @ 1.8% HM	2.0 Mt

3.5 Broken Hill Cobalt Project (Thackaringa)

Cobalt Blue is a cobalt orientated exploration company focused on development of the Broken Hill Cobalt Project. Cobalt is a strategic metal and is in strong demand for new generation batteries, particularly lithium-ion batteries now being widely used in clean energy systems including electric vehicles. The project area covers portions of the Broken Hill and Thackaringa group successions that host most of the mineralisation in the region, including the world-class Broken Hill Ag-Pb-Zn deposit. Cobalt Blue is proceeding with a Bankable Feasibility Study focusing upon revenue increases (mine life extension, cobalt recovery improvements, elemental sulphur market and potentially iron oxide product) and cost reductions.

Table 3.5-a Project Overview

Attribute	Details
Location:	25 km west of Broken Hill, NSW
Commodities contained:	cobalt
Ownership:	100%
Company name (ASX code):	Cobalt Blue (ASX:COB)
Website:	www.cobaltblueholdings.com/
Project Status:	PFS completed, prepare application for SEARs
Mining method:	Open cut
Proposed Plant Capacity:	5.25 Mtpa

Table 3.5-b Resources & Reserves

	Category	Ore (Mt)	Contained commodity Cobalt (t)
Resource	Measured	18	17,100
	Indicated	55	37,500
	Inferred	38	24,900
Reserve	Proved		
	Probable	46.3	38,000*

* Calculated figures

3.6 Copi Mineral Sands

The Copi deposit is a higher-grade strandline-type, ilmenite-rutile-zircon-leucoxene (titanium, zirconium) placer deposit, located in the Murray Basin in south-western NSW, including Copi North and Sunshine, Sunshine extension, Copi South, Springwood and Magic deposits. The deposit is characterised by low slimes (2.8%) and minimal oversize (2%). Relentless is undertaking a Pre-Feasibility Study (PFS) for the Copi Project. The company's proposed operating philosophy will be based on a dry mining open pit truck and excavator operation processing 1.5 million tonnes per annum (tpa) of heavy Mineral Sands.

Table 3.6-a Project Overview

Attribute	Details
Location:	170 km south of Broken Hill, Murray Basin, NSW
Commodities contained:	ilmenite, rutile, zircon, leucoxene
Ownership:	100%
Company name (ASX code):	Relentless Resources Limited
Website:	www.relentlessresources.com.au
Project Status:	Prepare EIS
Mining method:	dry mining open pit truck and excavator
Proposed Plant Capacity:	1.5 Mtpa

Table 3.6-b Resources & Reserves

Resource	Contained Heavy Mineral sands
39.1 Mt @ 4.5% HM	1.7 Mt

3.7 Dargues Gold

The Dargues Gold Mine Project is located 60 km south-east of Canberra in Majors Creek near Braidwood. Majors Creek is the largest historic alluvial goldfield in NSW and located in the eastern most segment of the Lachlan Fold Belt. The project will comprise an underground gold mine (decline), a run-of-mine (ROM) Pad, temporary waste rock emplacement, crushing facility, gold processing plant, tailings storage facility and associated infrastructure.

Table 3.7-a Project Overview

Attribute	Details
Location:	60 km southeast of Canberra
Commodities contained:	Gold
Ownership:	100%
Company name (ASX code):	Diversified Minerals Pty Ltd
Website:	www.divminerals.com.au
Project Status:	Approved
Mining method:	Underground
Proposed Plant Capacity:	355 ktpa

Table 3.7-b Resources & Reserves

	Category	Ore (t)	Contained commodity Gold (t)*
Resource	Measured	378,000	2.72
	Indicated	818,000	5.56
	Inferred	420,000	1.89
Reserve	Proved	476,000	2.52
	Probable	913,000	5.00

* Calculated figures

3.8 Dubbo Zirconia

The Dubbo Zirconia Project is a world-class large in-ground resource of zirconium, hafnium, niobium, yttrium and rare earth elements. It is the most advanced poly-metallic project of its kind outside China, making it a potential strategic and independent supply of critical minerals for a range of sustainable technologies and future industries. It has a potential mine life of 70+ years.

Table 3.8-a Project Overview

Attribute	Details
Location:	25 km south of Dubbo, NSW
Commodities contained:	zirconium, hafnium, niobium, rare earth elements
Ownership:	100%
Company name (ASX code):	Alkane Resources Ltd (ASX:ALK)
Website:	www.alkane.com.au
Project Status:	Approvals granted, construction ready, subject to financing
Mining method:	
Proposed Plant Capacity:	1 Mtpa

Table 3.8-b Resources & Reserves

	Category	Ore (Mt)	Contained commodity
			Total Rare Earth oxides (t)*
Resource	Measured	42.81	316,794
	Inferred	32.37	239,538
Reserve	Proved	18.9	139,860
	Probable		

* Calculated figures

3.9 Flemington Scandium

Australian Mines' Flemington Project is located within 400 km of Sydney, NSW and represents a potential second cobalt-nickel-scandium operation for the Company. During the year, Australian Mines exercised its option to take full ownership of this project following which the Company commenced a Mineral Resource expansion drilling program, which represents the largest exploration/resource definition program even undertaken across the project area and is a clear show of confidence in the Flemington Project's ability to potentially host a nationally important cobalt resource.

Table 3.9-a Project Overview

Attribute	Details
Location:	400 km west of Sydney, NSW
Commodities contained:	scandium, cobalt, nickel
Ownership:	100%
Company name (ASX code):	Australian Mines Limited (ASX:AUZ)
Website:	australianmines.com.au
Project Status:	Prepare EIS
Mining method:	
Proposed Plant Capacity:	

Table 3.9-b Resources & Reserves

Category	Ore (Mt)	Cobalt		Scandium		Nickel	
		Grade	Tonnes	Grade	Tonnes	Grade	Tonnes
Resource	2.7	0.101%	2,727	403 ppm	1,090	2423 ppm	

3.10 Kempfield

Located 41 kilometres to the south of Newcrest's Cadia is Kempfield, the Company's flagship project. The Kempfield Polymetallic Project is situated in the eastern province of the Lachlan Orogen. The Kempfield deposit belongs to a peer group of volcanic-hosted massive sulphide (VHMS) deposits located at the margins of geological basins. The Project would consist of two open cut complexes, a processing plant, a waste rock emplacement, a heap leach pad and associated infrastructure.

Table 3.10-a Project Overview

Attribute	Details
Location:	56 km southwest of Bathurst
Commodities contained:	silver, zinc, lead, gold
Ownership:	100%
Company name (ASX code):	Argent Minerals Limited (ASX:ARD)
Website:	www.argentminerals.com.au
Project Status:	Prepare EIS
Mining method:	Open cut
Proposed Plant Capacity:	1.5 Mtpa

Table 3.10-b Resources & Reserves

	Category	Ore (Mt)	Contained commodity			
			Zinc (t)*	Lead (t)*	Gold (t)*	Silver (t)*
Resource	Measured	7.4	61,100	30,550	0.86	414
	Indicated	12.7	120,000	57,000	1.60	467
	Inferred	5.5	68,600	83450	0.64	520
Reserve	Proved					
	Probable					

* Calculated figures

3.11 McPhillamys Gold

The McPhillamys Gold Project falls within the Silurian aged Anson Formation of the East Lachlan Fold Belt of New South Wales, Australia. The project is situated approximately 40 kilometres east of Newcrest Mining Limited's Cadia/Ridgeway mine. The deposit is located within dacite rich volcanoclastic rocks of the Silurian aged Anson formation. McPhillamys, if developed would consist of a large scale open cut gold mining operation that has a current mine life of approximately ten years.

Table 3.11-a Project Overview

Attribute	Details
Location:	8 km from the town of Blayney, NSW
Commodities contained:	gold
Ownership:	100%
Company name (ASX code):	Regis Resources Ltd (ASX:RRL)
Website:	www.regisresources.com.au
Project Status:	Collate Submissions
Mining method:	Open cut
Proposed Plant Capacity:	8.5 Mtpa

Table 3.11-b Resources & Reserves

	Category	Ore (Mt)	Contained commodity Gold (t)*
Resource	Measured		
	Indicated	67.7	71
	Inferred	1.2	0.77
Reserve	Proved		
	Probable	60.1	63

* Calculated figures

3.12 Narraburra Rare Earth Project

Narraburra, 375 km west of Sydney, contains zirconium oxide, yttrium oxide, rare earth oxides, niobium oxide, and thorium oxide, hosted by deeply weathered and fresh leucogranite. Positive results from metallurgical test work on samples of weathered resource material from the Narraburra Prospect indicate that a saleable Rare Metal and REE concentrate could be produced by conventional treatment methods.

Table 3.12-a Project Overview

Attribute	Details
Location:	375 km west of Sydney
Commodities contained:	Rare earth elements
Ownership:	
Company name (ASX code):	Paradigm Resources

3.13 NICO Young

NICO Young cobalt nickel project has the potential to be one of Australia's largest nickel-cobalt operations. Jervois finalised its Nico Young Technical Study on a heap leach facility. The study confirmed an attractive long-life nickel-cobalt project.

Table 3.13-a Project Overview

Attribute	Details
Location:	300 km west of Sydney, NSW
Commodities contained:	cobalt, nickel
Ownership:	100%
Company name (ASX code):	Jervois Mining Limited (ASX:JRV)
Website:	jervoismining.com.au
Project Status:	
Mining method:	
Proposed Plant Capacity:	

Table 3.13-b Resources & Reserves

	Category	Ore (Mt)	Contained commodity	
			Cobalt (t)*	Nickel (t)*
Resource	Measured			
	Indicated	3.2	1,280	21,440
	Inferred	90.1	45,050	567,630
Reserve	Proved			
	Probable			

* Calculated figures

3.14 Nyngan Scandium

Nyngan Scandium Project is world's first scandium-only mine development project. Surface mining at the site is anticipated to be done by conventional truck and shovel method. The resource is a typical tertiary laterite, composed of limonites and saprolites. Minerals exploration at the site has defined a measured and indicated resource significantly larger than the currently planned 20-year mine life outlined in the feasibility study. Production targeted for approximately 38,000 kg per year of scandium oxide (Sc_2O_3).

Table 3.14-a Project Overview

Attribute	Details
Location:	500 km NW of Sydney, NSW
Commodities contained:	scandium
Ownership:	100%
Company name (ASX code):	Scandium International Mining Corp. (TSX:SCY.To)
Website:	www.scandiummining.com
Project Status:	mining lease granted
Mining method:	Open cut
Proposed Plant Capacity:	

Table 3.14-b Resources & Reserves

Category	Ore (Mt)	Scandium	
		Grade	Tonnes*
Resource	16.9	235ppm	3,972
Reserve	1.43	409ppm	585

* Calculated figures

3.15 Platina Scandium Project (Owendale)

Owendale is one of the world’s highest-grade scandium deposits and has potential to be Australia’s first scandium producer with platinum, cobalt and nickel credits. The DFS has confirmed the technical and financial viability of constructing a simple, low-strip ratio, open-cut mining operation and processing facility producing scandium oxide.

Table 3.15-a Project Overview

Attribute	Details
Location:	53 km north-east of Condobolin, NSW
Commodities contained:	cobalt, scandium, nickel
Ownership:	100%
Company name (ASX code):	Platina Resources Limited (ASX:PGM)
Website:	www.platinareources.com.au
Project Status:	Prepare EIS
Mining method:	Open cut
Proposed Plant Capacity:	

Table 3.15-b Resources & Reserves

	Category	Ore (Mt)	Contained commodity		
			Scandium (t)	Cobalt (t)	Nickel (t)
Resource	Measured	8	5,200	5,400	9,900
	Indicated	13	7,800	8,100	13,400
	Inferred	15	8,900	7,000	12,400
Reserve	Proved	3,054	2,696	2,945	4,054
	Probable	972	816	654	767

3.16 Sunrise

Clean TeQ is developing its world-class Sunrise nickel, cobalt, scandium project (formerly named as Syerston Nickel Cobalt Scandium Project) in New South Wales. A Definitive Feasibility Study (DFS) was completed in June 2018, which demonstrated the robust economics and long mine life (40+ years) for the Project, and highlighted the Project's global importance as a sustainable, long-life, low-cost source of high purity cobalt and nickel sulphates for the rapidly growing battery market.

Table 3.16-a Project Overview

Attribute	Details
Location:	near the town of Fifield, central NSW
Commodities contained:	cobalt, nickel, scandium
Ownership:	100%
Company name (ASX code):	CleanTeQ Resources (ASX:CLQ)
Website:	www.cleanteq.com
Project Status:	Development approval granted, pre-production development phase
Mining method:	
Proposed Plant Capacity:	

Table 3.16-b Resources & Reserves

Category	Ore (Mt)	Cobalt		Scandium		Nickel	
		Grade	Tonnes*	Grade	Tonnes*	Grade	Tonnes
Resource							
Measured + Indicated	163	0.09%	146,700	76ppm	12,388	0.54%	
Inferred	21	0.09%	18,900	283ppm	5,943	0.23%	
Total							
Reserve	147.4	0.092%		53ppm		0.56%	

* Calculated figures

Glossary

Acronym	Meaning
ASX	Australian Stock Exchange
DFS	Definitive Feasibility Study
EIS	Environmental Impact Statement
HM / HMS	Heavy Mineral Sands
kt	Thousand metric tonnes
ktpa	Thousand metric tonnes per annum
Mt	Million metric tonnes
Mtpa	Million metric tonnes per annum
PFS	Preliminary Feasibility Study
REE	Rare Earth Elements
t	metric tonnes
tpa	metric tonnes per annum

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