

Australian & New Zealand Gold Operations

September Quarter 2022

Overview

The average All-in Sustaining Cost (AISC) for Australia and New Zealand was A\$2,012/oz, which is up 10.3% (A\$188/oz) on the previous quarter average AISC of A\$1,824/oz. Evolution Mining's Ernest Henry operations was the lowest cost producer reporting an AISC of **-A\$1,701/oz** followed by Newcrest's Cadia Valley operations with an AISC of A\$157/oz then by Capricorn Metals' Karlawinda mine (A\$1,166/oz). The average gold spot price for the quarter was A\$2,629/oz (US\$1,729/oz). It should be noted that Ernest Henry and Cadia Valley benefit from significant base metal by-products. Aurum Analytics' estimate of these operations AISC on a co-product basis (Co-AISC) is as follows; Ernest Henry Co-AISC of A\$1,373/oz and Cadia Valley Co-AISC of A\$1,251/oz. The lowest cost "gold only" operations were Capricorn Metals' Karlawinda mine with an AISC of A\$1,166/oz, then Alkane's Tomingley mine (A\$1,191/oz) and AngloGold Ashanti's/Regis Resources' Tropicana mine (A\$1,237/oz).

Newmont's Boddington operation took out top spot as Australia's largest gold producer with 174,000 oz for the quarter, followed by Newcrest's Cadia Valley operations (142,194 oz) and Newmont's Tanami mine (122,000 oz). Of the mines where gold is a by-product, BHP's Olympic Dam produced the most gold 47,194 oz followed by Oz Minerals' Prominent Hill with 35,943 oz and Evolution's Ernest Henry mine with 20,655 oz.

Grade wise for the companies that report AISC, the average reported mill head/feed grade was 2.41 g/t (Open Pit (OP) - 1.04 g/t, Underground (UG) - 3.62 g/t, Open Pit & Underground (OP/UG) - 1.77 g/t) which was down on the previous quarter, 2.56 g/t (-5.8%). Mandalay Resources' Costerfield mine took out the honour as the operation with the highest average feed grade with 11.91 g/t, followed by Gold Fields Agnew mine 6.12 g/t. The lowest grade mine was Evolution's Ernest Henry mine processing an average head grade of 0.51 g/t. The high-grade operations that do not report an AISC were Agnico Eagle's Fosterville mine with 15.11 g/t and Kaiser Reef's A1 mine with 12.10 g/t.

Top 10 Gold Producing Operations

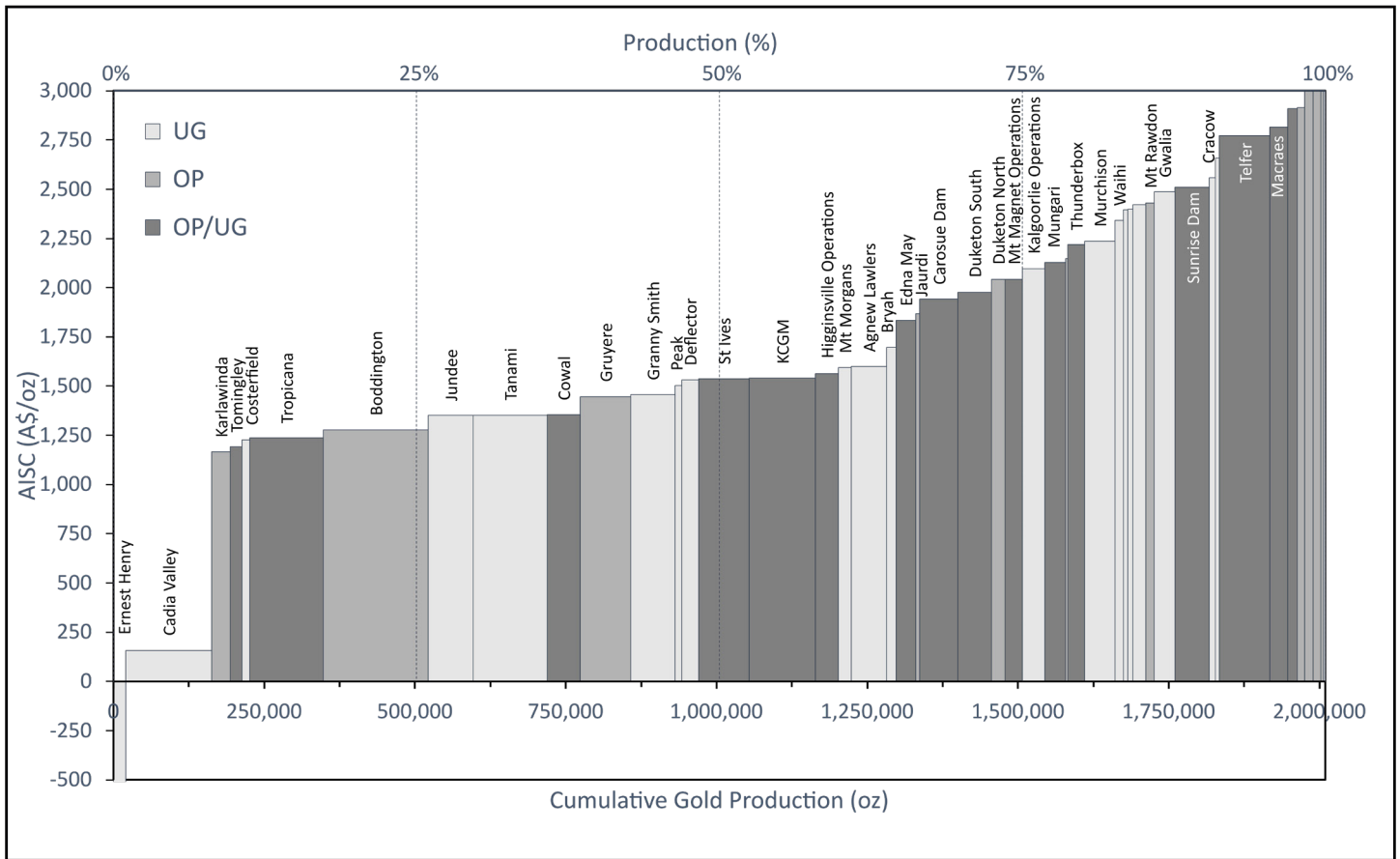
Rank	Operation	Company	Mine Type	Au Produced (oz)
1	Boddington	Newmont Corporation	OP	174,000
2	Cadia Valley	Newcrest Mining Limited	UG	142,194
3	Tanami	Newmont Corporation	UG	122,000
4	Tropicana	JV AngloGold Ashanti Limited/Regis Resources Limited	OP/UG	121,920
5	KCGM	Northern Star Resources Limited	OP/UG	109,215
6	Tropicana	AngloGold Ashanti Limited	OP/UG	86,000
7	St Ives	Gold Fields Limited	OP/UG	84,500
8	Telfer	Newcrest Mining Limited	OP/UG	84,372
9	Gruyere	JV Gold Fields Limited/Gold Road Resources Limited	OP	83,635
10	Fosterville	Agnico Eagle Mines Limited	UG	81,801

Gold Operations That Report AISC

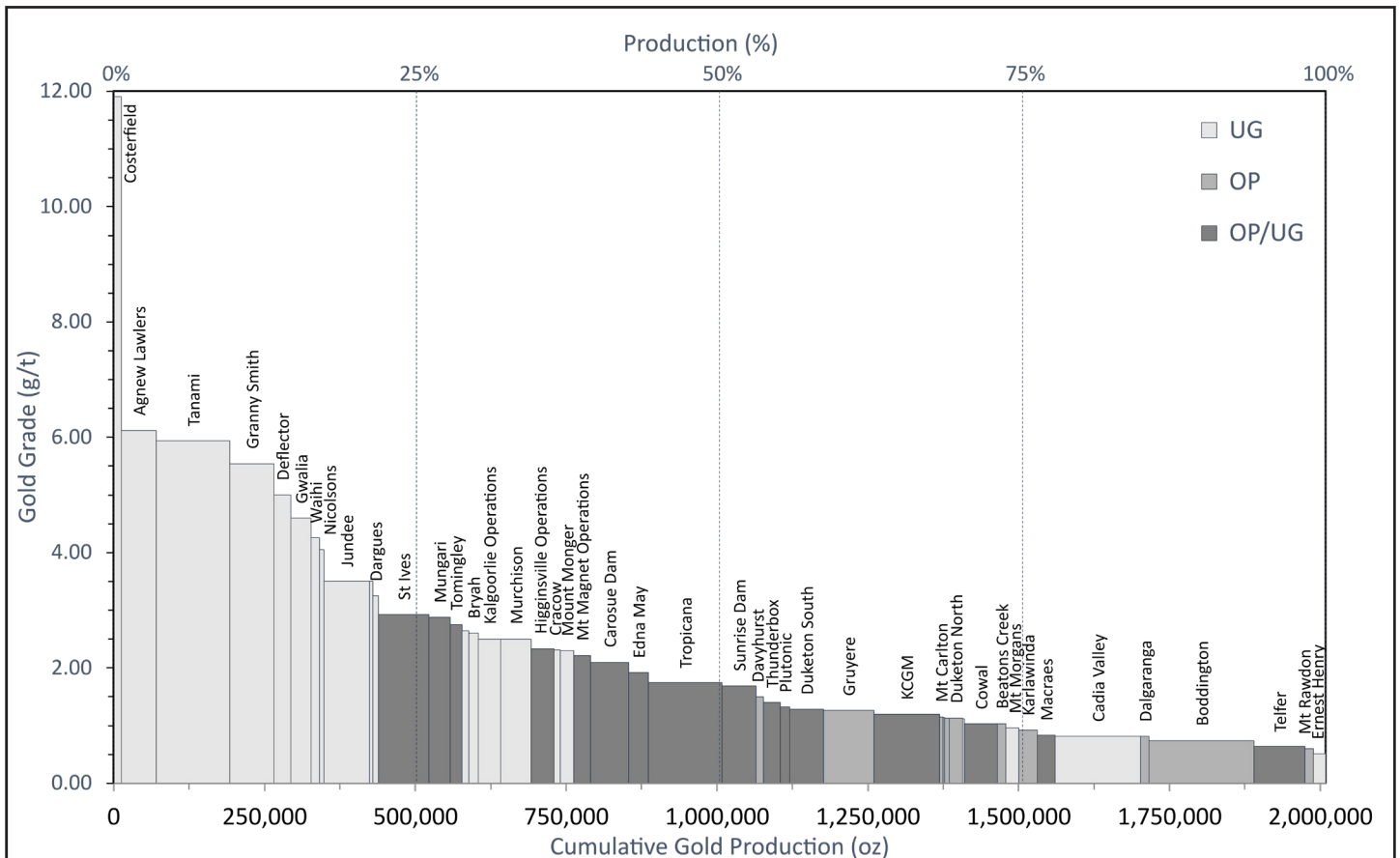
AISC Rank	Operation	Company	Mine Type	AISC (A\$/oz)	Grade (g/t)	Grade Rank	Au Produced (oz)
1	Ernest Henry	Evolution Mining Limited	UG	-1,701	0.51	48	20,655
2	Cadia Valley	Newcrest Mining Limited	UG	157	0.81	43=	142,194
3	Karlawinda	Capricorn Metals Limited	OP	1,166	0.92	41	31,005
4	Tomingley	Alkane Resources Limited	OP/UG	1,191	2.75	14	19,489
5	Costerfield	Mandalay Resources Limited	UG	1,226	11.91	1	12,526
6	Tropicana	JV AngloGold/Regis Resources	OP/UG	1,237	1.74	25	121,920
7	Boddington	Newmont Corporation	OP	1,277	0.74	45	174,000
8	Jundee	Northern Star Resources Limited	UG	1,352	3.50	9=	74,913
9	Tanami	Newmont Corporation	UG	1,353	5.94	3	122,000
10	Cowal	Evolution Mining Limited	OP/UG	1,354	1.03	38=	55,479
11	Gruyere	JV Gold Fields/Gold Road	OP	1,447	1.26	31	83,635
12	Granny Smith	Gold Fields Limited	UG	1,457	5.54	4	73,000
13	Peak	Aurelia Metals Limited	UG	1,504	2.64	15	11,311
14	Deflector	Silver Lake Resources Limited	UG	1,532	5.00	5	27,779
15	St Ives	Gold Fields Limited	OP/UG	1,536	2.93	12	84,500
16	KCGM	Northern Star Resources Limited	OP/UG	1,541	1.20	32	109,215
17	Higginsville Operations	Karora Resources Inc	OP/UG	1,564	2.33	19	38,437
18	Mt Morgans	Dacian Gold Limited	UG	1,594	0.96	40	21,525
19	Agnew Lawlers	Gold Fields Limited	UG	1,599	6.12	2	58,100
20	Bryah	Westgold Resources Limited	UG	1,696	2.60	16	15,719
21	Edna May	Ramelius Resources Limited	OP/UG	1,833	1.92	24	32,804
22	Jaurdi	Beacon Minerals Limited	OP	1,867	1.13	35=	7,088
23	Carosue Dam	Northern Star Resources Limited	OP/UG	1,942	2.10	23	62,973
24	Duketon South	Regis Resources Limited	OP/UG	1,977	1.28	30	55,403
25	Duketon North	Regis Resources Limited	OP	2,042	1.13	35=	22,852
26	Mt Magnet Operations	Ramelius Resources Limited	OP/UG	2,043	2.21	22	28,440
27	Kalgoorlie Operations	Northern Star Resources Limited	UG	2,095	2.50	17=	37,290
28	Mungari	Evolution Mining Limited	OP/UG	2,128	2.88	13	34,834
29	Mineral Hill	Kingston Resources Limited	OP	2,147	1.14	34	3,359
30	Thunderbox	Northern Star Resources Limited	OP/UG	2,218	1.40	28	27,920
31	Murchison	Westgold Resources Limited	UG	2,235	2.50	17=	50,329
32	Waihi	OceanaGold Corporation	UG	2,342	4.26	7	13,700
33	Nicolsons	Pantoro Limited	UG	2,395	4.05	8	7,289
34	Dargues	Aurelia Metals Limited	UG	2,400	3.25	11	8,968
35	Mount Monger	Silver Lake Resources Limited	UG	2,421	2.30	21	21,427
36	Mt Rawdon	Evolution Mining Limited	OP	2,431	0.60	47	13,990
37	Gwalia	St Barbara Limited	UG	2,487	4.60	6	34,078
38	Sunrise Dam	AngloGold Ashanti Limited	OP/UG	2,509	1.69	26	57,000
39	Cracow	Aeris Resources Limited	UG	2,558	2.31	20	10,400
40	Henty	Catalyst Metals Limited	UG	2,658	3.50	9=	5,923
41	Telfer	Newcrest Mining Limited	OP/UG	2,772	0.64	46	84,372
42	Macraes	OceanaGold Corporation	OP/UG	2,815	0.83	42	29,400
43	Plutonic	Superior Gold Inc	OP/UG	2,910	1.32	29	15,946
44	Davyhurst	Ora Banda Mining Limited	OP	2,914	1.50	27	11,720
45	Dalgaranga	Gascoyne Resources Limited	OP	3,135	0.81	43=	13,905
46	Beatons Creek	Novo Resources Corp	OP	3,353	1.03	38=	13,137
47	Mt Carlton	Navarre Minerals Limited	OP	3,539	1.15	33	5,213
48	Hera	Aurelia Metals Limited	UG	6,317	1.12	37	2,250

Notes: Operations shown on a 100% basis.

Gold Production Cost Curve Ranked By Reported AISC



Gold Production Grade Curve Ranked By Average Mill Feed/Head Grade



Gold Mines That Did Not Report All-in Sustaining Costs

Rank	Operation	Company	Mine Type	Grade (g/t)	Au Produced (oz)
1	Fosterville	Agnico Eagle Mines Limited ¹	UG	15.11	81,801
2	KOTH	Red 5 Limited	OP/UG	0.93	24,049
3	Matilda-Wiluna	Wiluna Mining Corporation Limited	UG	3.94	21,824
4	Warrawoona	Calidus Resources Limited	OP	0.78	12,836
5	Ballarat	Shen Yao Holdings Limited	UG	4.80	8,829
6	Kundana EKJV	JV Tribune Resources Limited/Rand Mining Limited	UG	4.74	7,679
7	A1	Kaiser Reef Limited	UG	12.10	3,512
8	Hillgrove	Red River Resources Limited	NM	NA	330
NR	Darlot	Red 5 Limited	UG	NA	NA
NR	Marvel Loch	Minjar Gold Pty Ltd ³	OP/UG	NA	NA
NR	Paddington	Zijin Mining Group Company Limited ³	OP/UG	NA	NA
NR	Pajingo	Minjar Gold Pty Ltd ³	UG	NA	NA
NR	Ravenswood	EMR Capital ³	OP/UG	NA	NA

1. Agnico Eagle Mines Limited does not report quarterly AISC values for individual mines.

2. Wiluna Mining Corporation Limited is in administration.

3. These companies do not provide detailed quarterly production statistics.

Mines Where Gold Is A By-Product

Rank	Operation	Company	Mine Type	Au Produced (oz)
1	Olympic Dam	BHP Group Limited	UG	47,194
2	Prominent Hill	OZ Minerals Limited	UG	35,943
3	Ernest Henry	Evolution Mining Limited	UG	20,655
4	Carrapateena	OZ Minerals Limited	UG	17,932
5	DeGrussa	Sandfire Resources NL	UG	8,215
6	Golden Grove	29Metals Limited	UG	5,235
7	Rosebery	MMG Limited	UG	5,216
8	North Parkes ¹	JV China Molybdenum Co Ltd/Sumitomo Australia Pty Ltd	UG	5,019
9	Eloise	AIC Mines Limited	UG	1,305
10	Jaguar	Aeris Resources Limited	UG	1,200
11	Mt Colin	Aeris Resources Limited	UG	1,100
12	Tritton	Aeris Resources Limited	UG	1,000
13	Wonawinta	Manuka Resources Limited	OP	308

1. North Parkes is a joint venture between China Molybdenum Co Ltd (80%) and Sumitomo Australia Pty Ltd (20%).

Quarter on Quarter Change in AISC and Grade

Statistic	AISC (A\$/oz)	Change (%)	Grade (g/t)	Change (%)
Average (Simple) ¹	2,012	10.3%	2.41	-5.8%
Average (Weighted) ²	1,624	14.2%	1.34	-5.1%
Minimum	-1,701	26.6%	0.51	2.0%
First Quartile ³	1,277	6.5%	0.92	-2.1%
Median ³	1,536	3.6%	1.74	16.0%
Third Quartile ³	2,095	10.5%	2.93	-0.3%
Maximum	6,317	69.8%	11.91	8.2%

Notes: This table of statistics is only based on mines that report an AISC.

1. Simple averages done by number of mining operations.

2. AISC weighted by gold ounces produced, Au grade weighted by ore tonnes milled.

3. First Quartile, Median and Third Quartile values are based on production in the AISC Cost Curve and Grade Curve.

Top 5 Gold Operations - Major Gold Miners

Gold Production (Attributable)			All-in Sustaining Costs		
Rank	Operation	oz	Rank	Operation	A\$/oz
1	Boddington	174,000	1	Cadia Valley	157
2	Cadia Valley	142,194	2	Tropicana (70% AngloGold Ashanti Limited) ¹	1,235
3	Tanami	122,000	3	Boddington	1,277
4	KCGM	109,215	4	Jundee	1,352
5	St Ives	84,500	5	Tanami	1,353

1. Tropicana AISC represents AngloGold Ashanti Limited's 70% attributable interest.

Top 5 Gold Operations - Mid-Tier Gold Miners

Gold Production (Attributable)			All-in Sustaining Costs		
Rank	Operation	oz	Rank	Operation	A\$/oz
1	Cowal	55,479	1	Tropicana (30% Regis Resources Limited) ¹	1,243
2	Duketon South	55,403	2	Cowal	1,354
3	Murchison ¹	50,329	3	Deflector	1,532
4	Tropicana (30% Regis Resources Limited) ²	36,576	4	Bryah	1,696
5	Mungari	34,834	5	Edna May	1,833

1. The Murchison operations also now include the Cue gold mine, which was reported separately previously.

2. Tropicana's gold produced and AISC represents Regis Resources Limited's 30% attributable interest.

Top 5 Gold Operations - Junior Gold Miners

Gold Production (Attributable)			All-in Sustaining Costs		
Rank	Operation	oz	Rank	Operation	A\$/oz
1	Gruyere (50% Gold Road Resources Limited) ¹	41,818	1	Karlawinda	1,166
2	Higginsville Operations	38,437	2	Tomingley	1,191
3	Karlawinda	31,005	3	Costerfield	1,226
4	KOTH - King of the Hills	24,049	4	Gruyere (50% Gold Road Resources Limited) ¹	1,426
5	Matilda-Wiluna	21,824	5	Peak	1,504

1. Gruyere's gold produced and AISC represents Gold Road Resources Limited's 50% attributable interest.

Top 5 Pure Gold Operations (No Base Metal By or Co-Products)

Gold Production (Total)			All-in Sustaining Costs		
Rank	Operation	oz	Rank	Operation	A\$/oz
1	Tanami	122,000	1	Karlawinda	1,166
2	Tropicana ¹	121,920	2	Tomingley	1,191
3	KCGM	109,215	3	Tropicana	1,237
4	St Ives	84,500	4	Jundee	1,352
5	Gruyere ²	83,635	5	Tanami	1,353

1. Tropicana is a joint venture between AngloGold Ashanti Limited (70%) and Regis Resources Limited (30%).

2. Gruyere is a joint venture between Gold Fields Limited (50%) and Gold Road Resources Limited (50%).

General Notes

Data was sourced from company quarterly reports. Aurum Analytics created the cost and grade curves. Mine Type reflects the source of the ore mined for the quarter, OP - Open Pit, UG - Underground, OP/UG - Open Pit and Underground and NM - No Mining.

For operations in joint venture such as Gruyere and Tropicana AISC values were apportioned by equity ownership percentages.

Where AISC values were reported in US\$ and no A\$ equivalent provided, the quarterly average US\$/A\$ exchange rate (0.6836) from the Reserve Bank of Australia was used.

Disclaimer

The information contained in this report is provided for information purposes only. Accordingly, it is provided on the basis of no liability whatsoever to Aurum Analytics, or the directors, officers and employees of Aurum Analytics who will not be responsible for any damages arising from any use made of the information herein. While all care has been taken in its preparation, this information has not been independently audited and Aurum Analytics, or the directors, officers and employees of Aurum Analytics make no representation and give no warranty or undertaking, express or implied, nor assume any responsibility for the authenticity, origin, validity, accuracy or completeness, or for any errors or omissions contained in the information. The assumptions that were made in its preparation were based on publicly available information which has not been verified by Aurum Analytics, or formally audited.



ARGONAUT
The Natural Choice in Resources

About Argonaut

Argonaut is a full-service corporate finance, stockbroking and investment house based in Perth with a Foreign Broker-Dealer Agreement for the USA and an International Dealer Exemption for Canada. Argonaut is technically driven & focused on natural resource companies & businesses that service the metals, mining, energy, industrial and agri-business sectors. Argonaut is led by an experienced executive team with deep industry knowledge, who have previously held senior executive roles at leading international investment and securities houses. In our target markets, Argonaut is recognised as a trusted, independent corporate advisor with a strong track record of success. Argonaut has proven expertise across the full capital spectrum, being able to deliver optimal financing solutions during a company's entire life cycle.



About Aurum Analytics

Aurum Analytics is an independent business providing information and analysis on the Australian and New Zealand gold industry. The information and analysis given is a by-product of Sam Ulrich's PhD research at The University of Western Australia's Centre for Exploration Targeting titled "Insights into the Economic Cost Structure of Gold Mining: From All-in Sustaining Costs to Quantifying Externalities."

Contact

Sam Ulrich

Aurum Analytics

E sam@aurumanalytics.com.au
W www.aurumanalytics.com.au
T +61 439 997 814

Liam Twigger

Argonaut Group

E ltwigger@argonaut.com
W www.argonaut.com
T +61 8 9224 6888