

Australian & New Zealand Gold Operations March Quarter 2023

Overview

The average All-in Sustaining Cost (AISC) for Australia and New Zealand was A\$1,871/oz, which is up 2.4% (A\$44/oz) on the previous quarter average AISC of A\$1,827/oz. Evolution Mining's Ernest Henry operations was the lowest cost producer reporting an AISC of **-A\$3,781/oz** followed by Newcrest's Cadia Valley operations with an AISC of **-A\$225/oz** then by Evolution Mining's Cowal mine (A\$1,072/oz). The average gold spot price for the quarter was A\$2,765/oz (US\$1,889/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\$1,690/oz and Cadia Valley Co-AISC of A\$1,574/oz. The lowest cost "gold only" operations were Evolution Mining's Cowal mine with an AISC of A\$1,072/oz, then Capricorn Metals' Karlawinda mine (A\$1,252/oz) and Northern Star's Jundee mine (A\$1,367/oz).

Newmont's Boddington operation took out top spot as Australia's largest gold producer with 199,000 oz for the quarter, followed by Newcrest's Cadia Valley operations (133,468 oz) and Northern Star's KCGM operations (96,505 oz). Of the mines where gold is a by-product, BHP's Olympic Dam produced the most gold 49,086 oz followed by Oz Minerals' Prominent Hill and Carrapateena mines with 24,215 oz and 19,868 oz respectively.

Grade wise for the companies that report AISC, the average reported mill head/feed grade was 2.31 g/t (Open Pit (OP) - 1.06 g/t, Underground (UG) – 3.38 g/t, Open Pit & Underground (OP/UG) - 1.95 g/t) which was down on the previous quarter, 2.49 g/t (-7.4%). Mandalay Resources' Costerfield mine took out the honour as the operation with the highest average feed grade with 7.71 g/t, followed by Newmont's Tanami mine 5.27 g/t. The lowest grade mine was Evolution's Ernest Henry mine processing an average head grade of 0.48 g/t. The high-grade operations that do not report an AISC were Agnico Eagle's Fosterville mine with 18.55 g/t and Kaiser Reef's A1 mine with 17.30 g/t.

Top 10 Gold Producing Operations

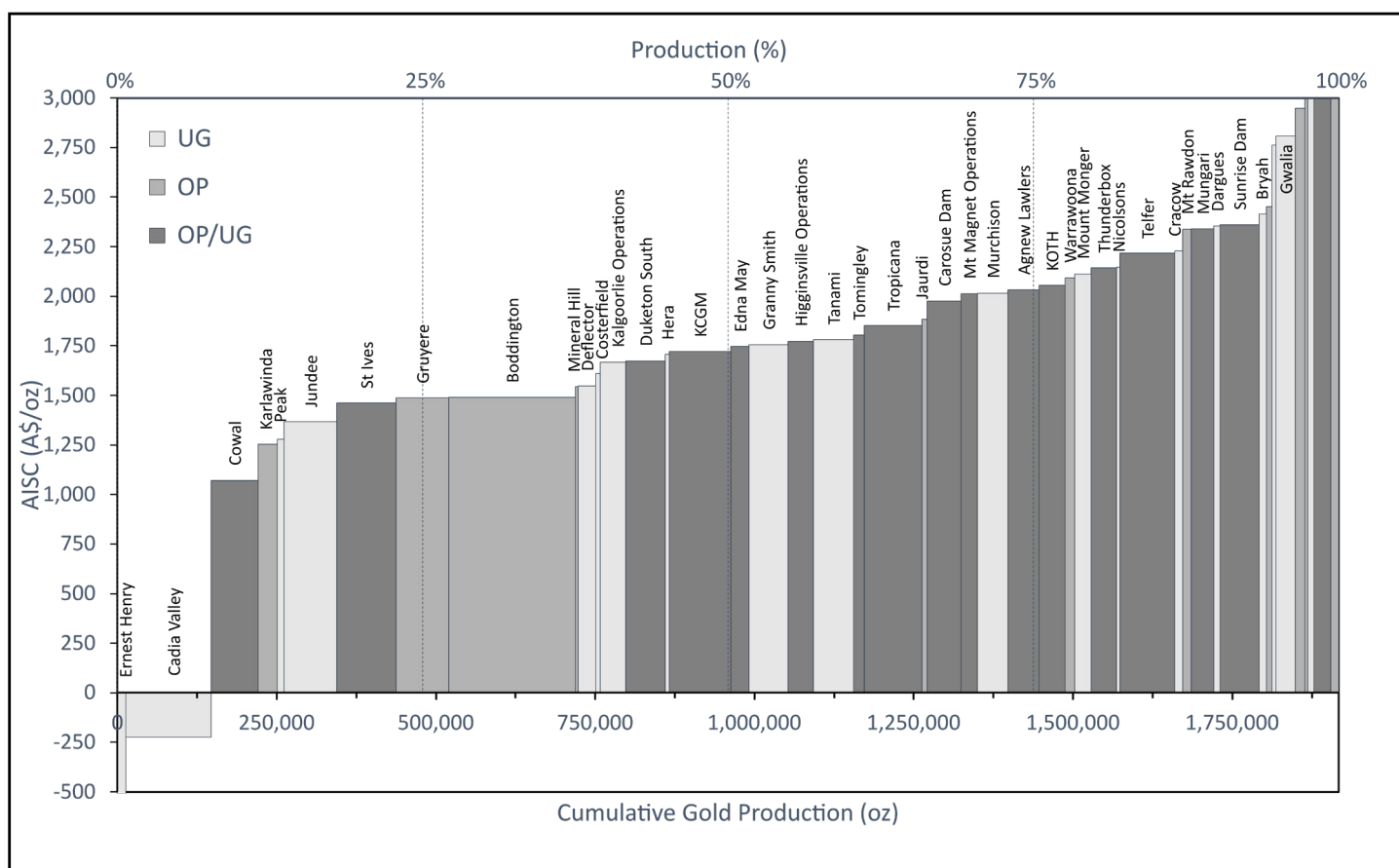
Rank	Operation	Company	Mine Type	Au Produced (oz)
1	Boddington	Newmont Corporation	OP	199,000
2	Cadia Valley	Newcrest Mining Limited	UG	133,468
3	KCGM	Northern Star Resources Limited	OP/UG	96,505
4	St Ives	Gold Fields Limited	OP/UG	92,700
5	Tropicana	JV AngloGold Ashanti Limited/Regis Resources Limited	OP/UG	91,185
6	Fosterville	Agnico Eagle Mines Limited	UG	86,558
7	Telfer	Newcrest Mining Limited	OP/UG	85,452
8	Jundee	Northern Star Resources Limited	UG	83,062
9	Gruyere	JV Gold Fields/Gold Road	OP	82,604
10	Cowal	Evolution Mining Limited	OP/UG	73,746

Gold Operations That Report AISC

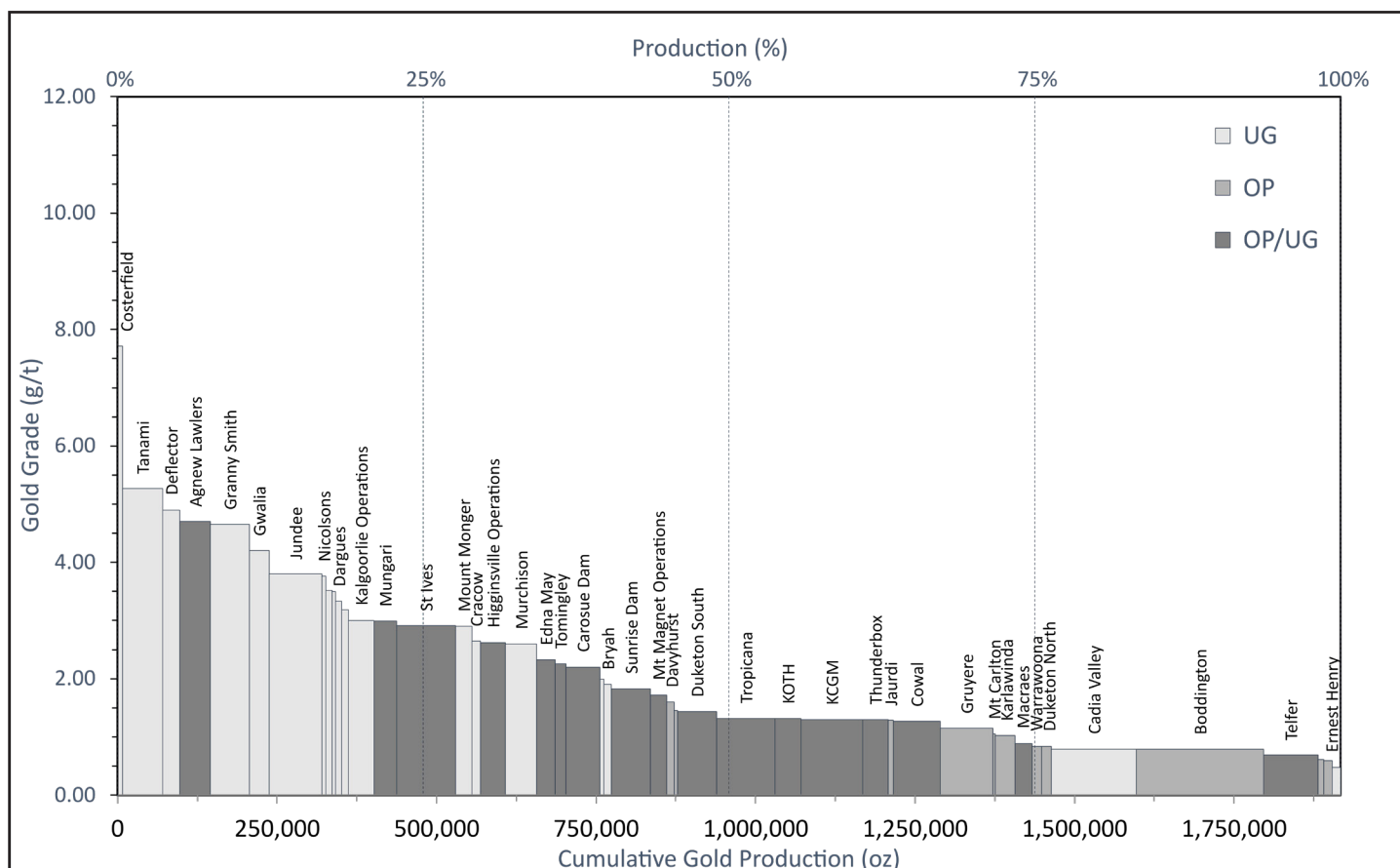
AISC Rank	Operation	Company	Mine Type	AISC (A\$/oz)	Grade (g/t)	Grade Rank	Au Produced (oz)
1	Ernest Henry	Evolution Mining Limited	UG	-3,781	0.48	47	13,194
2	Cadia Valley	Newcrest Mining Limited	UG	-225	0.79	42=	133,468
3	Cowal	Evolution Mining Limited	OP/UG	1,072	1.27	35	73,746
4	Karlawinda	Capricorn Metals Limited	OP	1,252	1.02	38	30,841
5	Peak	Aurelia Metals Limited	UG	1,279	3.19	12	10,146
6	Jundee	Northern Star Resources Limited	UG	1,367	3.80	7	83,062
7	St Ives	Gold Fields Limited	OP/UG	1,461	2.91	15	92,700
8	Gruyere	JV Gold Fields/Gold Road	OP	1,487	1.15	36	82,604
9	Boddington	Newmont Corporation	OP	1,489	0.79	42=	199,000
10	Mineral Hill	Kingston Resources Limited	OP	1,543	1.45	28	4,575
11	Deflector	Silver Lake Resources Limited	UG	1,548	4.90	3	27,161
12	Costerfield	Mandalay Resources Limited	UG	1,609	7.71	1	7,368
13	Kalgoorlie Ops	Northern Star Resources Limited	UG	1,666	3.00	13	40,047
14	Duketon South	Regis Resources Limited	OP/UG	1,673	1.43	29	61,792
15	Hera	Aurelia Metals Limited	UG	1,706	1.99	23	6,411
16	KCGM	Northern Star Resources Limited	OP/UG	1,720	1.30	32=	96,505
17	Edna May	Ramellus Resources Limited	OP/UG	1,746	2.32	20	29,029
18	Granny Smith	Gold Fields Limited	UG	1,756	4.65	5	60,800
19	Higginsville Ops	Karora Resources Inc	OP/UG	1,773	2.62	18	39,827
20	Tanami	Newmont Corporation	UG	1,782	5.27	2	63,000
21	Tomingley	Alkane Resources Limited	OP/UG	1,805	2.26	21	16,641
22	Tropicana	JV AngloGold/Regis Resources	OP/UG	1,851	1.32	30=	91,185
23	Jaurdi	Beacon Minerals Limited	OP	1,884	1.29	34	8,008
24	Carosue Dam	Northern Star Resources Limited	OP/UG	1,976	2.20	22	53,336
25	Mt Magnet Ops	Ramellus Resources Limited	OP/UG	2,012	1.72	26	25,215
26	Murchison	Westgold Resources Limited	UG	2,016	2.60	19	48,609
27	Agnew Lawlers	Gold Fields Limited	OP/UG	2,032	4.70	4	48,000
28	KOTH	Red 5 Limited	OP/UG	2,055	1.32	30=	40,867
29	Warrawoona	Calidus Resources Limited	OP	2,093	0.84	40=	15,187
30	Mount Monger	Silver Lake Resources Limited	UG	2,113	2.90	16	25,702
31	Thunderbox	Northern Star Resources Limited	OP/UG	2,144	1.30	32=	40,020
32	Nicolsons	Pantoro Limited	UG	2,147	3.76	8	5,800
33	Telfer	Newcrest Mining Limited	OP/UG	2,217	0.69	44	85,452
34	Cracow	Aeris Resources Limited	UG	2,229	2.65	17	13,000
35	Mt Rawdon	Evolution Mining Limited	OP	2,338	0.59	46	13,414
36	Mungari	Evolution Mining Limited	OP/UG	2,340	2.99	14	35,378
37	Dargues	Aurelia Metals Limited	UG	2,354	3.33	11	9,559
38	Sunrise Dam	AngloGold Ashanti Limited	OP/UG	2,361	1.83	25	61,000
39	Bryah	Westgold Resources Limited	UG	2,414	1.90	24	11,904
40	Mt Morgans	Dacian Gold Limited	NM	2,452	0.61	45	9,197
41	Henty	Catalyst Metals Limited	UG	2,763	3.50	10	5,461
42	Gwalia	St Barbara Limited	UG	2,809	4.20	6	30,942
43	Duketon North	Regis Resources Limited	OP	2,948	0.84	40=	14,752
44	Mt Carlton	Navarre Minerals Limited	OP	3,078	1.05	37	4,098
45	Waihi	OceanaGold Corporation	UG	3,169	3.52	9	10,300
46	Macraes	OceanaGold Corporation	OP/UG	3,173	0.89	39	26,700
47	Davyhurst	Ora Banda Mining Limited	OP	3,257	1.60	27	12,310

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	18.55	86,558
2	Kundana EKJV	JV Tribune Resources Limited/Rand Mining Limited	UG	4.69	6,820
3	Norseman	JV Pantoro Limited/Tulla Resources Plc	OP/UG	NA	6,631
4	Matilda-Wiluna	Wiluna Mining Corporation Limited ²	NM	0.94	6,209
5	A1	Kaiser Reef Limited	UG	17.30	3,372
NR	Plutonic	Superior Gold Inc ³	UG	NA	NA
NR	Marvel Loch	Minjar Gold Pty Ltd ⁴	OP/UG	NA	NA
NR	Paddington	Zijin Mining Group Company Limited ⁴	OP/UG	NA	NA
NR	Pajingo	Minjar Gold Pty Ltd ⁴	UG	NA	NA
NR	Ravenswood	EMR Capital ⁴	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. Superior Gold Inc usually reports AISC but hadn't at the time this report was compiled.

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	49,086
2	Prominent Hill	OZ Minerals Limited	UG	24,215
3	Carrapateena	OZ Minerals Limited	UG	19,868
4	Ernest Henry	Evolution Mining Limited	UG	13,194
5	North Parkes ¹	JV China Moly/Sumitomo	UG	5,701
6	DeGrussa	Sandfire Resources NL	NM	5,111
7	Rosebery	MMG Limited	UG	5,025
8	Golden Grove	29Metals Limited	UG	3,041
9	Eloise	AIC Mines Limited	UG	1,136
10	Tritton	Aeris Resources Limited	UG	1,000
11	Mt Colin	Aeris Resources Limited	UG	900
12	Jaguar	Aeris Resources Limited	UG	600
13	Wonawinta	Manuka Resources Limited	OP	164

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	1,871	2.4%	2.31	-7.4%
Average (Weighted) ²	1,652	6.7%	1.34	-2.2%
Minimum	-3,781	-0.9%	0.48	-4.0%
First Quartile ³	1,487	11.6%	0.84	-5.6%
Median ³	1,720	9.9%	1.32	-22.8%
Third Quartile ³	2,032	1.8%	2.91	-15.7%
Maximum	3,257	5.2%	7.71	-39.1%

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	199,000	1	Cadia Valley	-225
2	Cadia Valley	133,468	2	Jundee	1,367
3	KCGM	96,505	3	St Ives	1,461
4	St Ives	92,700	4	Boddington	1,489
5	Fosterville	86,558	5	Kalgoorlie Operations	1,666

Top 5 Gold Operations - Mid-Tier Gold Miners

Gold Production (Attributable)			All-in Sustaining Costs		
Rank	Operation	oz	Rank	Operation	A\$/oz
1	Cowal	73,746	1	Ernest Henry	-3,748
2	Duketon South	61,792	2	Cowal	1,042
3	Murchison ¹	48,609	3	Deflector	1,119
4	Mungari	35,378	4	Tropicana (30% Regis Resources Limited) ²	1,458
5	Gwalia	30,942	5	Duketon South	1,757

1. The Murchison operations also now includes 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	41,302	1	Karlawinda	1,252
2	KOTH (King of the Hills)	40,867	2	Peak	1,279
3	Higginsville Operations	39,827	3	Gruyere (50% Gold Road Resources Limited) ¹	1,399
4	Karlawinda	30,841	4	Mineral Hill	1,543
5	Tomingley	16,641	5	Costerfield	1,609

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	KCGM	96,505	1	Cowal	1,072
2	St Ives	92,700	2	Karlawinda	1,252
3	Tropicana ¹	91,185	3	Jundee	1,367
4	Fosterville	86,558	4	St Ives	1,461
5	Jundee	83,062	5	Gruyere ²	1,487

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

2. Gruyere is a joint venture between Gold Road Resources Limited (50%) and Gold Fields 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 (0.6842) from the Reserve Bank of Australia was used.

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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."

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