

Australian & New Zealand Gold Operations

June Quarter 2021 - Final Report

Overview

The average All-in Sustaining Cost (AISC) for Australia and New Zealand was A\$1,433/oz, which is down 1.4% (A\$20/oz) on the previous quarter average AISC of A\$1,453/oz. Evolution Mining's part of the Ernest Henry operations was the lowest cost producer reporting an AISC of **A\$-1,304/oz** followed by Newcrest's Cadia Valley operations with an AISC of **A\$-489/oz**, then by Kirkland Lakes' Fosterville mine (A\$458/oz). The average gold spot price for the quarter was A\$2,358/oz (US\$1,816/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\$676/oz and Cadia Valley Co-AISC of A\$797/oz. The lowest cost "gold only" operations were Kirkland Lakes' Fosterville mine with an AISC of A\$458/oz, then Evolution Mining's Cowal mine (A\$1,106/oz) and Regis Resources' Garden Well operation (A\$1,179/oz).

Newcrest's Cadia Valley operation took out top spot as Australia's largest gold producer with 194,757 oz for the quarter, followed by Newmont's Boddington (188,000 oz) and Kirkland Lake's Fosterville mine (157,993 oz). Of the mines where gold is a by-product, BHP's Olympic Dam produced the most gold 48,478 oz followed by OZ Minerals' Prominent Hill with 35,845 oz and Evolution's part of Ernest Henry with 20,947 oz.

Grade wise for the companies that report AISC, the average reported mill head/feed grade was 3.16 g/t (Open Pit (OP) - 0.98 g/t, Underground (UG) - 5.12 g/t, Open Pit & Underground (OP/UG) - 2.08 g/t) which was up on the previous quarter, 3.05 g/t (3.6%). Kirkland Lake's Fosterville mine again took out the honour as the operation with the highest average feed grade with 29.20 g/t, followed by Mandalay Resources' Costerfield mine 9.91 g/t. The lowest grade mine was Evolution's part in the Ernest Henry mine processing an average head grade of 0.47 g/t. The high-grade operations that do not report an AISC were Tribune Resources' and Rand Mining's share of the East Kundana Joint Venture with 3.71 g/t and Manuka Resources' Mt Boppy mine with 2.81 g/t.

Top 10 Gold Producing Operations

Rank	Operation	Company	Mine Type	Au Produced (oz)
1	Cadia Valley	Newcrest Mining Limited	UG	194,757
2	Boddington	Newmont Corporation	OP	188,000
3	Fosterville	Kirkland Lake Gold Limited	UG	157,993
4	KCGM	Northern Star Resources Limited	OP/UG	137,890
5	Telfer	Newcrest Mining Limited	OP/UG	125,603
6	Tanami	Newmont Corporation	UG	111,000
7	St Ives	Gold Fields Limited	OP/UG	94,517
8	Tropicana	JV AngloGold/IGO Limited/Regis Resources Limited	OP/UG	88,571
9	Jundee	Northern Star Resources Limited	UG	83,562
10	Kalgoorlie Ops	Northern Star Resources Limited	UG	76,175

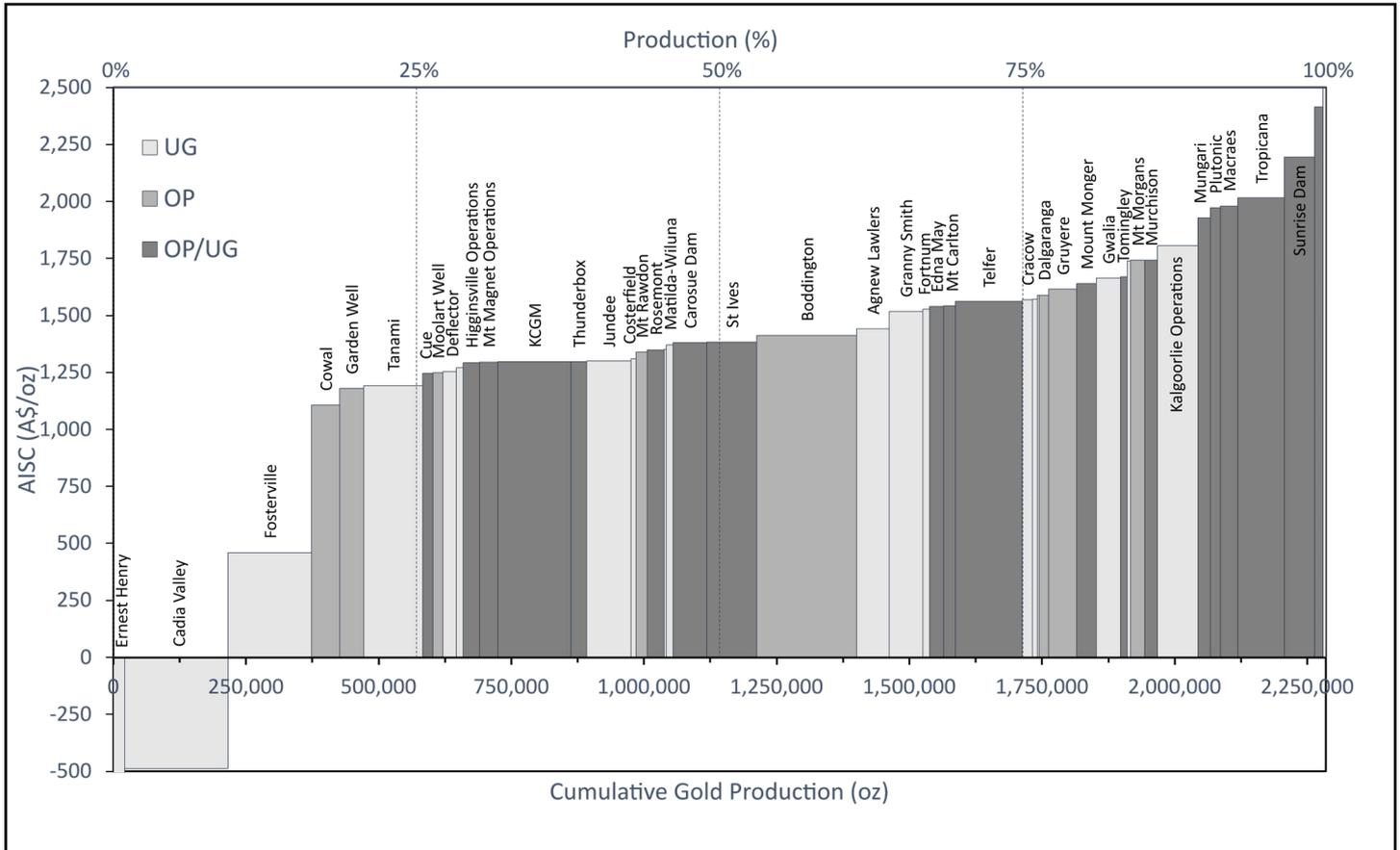
All-in Sustaining Costs & Grade

Gold Operations That Report AISC

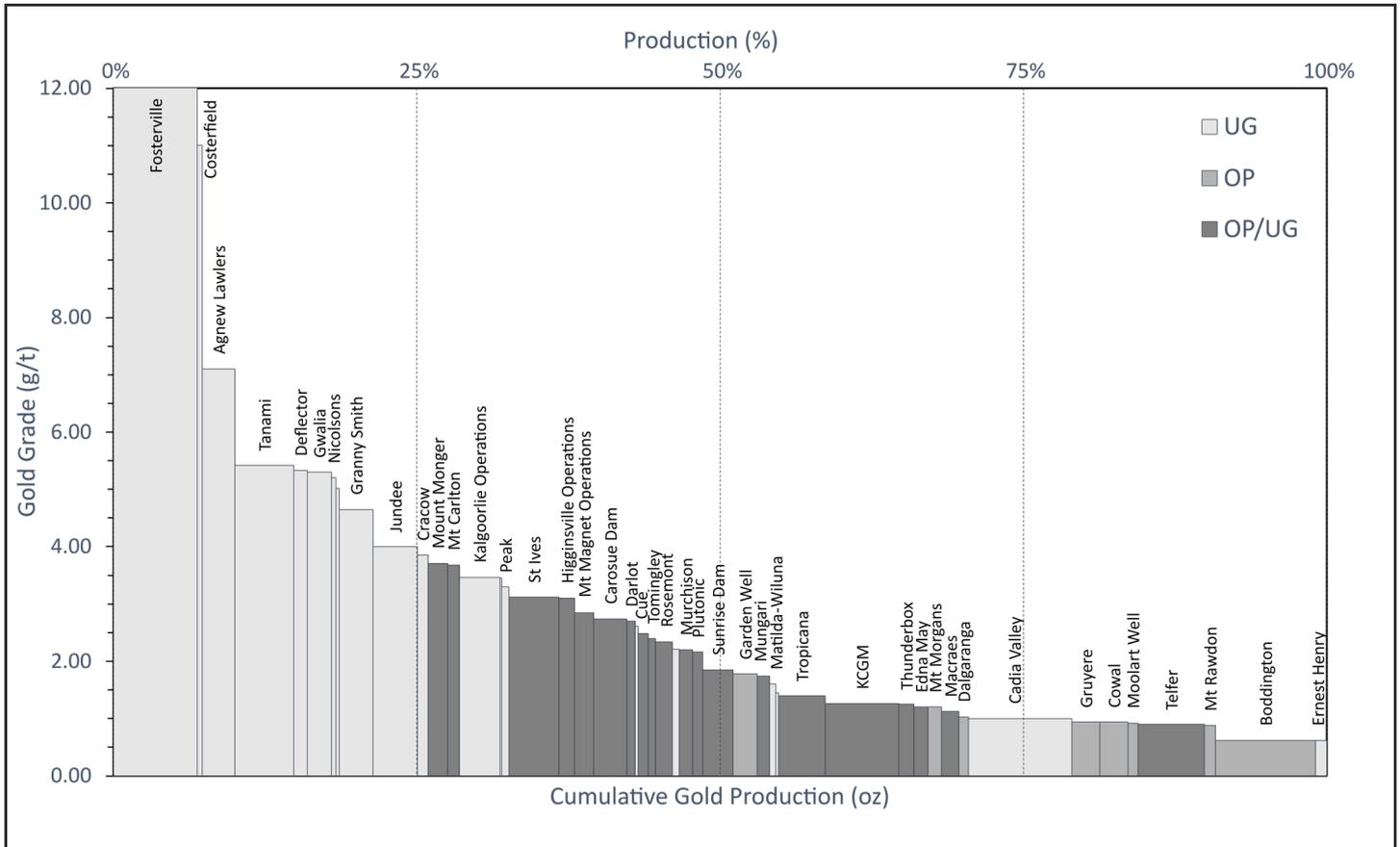
AISC Rank	Operation	Company	Mine Type	AISC (A\$/oz)	Grade (g/t)	Grade Rank	Au Produced (oz)
1	Ernest Henry	Evolution Mining Limited	UG	-1,304	0.47	48	20,947
2	Cadia Valley	Newcrest Mining Limited	UG	-489	0.92	41=	194,757
3	Fosterville	Kirkland Lake Gold Limited	UG	458	29.20	1	157,993
4	Cowal	Evolution Mining Limited	OP	1,106	0.91	43	52,323
5	Garden Well	Regis Resources Limited	OP	1,179	1.52	30=	45,432
6	Tanami	Newmont Corporation	UG	1,193	5.66	4	111,000
7	Cue	Westgold Resources Limited	OP/UG	1,245	2.24	23	19,376
8	Moolart Well	Regis Resources Limited	OP	1,248	0.90	44	19,078
9	Deflector	Silver Lake Resources Limited	UG	1,254	5.50	5	25,369
10	Peak	Aurelia Metals Limited	UG	1,271	2.89	16	13,166
11	Higginsville Operations	Karora Resources Inc	OP/UG	1,293	2.72	18	29,831
12	Mt Magnet Operations	Ramelius Resources Limited	OP/UG	1,294	2.40	19=	35,208
13	KCGM	Northern Star Resources Limited	OP/UG	1,296	1.40	35	137,890
14	Thunderbox	Northern Star Resources Limited	OP/UG	1,297	1.30	36	28,965
15	Jundee	Northern Star Resources Limited	UG	1,299	4.20	10	83,562
16	Costerfield	Mandalay Resources Limited	UG	1,310	9.91	2	9,959
17	Mt Rawdon	Evolution Mining Limited	OP	1,338	0.84	46	20,745
18	Rosemont	Regis Resources Limited	OP/UG	1,349	2.14	25	32,319
19	Hera	Aurelia Metals Limited	UG	1,352	1.49	33	4,465
20	Matilda-Wiluna	Wiluna Mining Corporation Limited	UG	1,371	1.50	32	12,524
21	Carosue Dam	Northern Star Resources Limited	OP/UG	1,380	2.40	19=	63,181
22	St Ives	Gold Fields Limited	OP/UG	1,382	2.88	17	94,517
23	Boddington	Newmont Corporation	OP	1,412	0.65	47	188,000
24	Agnew Lawlers	Gold Fields Limited	UG	1,441	5.75	3	60,777
25	Granny Smith	Gold Fields Limited	UG	1,517	4.52	9	63,629
26	Fortnum	Westgold Resources Limited	UG	1,527	2.06	26	12,674
27	Edna May	Ramelius Resources Limited	OP/UG	1,538	1.27	37	26,632
28	Mt Carlton	Evolution Mining Limited	OP/UG	1,541	3.75	13	22,180
29	Telfer	Newcrest Mining Limited	OP/UG	1,562	0.87	45	125,603
30	Cracow	Aeris Resources Limited	UG	1,568	4.19	11	19,889
31	Nicolsons	Pantoro Limited	UG	1,570	4.98	7	8,880
32	Waihi	OceanaGold Corporation	UG	1,588	3.13	15	3,900
33	Dalgaranga	Gascoyne Resources Limited	OP	1,589	0.98	40	17,416
34	Gruyere	JV Gold Fields/Gold Road	OP	1,614	0.92	41=	53,132
35	Mount Monger	Silver Lake Resources Limited	OP/UG	1,639	4.00	12	36,757
36	Gwalia	St Barbara Limited	UG	1,663	5.30	6	45,157
37	Tomingley	Alkane Resources Limited	OP/UG	1,669	2.16	24	13,500
38	Henty	Catalyst Metals Limited	UG	1,740	4.90	8	6,327
39	Mt Morgans	Dacian Gold Limited	OP	1,742	1.10	38	25,558
40	Murchison	Westgold Resources Limited	OP/UG	1,742	1.97	27	24,858
41	Kalgoorlie Operations	Northern Star Resources Limited	UG	1,805	3.40	14	76,175
42	Mungari	Evolution Mining Limited	OP/UG	1,927	1.52	30=	22,770
43	Plutonic	Superior Gold Inc	OP/UG	1,972	1.90	28	19,356
44	Macraes	OceanaGold Corporation	OP/UG	1,980	1.09	39	32,669
45	Tropicana	JV AngloGold/IGO Limited/Regis Resources Limited	OP/UG	2,016	1.42	34	88,571
46	Sunrise Dam	AngloGold Ashanti Limited	OP/UG	2,194	1.70	29	57,000
47	Darlot	Red 5 Limited	OP/UG	2,414	2.38	21	15,251
48	Dargues	Aurelia Metals Limited	UG	2,696	2.37	22	5,234

Notes: Operations shown on a 100% basis, except Northern Star's Kalgoorlie Operations. Ballarat usually reports AISC but had not at the time this report was compiled.

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	Kundana EKJV	JV Tribune Resources Limited/Rand Mining Limited	UG	3.71	15,863
2	Beatons Creek	Novo Resources Corp	OP	1.30	14,890
3	Davyhurst	Ora Banda Mining Limited	OP/UG	1.81	10,356
4	Jaurdi	Beacon Minerals Limited	OP	1.57	6,846
5	Mt Boppy	Manuka Resources Limited	OP	2.81	4,965
6	Hillgrove	Red River Resources Limited	UG	1.40	1,521
7	Red October	Matsa Resources Limited	UG	NA	881
NR	Paddington	Zijin Mining Group Company Limited ¹	OP/UG	NA	NA
NR	Marvel Loch	Minjar Gold Pty Ltd ¹	OP/UG	NA	NA
NR	Ravenswood	EMR Capital ¹	OP/UG	NA	NA
NR	Pajingo	Minjar Gold Pty Ltd ¹	UG	NA	NA
NR	Ballarat	Shen Yao Holdings Limited ²	UG	NA	NA
NR	Morning Star	AuStar Gold Limited ¹	UG	NA	NA

1. These companies did not provide detailed quarterly production statistics.

2. These companies usually report AISC but had not at the time of compiling this report.

Mines Where Gold Is A By-Product

Rank	Operation	Company	Mine Type	Au Produced (oz)
1	Olympic Dam	BHP Billiton Limited	UG	48,478
2	Prominent Hill	OZ Minerals Limited	UG	35,845
3	Ernest Henry	Evolution Mining Limited	UG	20,947
4	Carrapateena	OZ Minerals Limited	UG	20,775
5	Rosebery	MMG Limited	UG	10,076
6	DeGrussa	Sandfire Resources NL	UG	9,016
7	North Parkes ¹	JV China Moly/Sumitomo	UG	6,443
NR	Golden Grove	EMR Capital	UG	NA
NR	Jaguar	Washington H. Soul Pattinson and Company Limited	UG	NA

1. North Parkes is a joint venture between China Molybdenum Co Ltd (80%) and Sumitomo Australia Pty Ltd (20%). It had not reported its gold production at the time of compiling this report.

Quarter on Quarter Change in AISC and Grade

Statistic	AISC (A\$/oz)	Change (%)	Grade (g/t)	Change (%)
Average (Simple) ¹	1,433	-1.4%	3.16	3.6%
Average (Weighted) ²	1,237	-6.8%	1.47	2.4%
Minimum	-1,304	-27.0%	0.47	-7.8%
First Quartile ³	1,193	10.7%	1.00	6.4%
Median ³	1,382	-1.9%	1.85	6.3%
Third Quartile ³	1,568	-13.7%	4.00	21.2%
Maximum	2,696	12.2%	29.20	47.5%

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	Cadia Valley	194,757	1	Cadia Valley	-489
2	Boddington	188,000	2	Fosterville	458
3	Fosterville	157,993	3	Tanami	1,193
4	KCGM	137,890	4	KCGM	1,296
5	Telfer	125,603	5	Thunderbox	1,297

Top 5 Gold Operations - Mid-Tier Gold Miners

Gold Production (Attributable)			All-in Sustaining Costs		
Rank	Operation	oz	Rank	Operation	A\$/oz
1	Cowal	52,323	1	Ernest Henry	-1,304
2	Garden Well	45,432	2	Cowal	1,106
3	Gwalia	45,157	3	Garden Well	1,179
4	Mount Monger	36,757	4	Cue	1,245
5	Mt Magnet Operations	35,208	5	Moolart Well	1,248

Top 5 Gold Operations - Junior Gold Miners

Gold Production (Attributable)			All-in Sustaining Costs		
Rank	Operation	oz	Rank	Operation	A\$/oz
1	Higginsville Operations	29,831	1	Peak	1,271
2	Gruyere (50% Gold Road Resources Limited) ¹	26,566	2	Higginsville Operations	1,293
3	Mt Morgans	25,558	3	Costerfield	1,310
4	Cracow	19,889	4	Hera	1,352
5	Plutonic	19,356	5	Matilda-Wiluna	1,371

1. Gruyere 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	Fosterville	157,993	1	Fosterville	458
2	KCGM	137,890	2	Cowal	1,106
3	Tanami	111,000	3	Garden Well	1,179
4	St Ives	94,517	4	Tanami	1,193
5	Tropicana ¹	88,571	5	Cue	1,245

1. Tropicana is a joint venture between AngloGold Ashanti Limited (70%) and Regis Resources Limited (30%). IGO Limited had part production during the quarter.

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. Kalgoorlie Operations is based on Northern Star Resources Limited's reported AISC only as Tribune Resources Limited and Rand Mining Limited do not report an AISC.

Where AISC values were reported in US\$ and no A\$ equivalent provided, the quarterly average US\$/A\$ exchange rate (0.7703) 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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