

Australian & New Zealand Gold Operations September Quarter 2023

Overview

The average All-in Sustaining Cost (AISC) for Australia and New Zealand was A\$1,953/oz, which is down 3.7% (A\$75/oz) on the previous quarter average AISC of A\$2,027/oz. Evolution Mining's Ernest Henry operation was the lowest cost producer reporting an AISC of **-A\$2,275/oz** followed by Newcrest Mining's Cadia Valley mine with an AISC of A\$640/oz then by Evolution Mining's Cowal and Capricorn Metals' Karlawinda mines both on (A\$1,315/oz). The average gold spot price for the quarter was A\$2,945/oz (US\$1,928/oz). It should be noted that Ernest Henry and Cadia Valley benefit from 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\$1,516/oz and Cadia Valley Co-AISC of A\$1,680/oz. The lowest cost "gold only" operations were Evolution Mining's Cowal mine and Capricorn Metals' Karlawinda mine with an AISC of A\$1,315/oz, followed by Newmont's Tanami operations (A\$1,359/oz).

Newmont's Boddington operation took out top spot as Australia's largest gold producer with 181,000 oz for the quarter, followed by their Tanami operations (123,000 oz) and Newcrest's Cadia Valley operations (122,663 oz). Of the mines where gold is a by-product, BHP's Olympic Dam produced the most gold 53,028 oz followed by their Prominent Hill mine with 22,031 oz, then Evolution Mining's Ernest Henry mine with 20,399 oz.

Grade wise for the companies that report AISC, the average reported mill head/feed grade was 2.33 g/t (Open Pit (OP) - 1.10 g/t, Underground (UG) - 3.19 g/t, Open Pit & Underground (OP/UG) - 2.01 g/t) which was down on the previous quarter, 2.54 g/t (-7.9%). Mandalay Resources' Costerfield mine took out the honour as the operation with the highest average feed grade with 9.56 g/t, followed by Newmont's Tanami operations 5.57 g/t. The lowest grade mine was Evolution's Ernest Henry mine processing an average head grade of 0.49 g/t. The high-grade operations that do not report an AISC were Agnico Eagle's Fosterville mine with 13.22 g/t and Kaiser Reef's A1 mine with 7.83 g/t.

Top 10 Gold Producing Operations

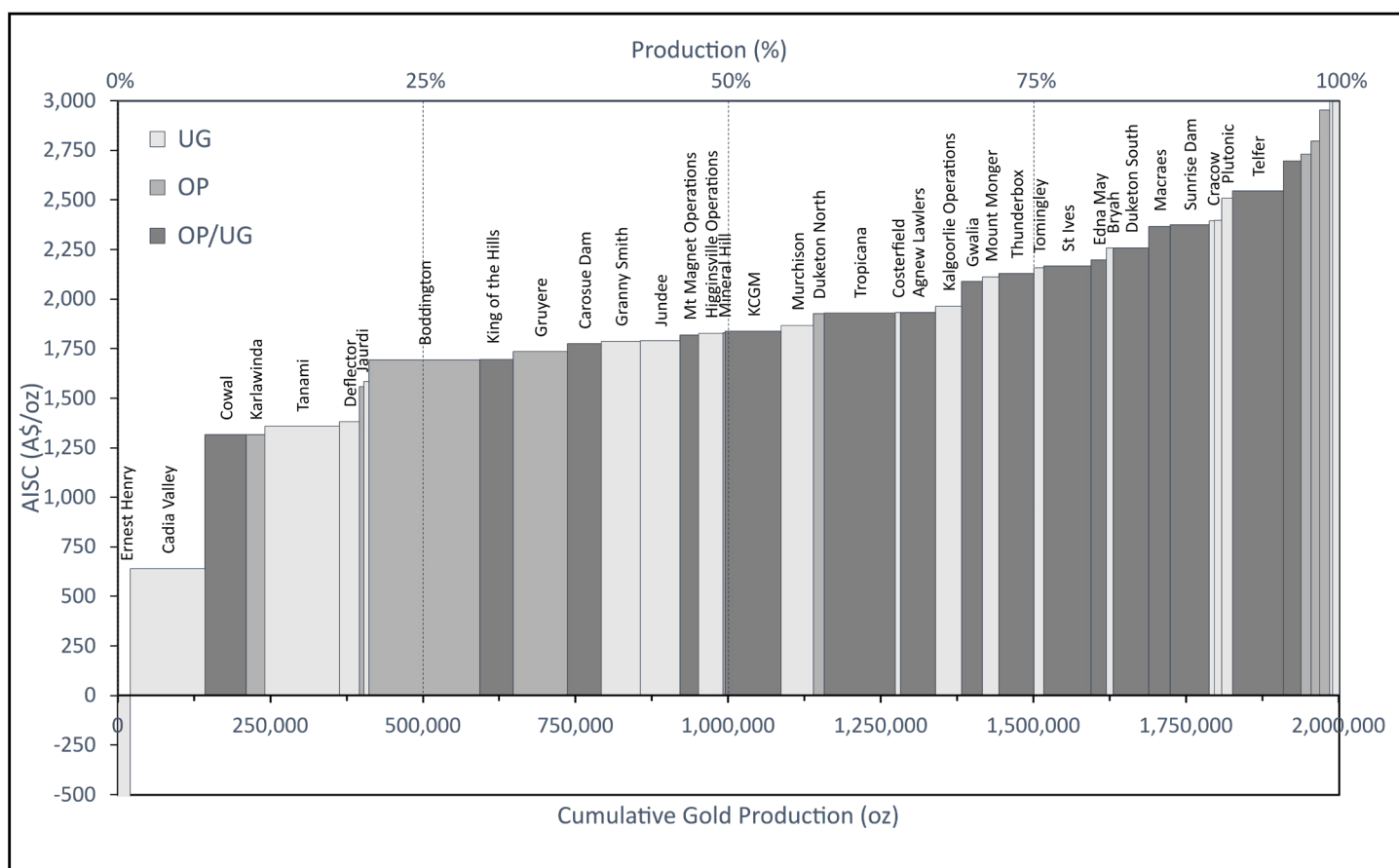
Rank	Operation	Company	Mine Type	Au Produced (oz)
1	Boddington	Newmont Corporation	OP	181,000
2	Tanami	Newmont Corporation	UG	123,000
3	Cadia Valley	Newcrest Mining Limited	UG	122,663
4	Tropicana	JV AngloGold Ashanti Limited/Regis Resources Limited	OP/UG	116,643
5	KCGM	Northern Star Resources Limited	OP/UG	91,525
6	Gruyere	JV Gold Fields Limited/Gold Road Resources Limited	OP	88,668
7	Telfer	Newcrest Mining Limited	OP/UG	83,729
8	St Ives	Gold Fields Limited	OP/UG	78,200
9	Cowal	Evolution Mining Limited	OP/UG	67,861
10	Jundee	Northern Star Resources Limited	UG	64,550

Gold Operations That Report AISC

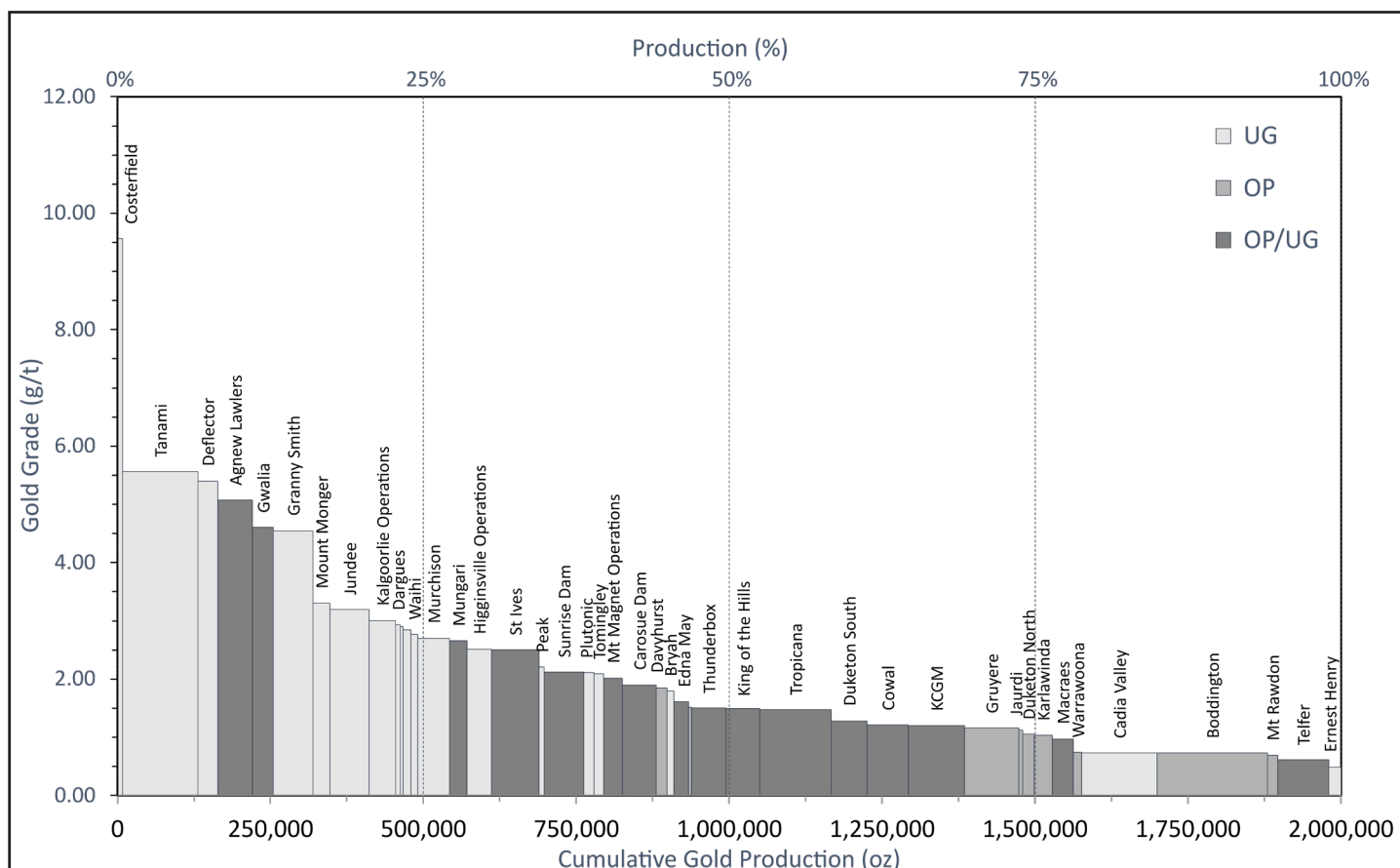
AISC Rank	Operation	Company	Mine Type	AISC (A\$/oz)	Grade (g/t)	Grade Rank	Au Produced (oz)
1	Ernest Henry	Evolution Mining Limited	UG	-2,275	0.49	44	20,399
2	Cadia Valley	Newcrest Mining Limited	UG	640	0.73	40=	122,663
3=	Cowal	Evolution Mining Limited	OP/UG	1,315	1.21	32	67,861
3=	Karlawinda	Capricorn Metals Limited	OP	1,315	1.03	37	29,700
5	Tanami	Newmont Corporation	UG	1,359	5.57	2	123,000
6	Deflector	Silver Lake Resources Limited	UG	1,382	5.40	3	32,287
7	Jaurdi	Beacon Minerals Limited	OP	1,558	1.12	35	7,157
8	Peak	Aurelia Metals Limited	UG	1,584	2.21	18	8,637
9	Boddington	Newmont Corporation	OP	1,692	0.73	40=	181,000
10	King of the Hills	Red 5 Limited	OP/UG	1,696	1.49	29	55,009
11	Gruyere	JV Gold Fields/Gold Road	OP	1,736	1.16	34	88,668
12	Carosue Dam	Northern Star Resources Limited	OP/UG	1,775	1.90	23	55,647
13	Granny Smith	Gold Fields Limited	UG	1,787	4.55	6	64,500
14	Jundee	Northern Star Resources Limited	UG	1,789	3.20	8	64,550
15	Mt Magnet Operations	Rameliuss Resources Limited	OP/UG	1,817	2.01	22	30,710
16	Higginsville Operations	Karora Resources Inc	UG	1,826	2.51	16	39,547
17	Mineral Hill	Kingston Resources Limited	OP	1,830	1.51	27	4,229
18	KCGM	Northern Star Resources Limited	OP/UG	1,839	1.20	33	91,525
19	Murchison	Westgold Resources Limited	UG	1,867	2.70	14	52,079
20	Duketon North	Regis Resources Limited	OP	1,925	1.05	36	17,858
21	Tropicana	JV AngloGold/Regis Resources	OP/UG	1,930	1.47	30	116,643
22	Costerfield	Mandalay Resources Limited	UG	1,931	9.56	1	8,377
23	Agnew Lawlers	Gold Fields Limited	OP/UG	1,933	5.07	4	57,200
24	Kalgoorlie Operations	Northern Star Resources Limited	UG	1,963	3.00	9	42,827
25	Gwalia	Genesis Minerals Limited	OP/UG	2,088	4.60	5	34,066
26	Mount Monger	Silver Lake Resources Limited	UG	2,113	3.30	7	27,641
27	Thunderbox	Northern Star Resources Limited	OP/UG	2,130	1.50	28	56,940
28	Tomingley	Alkane Resources Limited	UG	2,156	2.09	21	15,855
29	St Ives	Gold Fields Limited	OP/UG	2,167	2.50	17	78,200
30	Edna May	Rameliuss Resources Limited	OP/UG	2,196	1.61	26	24,813
31	Bryah	Westgold Resources Limited	UG	2,256	1.80	25	11,025
32	Duketon South	Regis Resources Limited	OP/UG	2,258	1.28	31	58,574
33	Macraes	OceanaGold Corporation	OP/UG	2,367	0.97	38	34,700
34	Sunrise Dam	AngloGold Ashanti Limited	OP/UG	2,374	2.12	19	64,000
35	Dargues	Aurelia Metals Limited	UG	2,394	2.93	10	8,135
36	Cracow	Aeris Resources Limited	UG	2,398	2.84	12	12,700
37	Plutonic	Catalyst Metals Limited	UG	2,507	2.11	20	17,091
38	Telfer	Newcrest Mining Limited	OP/UG	2,545	0.61	43	83,729
39	Mungari	Evolution Mining Limited	OP/UG	2,698	2.66	15	28,692
40	Mt Rawdon	Evolution Mining Limited	OP	2,732	0.69	42	16,154
41	Warrawoona	Calidus Resources Limited	OP	2,797	0.74	39	13,969
42	Davyhurst	Ora Banda Mining Limited	OP	2,953	1.85	24	16,952
43	Henty	Catalyst Metals Limited	UG	3,215	2.90	11	4,563
44	Waihi	OceanaGold Corporation	UG	3,353	2.77	13	10,900

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	13.22	59,790
2	Norseman	Pantoro Limited	OP/UG	1.76	13,145
3	Kundana EKJV	JV Tribune Resources Limited/Rand Mining Limited	UG	3.95	9,408
4	Matilda-Wiluna	Wiluna Mining Corporation Limited ²	NM	0.85	4,946
5	A1	Kaiser Reef Limited	UG	7.83	2,940
6	Mt Boppy	Manuka Resources Limited	OP	1.70	2,762
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	53,028
2	Prominent Hill	BHP Group Limited	UG	22,031
3	Ernest Henry	Evolution Mining Limited	UG	20,399
4	Carrapateena	BHP Group Limited	UG	19,393
5	Rosebery	MMG Limited	UG	7,489
6	North Parkes ¹	JV China Molybdenum Co Ltd/Sumitomo Australia Pty Ltd	UG	5,881
7	Golden Grove	29Metals Limited	UG	4,281
8	Eloise	AIC Mines Limited	UG	1,820
9	Mt Colin	Aeris Resources Limited	UG	1,100
10	Tritton	Aeris Resources Limited	UG	1,000
11	Jaguar	Aeris Resources Limited	UG	400

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	1,953	-3.7%	2.33	-7.9%
Average (Weighted) ²	1,809	7.4%	1.33	-5.7%
Minimum	-2,275	-909.6%	0.49	48.5%
First Quartile ³	1,692	15.7%	1.03	10.8%
Median ³	1,839	8.8%	1.49	-6.9%
Third Quartile ³	2,130	5.1%	2.70	-10.0%
Maximum	3,353	-51.4%	9.56	19.5%

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	181,000	1	Cadia Valley	640
2	Tanami	123,000	2	Tanami	1,359
3	Cadia Valley	122,663	3	Boddington	1,692
4	KCGM	91,525	4	Carosue Dam	1,775
5	Telfer	83,729	5	Granny Smith	1,787

Top 5 Gold Operations - Mid-Tier Gold Miners

Gold Production (Attributable)			All-in Sustaining Costs		
Rank	Operation	oz	Rank	Operation	A\$/oz
1	Cowal	67,861	1	Ernest Henry	-2,275
2	Duketon South	58,574	2	Cowal	1,315
3	King of the Hills	55,009	3	Deflector	1,382
4	Murchison	52,079	4	King of the Hills	1,696
5	Tropicana (30% Regis Resources Limited) ¹	34,993	5	Mt Magnet Operations	1,817

1. Tropicana's gold produced 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	44,321	1	Karlawinda	1,315
2	Higginsville Operations	41,278	2	Jaurdi	1,558
3	Karlawinda	24,280	3	Peak	1,584
4	Plutonic	15,515	4	Gruyere (50% Gold Road Resources Limited) ¹	1,682
5	Davyhurst	16,319	5	Higginsville Operations	1,826

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	123,000	1	Cowal	1,315
2	Tropicana ¹	116,643	2	Karlawinda	1,315
3	KCGM	91,525	3	Tanami	1,359
4	Gruyere ²	88,668	4	Jaurdi	1,558
5	St Ives	78,200	5	King of the Hills	1,696

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 (0.6549) 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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