

# Australian & New Zealand Gold Operations December Quarter 2023

## Overview

The average All-in Sustaining Cost (AISC) for Australia and New Zealand was A\$1,877/oz, which is down 3.9% (A\$76/oz) on the previous quarter average AISC of A\$1,953/oz. Evolution Mining's North Parkes, Ernest Henry and Cowal operations were the lowest cost producers reporting an AISC of **-A\$5,677/oz**, **-A1,470/oz** and A\$1,226/oz respectively. The average gold spot price for the quarter was A\$3,041/oz (US\$1,977/oz). It should be noted that North Parkes and Ernest Henry benefit from significant base metal by-products. Aurum Analytics' estimate of these operations AISC on a co-product basis (Co-AISC) is as follows; North Parkes Co-AISC of A\$3,310/oz and Ernest Henry Co-AISC of A\$1,955/oz. The lowest cost "gold only" operations were Evolution Mining's Cowal mine with an AISC of A\$1,226, Capricorn Metals' Karlawinda mine (A\$1,333/oz), followed by Gold Fields' Granny Smith operations (A\$1,363/oz).

Newmont's Boddington operation took out top spot as Australia's largest gold producer with 156,000 oz for the quarter, followed by their Tanami operations (136,000 oz) and AngloGold and Regis Resources' Tropicana operations (129,313 oz). Of the mines where gold is a by-product, BHP's Olympic Dam produced the most gold 55,828 oz followed by their Prominent Hill mine with 25,779 oz, then their Carrapateena mine with 22,272 oz.

Grade wise for the companies that report AISC, the average reported mill head/feed grade was 2.55 g/t (Open Pit (OP) - 0.95 g/t, Underground (UG) – 3.68 g/t, Open Pit & Underground (OP/UG) - 1.98 g/t) which was up on the previous quarter, 2.33 g/t (9.3%). Mandalay Resources' Costerfield mine took out the honour as the operation with the highest average feed grade with 13.14 g/t, followed by Gold Fields' Agnew operations 7.40 g/t. The lowest grade mine was Evolution's North Parkes mine processing an average head grade of 0.21 g/t. The high-grade operations that do not report an AISC were Agnico Eagle's Fosterville mine with 8.79 g/t and Kaiser Reef's A1 mine with 6.20 g/t.

## Top 10 Gold Producing Operations

Rank	Operation	Company	Mine Type	Au Produced (oz)
1	Boddington	Newmont Corporation	OP	156,000
2	Tanami	Newmont Corporation	UG	136,000
3	Tropicana	JV AngloGold Ashanti Limited/Regis Resources Limited	OP/UG	129,313
4	KCGM	Northern Star Resources Limited	OP/UG	124,102
5	St Ives	Gold Fields Limited	OP/UG	109,400
6	Cadia Valley <sup>1</sup>	Newmont Corporation	UG	97,000
7	Granny Smith	Gold Fields Limited	UG	85,400
8	Agnew Lawlers	Gold Fields Limited	UG	76,000
9	Jundee	Northern Star Resources Limited	UG	75,101
10	Gruyere	JV Gold Fields Limited/Gold Road Resources Limited	OP	74,659

1. Cadia Valley's production is for only part of the quarter under Newmont Corporations' ownership.

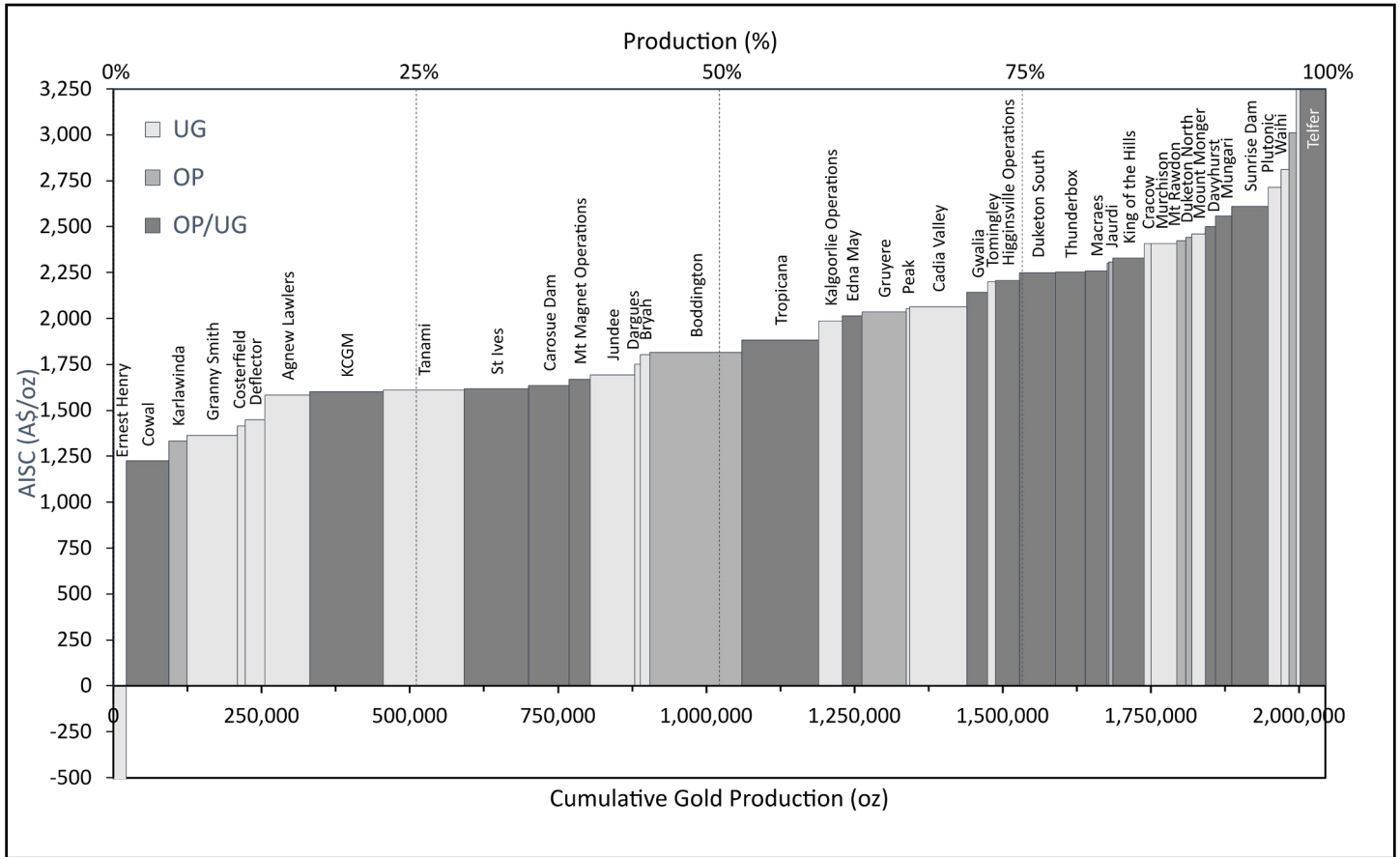
## Gold Operations That Report AISC

AISC Rank	Operation	Company	Mine Type	AISC (A\$/oz)	Grade (g/t)	Grade Rank	Au Produced (oz)
1	North Parkes	Evolution Mining Limited	-5,677	UG	0.21	45	1,011
2	Ernest Henry	Evolution Mining Limited	-1,470	UG	0.49	44	20,371
3	Cowal	Evolution Mining Limited	1,226	OP/UG	1.22	33	71,848
4	Karlawinda	Capricorn Metals Limited	1,333	OP	1.00	36	30,399
5	Granny Smith	Gold Fields Limited	1,363	UG	5.71	4	85,400
6	Costerfield	Mandalay Resources Limited	1,415	UG	13.14	1	13,016
7	Deflector	Silver Lake Resources Limited	1,449	UG	5.60	5	33,200
8	Agnew Lawlers	Gold Fields Limited	1,584	UG	7.40	2	76,000
9	KCGM	Northern Star Resources Limited	1,602	OP/UG	1.40	29=	124,102
10	Tanami	Newmont Corporation	1,609	UG	7.06	3	136,000
11	St Ives	Gold Fields Limited	1,616	OP/UG	3.23	11	109,400
12	Carosue Dam	Northern Star Resources Limited	1,634	OP/UG	2.20	20	67,926
13	Mt Magnet Operations	Ramelius Resources Limited	1,668	OP/UG	2.69	16	35,353
14	Jundee	Northern Star Resources Limited	1,693	UG	3.70	7	75,101
15	Dargues	Aurelia Metals Limited	1,750	UG	3.49	9	9,281
16	Bryah	Westgold Resources Limited	1,804	UG	2.60	17	15,866
17	Boddington	Newmont Corporation	1,816	OP	0.68	41	156,000
18	Tropicana	JV AngloGold/Regis Resources	1,884	OP/UG	1.96	23	129,313
19	Kalgoorlie Operations	Northern Star Resources Limited	1,985	UG	2.90	12	39,450
20	Edna May	Ramelius Resources Limited	2,014	OP/UG	1.93	24	33,171
21	Gruyere	JV Gold Fields/Gold Road	2,034	OP	1.11	35	74,659
22	Peak	Aurelia Metals Limited	2,054	UG	1.44	28	5,611
23	Cadia Valley <sup>1</sup>	Newmont Corporation	2,063	UG	0.72	39	97,000
24	Gwalia	Genesis Minerals Limited	2,141	OP/UG	4.60	6	35,296
25	Tomingley	Alkane Resources Limited	2,200	UG	1.84	26	13,182
26	Higginsville Operations	Karora Resources Inc	2,207	OP/UG	2.75	15	40,295
27	Duketon South	Regis Resources Limited	2,250	OP/UG	1.28	32	60,763
28	Thunderbox	Northern Star Resources Limited	2,251	OP/UG	1.40	29=	50,528
29	Macraes	OceanaGold Corporation	2,258	OP/UG	0.82	38	36,117
30	Mineral Hill	Kingston Resources Limited	2,302	OP	1.34	31	3,409
31	Jaurdi	Beacon Minerals Limited	2,307	OP	1.15	34	6,708
32	King of the Hills	Red 5 Limited	2,328	OP/UG	1.45	27	53,018
33=	Cracow	Aeris Resources Limited	2,407	UG	2.80	13=	11,100
33=	Murchison	Westgold Resources Limited	2,407	UG	2.30	19	43,372
35	Mt Rawdon	Evolution Mining Limited	2,423	OP	0.67	42	15,618
36	Duketon North	Regis Resources Limited	2,441	OP	0.92	37	9,651
37	Mount Monger	Silver Lake Resources Limited	2,461	UG	2.80	13=	23,429
38	Davyhurst	Ora Banda Mining Limited	2,499	OP/UG	2.10	21	16,340
39	Mungari	Evolution Mining Limited	2,558	OP/UG	2.07	22	28,130
40	Sunrise Dam	AngloGold Ashanti Limited	2,611	OP/UG	1.92	25	61,000
41	Plutonic	Catalyst Metals Limited	2,713	UG	2.43	18	21,904
42	Waihi	OceanaGold Corporation	2,813	UG	3.44	10	13,340
43	Warrawoona	Calidus Resources Limited	3,011	OP	0.71	40	11,980
44	Henty	Catalyst Metals Limited	3,447	UG	3.52	8	6,640
45	Telfer <sup>1</sup>	Newmont Corporation	3,968	OP/UG	0.65	43	43,000

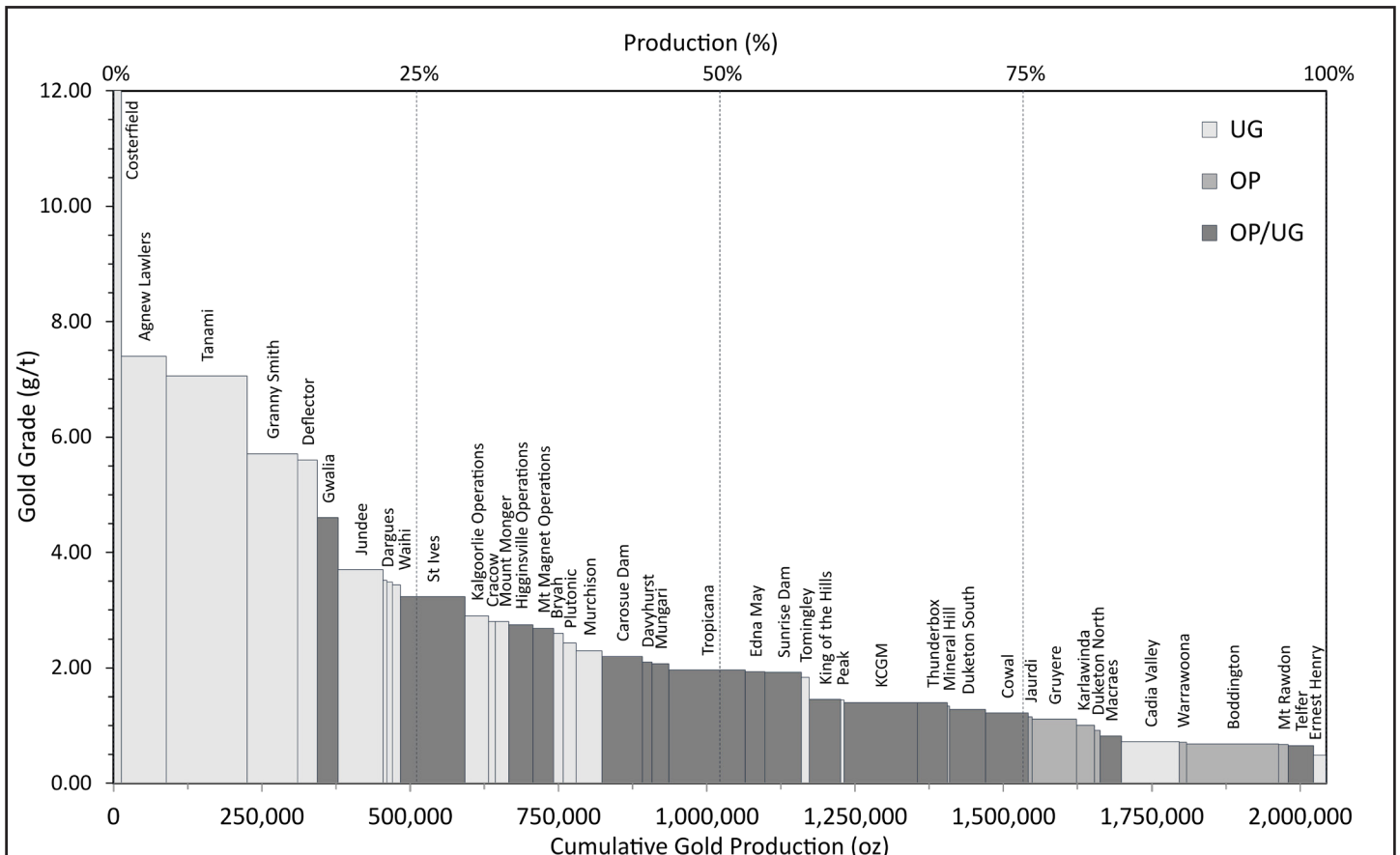
1. Cadia Valley's and Telfer's AISC and production is for only part of the quarter under Newmont's ownership. The AISC presented is Newmont's reported gold equivalent ounces AISC.

Notes: Operations shown on a 100% basis, except North Parkes only Evolution's 80% interest is shown.

## 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 <sup>1</sup>	UG	8.79	49,533
2	Norseman	Pantoro Limited	OP/UG	2.24	18,185
3	Bellevue	Bellevue Gold Limited	UG	3.30	15,495
4	Coolgardie	Focus Minerals Limited	OP	0.98	7,262
5	Matilda-Wiluna	Wiluna Mining Corporation Limited <sup>2</sup>	NM	0.61	5,954
6	Kundana EKJV	JV Tribune Resources Limited/Rand Mining Limited	UG	3.17	4,651
7	A1	Kaiser Reef Limited	UG	6.20	1,746
8	Mt Boppy	Manuka Resources Limited	OP	1.53	1,576
NR	Marvel Loch	Minjar Gold Pty Ltd <sup>3</sup>	OP/UG	NA	NA
NR	Paddington	Zijin Mining Group Company Limited <sup>3</sup>	OP/UG	NA	NA
NR	Pajingo	Minjar Gold Pty Ltd <sup>3</sup>	UG	NA	NA
NR	Ravenswood	EMR Capital <sup>3</sup>	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	55,828
2	Prominent Hill	BHP Group Limited	UG	25,779
3	Carrapateena	BHP Group Limited	UG	22,272
4	Ernest Henry	Evolution Mining Limited	UG	20,371
5	Rosebery	MMG Limited	UG	9,136
6	Golden Grove	29Metals Limited	UG	3,872
7	Eloise	AIC Mines Limited	UG	1,889
8	Tritton	Aeris Resources Limited	UG	1,200
9	North Parkes <sup>1</sup>	JV Evolution Mining Limited 80% Sumitomo Australia Pty Ltd 20%	UG	1,011
10	Mt Colin	Aeris Resources Limited	UG	800

1. North Parkes is a joint venture between Evolution Mining Limited (80%) and Sumitomo Australia Pty Ltd (20%). Gold produced represents Evolutions 80% interest for part ownership of the quarter only.

## Quarter on Quarter Change in AISC and Grade

Statistic	AISC (A\$/oz)	Change (%)	Grade (g/t)	Change (%)
Average (Simple) <sup>1</sup>	1,877	-3.9%	2.55	9.3%
Average (Weighted) <sup>2</sup>	1,902	5.2%	1.47	10.4%
Minimum	-5,677	-149.5%	0.21	-57.1%
First Quartile <sup>3</sup>	1,609	-4.9%	1.22	18.4%
Median <sup>3</sup>	1,816	-1.3%	1.96	31.5%
Third Quartile <sup>3</sup>	2,441	14.6%	3.23	19.6%
Maximum	3,968	18.3%	13.14	37.4%

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	156,000	1	Granny Smith	1,363
2	Tanami	136,000	2	Agnew Lawlers	1,584
3	KCGM	124,102	3	KCGM	1,602
4	St Ives	109,400	4	Tanami	1,609
5	Cadia Valley <sup>1</sup>	97,000	5	St Ives	1,616

1. Cadia Valley's production is for only part of the quarter under Newmont Corporations' ownership.

## Top 5 Gold Operations - Mid-Tier Gold Miners

Gold Production (Attributable)			All-in Sustaining Costs		
Rank	Operation	oz	Rank	Operation	A\$/oz
1	Cowal	71,848	1	North Parkes	-5,677
2	Duketon South	60,763	2	Ernest Henry	-1,470
3	King of The Hills	53,018	3	Cowal	1,226
4	Murchison	43,372	4	Deflector	1,449
5	Tropicana (30% Regis Resources Limited) <sup>1</sup>	38,794	5	Mt Magnet Operations	1,668

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	Higginsville Operations	40,295	1	Karlawinda	1,333
2	Gruyere (50% Gold Road Resources Limited) <sup>1</sup>	37,330	2	Costerfield	1,415
3	Karlawinda	30,399	3	Dargues	1,750
4	Plutonic	21,904	4	Gruyere (50% Gold Road Resources Limited) <sup>1</sup>	1,973
5	Norseman	18,185	5	Peak	2,054

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	136,000	1	Cowal	1,226
2	Tropicana <sup>1</sup>	129,313	2	Karlawinda	1,333
3	KCGM	124,102	3	Granny Smith	1,363
4	St Ives	109,400	4	Agnew Lawlers	1,584
5	Granny Smith	85,400	5	KCGM	1,602

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

## 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 (0.6502) 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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