

Australian & New Zealand Gold Operations December Quarter 2016

Overview

The average All-in Sustaining Cost (AISC) for Australia and New Zealand was A\$1,159/oz down 5.6% (A\$69/oz) on the previous quarter average AISC of A\$1,228/oz. Evolution Mining's part of the Ernest Henry operations was the lowest cost producer reporting an AISC of A\$-114/oz followed by Newcrest's Cadia Valley operations with an AISC of A\$333/oz, then by Evolution Mining's Mt Carlton (A\$604/oz) and St Barbara's Gwalia (A\$716/oz). The average spot price for the quarter was A\$1,628/oz (US\$1,222/oz). It should be noted that both Ernest Henry and Cadia Valley benefit from significant copper by-product credits in Evolution Mining's and Newcrest's calculation of AISC respectively, leading to a vastly lower AISC compared to other gold operations.

Newmont's Boddington operation kept top spot as Australia's largest gold producer with 199,000oz for the quarter, followed by Barrick and Newmont's Kalgoorlie operations (194,000oz) then Newcrest's Cadia Valley (179,173oz). Of the mines where gold is a by-product, OZ Minerals' Prominent Hill produced the most gold 32,205oz followed by BHP's Olympic Dam 29,651oz and Glencore and Evolution's Ernest Henry with 25,000oz.

Grade wise for the companies that report AISC, the average reported mill head/feed grade was 3.46g/t (Open Pit (OP) - 1.74g/t, Underground (UG) - 4.94g/t, Open Pit & Underground (OP/UG) - 2.76g/t) which was similar to the previous quarter, up 1.8% from 3.40g/t. St Barbara's Gwalia mine again took out the honour as the operation with the highest average feed grade with 11.30g/t, followed by Kirkland Lake's Fosterville mine 8.48g/t and OceanaGold's Waihi operation with 7.77g/t. The lowest grade was Evolution's Ernest Henry processing an average head grade of 0.58g/t. The high grade operations that do not report an AISC were Mandalay's Costerfield with 7.71g/t and A1's namesake operation with 5.95g/t on low production.

Top 10 Gold Producing Operations

Rank	Operation	Company	Mine Type	Au Produced (oz)
1	Boddington	Newmont Mining Corporation	OP	199,000
2	Kalgoorlie	Newmont Mining Corporation / Barrick Gold Corporation	OP/UG	194,000
3	Cadia Valley	Newcrest Mining Limited	UG	179,173
4	Tropicana	AngloGold Ashanti Limited / Independence Group NL	OP	121,195
5	Telfer	Newcrest Mining Limited	OP/UG	111,277
6	Tanami	Newmont Mining Corporation	UG	99,000
7	St Ives	Gold Fields Limited	OP/UG	95,600
8	Kalgoorlie Operations	Northern Star Resources Limited / Tribune Resources Limited / Rand Mining Limited	UG	78,770
9	Cowal	Evolution Mining Limited	OP	71,903
10	Gwalia	St Barbara Limited	UG	70,925

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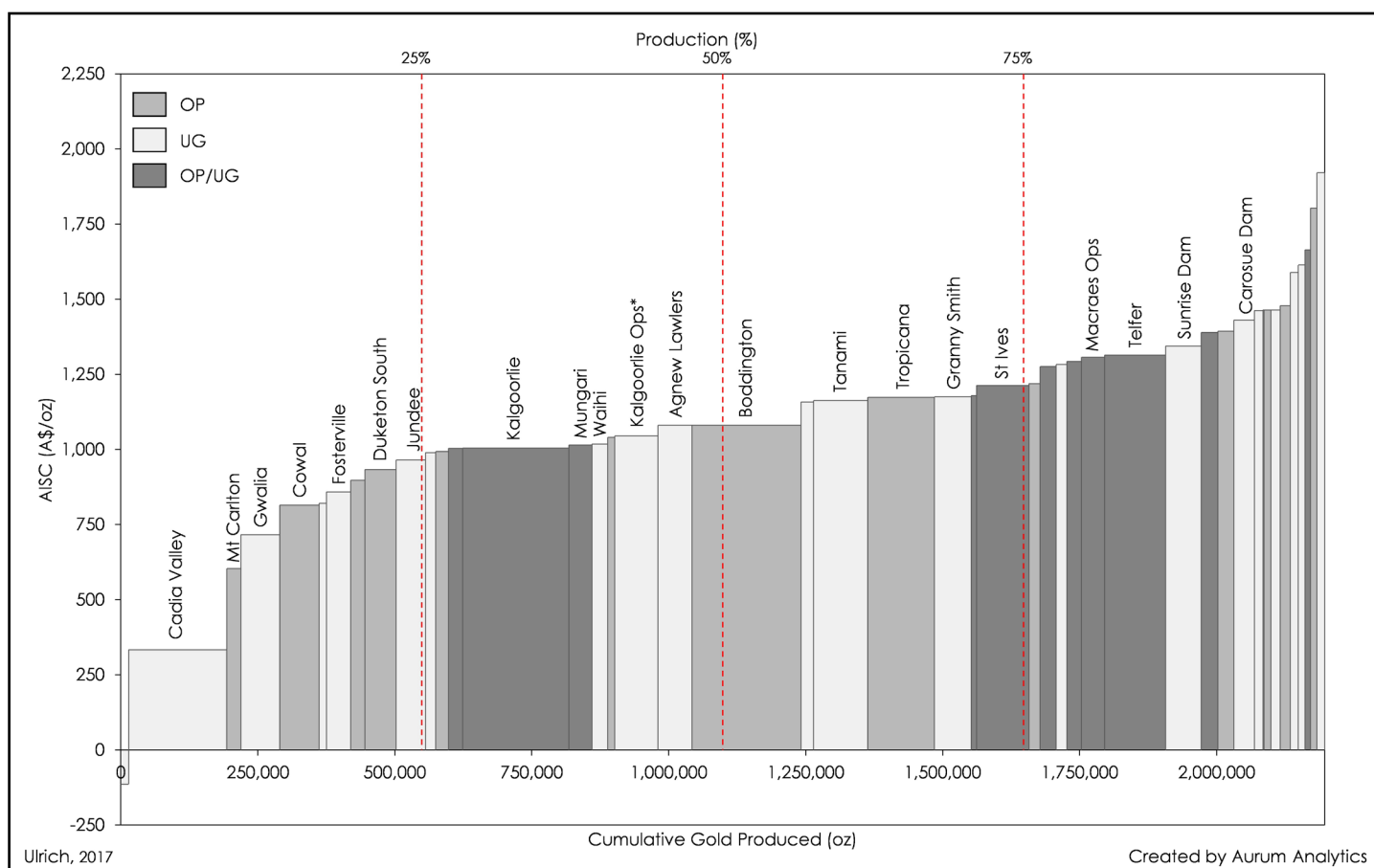
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Gold Operations That Report AISC

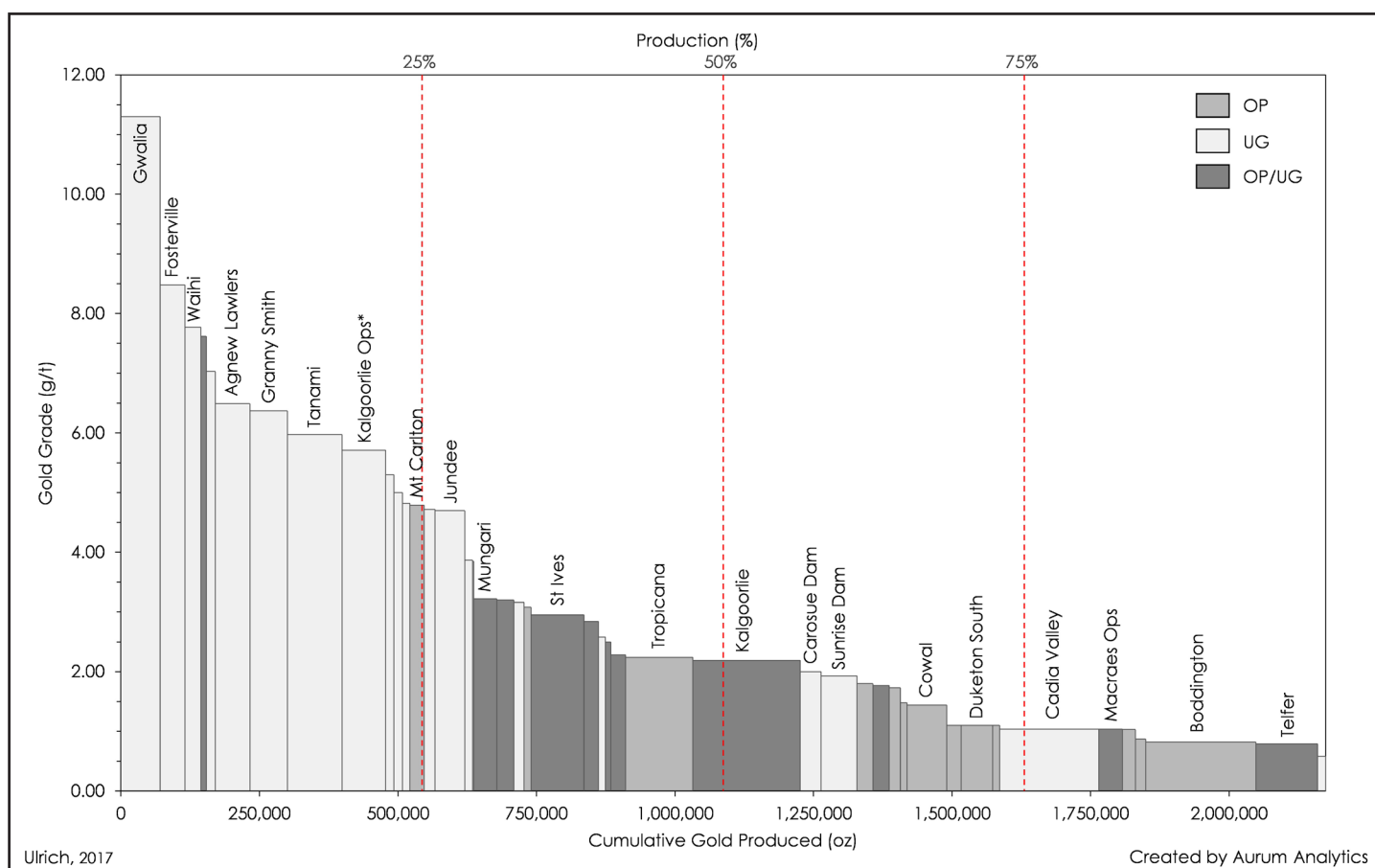
AISC Rank	Operation	Company	Mine Type	AISC (A\$/oz)	Grade (g/t)	Grade Rank	Au Produced (oz)
1	Ernest Henry	Evolution Mining Limited	UG	-114	0.58	45	14,257
2	Cadia Valley	Newcrest Mining Limited	UG	333	1.04	39=	179,173
3	Mt Carlton	Evolution Mining Limited	OP	604	4.79	13	25,674
4	Gwalia	St Barbara Limited	UG	716	11.30	1	70,925
5	Cowal	Evolution Mining Limited	OP	815	1.44	35	71,903
6	Hera	Aurelia Metals Limited	UG	821	4.82	12	13,427
7	Fosterville	Kirkland Lake Gold Limited	UG	859	8.48	2	44,406
8	Mt Rawdon	Evolution Mining Limited	OP	898	1.10	36=	25,983
9	Duketon South	Regis Resources Limited	OP	933	1.10	36=	56,660
10	Jundee	Northern Star Resources Limited	UG	965	4.70	15	53,554
11	Peak	New Gold Inc	UG	989	3.16	20	18,587
12	Duketon North	Regis Resources Limited	OP	993	1.03	41	23,430
13	Higginsville	Westgold Resources Limited	OP/UG	1,004	2.84	23	26,031
14	Kalgoorlie	JV Newmont/Barrick	OP/UG	1,005	2.19	28	194,000
15	Mungari	Evolution Mining Limited	OP/UG	1,015	3.22	18	41,645
16	Waihi	OceanaGold Corporation	UG	1,018	7.77	3	29,280
17	Cannon	Southern Gold Limited	OP	1,040	3.08	21	12,658
18	Kalgoorlie Operations	JV Northern Star/Tribune/Rand Mining	UG	1,045	5.71	9	78,770
19=	Agnew Lawlers	Gold Fields Limited	UG	1,081	6.49	6	62,200
19=	Boddington	Newmont Mining Corporation	OP	1,081	0.82	43	199,000
21	Plutonic	Superior Gold Inc	UG	1,158	NA	46	22,994
22	Tanami	Newmont Mining Corporation	UG	1,163	5.97	8	99,000
23	Tropicana	JV AngloGold Ashanti /Independence	OP	1,174	2.24	27	121,195
24	Granny Smith	Gold Fields Limited	UG	1,175	6.37	7	67,400
25	Nicolsons	Pantoro Limited	OP/UG	1,179	7.62	4	9,598
26	St Ives	Gold Fields Limited	OP/UG	1,213	2.95	22	95,600
27	Nullagine	Millennium Minerals Limited	OP	1,219	1.73	33	20,381
28	Ravenswood	Resolute Mining Limited	OPUG	1,276	1.77	32	29,233
29	Cracow	Evolution Mining Limited	UG	1,283	4.72	14	19,763
30	Central Murchison	Westgold Resources Limited	OP/UG	1,293	2.28	26	26,537
31	Macraes Operations	OceanaGold Corporation	OP/UG	1,307	1.04	39=	42,453
32	Telfer	Newcrest Mining Limited	OP/UG	1,314	0.79	44	111,277
33	Sunrise Dam	AngloGold Ashanti Limited	UG	1,344	1.93	30	65,000
34	Mount Monger	Silver Lake Resources Limited	OP/UG	1,389	3.20	19	30,662
35	Thunderbox	Saracen Mineral Holdings Limited	OP	1,394	1.80	31	28,530
36	Carosue Dam	Saracen Mineral Holdings Limited	UG	1,430	2.00	29	37,692
37	Paulsens	Northern Star Resources Limited	UG	1,462	5.00	11	15,657
38=	Vivien	Rameliuss Resources Limited	UG	1,464	7.03	5	16,524
38=	Kathleen Valley	Rameliuss Resources Limited	NM	1,464	3.85	17	2,169
38=	Mt Magnet	Rameliuss Resources Limited	OP	1,464	1.10	36=	12,674
41	Edna May	Evolution Mining Limited	OP	1,478	0.87	42	18,588
42	Andy Well	Doray Minerals Limited	UG	1,589	5.30	10	14,390
43	Challenger	WPG Resources Limited	UG	1,614	2.58	24	12,429
44	South Kalgoorlie	Westgold Resources Limited	OP/UG	1,664	2.50	25	9,908
45	Tomingley	Alkane Resources Limited	OP	1,803	1.48	34	11,756
46	Darlot	Gold Fields Limited	UG	1,921	3.87	16	14,000

Notes: Operations are 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	Cosmo ¹	Kirkland Lake Gold Limited	UG	2.78	13,307
2	Ballarat	LionGold Corp Ltd	UG	6.90	13,000
3	Kalgoorlie North	Excelsior Gold Limited	OP	1.73	11,734
4	Matilda-Wiluna	Blackham Resources Limited	OP/UG	1.46	8,773
5	Deflector	Doray Minerals Limited	OP	5.70	8,712
6	Beta Hunt ¹	RNC Minerals	UG	NA	7,600
7	Costerfield	Mandalay Resources Limited	UG	7.71	7,523
8	Stawell ¹	Kirkland Lake Gold Limited	UG	1.47	6,971
9	A1	A1 Consolidated Gold Limited	UG	5.95	3,073
10	Devon	GME Resources Limited	NM	1.61	940
NR	Pajingo	Minjar Gold Pty Ltd ²	UG	NA	NA
NR	Marvel Loch	China Hanking Holdings Limited ²	OP/UG	NA	NA
NR	Paddington	Zijin Mining Group Company Limited ²	OP/UG	NA	NA

1. At the time of report preparation these operations were still to report AISC, the gold produced value for Beta Hunt is provisional.

2. 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	Prominent Hill	OZ Minerals Limited	OP/UG	32,205
2	Olympic Dam	BHP Billiton Limited	UG	29,651
3	Ernest Henry ¹	Glencore PLC / Evolution Mining Limited	UG	25,000
4	Golden Grove	MMG Limited	UG	14,941
5	DeGrussa	Sandfire Resources NL	UG	10,183
6	Rosebery	MMG Limited	UG	9,138
7	Kanmantoo	Hillgrove Resources Limited	OP	2,316
8	Jaguar	Independence Group NL	UG	470
9	North Parkes ²	JV China Molybdenum Co Ltd / Sumitomo Australia Pty Ltd	UG	NA

1. Ernest Henry for the quarter produced 25,000oz - Glencore PLC's and Evolution Minings Limited's attributable production was 10,743oz and 14,267oz respectively.

2. 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	1,159	-5.6	3.46	1.8
Average (Weighted) ²	1,053	-2.3	1.68	-2.3
Minimum	-114	-132.4	0.58	-23.7
First Quartile	965	4.0	1.04	-11.1
Median	1,081	6.7	2.19	2.8
Third Quartile	1,213	-10.9	4.79	-2.2
Maximum	1,921	-10.2	11.30	13.0

1. Simple averages done by number of mining operations.

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

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	333
2	Kalgoorlie ¹	194,000	2	Kalgoorlie ¹	1,005
3	Cadia Valley	179,173	3	Agnew Lawlers	1,081
4	Telfer	111,277	4	Boddington	1,081
5	Tanami	99,000	5	Tanami	1,163

1. Kalgoorlie is a joint venture between Newmont Mining Corporation (50%) and Barrick Gold Corporation (50%).

Top 5 Gold Operations - Mid-Tier Gold Miners

Gold Production (Attributable)			All-in Sustaining Costs		
Rank	Operation	oz	Rank	Operation	A\$/oz
1	Cowal	71,903	1	Ernest Henry	-114
2	Gwalia	70,925	2	Mt Carlton	604
3	Duketon South	56,660	3	Gwalia	716
4	Kalgoorlie Operations ¹	55,660	4	Cowal	815
5	Jundee	53,554	5	Fosterville	859

1. Kalgoorlie Operations gold produced represents Northern Star Resources Limited's attributable gold produced only.

Top 5 Gold Operations - Junior Gold Miners

Gold Production (Attributable)			All-in Sustaining Costs		
Rank	Operation	oz	Rank	Operation	A\$/oz
1	Mount Monger	30,662	1	Hera	821
2	Nullagine	20,381	2	Cannon ²	1,040
3	Kalgoorlie Operations ¹	17,333	3	Nicolsons	1,179
4	Vivien	16,524	4	Nullagine	1,219
5	Andy Well	14,390	5	Mount Monger	1,389

1. Kalgoorlie Operations gold produced represents Tribune Resources Limited's attributable gold production from the East Kundana Joint Venture.

2. Cannon is owned by Southern Gold Limited, but has a mining and processing arrangement with Westgold Resources Limited for 50% of gold produced.

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	Kalgoorlie ¹	194,000	1	Gwalia	716
2	Tropicana ²	121,195	2	Cowal	815
3	Tanami	99,000	3	Fosterville	859
4	St Ives	95,600	4	Mt Rawdon	898
5	Kalgoorlie Operations ³	78,770	5	Duketon South	933

1. Kalgoorlie is a joint venture between Newmont Mining Corporation (50%) and Barrick Gold Corporation (50%).

2. Tropicana is a joint venture between AngloGold Ashanti Limited (70%) and Independence Group NL (30%).

3. Kalgoorlie Operations gold produced represents total gold attributable to Northern Star Resources Limited, Tribune Resources Limited and Rand Mining Limited.

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 Kalgoorlie 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. Ocean-aGold's Macraes and Waihi operations, the quarterly AISC values were back calculated using the previous quarter(s) AISC results.

Where AISC values were reported in US\$ and no A\$ equivalent provided, the quarterly average US\$/A\$ exchange rate (0.7505) 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 "Geological drivers and strategic implications of competitive advantage in Australian and New Zealand gold mines, linking geology to mine economics."

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