Australian Gold Fund
Analysis of Drivers on Operating Costs of Mines
A Quantitative Study

Summary

Our research finds that the metric EV/AISC-Adjusted Production has been effective in determining whether a company may be appropriately valued or not. This is reflected in our investment performance. Thus, our interest at this point is to gain further insight into the factors that may determine a mine's All-In Sustaining Cost (AISC). We are interested in using this information in order to have a foundation in estimating the reasonable range for the likely AISC of a newly built mine. While companies release these estimates in feasibility studies when they are planning to develop these mines, we believe that these need to be taken with a grain of salt. We find that the actual outcome can differ from the study estimates especially in light of a delay between the study and when the mine is in operation.

Using a combination of log-linear and linear regression models (developed by Jacky Poon), we find that the key drivers for AISC include the owner of the mine, the location of the mine, the year, the amount of reserves in the mine, the ore grade being processed and the recovery rate of the processing plant. Interestingly, the amount of gold produced and the amount of ore being mined or processed were not the factors that affected the AISC after we have included the aforementioned factors. The intuition is consistent, however, as the quantity of the gold produced may contribute to lower cost due to economies of scale, it is enhanced by the ore containing more gold or the processing plant being able to recover more gold. These factors are able to explain almost 49% of the variation in our sample, which we consider to be quite good given the volatile nature of mining operations.

Our model also finds that while some companies are more efficient in their operations by producing lower cost gold, the coefficients show that this is less clear-cut. The location of the mines they own and the time period may confound the result. As an illustration, our model suggests that Teranga Gold Corporation may have higher cost operations, this is almost completely offset by their mines being in Burkina Faso and Senegal that are shown to be locations with lower costs. In other words, the model's findings suggest that it is important to have a deeper understanding of individual mines rather than to generalise about the owner or the mine location.

What Drives AISC for Gold and Silver Mines?

The World Gold Council introduced the AISC metric as an improved cost figure to allow for different companies to be compared more appropriately. The C1 and C2 costs are not deemed to be adequate as it only takes into account operational costs, but capital expenditure may not be incorporated into these measures. Thus, while some mines are cheaper to operate because of higher ore grade, the cost of maintaining these properties may be substantial. This is the case for underground mine where substantial expenses are incurred to ensure that it is in good order. To this end, the AISC extends on the C1 and C2 costs by including the maintenance and sustaining capital expenditure necessarily to keep the mine operating in the future at a similar capacity.

AISC is reported by companies via a combination of audited and unaudited operational figures – mining, processing, administration, depreciation and amortisation, development and stripping expenses, etc. These cost figures are based on the accounting team applying allocation of expenses and may be discretionary. Furthermore, definitions of operations and capital expenditure can vary across different companies. To complicate things further, some companies report AISC based on gold sold while others base it on the production volume.

Currently, the AISC appears to be driven by the mine's economies of scale in terms of the level of production, borne about by how much ore has been processed and the ore grade. Naturally, as the ore grade and the ore processing volume increases, this should reduce the AISC. However, several environmental and idiosyncratic factors also can contribute to the variation of AISC between different mines. These include geographic location, company management, mine type (underground or open-pit), by-product credits, cost of inputs of production (labour, capital and fuel), the gold-oil ratio and many more. As to how much certain factors influence the AISC, we are not aware of any systematic studies that look into this.

Based on our past research, we find that the valuation of gold producing company stocks depends on a number of operational factors including production, AISC, prevailing economic conditions and company-specific factors. When we looked more closely, investors prefer companies that have economies of scale, strong cashflow generation and a long mine life. These qualities rest largely on the mine properties owned and operated by the company. Competent management will be able to identify economic deposits to develop or to acquire profitable mines at attractive prices and to manage mine operations effectively such that they are producing at low cost, generate free cashflows and not drain capital over the long term.

Methodology and Data

We analyse the mines data using a combination of log-linear and linear regression models in order to identify the key drivers of AISC of mines. The factors we are investigating include production, mined ore grade and volume, processing capacity and ore grade, geographic location, mine type, mineral resources and ore reserves.

Our study is based on selected mines owned by ASX-listed gold mining companies over 2013-2020, using annual operating data. We have excluded the large mines that have annual processing capacity of over 10 million tonnes p.a. as it would distort the data. Due to our limitation of coverage, we have only included ASX-listed gold mining companies only. To this end, our sample contains 300 entries coming from 29 companies and 76 mines.

Our sample covers mines around the world, though largely in Australia, Africa and South-East Asia with a small number operating in New Zealand, the Pacific Islands, North America and South America. In fact, almost 65% of our sample are Australian mines with the Philippines and Mali coming second and third but being just over 10% combined. The average AISC in our sample is $1 203.53/oz. Over the period, we noticed that the AISC appeared to be declining from 2013 to 2018 due to the oil price falling from 2014-2016. Furthermore, the gold bear market from 2013-2015 led to some mining companies facing financial distress due to high debt and marginally profitable operations deciding to resort to high-grading in order to

cut costs. The average ore grades started falling in 2019 and several companies saw their AISC rising. Buoyed by higher gold prices, these companies have been able to generate operating cashflows despite falling grades and higher operating costs. The average annual production from the mines in our sample is just under 121 000oz, with Casposo (partly owned by Austral Gold) and Talang Santo (Kingsrose Mining) being the smallest to the largest being Fosterville (Kirkland Lake Gold), Kalgoorlie (Northern Star Resources) and the Kalgoorlie Super Pit (jointly owned by Northern Star Resources and Saracen Mineral Holdings). In classifying the size of mine operations, we find that this is not clear-cut. If we consider the scope based on gold production, we classify mines producing more than 250 000oz p.a. as large mines, those above 80 000oz p.a. as medium mines and small mines as those producing less. If we consider the size of the processing plants, this becomes more complicated because open-pit mines process more tonnage of rocks to extract ore while underground mines have richer ore but harder rocks. The stripping ratio (waste-to-ore) is much higher for open-pit mines. As a result, we will classify the mines based on production.

Approximately 40% of the sample comprises open-pit mines and another 40% are underground mines, with the remaining being mines that have a combination of open-pit and underground deposits. We find that the average grade of the ore mined is 1.94g/t for open-pit mines, 5.1g/t for underground mines and 2.91g/t for mixed operations. The average ore grade being processed in open-pit mines is 1.91g/t, 6.08g/t for underground mines and 2.79g/t for mixed operations. The grades vary across different countries but due to the sample size for many countries, we believe it is not prudent to read too much into it.

Regression Results and Significance of Key Drivers

We will discuss the key findings in this section. The regression results are in Appendix G of the report. We propose from our sample that the model is specified as follows:

AISC = Owner + MineType + Location + Period + LogReservesMeanImputed + + HighHeadGrade + LowRecovery

Our model finds that the AISC is significantly associated by which company owns the mine, the geographic location of the mine, the year and month of the financial period, the amount of reserves in the ground, whether the ore grade is over 9g/t and whether the processing plant recovery is high or not (82% as the cutoff). We included the mine type (underground, open-pit and mixed) into the model even though this is not statistically significant. The reason for including the mine type into our model is merely to cosmetic. These factors explain just under 49% of the variation in our data sample (based on the adjusted R-squared coefficient).

In terms of the order of importance, the model appears to suggest that the owner of the mine, the geographic location and the amount of reserves are the strongest. A number of companies are significantly higher cost operators (after adjusting for any offset effects of the locations of their mines) – namely Blackham/Wiluna, Gascoyne and Kingsrose. However, while many companies have a significantly positive coefficient that should suggest they are higher cost operations, mine locations have an offsetting effect. Mines in countries such as Burkina Faso and Senegal appear to be less expensive to operate. Countries we found to have higher cost

operations include Ghana, New Zealand, Papua New Guinea and the Solomon Islands. We do qualify that the costs are relative to Australian mines and our findings are based on limited sample size. Also, we note that our sample is not representative of mines in the various countries featured. Interestingly, instead of the gold production being the significant factor associated with AISC, the AISC is significantly associated with the size of the mine in terms of the amount of ore reserves it has. The AISC falls by around $53/oz for every factor on the natural logarithmic scale for the ore reserves. For example, if the mine's ore reserves are around 163 000oz and another mine has reserves of around 442 000oz, then the second mine is expected to produce ore at an AISC of $53/oz less than the first mine. The economies of scale for AISC is not a linear relationship, but an exponential relationship.

We also find that while the year and month when the financial year ends are a significant factor, none of the periods are significant in and of itself. There is a weak trend showing that the AISC is increasing over time, consistent with rising costs and the weakening purchasing power of currency. The AISC significantly reduces with mines containing higher grade ore, as expected. On average, when the ore grade being processed is higher than 9g/t the AISC is expected to be $300/oz less than those with lower ore grade. This is also after taking into account underground mines being more expensive to operate due to substantial costs involved in maintaining tunnels deep beneath the ground and in drilling through harder rock. Furthermore, the AISC is on average $200/oz more if the processing plant recovery rate is lower, with our threshold being at 82%.

Based on the regression results, our sample shows that both the companies and the mine locations impact on the AISC. They are not distinct in the sense that certain companies or geographic locations distinctly lead to higher or lower AISC. However, while we do find that Australian mines seem to be lower cost compared to many other countries where the ASX-listed companies also operate, this is likely due to these companies have a preference for owning mines inside Australia. Our sample also contains larger mine operations that are based in Australia so this may be a matter of home-ground preference. We also qualify that our study did not include mines with processing capacity over 10Mt p.a. as it would skew our results.

Not surprisingly, the processing plant's efficiency plays a significant role in determining a mine's AISC. Despite our study's small sample size, we are able to show that higher ore grades and processing plant recovery rate are significant factors. Our finding shows the economies of scale is achieved by ore quality rather than the volume of ore being delivered for milling. However, we did not include the rock types and the method for extracting the ore from the rocks. We believe these can influence a mine's AISC.

While we were surprised that the gold production is not statistically significant in determining AISC, we found that it made more intuitive sense that the mine's ore reserve level is a significant factor. The gold production can be affected by operational issues or management may decide to scale down operations. The mine's size is better reflected by the ore reserve level.

Finally, while our model shows that the financial period may be a significant factor in determining AISC, we are unable to infer any further from our observations. However, we expect that extracting economic factors and commodity prices may be worthwhile to help us in investigating how these can affect the AISC. This factor has been identified as being very significant but underlying this include broad economic conditions, weather, localised operating conditions and the company's strategy.

To enhance this study in future, we would hope to expand on the sample to include the various mines in different countries. Instead of collecting data based on companies, we would collect data for mines and then extract the data from their operating companies. A more representative sample of mines in different countries may also enhance the usefulness of the results and conclusions arising from this analysis.

Conclusion

Our investigative analysis on the drivers of AISC of gold mines showed that the significant factors are the mine owners, the geographic location, the scale of the mine in terms of its ore reserves and the processing plant efficiency in terms of ore grade and recovery rates. These factors are intuitive. While the analysis shows that the timing of the financial period ending is also very significant, this factor would include environmental and economical factors that we did not include in our study. The results in this analysis are useful for identifying roughly what to focus on when evaluating a mine's performance in each report. The size of the sample and the locations of the mines are not adequate for us to confidently predict what each mine's AISC should be. With more data and collecting data from mines that are more representative of the various countries of operation, this may be possible. Nevertheless, the data in our report may be of value for users since it is in one location.

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Appendix A – Companies Listed and their Current Metrics

ASX Code	Name	Category	Price - 31st July	Market Capitalisation ($ mil)
AGD	Austal Gold	Junior	$0.170	$96.230
ALK	Alkane Resources	Micro	$1.210	$720.250
AMI	Aurelia Minerals	Junior	$0.545	$476.320
AQG	Alacer Gold	Mid-Tier	$10.460	$3,083.470
DCN	Doray Minerals	Junior	$0.325	$180.800
EVN	Evolution Mining	Large	$5.900	$10,056.040
GCY	Gascoyne Resources	Junior	$0.039	$39.190
GOR	Gold Road Resources	Mid-Tier	$1.835	$1,614.660
KLA	Kirkland Lake Gold	Major	$72.200	$20,738.731
KRM	Kingsrose Mining	Micro	$0.039	$28.470
MML	Medusa Mining	Junior	$0.860	$178.700
NCM	Newcrest Mining	Major	$35.180	$28,709.400
NST	Northern Star Resources	Major	$15.460	$11,452.230
OGC	Oceanagold	Mid-Tier	$3.650	$2,271.480
PNR	Pantoro	Junior	$0.265	$311.900
PRU	Perseus Mining	Mid-Tier	$1.535	$1,806.270
RED	Red5	Junior	$0.250	$489.900
RMS	Ramelius Resources	Mid-Tier	$2.180	$1,756.980
RRL	Regis Resources	Mid-Tier	$5.630	$2,861.660
RSG	Resolute Mining	Mid-Tier	$1.300	$1,433.670
SAR	Saracen Mineral Holdings	Large	$6.000	$6,617.940
SBM	St Barbara	Mid-Tier	$5.100	$2,355.370
SLR	Silver Lake Resources	Mid-Tier	$2.450	$2,156.220
TRY	Troy Resources	Junior	$0.090	$56.890
WGX	Westgold Resources	Mid-Tier	$2.360	$991.740
WMX	Wiluna Mining	Junior	$1.340	$134.380

Doray Minerals merged with Silver Lake Resources in 2019

Millennium Minerals was delisted in 2020

Teranga Gold Corporation is now listed on the Toronto Stock Exchange after delisting in 2017

Appendix B – Companies and their Mine Historical Performance

Note some mines have been excluded from our study so this table does not reflect the actual production profile for the mining company.

Row Labels	#Mines	TotGoldProd	AvgAISC	AvgOreMined	AvgMinedGrade	AvgProcessing	AvgHeadGrade
☐AGD	2	63,436	2,292.43	142,152		146,285	5.15
2019 Dec	2	63,436	2,292.43	142,152		146,285	5.15
☐ALK	2	127,502	974.80	994,999	1.84	1,045,652	2.04
2018 Jun	1	78,533	1,002.00	1,589,811	1.99	1,092,602	2.42
2019 Jun	1	48,969	947.60	400,187	1.68	998,702	1.66
☐AMI	8	398,984	962.92	391,908	5.01	389,821	4.92
2016 Jun	1	46,882	1,093.47	307,240	6.03	308,118	6.01
2017 Jun	1	45,679	968.00	373,795	4.36	368,086	4.37
2018 Jun	2	97,374	473.50	268,968	7.34	271,238	6.97
2019 Jun	2	117,520	960.30	456,484	4.40	460,430	4.23
2020 Jun	2	91,529	1,387.14	501,664	3.11	489,516	3.28
☐AQG	8	1,310,151	929.36	4,556,990	1.52	4,953,994	1.90
2013 Dec	1	216,850	847.17	6,673,520	1.90	6,697,209	1.91
2014 Dec	1	182,342	1,104.23	6,474,401	1.69	6,433,514	1.68
2015 Dec	1	163,732	917.06	6,119,506	1.21	6,030,514	1.23
2016 Dec	1	95,229	1,298.56	4,598,436	1.11	4,739,368	1.10
2017 Dec	1	168,163	877.07	6,311,175	1.13	6,225,773	1.13
2018 Dec	1	170,865	822.47	2,705,697	0.73	4,370,353	1.84
2019 Dec	2	312,970	784.15	1,786,594	2.21	2,567,611	3.15
☐BLK	4	237,269	1,821.12	1,572,004	1.33	1,574,154	1.39
2017 Jun	1	39,413	1,876.81	1,323,616	1.20	965,300	1.40
2018 Jun	1	70,565	1,629.00	1,696,843	1.47	1,835,093	1.37
2019 Jun	1	65,406	1,777.87	1,938,606	1.29	1,807,932	1.34
2020 Jun	1	61,885	2,000.80	1,328,952	1.34	1,688,291	1.45
☐DCN	1	138,815	1,618.47	2,817,318	1.59	2,963,348	1.63
2020 Jun	1	138,815	1,618.47	2,817,318	1.59	2,963,348	1.63
☐DRM	6	416,302	1,193.83	363,601	6.80	366,977	6.96
2014 Jun	1	76,785	1,044.00	233,549	10.70	225,433	10.78
2015 Jun	1	88,736	1,165.00	394,728	8.90	309,542	9.15
2016 Jun	1	84,135	1,229.00	323,949	7.80	337,443	8.00
2017 Jun	2	102,053	1,267.50	352,917	4.46	389,741	4.80
2018 Jun	1	64,593	1,190.00	523,549	4.50	549,960	4.20
☐EVN	46	5,134,238	941.04	2,687,391	2.98	2,683,261	2.97
2013 Jun	4	380,783	1,293.25	1,948,000	3.20	1,767,250	3.33
2014 Jun	5	427,702	1,060.40	1,436,400	3.79	1,544,000	3.78
2015 Jun	5	437,569	979.20	1,445,200	3.67	1,586,400	3.59
2016 Jun	7	803,475	1,042.29	2,544,571	3.27	2,320,429	3.31
2017 Jun	7	833,133	810.43	3,610,286	2.27	2,933,286	2.50
2018 Jun	6	779,541	669.50	3,523,167	3.19	3,463,333	2.76
2019 Jun	6	753,000	834.39	3,230,500	2.52	3,508,167	2.55
2020 Jun	6	719,035	987.42	2,969,000	2.30	3,684,000	2.30
☐GCY	2	129,996	1,862.27	2,918,500	0.80	2,858,872	0.81
2019 Jun	1	56,940	2,140.49	2,348,000	0.82	2,795,744	0.76
2020 Jun	1	73,056	1,584.06	3,489,000	0.78	2,922,000	0.86
☐GOR	1	50,703	1,102.00	3,355,500	0.88	1,639,000	1.05
2019 Dec	1	50,703	1,102.00	3,355,500	0.88	1,639,000	1.05
☐KLA	7	1,697,372	1,102.56			476,534	17.69
2018 Dec	4	722,759	1,089.61			416,314	14.05
2019 Dec	3	974,613	1,119.82			556,826	22.55
☐KRM	1	7,323	1,698.03	25,456	8.96	79,335	7.79
2019 Jun	1	7,323	1,698.03	25,456	8.96	79,335	7.79
☐MML	6	581,748	1,511.87	596,310		532,795	5.99
2015 Jun	1	98,359	1,324.64	659,495		582,311	5.61
2016 Jun	1	108,578	1,371.62	623,659		561,192	6.40
2017 Jun	1	80,743	1,822.07	564,965		499,733	5.33
2018 Jun	1	95,705	1,397.02	550,400		494,989	6.33
2019 Jun	1	103,307	1,487.03	606,676		544,601	6.29
2020 Jun	1	95,056	1,668.84	572,665		513,945	5.99
☐MOY	5	404,871	1,303.20	1,342,976		1,640,365	1.59
2014 Dec	1	74,345	1,293.00			1,583,016	1.66
2015 Dec	1	91,462	1,175.00			1,824,306	1.78
2016 Dec	1	86,325	1,213.00			1,987,690	1.54
2017 Dec	1	72,848	1,372.00	615,074		913,716	1.43
2018 Dec	1	79,891	1,463.00	2,070,877		1,893,095	1.53

NCM	**13**	**2,348,972**	**1,354.47**	**6,701,615**		**1,640,385**	**7.33**
2014 Jun	2	439,741	1,008.00	6,550,500		1,400,000	7.56
2015 Jun	2	451,525	879.50	5,754,500		1,357,000	8.24
2016 Jun	2	335,159	1,287.86	6,669,500		1,494,500	7.51
2017 Jun	2	424,203	1,234.61	10,023,500		1,648,500	9.33
2018 Jun	2	365,945	1,138.93	4,226,500		1,246,000	6.89
2019 Jun	1	190,185	1,533.82	808,000		709,000	8.77
2020 Jun	2	142,214	2,488.22	9,932,000		3,162,000	3.75
NST	**25**	**4,161,850**	**1,235.86**	**1,173,891**	**5.29**	**1,186,363**	**5.13**
2013 Jun	1	88,614	977.00	454,739	6.34	412,360	7.27
2014 Jun	3	215,419	1,137.68	415,310	5.95	430,884	5.67
2015 Jun	4	573,465	1,170.96	882,026	5.31	921,875	5.21
2016 Jun	4	558,143	1,170.40	873,920	5.52	967,114	5.20
2017 Jun	4	533,397	1,216.50	844,673	4.78	942,126	4.23
2018 Jun	3	575,120	1,164.67	1,272,445	4.83	1,366,908	4.56
2019 Jun	3	824,476	1,341.97	2,024,673	5.64	1,999,065	5.51
2020 Jun	3	793,216	1,585.02	2,450,930	4.76	2,177,229	5.04
OGC	**22**	**2,918,894**	**891.76**	**4,165,204**	**2.72**	**3,538,444**	**2.77**
2013 Dec	2	325,732	302.35	8,718,975	0.95	4,934,256	1.15
2014 Dec	2	307,463	688.35	6,385,197	1.02	5,105,922	1.13
2015 Dec	3	290,174	746.11	4,319,089	3.57	3,872,013	3.60
2016 Dec	3	416,741	928.89	4,883,162	3.34	3,352,227	3.51
2017 Dec	4	575,326	799.80	3,004,925	3.22	2,921,625	3.52
2018 Dec	4	533,304	993.65	2,629,650	3.02	3,054,575	2.84
2019 Dec	4	470,154	1,359.62	2,820,275	2.55	3,046,975	2.40
PNR	**5**	**189,473**	**1,372.82**	**194,825**	**6.46**	**183,682**	**6.89**
2016 Jun	1	16,398	1,404.78	76,637	7.02	78,730	6.82
2017 Jun	1	39,149	1,151.78	220,515	6.44	167,156	7.57
2018 Jun	1	52,202	1,130.00	197,972	7.35	230,893	7.61
2019 Jun	1	43,019	1,438.90	249,486	5.99	213,845	6.75
2020 Jun	1	38,705	1,738.65	229,514	5.49	227,787	5.69
PRU	**11**	**1,716,597**	**1,319.16**	**5,592,414**	**1.18**	**5,176,133**	**1.27**
2013 Jun	1	208,444	1,119.68	6,999,304	1.25	5,647,341	1.40
2014 Jun	1	180,519	1,408.54	6,148,407	1.07	6,650,421	1.00
2015 Jun	1	212,135	1,046.38	6,152,571	1.21	6,393,748	1.17
2016 Jun	1	153,902	1,854.91	5,305,791	1.05	6,608,357	0.86
2017 Jun	1	176,218	1,755.76	9,296,498	1.07	7,091,779	1.07
2018 Jun	2	255,916	1,053.08	5,604,826	1.12	3,906,506	1.43
2019 Jun	2	271,824	1,255.61	4,344,320	1.21	4,105,085	1.40
2020 Jun	2	257,639	1,354.05	3,857,846	1.35	4,261,318	1.39
RED	**7**	**362,162**	**1,497.48**	**636,482**	**3.58**	**608,224**	**3.08**
2013 Jun	1	18,255	1,376.00	411,512	4.06	369,864	2.20
2015 Jun	1	23,645	1,666.00	340,000	2.40	298,163	2.90
2016 Jun	1	59,663	1,458.00	786,363	3.80	692,384	3.20
2017 Jun	1	41,370	1,088.51	620,007	4.37	587,461	2.70
2018 Jun	1	48,259	1,480.00	416,519	3.48	458,834	3.50
2019 Jun	1	88,141	1,590.16	900,251	3.85	907,004	3.79
2020 Jun	1	82,829	1,823.67	980,722	3.13	943,861	3.30
RMS	**17**	**1,081,395**	**1,234.03**	**1,062,696**	**3.52**	**1,269,454**	**3.23**
2013 Jun	1	58,370	1,974.10	1,531,000	1.40	1,616,343	1.22
2014 Jun	1	73,980	1,231.33	1,367,737	1.37	1,603,470	1.60
2015 Jun	1	81,683	1,178.00	1,131,355	1.80	1,633,417	1.67
2016 Jun	3	110,839	1,171.00	424,110	6.36	564,961	5.10
2017 Jun	2	112,217	1,169.00	775,899	4.95	891,096	4.30
2018 Jun	3	208,147	1,191.67	1,357,320	3.47	1,335,000	3.14
2019 Jun	3	206,273	1,182.77	997,730	2.74	1,625,620	2.54
2020 Jun	3	229,886	1,206.92	1,382,157	3.52	1,456,184	3.13
RRL	**10**	**1,706,269**	**1,003.94**	**4,656,000**		**4,379,000**	**1.13**
2016 Jun	2	305,084	929.00	2,535,000		2,555,000	1.00
2017 Jun	2	324,353	901.50	5,425,000		4,890,000	1.12
2018 Jun	2	361,373	879.50	5,275,000		5,025,000	1.17
2019 Jun	2	363,419	1,038.36	5,060,000		4,735,000	1.20
2020 Jun	2	352,040	1,271.33	4,985,000		4,690,000	1.19

⊟RSG	**25**	**2,726,497**	**1,296.42**	**1,478,810**	**2.15**	**1,707,720**	**2.44**
2013 Jun	3	435,855	1,101.00	1,704,444		1,947,710	2.68
2014 Jun	3	342,774	1,123.33	1,908,681		1,632,061	2.46
2015 Jun	3	328,684	1,078.67	1,856,061		1,321,887	2.95
2016 Jun	3	315,169	1,234.33	950,364	2.29	1,485,146	2.63
2017 Jun	3	329,834	1,122.33	1,633,636	2.05	1,813,920	2.32
2018 Jun	3	284,186	1,318.00	1,754,723	1.84	1,936,439	1.78
2019 Jun	3	305,350	1,475.40	1,077,807	2.15	1,911,169	2.25
2019 Dec	3	330,159	1,700.85	1,484,176	2.47	1,282,908	3.00
2019 Full Year	1	54,486	1,948.67	290,436	2.04	2,699,284	0.69
⊟SAR	**13**	**2,077,944**	**1,184.22**	**2,517,785**	**2.71**	**2,775,308**	**2.04**
2014 Jun	1	133,492	1,515.00	2,201,000		2,569,000	1.85
2015 Jun	1	167,531	1,139.00	3,812,200		2,314,000	2.49
2016 Jun	2	188,656	1,180.00	993,500		1,635,000	1.70
2017 Jun	2	273,726	1,333.00	2,088,500		2,387,000	1.90
2018 Jun	2	316,453	1,135.00	2,564,000		2,567,000	2.05
2019 Jun	2	355,077	1,031.14	2,665,000	2.27	2,632,500	2.29
2020 Jun	3	643,009	1,127.52	3,365,333	3.00	4,251,000	2.09
⊟SBM	**23**	**3,022,266**	**1,308.69**	**1,704,565**	**4.58**	**1,691,043**	**4.42**
2013 Jun	5	364,601	1,520.80	988,800	3.46	996,200	3.10
2014 Jun	4	374,402	1,734.25	1,148,500	3.85	1,136,500	3.75
2015 Jun	3	377,387	1,136.00	1,143,000	4.74	1,327,667	4.63
2016 Jun	2	377,452	1,038.00	2,148,000	5.28	2,133,000	5.18
2017 Jun	2	381,101	986.00	2,405,000	5.92	2,259,000	5.75
2018 Jun	2	403,089	935.00	2,439,000	6.88	2,148,500	6.68
2019 Jun	2	362,347	1,094.59	2,010,500	6.28	1,861,500	6.20
2020 Jun	3	381,887	1,347.89	2,744,333	3.21	2,860,000	3.21
⊟SLR	**10**	**1,300,658**	**1,271.90**	**1,088,803**	**3.87**	**1,173,166**	**3.96**
2013 Jun	1	133,364	1,168.00	1,091,100	3.40	1,367,318	3.20
2014 Jun	1	170,800	1,224.00	1,028,326	4.10	1,931,486	2.90
2015 Jun	1	121,780	1,331.00	688,085	4.80	1,215,308	3.30
2016 Jun	1	131,109	1,281.00	1,286,196	3.40	1,236,600	3.50
2017 Jun	1	135,837	1,359.00	1,306,508	3.50	1,300,152	3.50
2018 Jun	1	157,936	1,289.00	1,269,722	4.20	1,256,120	4.20
2019 Jun	2	185,242	1,269.71	877,330	3.22	765,699	4.58
2020 Jun	2	264,590	1,263.81	1,231,719	4.44	946,638	4.94
⊟TGZ	**4**	**758,921**	**1,309.98**	**2,115,750**	**2.66**	**3,352,250**	**1.88**
2017 Dec	1	233,267	1,229.86	2,101,000	3.48	4,221,000	1.87
2018 Dec	1	245,230	1,257.11	1,921,000	3.62	4,069,000	2.03
2019 Dec	2	280,424	1,376.48	2,220,500	1.76	2,559,500	1.81
⊟TRY	**4**	**207,928**	**1,738.19**	**740,754**	**2.09**	**789,066**	**2.09**
2017 Dec	1	56,023	1,783.61	783,291	2.17	828,893	2.24
2018 Dec	1	70,207	1,200.95	996,529	2.28	871,660	2.64
2019 Dec	1	58,118	1,579.51	811,664	2.06	887,929	2.12
2020 Jun	1	23,580	2,388.70	371,531	1.84	567,782	1.35
⊟WGX	**12**	**1,008,533**	**1,365.52**	**1,099,243**	**2.41**	**1,319,202**	**2.21**
2017 Jun	3	264,846	1,215.33	1,104,347	2.67	1,260,503	2.49
2018 Jun	4	253,217	1,423.66	894,742	2.12	1,091,267	2.04
2019 Jun	3	255,321	1,397.86	1,165,564	2.20	1,346,278	2.10
2020 Jun	2	235,149	1,426.02	1,401,105	2.88	1,822,510	2.29
Grand Total	**300**	**36,287,069**	**1,203.53**	**2,335,161**	**3.39**	**2,067,680**	**3.75**

Appendix C – Mines included in the Study

Mine Name	Owners	Mine Type	Location
Andy Well	DRM	UG	Australia
Atlantic	SBM	OC	Canada
Bonikro	NCM	OC	Cote d'Ivoire
Carosue Dam	SAR	MX	Australia
Casposo	AGD	UG	Argentina
Central Murchison	WGX	MX	Australia
Co-O	MML	UG	Philippines
Copler Oxide	AQG	OC	Turkey
Copler Sulfide	AQG	OC	Turkey
Cowal	EVN	OC	Australia
Cracow	EVN	UG	Australia
Dalgaranga	GCY	OC	Australia
Darlot	RED	UG	Australia
Deflector	DRM/SLR	UG	Australia
Didipio	OGC	MX	Philippines
Duketon North	RRL	OC	Australia
Duketon South	RRL	OC	Australia
Edikan	PRU	OC	Ghana
Edna May	EVN/RMS	MX	Australia
Ernest Henry	EVN	UG	Australia
Fortnum	WGX	MX	Australia
Fosterville	KLA	UG	Australia
Gold Ridge	SBM	OC	Solomon Islands
Golden Pride	RSG	OC	Tanzania
Gosowong	NCM	UG	Indonesia
Gruyere	GOR	OC	Australia
Guanaco	AGD	UG	Chile
Gwalia	SBM	UG	Australia
Haile	OGC	MX	USA
Hera	AMI	UG	Australia
Higginsville	WGX	OC	Australia
Holt Complex	KLA	UG	Canada
Jundee	NST	UG	Australia
Kalgoorlie	NST	UG	Australia
Kalgoorlie Super Pit	SAR	MX	Australia
Karouni	TRY	OC	Guyana
Kathleen Valley	RMS	UG	Australia
King of the Hills	SBM/RED	UG	Australia
Macassa	KLA	UG	Canada
Macraes/Reefton	OGC	MX	New Zealand
Mako	RSG	OC	Senegal
Matilda-Wiluna	WMX	MX	Australia
Mount Carlton	EVN	OC	Australia
Mount Magnet	RMS	MX	Australia
Mount Monger	SLR	MX	Australia
Mount Morgans	DCN	MX	Australia
Mount Rawdon	EVN	OC	Australia
Mungari	EVN	UG	Australia
Nicolsons	PNR	UG	Australia
Nullagine	MOY	MX	Australia
Pajingo	EVN	UG	Australia
Paulsens	NST	UG	Australia
Peak	AMI	UG	Australia
Plutonic	NST	UG	Australia
Pogo	NST	UG	USA
Ravenswood	RSG	UG	Australia
Red Chris	NCM	MX	Canada
Sabodala	TGZ	OC	Senegal
Siana	RED	OC	Philippines
Simberi	SBM	OC	Papua New Guinea
Sissingue	PRU	OC	Cote d'Ivoire
South Kalgoorlie Operations	WGX	MX	Australia
Southern Cross	SBM	OC	Australia
Syama Oxide	RSG	OC	Mali
Syama Sulphide	RSG	UG	Mali
Talang Santo	KRM	OC	Indonesia
Taylor	KLA	UG	Canada
Thunderbox	SAR	MX	Australia
Tomingley	ALK	OC	Australia
Vivien	RMS	UG	Australia
Waghnion	TGZ	OC	Burkina Faso
Waihi	OGC	MX	New Zealand

Appendix D – Mine Performance by Year

Row Labels	#Mines	AvgAISC	TotalGoldProd	TotalOreMined	AvgMinedGrade	Sum of Processing	AvgHeadGrade
2013 Jun	17	$1,334.99	1,688,286	28,336,986	3.33	27,306,356	3.07
2013 Dec	3	$483.96	542,582	24,111,470	1.26	16,565,721	1.40
2014 Jun	22	$1,248.22	2,435,614	40,919,309	4.34	34,234,645	4.16
2014 Dec	4	$943.48	564,150	19,244,795	1.24	18,228,374	1.40
2015 Jun	24	$1,118.04	2,962,499	44,438,719	4.29	35,028,651	4.35
2015 Dec	5	$866.08	545,368	19,076,773	2.98	19,470,860	2.76
2016 Jun	32	$1,179.88	3,594,644	58,832,934	4.34	51,719,599	4.15
2016 Dec	5	$1,059.65	598,295	19,247,921	2.79	16,783,740	2.63
2017 Jun	36	$1,148.81	4,137,272	92,712,177	3.47	69,435,109	3.59
2017 Dec	8	$1,057.72	1,105,627	21,830,240	2.81	23,875,882	2.59
2018 Jun	38	$1,081.10	4,468,154	84,872,831	3.60	75,307,088	3.50
2018 Dec	12	$1,089.71	1,822,256	18,212,703	2.67	25,087,664	6.30
2019 Jun	38	$1,239.83	4,603,139	73,284,249	3.26	78,871,983	3.41
2019 Dec	18	$1,416.01	2,540,577	28,199,284	2.19	30,780,821	6.09
2019 Full Year	1	$1,948.67	54,486	290,436	2.04	2,699,284	0.69
2020 Jun	37	$1,430.56	4,624,120	101,250,631	2.97	94,908,216	2.92
Grand Total	**300**	**$1,203.53**	**36,287,069**	**674,861,458**	**3.39**	**620,303,993**	**3.75**

Appendix E – Mine Performance by Type (Open-Pit, Underground or Mixed) and Country

Row Labels	AvgAISC	#Mines	Sum of GoldProd	AvgGoldProd	AvgOreMined	AvgMinedGrade	AvgProcessing	AvgHeadGrade
⊟MX	**$1,204.89**	**58**	**6,698,506**	**115,491**	**2,817,095**	**2.91**	**2,470,993**	**2.79**
Australia	$1,346.61	34	3,636,284	106,950	1,506,347	3.06	1,695,804	2.90
Canada	$3,111.07	1	38,933	38,933	19,331,000		5,847,000	0.40
Mali	$1,369.00	1	104,395	104,395	1,210,204	2.40	1,967,503	2.00
New Zealand	$1,218.85	12	1,794,460	149,538	3,630,579	3.85	4,000,909	3.78
Philippines	$180.34	7	728,018	104,003	5,622,936	1.16	3,200,552	1.28
USA	$1,243.37	3	396,416	132,139	2,902,333	1.86	2,477,000	2.19
⊟OC	**$1,215.10**	**122**	**14,173,269**	**116,174**	**3,338,364**	**1.94**	**2,857,650**	**1.91**
Australia	$1,142.45	60	6,761,643	112,694	2,943,749	1.92	2,849,124	1.74
Burkina Faso	$1,372.14	1	39,148	39,148	1,532,000	1.37	958,000	1.63
Canada	$930.23	1	106,663	106,663	4,573,000	0.92	4,495,000	1.35
Cote d'Ivoire	$1,096.85	8	796,821	99,603	8,417,449	1.36	1,846,075	1.82
Ghana	$1,458.30	8	1,515,318	189,415	7,107,370	1.11	6,643,732	1.09
Guyana	$1,738.19	4	207,928	51,982	740,754	2.09	789,066	2.09
Indonesia	$1,698.03	1	7,323	7,323	25,456	8.96	79,335	7.79
Mali	$1,111.67	11	1,474,848	134,077	1,664,905	2.34	1,528,149	3.24
Papua New Guinea	$1,475.80	8	776,664	97,083	2,981,125	1.17	2,852,750	1.23
Philippines	$1,397.13	4	142,933	35,733	539,471	3.66	486,968	2.75
Senegal	$1,219.36	4	806,961	201,740	1,998,403	2.91	3,315,708	2.19
Solomon Islands	$2,164.50	2	91,052	45,526	1,503,000	1.45	1,452,000	1.45
Tanzania	$1,018.50	2	135,816	67,908	1,064,892		1,850,244	1.18
Turkey	$929.36	8	1,310,151	163,769	4,556,990	1.52	4,953,994	1.90
⊟UG	**$1,191.10**	**120**	**15,415,294**	**128,461**	**1,040,203**	**5.10**	**1,069,609**	**6.08**
Argentina	$3,291.95	1	2,770	2,770	33,318		39,545	2.70
Australia	$1,100.38	96	11,829,130	123,220	1,116,196	5.09	1,175,880	5.41
Canada	$1,341.58	5	721,776	144,355			477,190	11.87
Chile	$1,292.90	1	60,666	60,666	250,986		253,024	7.60
Indonesia	$1,223.79	7	1,714,497	244,928	729,714		642,429	12.22
Mali	$2,275.42	2	135,504	67,752	1,015,460	2.53	1,733,257	1.86
Philippines	$1,511.87	6	581,748	96,958	596,310		532,795	5.99
USA	$1,906.83	2	369,203	184,602	809,756	8.03	814,911	7.76
Grand Total	**$1,203.53**	**300**	**36,287,069**	**120,957**	**2,335,161**	**3.39**	**2,067,680**	**3.75**

Appendix F – Mine Performance by Mine Property

Row Labels	TotGoldProd	AvgAISC	AvgOreMined	AvgMinedGrade	AvgProcessing	AvgHeadGrade
⊟ Andy Well	302,580	1,238.75	307,111	8.15	301,728	8.26
2014 Jun	76,785	1,044.00	233,549	10.70	225,433	10.78
2015 Jun	88,736	1,165.00	394,728	8.90	309,542	9.15
2016 Jun	84,135	1,229.00	323,949	7.80	337,443	8.00
2017 Jun	52,924	1,517.00	276,219	5.20	334,494	5.10
⊟ Atlantic	106,663	930.23	4,573,000	0.92	4,495,000	1.35
2020 Jun	106,663	930.23	4,573,000	0.92	4,495,000	1.35
⊟ Bonikro	595,542	1,186.09	12,536,400		2,196,200	1.87
2014 Jun	94,994	1,193.00	12,059,000		1,974,000	1.62
2015 Jun	119,970	896.00	10,631,000		1,976,000	1.99
2016 Jun	137,696	1,291.98	12,923,000		2,510,000	1.82
2017 Jun	128,327	1,465.35	19,383,000		2,732,000	1.62
2018 Jun	114,555	1,084.12	7,686,000		1,789,000	2.29
⊟ Carosue Dam	1,176,967	1,236.66	2,095,600	3.00	2,426,429	2.38
2014 Jun	133,492	1,515.00	2,201,000		2,569,000	1.85
2015 Jun	167,531	1,139.00	3,812,200		2,314,000	2.49
2016 Jun	157,191	1,067.00	1,000,000		2,321,000	2.30
2017 Jun	144,426	1,413.00	1,566,000		2,469,000	2.10
2018 Jun	171,301	1,199.00	1,718,000		2,479,000	2.30
2019 Jun	199,744	1,063.26	1,976,000	3.00	2,438,000	2.75
2020 Jun	203,282	1,260.39	2,396,000	3.00	2,395,000	2.87
⊟ Casposo	2,770	3,291.95	33,318		39,545	2.70
2019 Dec	2,770	3,291.95	33,318		39,545	2.70
⊟ Central Murchison	559,630	1,449.91	1,852,621	2.54	2,163,215	2.36
2017 Jun	101,339	1,303.00	1,531,389	2.40	1,561,658	2.34
2018 Jun	121,347	1,501.63	1,661,027	2.57	1,831,410	2.47
2019 Jun	162,635	1,452.74	1,913,435	2.58	2,480,026	2.33
2020 Jun	174,309	1,542.25	2,304,631	2.59	2,779,765	2.29
⊟ Co-O	581,748	1,511.87	596,310		532,795	5.99
2015 Jun	98,359	1,324.64	659,495		582,311	5.61
2016 Jun	108,578	1,371.62	623,659		561,192	6.40
2017 Jun	80,743	1,822.07	564,965		499,733	5.33
2018 Jun	95,705	1,397.02	550,400		494,989	6.33
2019 Jun	103,307	1,487.03	606,676		544,601	6.29
2020 Jun	95,056	1,668.84	572,665		513,945	5.99
⊟ Copler Oxide	1,123,298	958.65	5,151,252	1.34	5,435,248	1.49
2013 Dec	216,850	847.17	6,673,520	1.90	6,697,209	1.91
2014 Dec	182,342	1,104.23	6,474,401	1.69	6,433,514	1.68
2015 Dec	163,732	917.06	6,119,506	1.21	6,030,514	1.23
2016 Dec	95,229	1,298.56	4,598,436	1.11	4,739,368	1.10
2017 Dec	168,163	877.07	6,311,175	1.13	6,225,773	1.13
2018 Dec	170,865	822.47	2,705,697	0.73	4,370,353	1.84
2019 Dec	126,117	843.98	3,176,026	1.60	3,550,007	1.57
⊟ Copler Sulfide	186,854	724.33	397,162	2.83	1,585,214	4.74
2019 Dec	186,854	724.33	397,162	2.83	1,585,214	4.74
⊟ Cowal	1,272,440	883.25	7,123,400	1.20	7,611,000	1.27
2016 Jun	237,940	776.00	8,714,000	1.16	6,666,000	1.33
2017 Jun	263,015	833.00	10,203,000	1.23	7,171,000	1.37
2018 Jun	257,951	877.00	7,770,000	1.18	7,795,000	1.25
2019 Jun	251,499	995.31	6,114,000	1.24	7,937,000	1.21
2020 Jun	262,035	934.92	2,816,000	1.17	8,486,000	1.17
⊟ Cracow	729,890	1,159.61	520,750	5.79	532,125	5.73
2013 Jun	102,560	1,326.00	495,000	6.57	522,000	6.53
2014 Jun	95,064	1,058.00	519,000	6.12	514,000	6.12
2015 Jun	93,064	1,050.00	541,000	5.85	541,000	5.72
2016 Jun	90,626	1,065.00	499,000	5.92	511,000	5.92
2017 Jun	89,496	1,123.00	529,000	5.55	540,000	5.45
2018 Jun	90,351	1,181.00	537,000	5.51	529,000	5.63
2019 Jun	80,984	1,270.61	561,000	4.88	573,000	4.80
2020 Jun	87,745	1,203.30	485,000	5.91	527,000	5.63
⊟ Dalgaranga	129,996	1,862.27	2,918,500	0.80	2,858,872	0.81
2019 Jun	56,940	2,140.49	2,348,000	0.82	2,795,744	0.76
2020 Jun	73,056	1,584.06	3,489,000	0.78	2,922,000	0.86
⊟ Darlot	219,229	1,631.27	765,831	3.49	769,900	3.53
2018 Jun	48,259	1,480.00	416,519	3.48	458,834	3.50
2019 Jun	88,141	1,590.16	900,251	3.85	907,004	3.79
2020 Jun	82,829	1,823.67	980,722	3.13	943,861	3.30
⊟ Deflector	266,573	1,106.86	499,155	4.15	489,126	4.93
2017 Jun	49,129	1,018.00	429,614	3.72	444,987	4.50
2018 Jun	64,593	1,190.00	523,549	4.50	549,960	4.20
2019 Jun	48,475	1,105.94	335,559	3.00	302,202	5.52
2020 Jun	104,376	1,113.52	707,899	5.39	659,353	5.50
⊟ Didipio	728,018	180.34	5,622,936	1.16	3,200,552	1.28
2013 Dec	66,277	-822.20	8,787,878	0.58	2,578,295	0.94
2014 Dec	106,256	-123.09	8,380,658	0.65	3,111,516	1.19
2015 Dec	33,094	456.51	7,063,642	0.82	3,581,471	1.24
2016 Dec	147,150	321.28	9,199,375	0.92	3,499,584	1.50
2017 Dec	176,790	91.29	3,764,000	1.09	3,500,000	1.77
2018 Dec	114,985	571.05	991,000	2.25	3,500,000	1.18
2019 Dec	83,466	767.51	1,174,000	1.80	2,633,000	1.11

⊟ **Duketon North**	**464,683**	**985.24**	**2,776,000**		**2,740,000**	**1.03**
2016 Jun	76,139	934.00	1,450,000		1,480,000	0.89
2017 Jun	100,875	785.00	3,370,000		2,950,000	1.14
2018 Jun	106,928	827.00	3,150,000		3,260,000	1.09
2019 Jun	88,558	1,055.65	3,160,000		3,000,000	1.00
2020 Jun	92,183	1,324.55	2,750,000		3,010,000	1.04
⊟ **Duketon South**	**1,241,586**	**1,022.63**	**6,536,000**		**6,018,000**	**1.24**
2016 Jun	228,945	924.00	3,620,000		3,630,000	1.10
2017 Jun	223,478	1,018.00	7,480,000		6,830,000	1.10
2018 Jun	254,445	932.00	7,400,000		6,790,000	1.24
2019 Jun	274,861	1,021.06	6,960,000		6,470,000	1.41
2020 Jun	259,857	1,218.11	7,220,000		6,370,000	1.35
⊟ **Edikan**	**1,515,318**	**1,458.30**	**7,107,370**	**1.11**	**6,643,732**	**1.09**
2013 Jun	208,444	1,119.68	6,999,304	1.25	5,647,341	1.40
2014 Jun	180,519	1,408.54	6,148,407	1.07	6,650,421	1.00
2015 Jun	212,135	1,046.38	6,152,571	1.21	6,393,748	1.17
2016 Jun	153,902	1,854.91	5,305,791	1.05	6,608,357	0.86
2017 Jun	176,218	1,755.76	9,296,498	1.07	7,091,779	1.07
2018 Jun	220,491	1,418.95	10,190,371	1.08	7,134,985	1.15
2019 Jun	191,971	1,464.68	7,037,886	1.06	6,680,083	1.09
2020 Jun	171,638	1,597.48	5,728,134	1.12	6,943,145	1.00
⊟ **Edna May**	**608,629**	**1,286.23**	**1,959,340**	**1.26**	**2,577,487**	**1.02**
2013 Jun	86,216	1,325.00	2,856,000	1.01	2,607,000	1.13
2014 Jun	80,165	1,213.00	2,101,000	1.06	2,547,000	1.04
2015 Jun	98,766	898.00	2,279,000	1.27	2,827,000	1.16
2016 Jun	71,028	1,504.00	2,351,000	0.91	2,945,000	0.82
2017 Jun	70,188	1,440.00	2,082,000	1.14	2,580,000	0.91
2018 Jun	72,521	1,203.00	2,635,959	1.03	2,010,000	1.20
2019 Jun	83,969	1,249.97	664,483	1.40	2,842,172	0.93
2020 Jun	45,776	1,456.87	705,276	2.24	2,261,722	0.99
⊟ **Ernest Henry**	**349,059**	**-499.57**	**6,250,750**	**0.57**	**6,249,000**	**0.57**
2017 Jun	60,259	-361.00	4,378,000	0.55	4,364,000	0.56
2018 Jun	95,209	-641.00	6,818,000	0.57	6,759,000	0.56
2019 Jun	98,689	-543.01	6,729,000	0.58	6,828,000	0.58
2020 Jun	94,902	-453.27	7,078,000	0.59	7,045,000	0.59
⊟ **Fortnum**	**160,974**	**1,305.95**	**657,375**	**2.43**	**853,425**	**2.06**
2018 Jun	41,826	1,387.00	606,449	1.87	845,180	1.66
2019 Jun	58,308	1,221.07	868,098	2.24	849,840	2.23
2020 Jun	60,840	1,309.79	497,579	3.18	865,255	2.29
⊟ **Fosterville**	**975,596**	**505.01**			**474,892**	**32.24**
2018 Dec	356,230	591.11			456,909	24.90
2019 Dec	619,366	418.91			492,874	39.59
⊟ **Gold Ridge**	**91,052**	**2,164.50**	**1,503,000**	**1.45**	**1,452,000**	**1.45**
2013 Jun	45,931	2,111.00	1,581,000	1.50	1,437,000	1.50
2014 Jun	45,121	2,218.00	1,425,000	1.40	1,467,000	1.40
⊟ **Golden Pride**	**135,816**	**1,018.50**	**1,064,892**		**1,850,244**	**1.18**
2013 Jun	97,827	1,007.00	1,064,892		2,249,568	1.46
2014 Jun	37,989	1,030.00			1,450,920	0.89
⊟ **Gosowong**	**1,714,497**	**1,223.79**	**729,714**		**642,429**	**12.22**
2014 Jun	344,747	823.00	1,042,000		826,000	13.50
2015 Jun	331,555	863.00	878,000		738,000	14.49
2016 Jun	197,463	1,283.74	416,000		479,000	13.19
2017 Jun	295,876	1,003.86	664,000		565,000	17.03
2018 Jun	251,390	1,193.75	767,000		703,000	11.49
2019 Jun	190,185	1,533.82	808,000		709,000	8.77
2020 Jun	103,281	1,865.36	533,000		477,000	7.10
⊟ **Gruyere**	**50,703**	**1,102.00**	**3,355,500**	**0.88**	**1,639,000**	**1.05**
2019 Dec	50,703	1,102.00	3,355,500	0.88	1,639,000	1.05
⊟ **Guanaco**	**60,666**	**1,292.90**	**250,986**		**253,024**	**7.60**
2019 Dec	60,666	1,292.90	250,986		253,024	7.60
⊟ **Gwalia**	**1,837,554**	**952.03**	**765,375**	**9.60**	**816,000**	**9.13**
2013 Jun	183,116	979.00	696,000	8.20	834,000	7.10
2014 Jun	214,319	912.00	811,000	8.40	851,000	8.10
2015 Jun	248,142	841.00	902,000	8.90	931,000	8.60
2016 Jun	267,166	783.00	924,000	9.30	951,000	9.10
2017 Jun	265,057	785.00	790,000	10.70	828,000	10.30
2018 Jun	268,428	802.00	679,000	12.50	711,000	12.00
2019 Jun	220,170	1,028.46	624,000	11.13	651,000	10.76
2020 Jun	171,156	1,485.75	697,000	7.65	771,000	7.12
⊟ **Haile**	**396,416**	**1,243.37**	**2,902,333**	**1.86**	**2,477,000**	**2.19**
2017 Dec	118,466	663.84	2,710,000	2.05	1,836,000	2.67
2018 Dec	131,819	1,207.63	2,780,000	1.74	2,392,000	2.11
2019 Dec	146,131	1,858.64	3,217,000	1.78	3,203,000	1.80
⊟ **Hera**	**255,439**	**889.83**	**395,365**	**4.73**	**392,437**	**4.71**
2016 Jun	46,882	1,093.47	307,240	6.03	308,118	6.01
2017 Jun	45,679	968.00	373,795	4.36	368,086	4.37
2018 Jun	59,822	430.00	406,234	5.07	407,131	5.10
2019 Jun	58,025	814.51	464,343	4.30	468,358	4.24
2020 Jun	45,031	1,143.15	425,212	3.89	410,494	3.84
⊟ **Higginsville**	**174,931**	**1,442.59**	**817,247**	**2.09**	**1,043,517**	**1.95**
2017 Jun	84,595	1,243.00	952,576	2.75	1,232,184	2.37
2018 Jun	55,958	1,565.00	784,004	1.74	1,189,400	1.73
2019 Jun	34,378	1,519.78	715,160	1.78	708,967	1.74

⊟ Holt Complex	**181,721**	**1,707.39**			**662,673**	**4.55**
2018 Dec	67,770	1,467.07			471,819	4.70
2019 Dec	113,951	1,947.71			853,527	4.40
⊟ Jundee	**1,544,409**	**984.74**	**1,902,993**	**5.11**	**1,741,567**	**5.17**
2015 Jun	222,848	1,008.00	1,249,633	5.92	1,285,462	5.82
2016 Jun	209,515	1,007.00	1,245,354	5.70	1,290,366	5.50
2017 Jun	233,556	948.00	1,473,241	5.50	1,527,479	5.20
2018 Jun	283,288	870.00	1,678,592	5.62	1,839,273	5.38
2019 Jun	295,053	979.99	2,306,946	4.50	2,207,099	4.62
2020 Jun	300,149	1,095.45	3,464,189	3.42	2,299,724	4.47
⊟ Kalgoorlie	**1,622,065**	**1,089.62**	**1,708,731**	**5.05**	**1,806,063**	**4.80**
2014 Jun	73,755	894.03	374,833	6.36	428,559	5.72
2015 Jun	196,909	861.84	1,012,348	6.46	1,081,899	6.01
2016 Jun	203,029	837.58	1,211,771	5.56	1,257,012	5.30
2017 Jun	225,689	968.00	1,362,236	5.20	1,454,578	5.10
2018 Jun	269,396	1,174.00	1,963,768	4.52	2,028,158	4.45
2019 Jun	334,527	1,328.62	2,983,567	3.85	2,993,777	3.82
2020 Jun	318,760	1,563.26	3,052,596	3.39	3,398,461	3.22
⊟ Kalgoorlie Super Pit	**265,190**	**1,397.02**	**3,714,000**	**3.00**	**7,466,000**	**1.31**
2020 Jun	265,190	1,397.02	3,714,000	3.00	7,466,000	1.31
⊟ Karouni	**207,928**	**1,738.19**	**740,754**	**2.09**	**789,066**	**2.09**
2017 Dec	56,023	1,783.61	783,291	2.17	828,893	2.24
2018 Dec	70,207	1,200.95	996,529	2.28	871,660	2.64
2019 Dec	58,118	1,579.51	811,664	2.06	887,929	2.12
2020 Jun	23,580	2,388.70	371,531	1.84	567,782	1.35
⊟ Kathleen Valley	**51,973**	**1,171.00**	**421,214**	**4.08**	**336,251**	**4.98**
2016 Jun	51,973	1,171.00	421,214	4.08	336,251	4.98
⊟ King of the Hills	**178,865**	**1,239.33**	**466,333**	**4.37**	**448,333**	**4.37**
2013 Jun	58,477	1,193.00	470,000	4.40	439,000	4.40
2014 Jun	70,711	1,422.00	472,000	4.60	514,000	4.50
2015 Jun	49,677	1,103.00	457,000	4.10	392,000	4.20
⊟ Macassa	**481,422**	**973.19**			**339,274**	**22.63**
2018 Dec	240,126	953.53			354,469	21.60
2019 Dec	241,296	992.85			324,078	23.66
⊟ Macraes/Reefton	**1,372,059**	**1,398.00**	**5,923,155**	**1.23**	**6,557,465**	**1.12**
2013 Dec	259,455	1,426.90	8,650,072	1.31	7,290,217	1.35
2014 Dec	201,207	1,499.80	4,389,736	1.39	7,100,328	1.06
2015 Dec	222,093	1,148.45	5,608,026	1.37	7,751,911	1.10
2016 Dec	153,563	1,477.35	4,971,248	1.04	6,067,798	0.96
2017 Dec	160,266	1,454.18	5,072,000	1.13	5,878,000	1.04
2018 Dec	203,000	1,175.53	6,314,000	1.31	5,897,000	1.24
2019 Dec	172,475	1,603.79	6,457,000	1.04	5,917,000	1.10
⊟ Mako	**87,188**	**1,009.63**	**1,062,611**	**2.41**	**811,830**	**2.86**
2019 Dec	87,188	1,009.63	1,062,611	2.41	811,830	2.86
⊟ Matilda-Wiluna	**237,269**	**1,821.12**	**1,572,004**	**1.33**	**1,574,154**	**1.39**
2017 Jun	39,413	1,876.81	1,323,616	1.20	965,300	1.40
2018 Jun	70,565	1,629.00	1,696,843	1.47	1,835,093	1.37
2019 Jun	65,406	1,777.87	1,938,606	1.29	1,807,932	1.34
2020 Jun	61,885	2,000.80	1,328,952	1.34	1,688,291	1.45
⊟ Mount Carlton	**661,776**	**844.18**	**850,571**	**4.93**	**803,714**	**5.01**
2014 Jun	87,952	886.00	893,000	4.77	687,000	5.80
2015 Jun	77,658	912.00	744,000	4.42	785,000	4.25
2016 Jun	113,056	742.00	838,000	5.55	837,000	5.71
2017 Jun	105,024	622.00	1,338,000	3.88	816,000	5.33
2018 Jun	112,479	535.00	608,000	7.48	801,000	5.61
2019 Jun	106,646	733.00	746,000	5.33	807,000	5.29
2020 Jun	58,961	1,479.26	787,000	3.08	893,000	3.04
⊟ Mount Magnet	**642,687**	**1,265.41**	**1,582,910**	**1.56**	**1,650,146**	**1.60**
2013 Jun	58,370	1,974.10	1,531,000	1.40	1,616,343	1.22
2014 Jun	73,980	1,231.33	1,367,737	1.37	1,603,470	1.60
2015 Jun	81,683	1,178.00	1,131,355	1.80	1,633,417	1.67
2016 Jun	51,636	1,171.00	822,877		1,332,113	1.36
2017 Jun	66,073	1,169.00	1,360,783	1.78	1,574,617	1.42
2018 Jun	79,943	1,186.00	1,208,000	1.92	1,742,000	1.59
2019 Jun	80,204	1,152.16	2,087,267	1.28	1,778,243	1.33
2020 Jun	150,798	1,061.72	3,154,257	1.38	1,920,962	2.61
⊟ Mount Monger	**1,147,807**	**1,312.45**	**1,230,572**	**3.79**	**1,346,263**	**3.58**
2013 Jun	133,364	1,168.00	1,091,100	3.40	1,367,318	3.20
2014 Jun	170,800	1,224.00	1,028,326	4.10	1,931,486	2.90
2015 Jun	121,780	1,331.00	688,085	4.80	1,215,308	3.30
2016 Jun	131,109	1,281.00	1,286,196	3.40	1,236,600	3.50
2017 Jun	135,837	1,359.00	1,306,508	3.50	1,300,152	3.50
2018 Jun	157,936	1,289.00	1,269,722	4.20	1,256,120	4.20
2019 Jun	136,767	1,433.49	1,419,100	3.44	1,229,195	3.64
2020 Jun	160,214	1,414.10	1,755,539	3.50	1,233,922	4.38
⊟ Mount Morgans	**138,815**	**1,618.47**	**2,817,318**	**1.59**	**2,963,348**	**1.63**
2020 Jun	138,815	1,618.47	2,817,318	1.59	2,963,348	1.63
⊟ Mount Rawdon	**780,043**	**1,062.19**	**3,869,250**	**0.93**	**3,359,875**	**1.00**
2013 Jun	106,089	1,213.00	3,753,000	1.03	3,329,000	1.08
2014 Jun	103,755	854.00	3,638,000	0.97	3,574,000	0.98
2015 Jun	102,162	873.00	3,283,000	1.04	3,405,000	1.03
2016 Jun	85,002	1,024.00	3,307,000	0.88	3,421,000	0.86
2017 Jun	101,331	873.00	5,005,000	0.90	3,351,000	1.06
2018 Jun	105,053	884.00	4,443,000	1.03	3,242,000	1.14
2019 Jun	94,647	1,230.63	3,202,000	0.87	3,244,000	1.01
2020 Jun	82,004	1,545.90	4,323,000	0.72	3,313,000	0.87

Mungari	**653,434**	**1,176.44**	**1,748,200**	**2.71**	**1,661,200**	**2.64**
2016 Jun	137,193	1,024.00	1,685,000	2.95	1,441,000	3.16
2017 Jun	143,820	1,143.00	1,737,000	2.62	1,711,000	2.81
2018 Jun	118,498	1,181.00	963,000	3.39	1,654,000	2.36
2019 Jun	120,535	1,319.78	2,031,000	2.25	1,660,000	2.39
2020 Jun	133,388	1,214.44	2,325,000	2.33	1,840,000	2.47
Nicolsons	**189,473**	**1,372.82**	**194,825**	**6.46**	**183,682**	**6.89**
2016 Jun	16,398	1,404.78	76,637	7.02	78,730	6.82
2017 Jun	39,149	1,151.78	220,515	6.44	167,156	7.57
2018 Jun	52,202	1,130.00	197,972	7.35	230,893	7.61
2019 Jun	43,019	1,438.90	249,486	5.99	213,845	6.75
2020 Jun	38,705	1,738.65	229,514	5.49	227,787	5.69
Nullagine	**404,871**	**1,303.20**	**1,342,976**		**1,640,365**	**1.59**
2014 Dec	74,345	1,293.00			1,583,016	1.66
2015 Dec	91,462	1,175.00			1,824,306	1.78
2016 Dec	86,325	1,213.00			1,987,690	1.54
2017 Dec	72,848	1,372.00	615,074		913,716	1.43
2018 Dec	79,891	1,463.00	2,070,877		1,893,095	1.53
Pajingo	**281,233**	**1,231.00**	**379,000**	**5.38**	**451,250**	**5.17**
2013 Jun	85,918	1,309.00	688,000	4.20	611,000	4.57
2014 Jun	60,766	1,291.00	31,000	6.05	398,000	4.96
2015 Jun	65,919	1,163.00	379,000	5.78	374,000	5.78
2016 Jun	68,630	1,161.00	418,000	5.50	422,000	5.36
Paulsens	**422,322**	**1,225.00**	**391,076**	**5.86**	**402,450**	**5.95**
2013 Jun	88,614	977.00	454,739	6.34	412,360	7.27
2014 Jun	100,041	1,105.00	510,244	7.10	464,777	7.40
2015 Jun	74,999	1,264.00	455,655	5.18	483,456	5.40
2016 Jun	80,742	1,099.00	398,812	7.10	386,570	7.20
2017 Jun	55,490	1,455.00	352,029	5.10	434,246	4.60
2018 Jun	22,436	1,450.00	174,974	4.35	233,292	3.85
Peak	**143,545**	**1,084.75**	**386,147**	**5.48**	**385,461**	**5.26**
2018 Jun	37,552	517.00	131,701	9.61	135,345	8.83
2019 Jun	59,495	1,106.10	448,624	4.50	452,502	4.22
2020 Jun	46,498	1,631.14	578,116	2.32	568,537	2.72
Plutonic	**203,851**	**1,549.25**	**500,562**	**3.76**	**630,677**	**3.08**
2014 Jun	41,623	1,414.00	360,852	4.40	399,317	3.90
2015 Jun	78,709	1,550.00	810,467	3.66	836,683	3.61
2016 Jun	64,857	1,738.00	639,742	3.70	934,507	2.80
2017 Jun	18,662	1,495.00	191,187	3.30	352,199	2.00
Pogo	**369,203**	**1,906.83**	**809,756**	**8.03**	**814,911**	**7.76**
2019 Jun	194,896	1,717.32	783,505	8.58	796,318	8.08
2020 Jun	174,307	2,096.34	836,006	7.48	833,503	7.44
Ravenswood	**788,746**	**1,401.95**	**1,476,106**	**1.64**	**1,992,128**	**1.80**
2013 Jun	141,846	1,079.00	1,557,512		1,584,657	2.93
2014 Jun	139,291	1,029.00	1,586,160		1,670,098	2.75
2015 Jun	103,773	1,178.00	1,481,435		1,439,822	2.37
2016 Jun	105,552	1,225.00	1,305,585	2.38	1,700,386	2.05
2017 Jun	92,004	1,406.00	2,366,159	1.43	1,995,292	1.54
2018 Jun	89,975	1,395.00	2,459,319	1.03	2,445,010	1.19
2019 Jun	61,819	1,954.93	762,245	1.32	2,402,474	0.86
2019 Full Year	54,486	1,948.67	290,436	2.04	2,699,284	0.69
Red Chris	**38,933**	**3,111.07**	**19,331,000**		**5,847,000**	**0.40**
2020 Jun	38,933	3,111.07	19,331,000		5,847,000	0.40
Sabodala	**719,773**	**1,289.27**	**2,310,333**	**3.08**	**4,150,333**	**1.96**
2017 Dec	233,267	1,229.86	2,101,000	3.48	4,221,000	1.87
2018 Dec	245,230	1,257.11	1,921,000	3.62	4,069,000	2.03
2019 Dec	241,276	1,380.83	2,909,000	2.15	4,161,000	1.99
Siana	**142,933**	**1,397.13**	**539,471**	**3.66**	**486,968**	**2.75**
2013 Jun	18,255	1,376.00	411,512	4.06	369,864	2.20
2015 Jun	23,645	1,666.00	340,000	2.40	298,163	2.90
2016 Jun	59,663	1,458.00	786,363	3.80	692,384	3.20
2017 Jun	41,370	1,088.51	620,007	4.37	587,461	2.70
Simberi	**776,664**	**1,475.80**	**2,981,125**	**1.17**	**2,852,750**	**1.23**
2013 Jun	45,609	1,621.00	1,942,000	1.00	1,471,000	1.10
2014 Jun	44,251	2,385.00	1,886,000	1.00	1,714,000	1.00
2015 Jun	79,568	1,464.00	2,070,000	1.23	2,660,000	1.10
2016 Jun	110,286	1,293.00	3,372,000	1.26	3,315,000	1.26
2017 Jun	116,044	1,187.00	4,020,000	1.13	3,690,000	1.19
2018 Jun	134,661	1,068.00	4,199,000	1.25	3,586,000	1.35
2019 Jun	142,177	1,160.72	3,397,000	1.44	3,072,000	1.64
2020 Jun	104,068	1,627.70	2,963,000	1.06	3,314,000	1.17
Sissingue	**201,279**	**948.12**	**1,552,530**	**1.36**	**1,262,534**	**1.73**
2018 Jun	35,425	687.21	1,019,280	1.15	678,027	1.70
2019 Jun	79,853	1,046.55	1,650,753	1.36	1,530,086	1.71
2020 Jun	86,001	1,110.61	1,987,557	1.58	1,579,490	1.79
South Kalgoorlie Operations	**112,998**	**1,170.50**	**678,281**	**2.58**	**743,372**	**2.53**
2017 Jun	78,912	1,100.00	829,076	2.85	987,666	2.75
2018 Jun	34,086	1,241.00	527,486	2.31	499,078	2.31
Southern Cross	**31,468**	**1,700.00**	**255,000**	**2.20**	**800,000**	**1.40**
2013 Jun	31,468	1,700.00	255,000	2.20	800,000	1.40

⊟Syama Oxide	668,592	1,125.56	1,458,352	2.33	1,246,076	3.05
2015 Jun	45,916	1,029.00	873,227		580,195	2.72
2016 Jun	80,032	1,561.00	1,132,468	2.21	1,257,948	2.30
2017 Jun	101,830	960.00	1,319,596	2.29	1,340,097	2.84
2018 Jun	89,816	1,190.00	1,594,647	2.09	1,396,805	2.16
2019 Dec	180,534	1,179.61	2,096,336	2.54	1,415,516	4.22
2019 Jun	170,464	833.73	1,733,838	2.52	1,485,895	4.08
⊟Syama Sulphide	1,046,155	1,424.36	1,600,620	2.44	1,845,901	2.87
2013 Jun	196,182	1,217.00	2,490,927		2,008,905	3.65
2014 Jun	165,494	1,311.00	2,231,201		1,775,164	3.73
2015 Jun	178,995	1,029.00	3,213,520		1,945,645	3.77
2016 Jun	129,585	917.00	413,038	2.29	1,497,103	3.53
2017 Jun	136,000	1,001.00	1,215,153	2.44	2,106,371	2.59
2018 Jun	104,395	1,369.00	1,210,204	2.40	1,967,503	2.00
2019 Dec	62,437	2,913.32	1,293,581	2.45	1,621,377	1.92
2019 Jun	73,067	1,637.53	737,338	2.61	1,845,137	1.81
⊟Talang Santo	7,323	1,698.03	25,456	8.96	79,335	7.79
2019 Jun	7,323	1,698.03	25,456	8.96	79,335	7.79
⊟Taylor	58,633	1,346.71			382,059	5.00
2018 Dec	58,633	1,346.71			382,059	5.00
⊟Thunderbox	635,787	1,068.23	2,869,600	2.27	2,325,600	1.70
2016 Jun	31,465	1,293.00	987,000		949,000	1.10
2017 Jun	129,300	1,253.00	2,611,000		2,305,000	1.70
2018 Jun	145,152	1,071.00	3,410,000		2,655,000	1.80
2019 Jun	155,333	999.01	3,354,000	1.53	2,827,000	1.82
2020 Jun	174,537	725.14	3,986,000	3.00	2,892,000	2.08
⊟Tomingley	127,502	974.80	994,999	1.84	1,045,652	2.04
2018 Jun	78,533	1,002.00	1,589,811	1.99	1,092,602	2.42
2019 Jun	48,969	947.60	400,187	1.68	998,702	1.66
⊟Vivien	151,157	1,168.04	172,173	7.44	185,885	7.03
2016 Jun	7,230	1,171.00	28,238	8.63	26,519	8.97
2017 Jun	46,144	1,169.00	191,015	8.12	207,574	7.17
2018 Jun	55,683	1,186.00	228,000	7.47	253,000	6.64
2019 Jun	42,100	1,146.18	241,440	5.54	256,446	5.34
Grand Total	35,792,208	1,207.31	2,379,212	3.30	2,105,978	3.68

Appendix G – Multiple Regression Output on AISC Against Other Factors

We credit Jacky Poon for the regression model and output.

AISC = Owner + MineType + Location + Period + LogReservesMeanImputed +
+ HighHeadGrade + LowRecovery

Residual standard error: 254.3 on 231 degrees of freedom
Multiple R-squared: 0.5948, Adjusted R-squared: 0.4895
F-statistic: 5.651 on 60 and 231 DF, p-value: < 2.2e-16

Factor	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Owner	28	9 194 661.19	328 380.76	5.0788766	0.0000000
MineType	2	91 131.67	45 565.83	0.7047406	0.4952962
Location	12	7 537 230.97	628 102.58	9.7145019	0.0000000
Period	15	2 859 993.47	190 666.23	2.9489251	0.0002601
LogReservesMeanImputed	1	902 344.72	902 344.72	13.9560477	0.0002358
HighHeadGrade	1	586 390.47	586 390.47	9.0693646	0.0028884
LowRecovery	1	749 703.94	749 703.94	11.5952403	0.0007796
Residuals	231	14 935 577.46	64 656.18	NA	NA

Factor	Estimate	Std Error	F-Statistic	P-value
(Intercept)	1 708.37479	437.05480	3.9088343	0.0001219
OwnerALK	217.23385	355.57864	0.6109305	0.5418462
OwnerAMI	46.33752	315.98327	0.1466455	0.8835398
OwnerAQG	57.33538	289.64991	0.1979472	0.8432605
OwnerBLK	1 058.28218	337.27226	3.1377682	0.0019239
OwnerDCN	734.10793	402.76877	1.8226535	0.0696486
OwnerDRM	429.76147	322.31938	1.3333404	0.1837335
OwnerEVN	320.79333	306.82788	1.0455156	0.2968775
OwnerGCY	1 052.64534	355.57490	2.9604040	0.0033926
OwnerGOR	43.44017	366.18863	0.1186279	0.9056733
OwnerKLA	43.07340	317.11076	0.1358308	0.8920734
OwnerKRM	931.11523	399.68402	2.3296283	0.0206888
OwnerMML	729.40410	361.32119	2.0187139	0.0446727
OwnerMOY	328.04084	300.35480	1.0921778	0.2758927
OwnerNCM	673.00723	326.09184	2.0638579	0.0401484
OwnerNST	361.97607	309.55478	1.1693441	0.2434702
OwnerOGC	-451.39514	319.94356	-1.4108587	0.1596316
OwnerPNR	545.70007	327.51096	1.6662040	0.0970282
OwnerPRU	295.01164	375.67962	0.7852745	0.4330973
OwnerRED	713.47387	330.66233	2.1577113	0.0319818
OwnerRMS	430.80338	309.22071	1.3931906	0.1649013

OwnerRRL	314.98991	317.48204	0.9921503	0.3221623
OwnerRSG	599.79470	324.27486	1.8496491	0.0656415
OwnerSAR	470.74634	314.27320	1.4978889	0.1355273
OwnerSBM	344.43391	314.34049	1.0957351	0.2743358
OwnerSLR	486.54719	317.87458	1.5306263	0.1272300
OwnerTGZ	1 134.11642	449.15166	2.5250189	0.0122401
OwnerTRY	737.20651	297.75220	2.4759062	0.0140080
OwnerWGX	625.04351	315.86393	1.9788379	0.0490221
MineTypeOC	-30.72904	77.27237	-0.3976718	0.6912394
MineTypeUG	59.95378	80.61798	0.7436775	0.4578273
LocationBurkina Faso	-830.35640	449.22610	-1.8484153	0.0658204
LocationCanada	264.37075	175.35093	1.5076666	0.1330063
LocationChile	NA	NA	NA	NA
LocationCote d'Ivoire	-116.02923	174.98105	-0.6630960	0.5079302
LocationGhana	462.45049	252.85231	1.8289352	0.0686986
LocationGuyana	NA	NA	NA	NA
LocationIndonesia	NA	NA	NA	NA
LocationMali	-83.79399	133.29668	-0.6286277	0.5302139
LocationNew Zealand	657.54818	185.28856	3.5487792	0.0004687
LocationPapua New Guinea	459.58976	132.41015	3.4709557	0.0006188
LocationPhilippines	-29.45418	162.81415	-0.1809067	0.8565994
LocationSenegal	-704.01632	329.10823	-2.1391635	0.0334714
LocationSolomon Islands	866.86214	211.87934	4.0913010	0.0000593
LocationTanzania	-359.99733	218.56661	-1.6470829	0.1009006
LocationTurkey	NA	NA	NA	NA
LocationUSA	647.96404	158.57388	4.0861966	0.0000605
Period2013 Jun	-176.89924	268.12266	-0.6597698	0.5100588
Period2014 Dec	155.12009	238.10900	0.6514667	0.5153928
Period2014 Jun	-228.88529	265.88740	-0.8608354	0.3902213
Period2015 Dec	-201.89117	218.24524	-0.9250656	0.3558971
Period2015 Jun	-364.73010	265.48967	-1.3738015	0.1708350
Period2016 Dec	35.34218	219.65395	0.1608994	0.8723133
Period2016 Jun	-281.01229	263.65003	-1.0658534	0.2876026
Period2017 Dec	-157.27399	209.95083	-0.7490992	0.4545596
Period2017 Jun	-290.43387	263.46200	-1.1023748	0.2714460
Period2018 Dec	-81.91246	207.84922	-0.3940956	0.6938740
Period2018 Jun	-339.58482	263.18007	-1.2903136	0.1982319
Period2019 Dec	158.09385	206.11158	0.7670304	0.4438467
Period2019 Full Year	378.38301	375.85218	1.0067336	0.3151162
Period2019 Jun	-236.06963	262.43625	-0.8995313	0.3693065

Period2020 Jun	-95.44838	260.67200	-0.3661627	0.7145788
LogReservesMeanImputed	-53.83590	20.81533	-2.5863585	0.0103131
HighHeadGrade	-305.26194	106.28495	-2.8721087	0.0044568
LowRecovery	208.87421	61.34017	3.4051785	0.0007796

Valuation Thesis

Our key valuation metric is the **EV/AISC-Adjusted Annual Production** as we have found in our empirical study that the market valuation is most aligned to this metric, as opposed to earnings, resources and reserves. We also prefer a multiples method over the typical Discounted Cashflow Method for valuation because we understand that beyond even one year of projection, everything is highly speculative – whether it is the management outlook on production and costs as well as the gold price and broader economic drivers. To allow for comparison across all classes of producers, our metric can standardise by the company's scope of production as we observe that the market values the companies with higher production with a greater multiple. However, we scale production by AISC because we believe that not all ounces are equal. Companies that can produce gold at lower cost are naturally more profitable and deserve a higher multiple of their production and other operational or financial performance measures. We use the following classes for the different tiers of gold producing companies – **A** (major producer – 1Moz p.a. or more), **B** (large producer – 0.5-1Moz p.a.), **C** (mid-tier producer – 150 000-500 000oz p.a.), **D** (junior producer – 50 000-150 000oz p.a.) and **E** (micro producer – less than 50 000oz p.a.).

The **Enterprise Value** is the sum of the market value of equity (stock price multiplied by number of issued stocks) and net debt (total borrowings less cash and gold bullion, but excluding gold in circuit and ore stockpiles). This metric quantifies the market value of the company's assets deployed in the company's operations. The **AISC-Adjusted Annual Production** calculated as the annual production of gold per oz divided by the AISC adjusted by a factor of 1 000. The factor of 1 000 is arbitrarily chosen as a way to standardise the final metric. As an illustration, if a company produces 250 000oz p.a. at AISC of $1 250, the AISC-adjusted production is 200 000.

When determining the production ranges in our valuation metric, we take the management guidance as this is based on their access to information relating to their operations and progress. We believe that the market will use the guidance figures to base their valuation and investment decisions. This may not always be optimal given that some management may have their bias in reporting their outlook, as well as having a track record of announcing surprises. In such cases, we seek to qualify this in our SWOT analysis and adjust it in our EV/AISC-Adjusted Production multiple.

The **Price Range** determines a reasonable range for which the company stock price should be trading at. This range is relatively wide as it considers the **margin of safety**. A company whose stock price is currently outside the fair value range is significantly over or undervalued and investors should look more deeply into the company's operations, financial performance and recent market announcements. This range should not be taken as the sole driver for investment decisions, but as a starting point for further research to identify the potential causes for the current stock price.

We recognise that many analysts consider discretionary forecasts and adjustments on the company's production level, ore grade, cost levels, resources and reserves and economic

factors into their valuation. We have studied many of these reports and recognise their merits. However, our view is that such subjective adjustments are dubious in terms of additional accuracy of their estimations. This is because with mining companies, both internal and external drivers that affect the company's future performance are unpredictable. Furthermore, we understand that while a company with substantial resources and reserves have potential to convert into substantial value in future, this is contingent on the successes in building the infrastructure, extracting the ore from the ground and processing it in a cost-effective manner. We recognise the criticism by many regarding our approach, but we have tried and tested our valuation against the actual price performance as well as through our own investment performance. We let these results speak for themselves.

Given the rise in gold price in the recent three months, we see reason to re-rate the gold mining companies' valuation metrics upwards to reflect their improving profitability as well as increased enthusiasm from investors. As a rough guide, the fair value ranges for different mining company classes are as follows:

Major and Large Companies - $8 000-$12 000/oz

Mid-Tier Companies - $4 000-$7 000/oz

Micro and Junior Companies - $1 500-$4 000/oz

Glossary

The **All-in Sustaining Cost (AISC)** is a measure adopted by the World Gold Council as a standardised measure of production costs. This cost includes typically the **Cash Cost** associated with the direct production (extraction, transportation, processing and refining costs, staff salary and wages and relevant corporate costs) as well as **Sustaining Expenditure** that may include maintenance of mine equipment and infrastructure, insurance and administration costs over its production life. Companies may still have discretion in apportioning their expenses.

The **Net Cash/Debt** is the net amount of cash and bullion the company holds after their borrowings and interest-bearing debt are paid. This represents the liquidity position of the company, although this measure does not consider whether the debt is current (due within the next twelve months) or not. A company in a significant net debt position is owing more than they currently have in cash and bullion, which may potentially put them in financial distress if the debt is due soon.

The **Net Cashflow from Operations Excluding Maintenance Capital Expenditure** measures to what extent the company can generate cashflows from its operations after paying for its operating costs as well as Cash Paid for Purchases of Property, Plant and Equipment and the Cash Paid for Development Expenditure in the Investing Cashflows section of the Statement of Cash Flows. It does not include Cash Paid for Exploration and Evaluation, which is assumed to be growth capital expenditure. This is by no means a stable and comparable measure as different companies may have discretionary interpretation of what constitutes as

Operating Activities and Investing Activities or Development, Exploration and Evaluation expenditures.

Disclaimer

Information in this report is not intended to be financial advice and should not be used as such. While every effort is made to ensure the information is reliable and accurate, errors and omissions may still exist. The interpretation of financial reports, market announcements and management commentary is subject to personal views and discretion. Users of this report are highly advised to seek professional financial advice before making their decisions.