

Annex

Background Information on Fairtrade Minimum Price setting for Gold¹

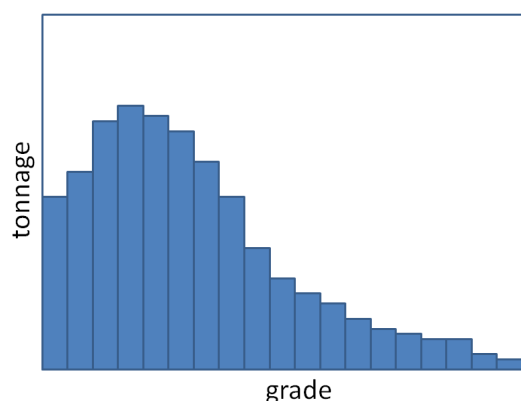
Some basics on mineral occurrences

Any part of the earth crust and in particular any mineral occurrence is made up of different minerals. In case of gold (and other precious metal) occurrences, gold is contained or incrustated within or between these minerals, or in case of alluvial deposits dispersed in the gravel. Simplified, at microscopic scale, a certain particle can be either gold or not gold; if being gold, the particle consists of 100% gold, if it is some other mineral, it contains 0 % gold.

At zooming out to the size of one shovel of gold bearing rock or gravel, this sample will contain some particles of gold. This can be expressed as the grade of the mineral. As the gold grade is very low, it is usually expressed in ppm (parts per million) which is equivalent to grams per ton. In alluvial occurrences, the grade is usually expressed in grams per cubic meter.

It is easy to imagine, that each shovel we take, will have a different grade, according to the amount of gold particles in it, and that the larger the shovel is, the less the grade between two shovels will vary. Thus, a larger sample will have a grade closer to the statistical average.

Zooming out at the entire gold occurrence, we will additionally find out, that different parts of it have different average grades. Besides of mapping the grade distribution of an area, any gold occurrence can be characterized by its grade-tonnage relation, which follows usually a log-normal distribution.²



¹ Within the entire text „gold“ refers to gold and associated precious metals (silver and platinum).

² The shape of the curve depends further on the size of the „shovel“, or – scientifically speaking on the block size. Artisanal mining is able to work very selectively and thus on a very small block size. As this is only marginally relevant for the present analysis, it is not discussed in depth.

For some occurrences, where the gold is dispersed in the host rock, we cannot even easily say where the occurrence ends, as the surrounding host rock also contains gold. In an exaggerated way the entire earth is a gold occurrence, as any rock contains some traces of gold.

So, what makes a mineral deposit (or a gold deposit in particular)?

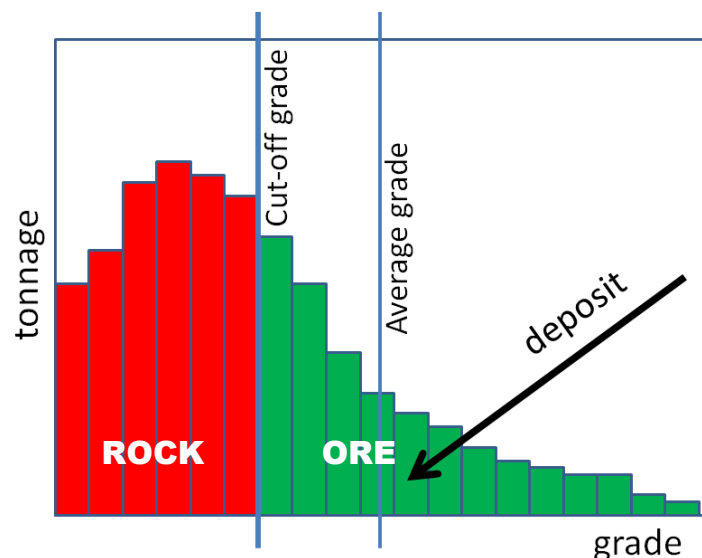
First of all, “ore” (or “gold ore” in our case) is the result of an economic definition. For miners, any mineral that can be economically mined is called “ore”, while any mineral that is not economic is just “rock”.

Consequently, the definition of a mineral deposit is also an economic one. Only an accumulation of economically mineable ore is called a mineral “deposit”.

In case of a gold occurrence, the delimitation of the gold deposit depends on the gold grade in the rocks. Every shovel that has enough gold in it to be economic is ore; all the rest is just rock. And every part of the occurrence where a shovel of mineral is usually “ore” is the deposit. In summary, the average grade of all shovels that will go into mineral processing must allow for an economic operation of the mine.

The necessary average ore grade that is required to cover the cost of mining and processing, and to make some profit depends therefore on the price of the gold.

The lowest grade, which allows including a shovel into the material to be sent to the processing plant, results therefore from the statistical grade-tonnage relation and is called “cut-off grade”.



In conventional mining cut-off calculation is a highly sophistic issue, often included in mine design optimization software and linked to geologic deposit model databases with data from extensive exploration. Grade control is one of the key tasks of running a mine.

Artisanal and small-scale miners do usually not have any geologic data from exploration works, nor do they have geologists or mineral-economists to operate such high-tech software. But as the underlying economics are exactly the same, artisanal and small-scale miners do exactly the same by empirical cut-off grade optimization: they just mine all ore that is economically mineable for them.

Production costs

Mining consists of two main processes: (a) *Mineral Extraction* from the deposit (mining in a narrower sense) and (b) *Mineral Processing* of the ore. Both processes have related costs: mining costs and processing costs, respectively.

Mining costs depend on the shape and geologic characteristics of the deposit, as well as on the applied technology. Extracting one ton of ore has a certain, clearly calculable cost. This cost also includes the extraction of waste rock or overburden if this is technically necessary. The cost of extracting one ton of ore is however absolutely not related to its gold content – it costs the same to extract one ton of ore as to extract one ton of waste rock with not enough gold in it to be economically mined.

In general the same applies for mineral processing. To mill, wash and to process one ton of mineral costs mainly the same whether it is ore or waste rock.³

What we see, is that mining and processing costs can be clearly determined at the basis of costs in MONEY/TON or MONEY/CUBIC METER.

However, the ton or the cubic meter of ore is not a tradable product. The tradable product is the gold content within that ton or cubic meter that can be determined according to the formula:

$$\text{Content} = \text{Mass} * \text{Grade} \quad \text{or} \quad \text{Content} = \text{Volume} * \text{Grade}$$

Hence, the production costs in MONEY/GOLD depend almost entirely on the grade of the ore. Under the same conditions and with same production costs in MONEY/TON, costs expressed in MONEY/GOLD can be astronomically high if the ore contains no gold, or can be extremely low if grades are extremely high.

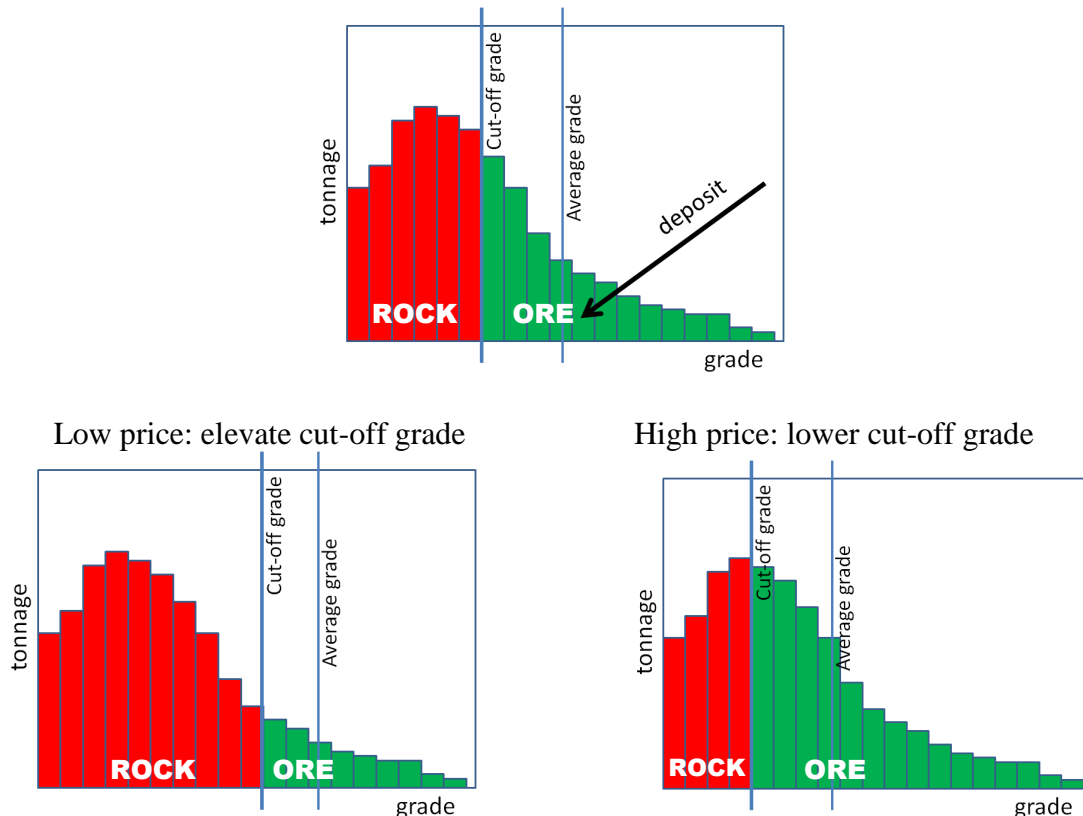
As the grade of the ore depends itself on the cut-off decision, which is a decision based on the gold price⁴, it comes clearly, that production costs in MONEY/GOLD depend on the gold price and are the result of an iterative optimization process.

³ Without going deeper into cut-off grade theories, it should only be mentioned here that this leads to further economic decisions (calculated or empiric) on “mill cut-off grades”. Once mineral is already extracted (e.g. in case of low-grade waste rock) processing of this mineral which was not mined as “ore” may be economic, as it had to be extracted due to technical reasons and its mining costs are covered by the “mine cut-off grade”.

⁴ As gold is traded worldwide during 24 hours and the spot price varies every second, the international reference price is the Gold Fixing of the London Bullion Market Association (known as „LBMA Fix“). This price (which is reported daily by all newspapers and news agencies) allows trading partners to refer exactly to a third part set gold price (LBMA Fix) at a certain day.

This sounds complicated, but in practice this is done either by computer software for conventional mining or by a quite reasonable empiric approach by artisanal miners.

Price variations have thus mainly an effect on the size of the deposit (the mineable reserves), by elevating or lowering the cut-off grade and thus decreasing or increasing the mineable reserves.



In conventional large-scale mining operations, practices like “high grading” are in some cases reported, in order to increase the net present value (NPV) and thereby the shareholder value. This has never been observed in artisanal and small-scale mining, as for artisanal miners the over-proportional costly effort to obtain a mining concession and become formalized needs to be compensated by extracting the deposit as complete as possible.

In any case, artisanal and small-scale miners always adjust the cut-off grade in a way, that the revenues cover mining and processing costs (in MONEY/TON) and generate a sustainable income.

Obviously the cut-off grade is not adjusted on a daily basis, but it is not unusual to adjust short-term cut-off grades for each campaign or for each consignment.

Interpretation of Production Costs of ARM pilots.

As can be seen from the widely varying results (expressed in MONEY/GOLD) from the ARM pilot projects, production costs vary between 260 and 860 USD/oz (USD / Troy ounce⁵).

This wide variation is in fact the result of adjusting the cut-off grade in each case according to the local conditions. As the baseline studies, carried out by ARM simultaneously to the application of the cost-of-production tool and other independent investigations⁶ demonstrate, individual income and livelihood situations for miners do not vary widely among the different pilot sites.

A further aspect to consider is that all ARM pilot sites are not “new” artisanal and small-scale mining operations. All of them existed already in the early 2000’s, when the international gold price hit its historic low of below 300 USD/oz. At that time their production costs must have been in the range of 150 USD/oz, otherwise they would not have been able to exist. However, as the gold price went up, many of them started to lower their cut-off grade, incurring in higher production costs and allowing them to extract now parts of their deposits that were not mineable when the gold price was low.

CONCLUSION

1. In case of gold, determining a Cost of Sustainable Production (COSP) is not possible.

Mining and processing costs are related to the volume or tonnage of mineral and not to the gold content of the mineral. Mineral is however not a tradable product. There exist high grade deposits that allow for high production costs and low grade deposits that demand low production costs in MONEY/MINERAL.

Production costs in MONEY/GOLD are mainly defined by the cut-off grade which (i) depends recursively on the price, and (ii) can be freely chosen by the miners within a wide range. Production costs in MONEY/GOLD do not reflect or directly influence the miner’s income.

2. As a COSP can not be determined, a Fairtrade Minimum Price (FTMP) can not be set as a floor price like for other Fairtrade products.

Even worse, a floor price would not have an effect on the miners’ income, but would lead to inflexibility at adjusting cut-off grades. Cut-off grades disarticulated from real world would lead to unsustainable decisions in mine planning and mine operation⁷ and make producers completely dependent from Fairtrade.

⁵ 1 troy ounce = 31,1 gr

⁶ Bobadillo, P. et al: Nosotros hacemos los pueblos. Proyecto GAMA, Lima/Peru 2008.

⁷ Operating at a too low cut-off grade a mine that could be run economically will become uneconomic and will only be able to sell to subsidizing buyers who caused the cut-off grade to be set at unsustainable levels.

As gold is traded 24 hours a day, the “LBMA Fix” (Twice a day announced prices of the London Bullion Market Association) is the worldwide reference price in gold trading.

A FTMP for Gold is therefore best set as a minimum percentage of the LBMA Fix.

Background Information on Fairtrade Premium setting for Gold⁸

Fairtrade Premium is proposed to be initially set at 6% (of the LBMA Fix for the pure content) for Fairtrade Gold⁹ plus an additional Ecological Premium of 9% (of the LBMA Fix for pure content, 15% in total) for Fairtrade Ecological Premium Gold¹⁰.

Rationale

The ORO-VERDE® fair trade program in Colombia inspired ARM to develop its STANDARD ZERO as the first global certification scheme for responsible artisanal and small-scale gold mining. ORO-VERDE® certified miners, who also participate in ARM's pilot projects, produce and trade gold with equivalent characteristics as Fairtrade Ecological Premium Gold. ORO-VERDE® operates currently at a Premium of 15%.

The proposal to set the Premium for Fairtrade Gold initially at 6% (+9% for Fairtrade Ecological Premium Gold) was agreed in the ARM Technical Committee Meeting in October 2008 between producers and buyers based on the following considerations:

1. A 15% total Premium for Fairtrade Ecological Premium Gold is in-line with the current market for ORO-VERDE® Gold. Setting the Premium at the same level avoids conflicts between ORO-VERDE® and Fairtrade Ecological Premium Gold, and allows for a transition, if desired by ORO-VERDE® miners.
2. If the Premium differential between ordinary and ecological gold is low, consumers will probably prefer (at almost the same consumer product¹¹ price) Fairtrade Ecological Premium Gold, limiting the market potential for Fairtrade Gold and therefore limiting the development opportunities for the majority of certified miners who are not yet able to produce Fairtrade Ecological Premium Gold.
3. If the Premium differential between ordinary and ecological gold is high, consumers will probably opt for consumer products made with a significantly cheaper Fairtrade Gold, limiting the market potential for Fairtrade Ecological Premium Gold and therefore limiting the development opportunities for miners who are able and willing to produce Fairtrade Ecological Premium Gold.
4. Based on trading tests, it was estimated, that an initial Premium differential of 9% has the best chances to match supply and demand for Fairtrade and Fairtrade Ecological Premium Gold in a balanced way.

⁸ "Gold" refers to gold and associated silver and platinum.

⁹ "Fairtrade Gold" (also called in this text "ordinary gold" for distinguishing it from ecological gold) refers to FAIRTRADE® and FAIRMINED® Gold, Silver or Platinum.

¹⁰ "Fairtrade Ecological Gold" refers to FAIRTRADE® and FAIRMINED® Ecological Premium Gold, Silver or Platinum.

¹¹ Jewellery, commemorative coins and ingots, medals and trophies

5. As real-market-scale data can only be obtained after market introduction of Fairtrade Gold, it was further agreed to revise the Premium levels during the first year every 3 months on demand of any producer or buyer. An adequate Premium differential shall assure balanced demand and supply for both types of Fairtrade Gold.