

Alchemist

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SAVE THE DATE!

LBMA/LPPM Virtual Global Precious Metals Conference

20-21 September 2021

Mark your diaries for the annual LBMA/LPPM Global Precious Metals Conference, which this year will be taking place virtually. The Conference will feature in-depth market discussions, keynote speeches, panel sessions and many networking opportunities.

To complement the Conference, we are hosting a hotly anticipated in-person networking reception in London on the evening of Monday, 20 September. Further details will follow but, in the meantime, login to the MyLBMA portal to change your subscription preferences, and be the first to receive updates for these events.



EDITORIAL

BY SAKHILA MIRZA, LBMA GENERAL COUNSEL
AND EXECUTIVE BOARD DIRECTOR



The Global precious metals markets have seen significant developments since my time at the LBMA. To name a few, the LBMA's Responsible Sourcing Programme (RSP)

and the Global Precious Metals Code (the Code) have helped to strengthen the integrity of the market, and yet regulation like the Net Stable Funding Ratio (NSFR), have the potential to disrupt the effective functioning of the global market.

When I joined LBMA, in 2014, version one of the Responsible Gold Guidance (RGG) was in full swing, with the first set of auditor reports falling on my desk. Fast forward to 2021, not only is LBMA working on the ninth version of the RGG, but LBMA is also strengthening its engagement and collaboration with various stakeholders across the value chain, as well as national authorities, to improve global standards. The RSP has played a critical role in supporting refiners in identifying, assessing and mitigating their supply chain risks. However, ultimately, the responsibility to ensure that metal is free from threat financing is shared across the entire value chain.

More than ever before, it's absolutely crucial that all value chain actors map out their supply chains in detail to identify vulnerabilities and weaknesses, and work together to help address risks. The challenges under Covid-19 have highlighted just how interconnected the world is, and how a failure to have proper supply chain risk management strategy threatens the resilience of any organisation, but also the integrity of the global precious metals market. Whilst audit programmes are necessary in order to help provide a certain level of assurance and comfort, the inherent limitations of any audit programme mean that without a concentrated collective effort, the industry will remain vulnerable to supply chain risks. This was the catalyst for LBMA's Call to Action to national authorities, which highlighted three strategic priorities and lead to LBMA's International Bullion Centres Recommendations focussing on three strategic priorities:

- 1** responsible sourcing of recycled gold,
- 2** eliminating cash transactions and
- 3** support for Artisanal and Small-Scale Mining.

In 2017, LBMA launched the first standalone Global Precious Metals Code, articulating the principles and conduct rules that should be followed by market participants. Even though it was primarily focused on market participants trading in the OTC wholesale markets, several sections were relevant to other stakeholders along the value chain.

The Code was welcomed by the industry as it allowed organisations to benchmark against best practice, and provided clarity on market conventions and expectations.

Whilst all LBMA members confirmed their commitment to the Code, it was always intended that it would be adopted by the wider international markets, non-members included.

This year, LBMA will be updating the Code to reflect the significant number of developments, including ESG and Sustainability which are such a key element now of the strategic corporate agenda. With the growing emphasis on Diversity and Inclusivity, as well as flexible working conditions, be it from the office or home, the Code will focus on addressing these developments, as well as updating the existing rules so that they continue to remain relevant.

Amongst the biggest threats to the precious metals value chain is the impact of NSFR. The industry relies strongly on the need for financing, through gold loans and leases, as well the services provided by the London Precious Metals Clearing Limited (LPMCL).

Imposing an 85% haircut on the market will be hugely detrimental, potentially undermining the effectiveness of the LPMCL system and increasing the cost of doing business for the end user, including miners and refiners. In particular, the NSFR proposal fails to take account of the quantitative evidence, which suggests that in a liquidity crisis, gold acts as an extremely liquid asset. LBMA continues to engage with regulators and share this evidence, and strongly encourages regulators to recognise the unique characteristics of gold. LBMA's recent letter to the UK prudential regulator, supported by our liquidity study, only further strengthens the market claim that gold should be treated as a High-Quality Liquid Asset. Had the liquidity data been available back in 2013, it is highly likely that the authorities would have supported LBMA's stance.

Although I have only referenced a few key developments, the work of LBMA, continues to grow, and I have the pleasure of learning more about market innovation (Digital Gold and Gold Bar Integrity, to name a few). If you would like to find out more about these, then please do get in touch. As always, LBMA welcomes engagement from market participants, to help shape the strategic direction. I know my time in the precious metals market has only been made easier by talking to the market.

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Front Cover – The Birth Of Gold: The Aftermath of the Supernova known as Cassiopeia A. Image Credit: NASA/DOE/Fermi LAT Collaboration, CXC/SAO/JPL-Caltech/Steward/O. Krause et al., and NRAO/AUI.



RAND REFINERY: 100 YEARS OF RESHAPING VALUE

BY PRAVEEN BAIJNATH, CEO, RAND REFINERY

It was in 1920 that Rand Refinery was officially registered (refining operations only commenced late in 1921) with start-up capital of £50,000 and shares split between the gold-mining companies that were members of the Chamber of Mines (now the Minerals Council of South Africa). Like the present times, it was a tumultuous historical period – people were still piecing together their lives following the devastation left behind by the Spanish flu, World War I had just ended and a recession was on the horizon.

The economy then had no choice but to look to the future with optimism.

The discordant notes at the turn of the decade were soon replaced by the Roaring Twenties, which saw rapid industrial and economic growth, accelerated consumer demand, and the introduction of significant new trends in fashion, lifestyle and culture.

LONDON

The relatively free market conditions of the 1920s gave support to South African gold producers, which finally began exercising their influence. One of their biggest grievances was that they were not getting the best price or the lowest handling charges for gold produced on the Witwatersrand. Gold producers on the southern-most tip of the continent incurred significant refining charges as a result of the entire South African gold output having to be transported and processed in London.

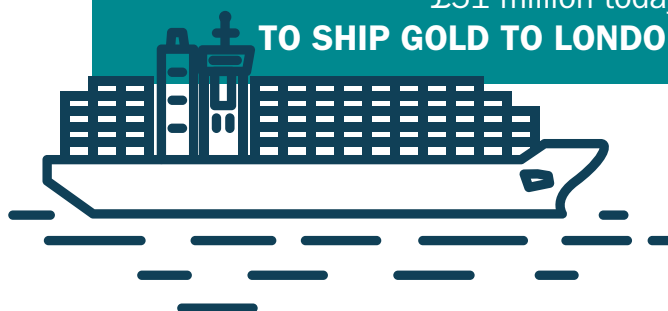
**LIKE THE PRESENT
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SPANISH FLU**

In the decade before Rand Refinery was actually conceptualised, South African mines spent some £500,000 (the equivalent of more than £51 million today) to ship gold to London. These exorbitant costs gave voice to calls for the establishment of a gold refinery in South

Africa. As expected, the fear of losing its place as the principal market for global supply of gold forced the Bank of England to table many options, such as building a new refinery in London to refine all South African gold for free.

Unbeknown to all, Rand Refinery became one of the early proponents of disruption. The persistence of the Chamber of Mines paid rich dividends when Rand Refinery rose up from the ground 16 months after construction started on 20 August. Built on a stand in Elandsfontein (later Germiston) Junction, South Africa's largest railroad junction, it linked the refinery not only with the mines – including, later, gold from mines in the then-British colonies of Rhodesia (Zimbabwe) and Tanganyika (Tanzania) – but also with the large ports in Durban and Cape Town.

**SOUTH AFRICAN MINES SPENT
SOME £500,000**
(the equivalent of more than
£51 million today)
TO SHIP GOLD TO LONDON



The act of unseating London as the hub for refining South African gold and setting up a local refinery was in equal measure both bold and progressive.

On completion, the refinery had a capacity of 12 million troy ounces or 373 tonnes. Over the next decade, this capacity fell short as the gold rush continued unabated.

The fortunes of the refinery grew with the growing volumes of gold discovered in the country's gold belts stretching from Johannesburg to the Free State. South Africa's gold production peaked in 1971, reaching nearly 1,000 tonnes of gold in a single year, equal to nearly 80% of world gold production.

DWINDLING GOLD RESERVES

In the ensuing years, even as South Africa's gold volumes thinned and new finds became scarce, Rand Refinery's growth trajectory continued northwards. Today, it continues operation as an integrated, single-site precious metals smelting and refining complex. Rand Refinery is one of five LBMA accredited referees in the world.

Much of consequence happened during the late 1980s when the country's gold volumes dropped to some 30% of the global output. The decline in South African gold production meant a decline in business for Rand Refinery. This change of setting however did not dent its zeal for value creation.

At the same time as South African gold output was declining, gold production across the rest of Africa began to increase. In response, Rand Refinery changed its business model from being a Southern African gold refinery to reflect its international ambitions. In addition to almost all of South Africa's gold, gold for the refinery is now sourced from all parts of the continent and America.

BUILDING FOR THE FUTURE

Since 1920, Rand Refinery's technological pioneering spirit has enabled it to transform into a global presence with a wide range of products and services. In the decades that followed, it consistently and continuously expanded its product portfolio and technical know-how.

Our history and experience in dealing with complex and different types of mine doré deposits is critical in the sampling and assaying processes, as precise content reflection for the depositing customer is of paramount importance.

The refinery's products include Good Delivery bars, kilobars, minted bars, coin blanks and value-added products, which are part of its signature offerings, as well as the world's most widely held and actively traded gold bullion coin, the Krugerrand (with Prestige Bullion).

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INTRODUCE NEW
TECHNOLOGIES**

At the beginning of the last decade, Rand Refinery embarked on an extensive modernisation programme aimed at enhancing the company's technologies, processes and equipment.

An amount of R1 billion was earmarked to automate and simplify the refinery complex's processes and introduce new technologies.

The refinery has the capability to refine and provide the necessary assurance for refinery deposits from 25% Au and upwards.

Our smelter operations deal with complex low-grade materials ranging from 300g/t Au.

We provide a one-stop service offering to our shareholder mines so that they can optimise the value returned for both mine doré as well as low-grade mine waste products containing Au.

With value-added products from Rand Refinery used globally in jewellery fabrication and industrial applications, the consumers of these products are ensured that this gold is responsibly sourced – in some instances, provenance data is supplied to select customers.





Today, Rand Refinery is much more than what its history suggests. It is ideally positioned to not only extract value from the resources but also play an active role in shaping sustainable and responsible mining conversations of the future.

RESPONSIBLE SOURCING

Throughout our history, we have contributed to the development of responsible gold supply chains on the continent with the aim of being a strong partner to our customers and ensuring countries derive the direct benefits of their resources. However, the role of LBMA accredited refineries is truly underappreciated in this regard.

The metal that is one of the biggest foreign currency earners for most major economies on the continent is also one of the ugliest market forces in the world. Conflict gold has become a byword for human rights violation, child labour, slavery and poor practices that often lead to environmental degradation.

Responsible sourcing is gaining traction and, increasingly, consumers are asking the difficult questions about origin and impact. Our sourcing processes are a key strategic differentiator as we deal with credible mines, uphold our legacy of dealing with only shareholder mines and provide value in best-in-class out-turn (from doré received to settled payments).

We have a detailed understanding of the mines that make up most of our supply. Most of the local mines are visited on a frequent basis by sourcing specialists, whilst mines in Africa are directly visited by Rand Refinery or by approved outsourced partners.

Our certified gold and silver chain-of-custody is independently audited to meet the requirements set by relevant industry bodies. All companies that deal with Rand Refinery need to go through strict vetting processes known as KYC (Know Your Customer) and KYP (Know Your Product). This ensures that everyone adheres to the responsible gold guidance principles that Rand Refinery subscribes to and maintains.

RESPONSIBLE SOURCING IS GAINING TRACTION AND INCREASINGLY CONSUMERS ARE ASKING THE DIFFICULT QUESTIONS ABOUT ORIGIN AND IMPACT

WE SEEM TO HAVE COME A FULL CIRCLE SANDWICHED BETWEEN TWO GLOBAL PANDEMICS

whether a shareholder or not, has to pass a rigorous onboarding process and due diligence, which includes a physical visit to the mine to confirm production and practices.

In 2017, Rand Refinery became a signatory to the Global Precious Metals Code, which sets out the standards and best practices expected from market participants in the global over-the-counter (OTC) wholesale precious metals market. Rand Refinery produces products that are tradeable on the OTC market.

CONCLUSION

The centenary is a remarkable milestone for Rand Refinery. Our survival through World War II, the Great Depression and the many financial downturns that fortuitously followed speaks of our resilience, our commitment to doing business with integrity and our customer centricity.

We seem to have come a full circle, sandwiched between two global pandemics. Covid-19 has turned the clock back, disrupting every sense of normalcy, but our experience is strengthening our fight and, with people on our side, we will emerge stronger.

If our success during our first century was led by the gold rush, our second century is being well led by our focus on people, partners and the planet.



Praveen Baijnath is a Chemical Engineer with more than 30 years' experience in minerals beneficiation, smelting and refining, and the chemical process industry.

He attended University of Cape Town's Graduate School of Business Program (PMD) in 1995 and in 2000 attained an MBA with distinction from the University of Wales.

He was appointed as Chief Executive of Rand Refinery on 1 June 2015. He is also an Executive Director on the Rand Refinery Board. His other board directorships include Prestige Bullion and the Ekurhuleni Jewellery Project.

He was previously (2009-2015) Group CEO of JSE listed Delta EMD and remains on the Board of Delta EMD Limited as independent, non-executive director. He also served as CEO of Gold Reef Speciality Chemicals. His previous roles spanning a period of 20 years was with Huntsman Corporation in process and chemical engineering, plant management and executive management roles in Operations, EHS, Technical and Strategic Development.

He is a member of the South African Institute of Directors, South African Institute of Chemical Engineers and an Associate of The Institution of Chemical Engineer (ICHEME).



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Where Did the Gold Go?

Precious Metal Losses in Refineries

BY MICHAEL B. MOOIMAN, PRESIDENT ARGO ADVISORS INTERNATIONAL
AND PROFESSOR AT FRANKLIN PIERCE UNIVERSITY

Fire Assay (cupellation) © Metalor

For a precious metals operation, the most important task, after ensuring the safety of workers and community, is control of the precious metals inventory.

In some operations, such as a jewellery fabrication, this is readily accomplished through a system of weight checks and piece counts. In these operations, the form of the material might change, but for the most part, the composition does not.

However, in a refinery, it is more challenging to keep track of precious metals inventory, because the material is changing in form and composition throughout the operation. Feed material is received, and then it is melted, sampled and weighed. The material is blended with other lots and is processed through pyrometallurgical and hydrometallurgical operations that ultimately produce refined precious metals and base metal by-products.

Complicating matters for refineries are the number of by-products produced from the refining operations. By-products, such as salts, sludges, filter cakes, slags, dusts or solutions, contain precious metals in varying concentrations and they have to be recycled and reprocessed to recover the precious metals content. These by-products are often heterogeneous in nature, highly variable in metals content and numerous in form.

An accurate assessment of the precious metals in these by-products can be difficult to achieve due to the challenge of obtaining representative samples. The usual approach of weighing and grab sampling leads to a poor estimate of the metals content.

PHYSICAL INVENTORIES

Precious metals control and accounting is accomplished through regular physical inventories. The refiner has a record from the previous stocktake of the work-in-progress (WIP) at that point in time. The amount of incoming precious metals is known from the refiner's evaluation of received lots and it also has a record of outgoing material from weights and assays of its products. The refiner then applies the following formula (equation 1) to determine the calculated WIP at the time of the new physical inventory stocktake:

$$WIP_t = WIP_{t-1} + \sum_{i=1}^n R_i - \sum_{i=1}^n S_i$$

Where:

WIP_t = Calculated WIP at time t (or the most recent stocktake)

WIP_{t-1} = WIP determined from previous stocktake

R_i = incoming metal from lots received between time periods t-1 and t

S_i = outgoing metal from lots shipped between time periods t-1 and t.

The formula is often summarised as
Calculated WIP = WIP from previous stocktake + received precious metals – shipped precious metals.

The calculated WIP value is sometimes referred to as the book number.

GAINS AND LOSSES

The purpose of a physical inventory is to determine the actual physical WIP in the operations and compare it with the calculated WIP_t value from equation 1 and to compute the gain/loss from the following formula (equation 2):

$$\text{Gain/Loss} = \text{Physical WIP} - \text{Calculated } WIP_t$$

It needs to be appreciated that the computed gain or loss number is not a single definitive value.

Instead, it is the end result of numerous samples, weights and assays, each of which has an associated measurement error. Just as a repeated assay is unlikely to yield the exact same result, a repeated inventory is unlikely to yield the exact same value. Like

an assay, the physical inventory result is an average with an associated standard deviation or error range. The reality is that the calculated error range is often much larger than the industry is comfortable with.

Even with this knowledge, refiners, driven by the need to book a financial result, treat the calculated gain/loss number as a definitive value and book a single number. Caution needs to be applied and it would seem to be prudent to only book gains or losses that lie outside the expected range of variability.

Gains and losses should be viewed in context and with an awareness of the 'noise' built into the result.

PRECIOUS METALS CONTROL AND ACCOUNTING IS ACCOMPLISHED THROUGH REGULAR PHYSICAL INVENTORIES

Metal accountability	Metal Loss	Gold losses \$/received oz @ \$1800/oz Au	Silver losses \$/received oz @ \$18/oz Ag
99%	1%	\$18.00	\$0.18
99.9%	0.1%	\$1.80	\$0.02
99.95%	0.05%	\$0.90	\$0.01
99.99%	0.01%	\$0.18	\$0.002
99.995%	0.005%	\$0.090	\$0.001
99.999%	0.001%	\$0.018	\$0.0002

Bearing in mind the inherent error built into the gain/loss calculation, the table below shows the dollar value of various degrees of gold and silver losses. In a world without variability, a useful guideline would be that the losses as a percent of the received feedstock should be no larger than 0.01% for Au and 0.10% for Ag. In other words, accountability for gold should be within 99.99% and accountability for silver should be within 99.9%.

THE FOCUS OF THIS ARTICLE IS THE TECHNICAL LOSSES THAT ACTUALLY RESULT IN THE LOSS OF PHYSICAL METAL

When discussing precious metals losses, it is important to distinguish between transactional and technical losses.

Transactional losses are those caused by incorrect entries into the lot tracking, accounting or ERP systems. They tend to be referred to as accounting or data entry errors and occur through the transposition of numbers, double-booked entries or overlooked entries. These errors can, with diligence, often be found and corrected.

The focus of this article is the technical losses that actually result in the loss of physical metal.

These are the more problematic losses and can be grouped into two categories: known losses and unknown losses.

KNOWN LOSSES

Known losses are losses that can be calculated and accounted for even though they are largely unrecoverable. These losses occur due to the department of precious metals into other products of the operation or into by-products. A well-known example is the loss of gold in the refined silver output of a refinery. For example, a typical quantity of gold in refined silver bullion is 5 ppm. If the operation is a large silver refinery producing 10 million oz of Ag per year, a 5 ppm gold content results in an annual loss of 50 oz of gold for which the refiner is never compensated. Another example occurs in the sale of gold bullion.

The refiner is only compensated for the stamped purity of its bars, for example, 99.99%, even though the purity of its refined material might be higher, e.g. 99.996%. In a refinery with a large output, small differences between actual purity and compensated purity can be considerable.

The reasons for unknown losses are numerous and include:

- 1 Precious metals below the payable limits in subcontracted materials
- 2 Contracted retentions of metal in subcontracted materials
- 3 Trace amounts of precious metals in wastewater or airborne discharges from a refinery
- 4 Weight giveaways on final products due to rounding rules and minimum weights.

UNKNOWN LOSSES

In inventory accounting, the correct approach is to include known losses in the $\sum_{i=1}^n S_i$ term from equation 1. When this is done, equation 2 yields the value for unknown losses or gains. It is the amount and the value associated with unknown losses that are the single largest cause of distress and management turnover at any refining operation. Even when the losses are small and tolerable, they can be a source of frustration as their cause might not be obvious. As a result, refineries spend an enormous amount of effort in tracking down the causes of unknown losses and working to minimise them.

The reasons for unknown losses are numerous and include:

- 1 Theft
- 2 Incorrect values from the most recent stocktake
- 3 Incorrect values for WIP from a previous stocktake
- 4 Incorrect evaluation of incoming material
- 5 Incorrect values for outgoing or shipped materials.

Each of these possible losses are discussed here.

1 THEFT

The security operations at most refineries are designed with two purposes. The first is to limit outside access and the second is to keep the precious metals within the operation. Even in the most highly secured operations, theft from the inside is a continual threat.

When working with large amounts of high-value material that is not immediately traceable, the temptation to try sneak small amounts out of a facility is ever present.

REFINERIES SPEND AN ENORMOUS AMOUNT OF EFFORT IN TRACKING DOWN THE CAUSES OF UNKNOWN LOSSES AND WORKING TO MINIMISE THEM



Equipment including reactors, piping and ductwork, all of which require regular cleaning

Outside pressures on employees, driven by addiction, financial hardship or even blackmail, can drive the most well-intentioned individuals to make poor choices. Thefts often start off small but then grow in amount and frequency, and the ingenuity applied in illegally removing precious metals from a facility is often astounding. Even though most operations have a separate security department whose employees serve as gatekeepers, theft from an operation often involves the collusion of these same gatekeepers with operators in the facility who have hands-on access to the precious metals.

A WELL-DESIGNED REFINERY CONSIDERS THAT PERIODIC EQUIPMENT CLEAN-OUT IS NECESSARY

This leaves the refiner dependent on the determination of the precious metals value by the subcontractor. Errors do occur in these situations and to avoid these, all materials shipped from a refinery should be homogenised, weighed and sampled internally.

One of challenges with treating WIP lots after a stocktake is ensuring their segregation and tracking. It is good practice to minimise inventories of by-products at the time of stocktake. This

reduces the amount of material that has to be treated after stocktake and also lessens the evaluation errors that accompany these materials.

2 INCORRECT VALUES FROM THE MOST RECENT STOCKTAKE

One of the most important tasks taken on by a refinery is the periodic determination of the precious metals physical inventory in an operation, also known as a stocktake. In most refining operations, this is done several times a year and it involves the stopping of the operations for a few days. All the equipment and reactors are cleaned out, all the WIP material is assembled and consolidated into lots, which are weighed, and samples are taken for analysis. For some difficult-to-sample materials, the lots would be separately processed and tracked, with care being taken not to commingle them with materials produced after the inventory cut-off date.

These special lots would be treated to recover the precious metals content, which can then be weighed and assayed. A common example is the treatment of gold-bearing solutions by precipitating out the gold, which can then be melted, weighed and analysed.

There are many ways that a physical inventory evaluation can go wrong, leading to incorrect results. The most common are:

- Equipment or operations incompletely cleaned out
- Incorrect weights assigned to lots
- Poor sampling practice.

The first two can be overcome by good operating practices, such as clear stocktake protocols that provide explicit instructions as

ALL MATERIALS SHIPPED FROM A REFINERY SHOULD BE HOMOGENISED, WEIGHED AND SAMPLED INTERNALLY



to how equipment should be cleaned out and procedures for ensuring weighs are checked, rechecked and recorded correctly. It takes work to find all the precious metals-containing material in a refinery and, as a result, equipment, ductwork, piping and air scrubbers have to be disassembled, cleaned out and reassembled. A well-designed refinery considers that periodic equipment clean-out is necessary and clean-out ports, inspection hatches and manways are incorporated into the equipment design.

POOR SAMPLING PRACTICE

The most common cause for error is due to poor sampling practice. There can be an

over-reliance on solution assays in order to avoid the work associated with the precipitating out and processing of the precious metals in solutions. If the solutions are concentrated and not well mixed, they will yield poor samples.

Sampling errors are particularly common with intermediate and lower-grade WIP materials such as sludges, filter cakes, slags, spent crucibles, etc. There can be large volumes of these materials in a refinery and it takes a significant amount of work to correctly homogenise and sample these materials. Sometimes, these materials are directly subcontracted, in an unprocessed, non-homogenous form, to another operation specialising in these materials.

3 INCORRECT VALUES FOR WIP FROM A PREVIOUS PHYSICAL INVENTORY

If a counting, weighing or analytical error similar to those described above was made during the previous stocktake, this would create an error in the previous precious metals physical inventory result. If the error is not repeated during the current stocktake, an over-evaluation of the previous inventory would yield a loss once the current inventory numbers are included in equation 1. An under-evaluation in the previous inventory would, of course, lead to a gain after the current inventory results are included in equation 1.





4

INCORRECT EVALUATION OF INCOMING MATERIAL

Errors made in evaluating the precious metals content of incoming lots is a common reason for precious metals losses. If errors are made in the evaluation process, through incorrect weights, poor samples or incorrect analysis, this will result in the over- or under-evaluation of the precious metals content.

For those experienced in the precious metals industry, it is understood that coming to a final agreement with the customer of the precious metals value in a lot is ultimately a negotiation bound by the settlement

terms outlined in the refining contract and underpinned by the statistics of sampling and analysis. Ultimately, there is no 'true' value for the precious metals assay in a lot – there is simply a mutually agreed to, or negotiated value.

Reiss and Taylor¹ have examined these negotiations and they note that in the case where simple averages are offered (= measured

assays), both sides give up a little when they settle. The refinery pays out a bit more than its average result and the customer receives less as well. Because the incentives exist to reduce these losses, Reiss and Taylor have used game theory and Monte Carlo simulation to provide guidance for negotiating parties to minimise their losses in settlement negotiations.

ERRORS MADE IN EVALUATING THE PRECIOUS METALS CONTENT OF INCOMING LOTS IS A COMMON REASON FOR PRECIOUS METALS LOSSES

For the refiner, the final settled value is often a little bit higher than the average that came out of the assay laboratory and it is important to account for these small and cumulative differences when calculating the total received precious metals over a specified time period.

A – SAMPLING ERRORS

Refiners deal with two basic types of material. High-grade metallic materials and lower-grade materials that are often non-metallic in nature, such as sweeps. Each of these present their own sampling challenges and once a representative sample is taken, it then needs to be subsampled correctly to produce the analytical aliquot. In the steps from sampling the lot to splitting the sample to subsampling in the lab, there are numerous potential sources of error. Refiners need to understand and apply good sampling practice. It takes knowledge, experience and effort to produce samples that are representative of the received materials. Poor samples can result in an under- or over-evaluation of the received materials, which can result in unexpected losses or gains.

B – ANALYTICAL ERRORS

Even if representative samples of materials are taken, mistakes can occur in the analytical step. The mistakes range from mixing up lots, poor preparation of the analytical samples, weighing errors, incorrect analytical procedures, faulty calibrations, poor proof corrections and miscalculations of the final results. Most good assay labs have rigorous quality assurance and control protocols in place to ensure that these errors are minimised and when they occur, they can be identified. Many labs also have programs where they periodically run standard reference materials or even just their own internal standards to ensure that reliable and consistent results are being produced.

¹. Reiss, M., and Taylor, A, 'MMC Assay Exchange Program White Paper', 2019, Private Communication

5 INCORRECT VALUES FOR OUTGOING OR SHIPPED MATERIALS

The products leaving a precious metals refinery are a combination of refined metals in various forms, subcontracted refining lots shipped to other refiners, as well as plant trash and scrap. Possible sources of error associated with shipped materials include:

A – INCORRECT SHIPMENT WEIGHTS

It is possible that incorrect weights are assigned to material shipped out of a facility. This is not normally an issue with refined materials in ingot form, as the shipments tend to be rigorously checked and they are accompanied with bar lists, which include bar counts, weights and serial numbers. It is more likely to occur with refined materials in grain, powder or sponge form, but many refiners have instituted procedures that involve weight checks by different personnel to prevent this from occurring.

B – EVALUATION ERRORS

There is generally little room for error in the shipment of refined materials as the various materials have been subjected to extensive analysis to ensure they meet the required purity standards. However, materials generally subcontracted, such as sweeps, slags, spent crucibles or sludges, are prone to evaluation errors if good sampling protocols are not followed. As noted previously, sometimes refiners choose to send out these materials in an unprepared form and rely on the receiving party to prepare, homogenise, sample and assay these materials. This is a risky endeavour and it leaves the sending party poorly prepared for the settlement process. Instead, the materials should be evaluated internally so that they are correctly prepared for the settlement process.

C – PLANT TRASH AND SCRAP

Most refiners do a good job at ensuring that internally generated plant trash, such as rags, wipes, used safety equipment, filters, etc., are processed internally through incineration. However, sometimes food-related waste is segregated and is simply consigned to an outside dumpster. This is also the fate of broken equipment such as filters, pumps and reactors. Sometimes this equipment is poorly cleaned out and inspected, and this can be a cause for precious metals losses. In the case of one refining operation, the food waste placed in the dumpster was a conduit for theft.

MANY REFINERS HAVE INSTITUTED PROCEDURES THAT INVOLVE WEIGHT CHECKS BY DIFFERENT PERSONNEL

CONCLUDING REMARKS

It is important to appreciate that just as there is variability in weight and assay determinations, there is variability in the precious metals gain/loss number that is calculated after a physical inventory determination. When booking gains or losses, caution needs to be applied and it is prudent practice to only book gains or losses that lie outside the expected range of variability.

Due to the built-in variability of the results, even the best-run refining operations will at times experience losses or gains. As with large losses, large gains are a cause of great concern and indicate a fundamental problem. They need to be diligently investigated so that the cause can be determined and corrected.

Refining operations make substantial investments in security equipment, personnel and material control software packages to monitor the flow of precious metals within a refining operation and to prevent losses.

All these are important and necessary but need to be coupled with the general operating guidelines shown in the table below, which go a long way to understanding and preventing losses.

GUIDELINES FOR REDUCING UNDERSTANDING AND REDUCING PRECIOUS METAL LOSSES

1	Gain an understanding of the built-in variability of the physical inventory results using standard statistical techniques.
2	Understand and apply the Theory of Sampling to improve the sample reliability.
3	Process by-products internally and in a timely fashion.
4	Keep WIP levels low – this way, there is less to count, sample and weigh, leading to a smaller chance of errors.
5	Watch your receipts – ensure good sampling and assaying practices, and invest in quality assurance and control programs in the melt shop, lab and assay lab.
6	Watch your shipments – institute multiple weight checks, be rigorous about plant trash checks, and do not send out non-homogenised and unsampled materials.

Acknowledgements

The author wishes to thank Arthur Taylor and Mike Hinds for their comments on early drafts of this article.



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He is the President of Argo Advisors International, a consultancy and engineering company that specialises in the precious metals and extractive metallurgical industries. He has worked and consulted for major metallurgical research organisations and metals operations around the world.

When he is not consulting, he is a Professor in the MBA program at Franklin Pierce University, New Hampshire where he coordinates the Energy and Sustainability program. He is a member of the Mineral, Metals and Material Society and Co-President of the New England Chapter of the International Precious Metals Institute. During the summer of 2009, he was a Visiting Scholar at the Federal Reserve Bank in Boston. In 2015 he was awarded a Fulbright Scholarship by the US Government for energy studies in Botswana.

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From sourcing to product:

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TRANSPARENCY IS TRUST



MKS PAMP
GROUP

THE ORIGIN OF GOLD – GEOFORENSIC PASSPORT

Gold doré bars © Metalor

BY DR BARBARA BECK, LECTURER & SENIOR RESEARCHER,
UNIVERSITY OF LAUSANNE AND DR JONATHAN J. JODRY,
HEAD OF LABORATORIES & NEW BUSINESS DEVELOPMENT,
METALOR TECHNOLOGIES SA

In 2016, Metalor Technologies and the University of Lausanne (Switzerland) began a scientific collaboration to determine the origin of mined gold. This led to the creation of a new approach to validating the origin of doré – the geoforensic passport. This passport, which comprises a complex set of data characterising every single doré provider, was created using a multivariate statistical approach. Metalor now compares every doré received against that database, allowing it to identify any potentially problematic shipments.

Our project led to the creation of the **'GEOFORENSIC PASSPORT'**

a scientific tool used to validate the declared origin of any mined gold

14



INTRODUCTION

For a very long time, the extreme complexity of the gold supply chain meant that the accurate traceability of gold was considered impossible. Associations such as LBMA, private and public organisations such as the RJC and BGI, as well as many refiners themselves have introduced

responsible sourcing programmes to ensure that gold entering the supply chain is responsibly produced. However, all these initiatives have one fundamental flaw: they rely on compliance, audits and local governments in an environment that is not corruption-free.

In the past, several research projects have been undertaken to increase confidence in the gold supply chain:

- Colonel Dixon (who presented at the LBMA Assaying and Refining Conference in 2013) pioneered an approach to determining the origin of gold, which was originally used to prove the origin of gold in criminal cases. His approach was later extended to supply chain issues and is mostly based on detailed analyses of the chemical composition of gold using LA-ICP-MS.
- BGR (Bundesanstalt für Geowissenschaften und Rohstoffe) developed the analytical fingerprint methods (AFP) to monitor the supply of tin, tungsten, tantalum and gold ores in the Great Lakes region of Central Africa. Developed since 2006 to support UN initiatives in verifying the origin of conflict minerals, it comprises a reference database of all artisanal and small-scale mines in this region against which transboundary mineral shipments can be compared. This tool is based on a combination of chemical and mineralogical analyses; however, a feasibility study only has been undertaken for gold.
- BRGM (Bureau de recherches géologiques et minières) developed an approach aimed at controlling the supply of gold in Guyana and Suriname. This approach, based on the collection of doré from artisanal and small-scale mines followed by a complex mineralogical and metallographic study, turned out to be very complex, expensive and time-consuming.

This background research showed that our approach had to meet two clear objectives:

- Since gold supply involves a very large number of players around the world, and since it is impossible to collect samples from every gold mine without involving extensive field work, it was necessary to intervene at the bottleneck of the gold supply chain – the refinery.
- Any solution had to be usable for every doré received and had to be integrated at a reasonable cost into existing flows at the refinery.

Our project led to the creation of the 'geoforensic passport', a scientific tool used to validate the declared origin of any mined gold.

**USING ED-XRF
WE COLLECTED
SEVERAL
THOUSANDS OF
RESULTS FROM
MINES FROM
ALL AROUND THE
WORLD IN LESS
THAN TWO YEARS**

Figure 1: Multilevel analysis approach

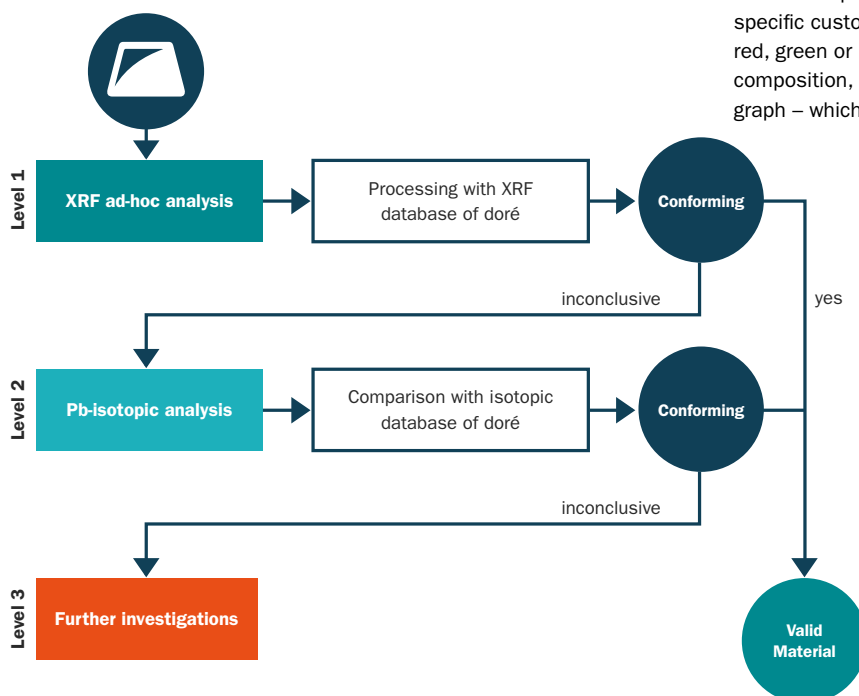
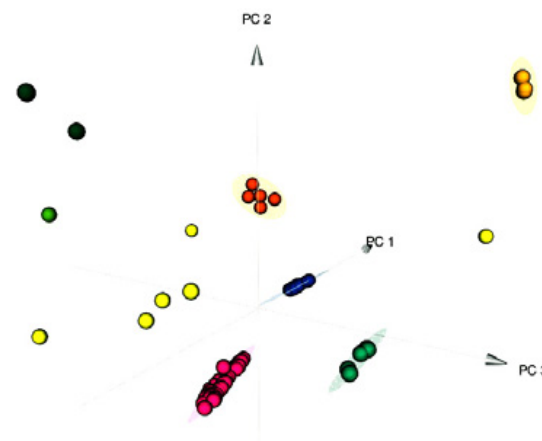


Figure 2: The geoforensic passport of a single customer (only three dimensions out of 15 are represented)



THE GEOFORENSIC PASSPORT

The geoforensic passport can detect irregularities in the supply of dorés upon their arrival at the refinery. It is based on a multilevel approach (see Figure 1). Level 1 relies on ED-XRF analysis followed by statistical interpretations. If a doré cannot be validated by level 1 analysis, we then move it to level 2, which introduces more sophisticated analyses, namely the determination of lead isotopic composition, and also integrates geological information. If, at this stage, there is still an inconclusive result, further investigation tools are available at level 3.

Figure 2 shows the level 1 result of the geoforensic passport for one single customer. We can see dots in a three-dimensional co-ordinate system. This graphic provides the following information:

- The axes do not represent a single chemical element, but a combination of chemical elements arranged to be as discriminating as possible. These are the principal components of the passport and are based on statistical evaluation. While only the first three axes are represented on this graphic, our analysis is carried out in a multidimensional space of up to 15 dimensions. Due to the large number of dimensions, it is not possible to draw conclusions just by looking at the graphical representations, as dots that appear close to each other in three dimensions could be completely segregated in some other dimensions.
- Each dot represents the signature of a specific doré received from a specific customer. We can either see well-grouped dots, such as the red, green or orange subgroups characterised by similar chemical composition, or isolated dots – the outliers marked in yellow on the graph – which do not have a signature common with any other dot.

- The geoforensic passport evolves over time, either through the evolution of the ore deposits or because of metallurgical changes. It can take several shipments of dorés to transform an outlier into a newly formed subgroup.
- Furthermore, these signatures are not necessarily unique, as two different suppliers both exploiting the same ore deposits can have very close signatures.

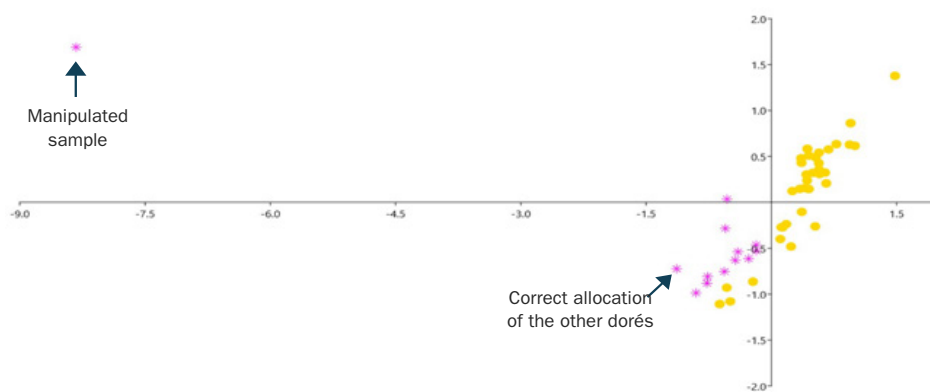
When a doré bar is received at Metalor, it is directly drilled as received (without prior melting for homogenisation). The sample is analysed by ED-XRF and a statistical analysis is performed.

If it can be assigned to one of the subgroups of the customer, the origin of the doré bar is confirmed. If this is not the case, the doré is defined as an outlier dot and further investigations are performed. While some bars can show heterogeneity, this does not significantly affect the statistical approach. Typically, more than 90% of doré are directly confirmed.

The advantages of our tool are:

- The possibility of a low-cost routine implementation at the refiner. The main benefit of using a multilevel process is the ability to start with ED-XRF analysis, using a relatively inexpensive instrument that has improved a lot over recent years. While samples do not require a significant preparation time, the equipment needs to be calibrated properly. Our method is calibrated for 20 different elements, using 120 standards developed at Metalor. Still, this approach is much more affordable than those used in the past, involving very expensive MC-ICP-MS, which we reserve for level 2 analysis, or LA-ICP-MS, which we use for level 3 analysis. Using ED-XRF, we collected several thousands of results from mines from all around the world in less than two years.
- The creation of a geoforensic passport based on well-defined subgroups. The geoforensic passport is created starting with the data obtained by ED-XRF, through a series of statistical evaluations based on unsupervised learning. While this process can appear complex, it is based on very robust and validated statistical tools brought together for this project. The geoforensic passport is characterised by the clear presence of subgroups, an important concept that was one of the key findings during this research. These subgroups are created statistically for every customer – we do not seek nor receive any information from the supplier – and likely correspond to different pits within a single mine, different depths of mining or different pre-processing at the mine.

Figure 3: Multivariate statistics (PCA) comparing the manipulated sample and the mine references



- The immediate validation of the declared origin of a doré on arrival at the refinery. Once we have this geoforensic passport in our hand, we systematically analyse every doré received at the refinery and, through multivariate statistics, we are able to check whether that material fits in any of the subgroups of the identified customer. In most of the cases, this validation is straightforward, but if the assignment is not clear or is only partially clear, we then move to the level 2 analysis. The more data that are available for any given customer, the more stable the system is. This means that after a couple of months of data-gathering from any given mine, the need to use level 2 analysis becomes less frequent.

VALIDATION AND APPLICATION

To test our approach, we randomly selected 100 doré samples received from South America in 2020. For these lots, we used the customer's name, the country of origin and the ED-XRF results, and then compared them to the geoforensic passports created for the continent. To test the robustness of the approach, we replaced the analysis of one of the South American samples with that of a sample from Asia.

Their compositions were almost identical (Au 836%, Ag 155%, Cu 5%), differing only at the level of trace elements.

Comparison of each doré with its identified supplier's geoforensic passport indicated an issue for two samples:

- The manipulated sample signature very clearly differed from the other dorés of the same supplier (see Figure 3). It underlined that the geoforensic passport is not built on simple element concentrations, but rather uses complex functions for each of its dimensions.

Unexpectedly, a second signature was also problematic! In an effort to understand why the origin of that sample could not be confirmed, we went back to a receiving team at Metalor, and asked them to provide details of the shipment.

It appears that out of the four ingots received the same day from the supplier, one was not coherent with the geoforensic passport, and that specific ingot was very different – both in weight and appearance – from the three others (see Figure 4).

**IN JUNE 2019
METALOR
ANNOUNCED
THAT IT
WOULD STOP
SOURCING DORÉ
FROM MINE
COLLECTORS**

We eventually learnt from the supplier that this small ingot was made by remelting analytical samples kept at the mine. It is interesting to observe that the geoforensic passport not only allows the detection of sourcing

problems, but also identifies significant changes in the metallurgical processes.

**At above
5,000
metres
La Rinconada is
the highest city
in the world**

Figure 4: Standard ingot from supplier (below) and the outlier identified (below right)



Figure 5: Semi-artisanal mine in the process of formalisation in the Peruvian altiplano (photo taken by B. Beck)



MINE COLLECTORS

In June 2019, Metalor announced that it would stop sourcing doré from mine collectors. Among the reasons leading to this decision were the difficulties in relying on local authorities, the higher compliance risk associated with collectors and, of course, the challenge of traceability from the mine to the refiner. The geoforensic passports collected prior to this date offer interesting insights into the mine collectors' business.

Semi-artisanal mines in the process of being formalised, such as the one seen in Figure 5, typically provide materials to collectors, leading to potentially complex signatures.

Figure 6 shows the geoforensic passport of a mine collector. We can see different types of subgroups:

- Very well-defined subgroups (i.e. green and pink dots) likely corresponding to industrial mines or relatively large semi-artisanal mines.
- Larger cloud (i.e. yellow dots), which we believe is made up of artisanal mines. It is slightly more heterogeneous, but it still has a relatively clear signature.
- Finally, a very large number of orange dots – the complete outliers.

This geoforensic passport made it possible to get a clear insight into the collector's sourcing pool. The large number of outliers underlines the presence of multiple gold sources that we do not understand.

At Metalor, we consider such signatures to be a compliance risk.

In some cases, data obtained solely from ED-XRF is not sufficient to make an informed decision. In a typical example, the geoforensic passport of a mine suggested two extremely different subgroups – one of them containing large amounts of nickel and copper (representing 80% of the composition).

We were concerned that this subgroup might represent a very different type of sourced material and, for this reason, we carried out additional investigations as proposed by level 2 of our approach. Using lead isotopic analyses, it was eventually proven that the two subgroups were of identical origin.

This case study shows that even when an inconclusive result is obtained through level 1 analysis, moving to level 2 analysis can confirm the origin of a shipment.

Figure 6: The geoforensic passport of a mine collector

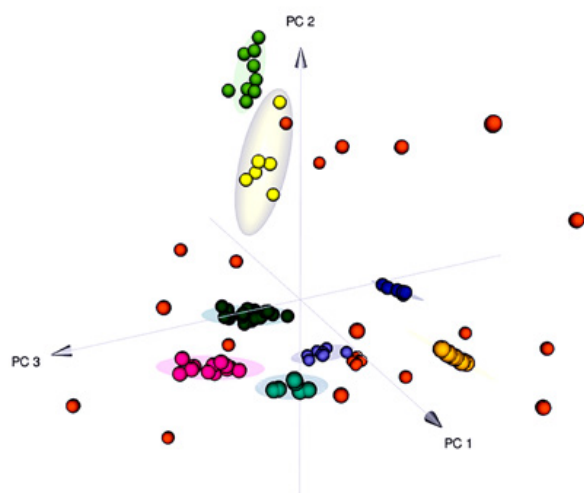


Figure 7: Gold nugget (1.2 cm long) purchased at a gold comptoir in Juliaca, which in fact came from La Rinconada (Photo taken by S. Ansermet)

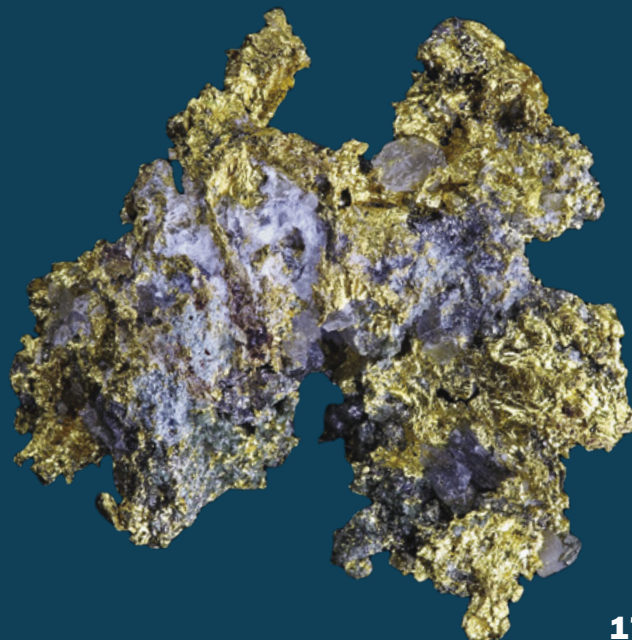
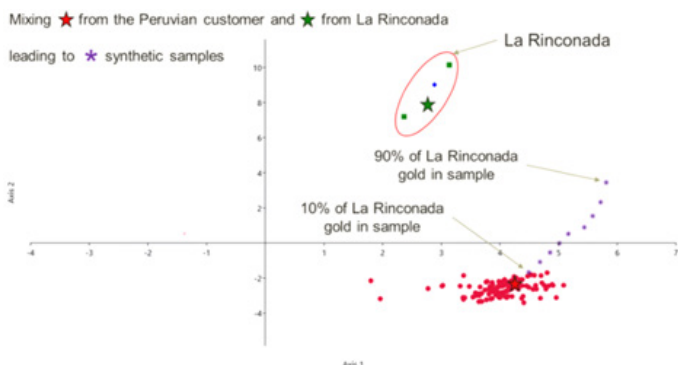


Figure 8: Multivariate statistics (PCA) showing mixtures of gold made from a Peruvian customer and gold from La Rinconada



LA RINCONADA

At above 5,000 metres, La Rinconada is the highest city in the world. It is a shantytown where more than 60,000 people live and work in extremely difficult social and climatic conditions. The city is crossed by a gold vein that is too small to be exploited industrially, but that has created a huge number of small artisanal mines, one next to another. No serious refiner wants to source gold from there.

In the course of this project, Dr Barbara Beck spent time in Peru and gathered first-hand samples from La Rinconada as well as from surrounding gold comptoirs, including gold nuggets from Juliaca, located close to Lake Titicaca (see Figure 7).

Through the geoforensic passport, we could prove that those gold nuggets in fact came from La Rinconada ores, showing that gold travels easily between illegal mining sites and trading areas. The geoforensic passport can also be a fantastic tool to track how gold moves illegally from mining sites to markets.

As with all other gold sources, gold coming from La Rinconada has a specific signature – and this signature is so characteristic that we

could prove, after analysing several thousands of lots, that no shipment from La Rinconada has been received at Metalor since the beginning of the project.

The risk of getting mixtures from both illegal and legal sources was then investigated. We wanted to check whether the geoforensic passport could detect mixtures of gold from two different sources, as well as the percentage make-up. For this, we created artificial mixtures from two sources, one from a well-known supplier in Peru and the other from La Rinconada

THIS STUDY SHOWS THAT SCIENTIFICALLY ROBUST & VALIDATED MULTISTEP TOOLS CAN BE USED TO VALIDATE THE SOURCE OF MINED GOLD



(see Figure 8). The result was quite astonishing – it was even possible to detect an addition of just 10% of Rinconada gold to the sample.

On the 2D representation of the geoforensic passport (keep in mind that this passport has up to 15 dimensions, so only the two dimensions with the most visible differences are shown here), we can see the signatures of the samples from La Rinconada as well as from a specific large Metalor customer from Southern Peru (red). We then created artificial mixtures (purple stars) from those two sources. It appears that the addition of just 10% of gold from La Rinconada can be detected by this statistic analysis!

CONCLUSION

This study shows that scientifically robust and validated multistep tools can be used in a novel approach – the geoforensic passport – to validate the source of mined gold. This approach does not attempt to determine an unknown origin of doré, but to confirm the declared origin of the gold. A key advantage of this method is that it does not require extensive and expensive field studies.

For refiners, this is a game-changing approach. Using inexpensive equipment readily available at most refineries, it is now possible to perform a systematic control of all received dorés without slowing the precious metal flow. This is the first time that a readily available scientific tool can be used to answer a fundamental question: Can we be sure that the declared origin of this gold is genuine?

This project was rendered possible by the combination of three factors:

- The recent development in ED-XRF, which allows fast and reliable analyses of the doré samples, even at trace levels, provided that the calibration has been accurately set up. This makes it possible to create a database with thousands of results, as well as to perform systematic control on the doré received.
- The multivariate statistical approach, using the large database, can be developed over time to lead to more and more precise statistical interpretations.
- The implementation of our tool in the refinery rather than at mining sites.

Acknowledgement

This multidisciplinary project was rendered possible by the support received from people at the University of Lausanne and at Metalor Technologies, as well as by the help of the Swiss Embassy in Peru, the University of Geneva, the Better Gold Initiative and the SBGA. This project was co-funded by InnoSuisse, the Swiss Innovation agency, together with Metalor Technologies.



Dr Jonathan Jodry, Head of Laboratories & New Business Development, Metalor Technologies SA.

Based in Switzerland, Jonathan J. Jodry currently holds the position of Head of Laboratories & New Business Development at Metalor Technologies, a company he joined in 2009. In those roles, he is involved in the analytical activities of the LBMA GDL accredited laboratories of Metalor on three continents, as well as the development of new products and services for the company.

He is also heavily involved in trade associations, and is elected at the Management Committee of the LPPM (London Platinum and Palladium Market). He represents Metalor as one of the five referees appointed by both the LPPM and the LBMA (London Bullion Market Association), and is the current President of the European Chapter of the IPMI. Finally, Jonathan also chairs the ISO/TC 174, the technical committee writing international standards for precious metals, jewellery and gemstones. Jonathan got his PhD at the University of Geneva in 2000 in organic and supramolecular chemistry, before spending 8 years in Japan. He also holds two Executive MBAs from London Business School and Columbia University of New York.



Dr Barbara Beck graduated in Earth Sciences at the University of Lausanne in Switzerland and received her doctoral degree at the Universities of Lausanne and Fribourg in the field of archaeometry, a research topic which aims to solve historical or archaeological questions with extended mineralogical methods. She then worked at the Swiss Federal Laboratories for Materials Science and Technology and later, for the Swiss Federal Office of Public Health, Consumer Protection Division.

She is currently a lecturer in the field of natural resource management and senior researcher at the University of Lausanne. With her research, she aims to use mineralogical, geochemical and geostatistical tools to solve issues relating to the traceability of mined gold.



Weighty Matters Looking for Troy

BY SIMON ROSTRON, LBMA PR CONSULTANT

Town of Troyes

The concept of troy weight, although not the name, begins with cereals. The early Egyptian silver dirhem weighed 48 barley grains (and continued to do so for many centuries) and in the reforms to the English currency introduced by the Mercian King Offa (757-796 AD), matching those of Charlemagne, one silver penny weighed exactly half a dirhem. Indeed, some circulating coins of Offa's time have been found to have been dirhems used either directly or partially restruck.

Despite the fact that the later medieval English system worked with wheat grains rather than barley grains (at a ratio of 4:3), today's troy ounce weighs 20 pennyweights or 480 grains, and as Charlemagne decreed, there are still 12 troy ounces to the pound.

But whereas the name dirhem is etymologically connected to the Greek drachma, the origin of the name 'troy' is more difficult to define – the one certainty is that it has nothing to do with Homer!

There are several competing theories. The best supported of these links 'troy' to Troyes, the market town a little more than 100 miles south-east of Paris.

TRICASSIUM

Troyes has a long and often colourful history stretching back to around 600BCE as evidenced by Celtic burial mounds nearby. Julius Caesar was responsible for the city's original ramparts, fragments of which still exist, and in the later Roman period, these fortifications were certainly of practical value as the Emperor Julian discovered in 357 AD, when journeying from Auxerre (some 50 miles to the south-west) to Troyes to deal with an outbreak of lawlessness:

"So, as he now had firmer hope of success in resisting their attacks, he proceeded among many dangers to Tricasa [Troyes], reaching there so unlooked for, that when he was almost knocking at the gates, the fear of the widespread bands of savages was such, that entrance to the city was vouchsafed only after anxious debate." (Ammianus Marcellinus – contemporary account, ToposText).

The Roman name for Troyes – Tricasa or, more fully, Augustobonum Tricassium – reflected the fact that it was the principal city of the Gallic tribe, the Tricasses. Some authorities, for example, the writers of Encyclopedia Britannica, have implied that 'Troyes' is a straightforward corruption of this name, but if so, this derivation poses a problem when the concept of troy weight is investigated, for what are we to make of the contemporary 'Bremen troy' and/or the 'Holland troy'?



By the eighteenth century, as this plate for the Trial of the Pyx - the annual test of British Currency - shows, the Troy Pound had been long-established. The first definitive reference appears in a 1414 statute from the reign of Henry V pertaining to silver although it is likely this formal English measure dated back at least a further 140 years. (By permission of the Royal Mint).

THE CHAMPAGNE FAIRS

As much as Troyes' fortifications provided it with strategic importance, it was the city's location at the intersection of a series of Roman roads, notably the direct route from Boulogne to Milan and another to the port city of Harfleur (a few miles inland from Le Havre), that led to its commercial heyday in the Middle Ages.

In short, Troyes became the capital of Champagne and one of four cities or towns which, under the rule of the Counts of Champagne, played host to 'Champagne Fairs', which reached their zenith in the 12th and 13th centuries. Although not as exciting as they sound to modern ears (given the manufacture of Champagne – in bottles – did not begin until late into the 17th century), these fairs were internationally important, serving as "a premier market for textiles, leather, fur, and spices" (Wikipedia).

The key question is whether the fairs at Troyes were better known and respected than those of the nearby cities such as Provins, 44 miles to the north-west or Lagny-sur-Marne, in the outskirts of modern Paris.

The answer is probably yes, given that Troyes hosted two fairs a year – one in June, the other in November. Therefore, so the argument goes, it was the system of weights and measures in force at Troyes that became institutionalised. But then again, Provins also hosted two Champagne Fairs every year.

BOOK MARKS

This point in the narrative requires the introduction of three new characters: Henry, Henry and Watson. But before their relevance to troy weight is explained, a brief diversion into the world of the medieval 'mark' is necessary.

Like the pound, the mark was originally a unit of weight – almost always of precious metals – which at the outset was also an equivalent value. However, again like the pound, its weight and value diverged very considerably over the years.

Although familiar in England, the mark was never an actual unit of currency there so much as a unit of account. However, in Europe, more frequently in the Germanic and Scandinavian regions, there were many marks of differing value. That said, in the context of Troyes, it is or was the weight of the mark, which was often but not always equivalent to eight ounces, that is consequential.

Enter the first Henry: Henry Bolingbroke, Earl of Derby and latterly King Henry IV. It is to Henry, or more accurately to the book *Expeditions to Prussia and the Holy Land* made by Henry Earl of Derby in the years 1390-1 and 1392-3 (edited by Lucy Toulmin Smith, Camden Society, 1894) that we owe the first formal reference to troy weight.

In this book, written in curious medieval Latin with French and English inclusions, Henry's Treasurer, Richard de Kyngeston, Archdeacon of

Hereford, lists all the expenses that Henry's military excursions incurred. In the section titled 'Vasa Argentea', dated January 7 [1390] and referring to silverware, is the following phrase [my numerals]:

Et pro 1 chargeour, 3 discis, et 1 sawcere, ponderis 20 marc. de troye, 45 marc.

In my loose translation, this says: "And for one charger, three 'discs' (presumably flat plates) and one platter weighing 20 marks troy [with a value of] 45 [English] marks."

Most authorities consider the use of the term 'de troye' in this fragment to refer to weight.

But does this mean that the 'troye' referred to is synonymous with Troyes?

THE FIRST ACT

Of course, it is possible that Henry or indeed Richard de Kyngeston had visited Troyes, particularly given the English stronghold of Calais (referred to in the book as 'Calys'), which made the first step of any journey to Troyes much easier, but it is certain that the next reign saw a greater association with Troyes, and formally with troy weight.

Henry V's brief military career is too well known to be recounted here, but in the context of this story, the important date is the year before Agincourt, when the first reference to troy weight as a formal and approved measure appeared in an English statute.

To quote Charles Watson, who will be more formally introduced below:

"In the second year of King Henry V, AD 1414, an Act was passed dealing with the price which was to be paid for articles of silver gilt. In this it is stated that the goldsmiths were in the habit of charging for silver-gilt ware double the price for pure silver, 'which was an outrageous price', and apparently, even then, the silver was not always of good quality. It was therefore enacted that in future no silver of less value than sterling (i.e. the silver used for coins) should be gilt, and that a troy pound of silver gilt-ware should be sold for £2 6s 8d [560 pence] at the most.

"This is the first time that the pound used for weighing silver, i.e. the pound of 12 ounces, is definitely called a troy pound in the laws of England ..." (British Weights and Measures, John Murray, 1910).

A related date is 1420, when following the Treaty of Troyes, Henry married the French King Charles VI's daughter, Catherine de Valois, in the Eglise St-Jean-au Marché (in Troyes, of course) and became heir to France. Sadly (from the point of view of the English), Henry pre-deceased Charles, and following Joan of Arc's uprising, that was that.

This point in the narrative requires the introduction of three new characters:

HENRY, HENRY AND WATSON





Église St-Jean-au Marché

WATSON – ANYTHING BUT ELEMENTARY

Unfortunately, this digression into Henry V's territorial ambitions does not advance the case for an alternative explanation of the origins of the 'troy' name. For that, the world had to wait another 500 years and the publication in 1910 of an authoritative book, *British Weights and Measures*, by the redoubtable Colonel Sir Charles Moore Watson.

Watson 'Pasha' (the honorific derives from his becoming a Major General in the Egyptian army) had a distinguished military career. Among other things, he was, as his 1916 obituary in *The Times*, noted, "a friend and lieutenant of General Gordon, and the daring captor of the Citadel of Cairo after the Battle of Tel el-Kebir" (1882). Prior to that, he had surveyed the White Nile and, after his heroics in Cairo, became a military administrator in Egypt and subsequently Chairman of the Palestine Exploration Fund.

An engineer by training as well as a surveyor, the 'Pasha' was particularly interested in measures of all sorts and his book, described grandiloquently (on Amazon) as "part of the knowledge base of civilization as we know it" [!], covers a very broad range of issues from 'weys of wool', through yards, chains and furlongs,

to the 'Winchester bushel' and 'coal bushels of Queen Anne'.

Watson has no interest in Troyes and Champagne Fairs, and, indeed, makes no reference to them. Instead, he derives the word 'troy' from two plausibly linked sources. The first, perhaps surprisingly, is to do with lead rather than silver or gold and appears in ordinances from the time of Edward 1 (late 13th century).

In the so-called Assize of Weights and Measures, the following paragraph appears:

"But, according to some others, the load [of lead] consists of 12 Wayes and this is according to troy weight."

The original Latin is *troni ponderacionem* and Watson records that the translation to 'troy weight' may be laid at the door of the Public Record Commissioners and is "the first time the words appear in the laws".

The second, and perhaps most compelling of Watson's sources was Joseph Wright (1855-1930), Professor of Comparative Philology at Oxford. In the *Oxford Dialect Dictionary* (Oxford University Press, 1898), Wright defines the word 'troy' as 'balance', thus suggesting that 'troy weight' could simply mean 'balance weight' without any specific geographical association.

In the end, as a Punch cartoon of 1846 has it, "You pays your money and you takes your choice". But best pay in Maundy Money – the Easter distribution by the sovereign to the poor and, since time immemorial, struck from one troy pound of silver.

WRIGHT DEFINES THE WORD 'TROY' AS 'BALANCE' THUS SUGGESTING THAT 'TROY WEIGHT' COULD SIMPLY MEAN 'BALANCE WEIGHT'

Sir Charles Moore Watson
"Pasha"

Simon Rostron has been Managing Director of Rostron Parry Ltd - media relations consultancy since 1991 and PR and media consultant to LBMA since 2014. In his earlier career he was a Stockjobber, London Stock Exchange and remains a legend in his own lunchtime.

LBMA NEWS

BY RUTH CROWELL, CEO, LBMA

LBMA recently published a mid-year update to outline the progress made on its 'Five Key Strategic Focus Areas' and audits for 2020.

These five key areas – value chain accountability, advancing standards, transparency, audit programme, and Artisanal and Small-Scale Mining – underpin the priorities for the programme over the next three years and are key to building long-term trust and credibility in the industry globally.

Central to LBMA's strategy is engaging with stakeholders, and this year will continue to see a focus on several initiatives which require close collaboration with various actors in the supply chain, as well as with other industry programmes.

Read the full update on our [website](https://www.lbma.org.uk).



102 ACCREDITED REFINERS



We now have **102 refiners** on the Good Delivery Lists, with **70** listed for gold, **81** listed for silver and **49** refiners on both lists.

There are currently three active Good Delivery List applications (two silver and one gold) and five new applications under review – two gold, one silver and one for both metals (which is treated as two separate applications).

COMMITTEE VACANCIES – GET INVOLVED!

Public Affairs Committee (PAC)

The purpose of the PAC is primarily to organise LBMA events and speaker programmes, most notably, the annual Precious Metals Conference. The Committee also oversees LBMA publications and the LBMA website.

Membership Committee (MC)

The role of the MC is to ensure that the quality of LBMA's membership is maintained and to guide the Executive in the identification and encouragement of all suitably qualified companies involved in the bullion business to join the Association.

LBMA MEMBERS



We currently have **148 Member Companies** – consisting of **13 Market-Making Members**, **78 Full Members** and **57 Affiliate Members**.

LBMA is delighted to announce that Credit Suisse AG has been approved as a Market Maker in spot, forwards and options, with effect from 12 May 2021.

We're also delighted to welcome the admission of Geiger Edelmetalle as an Affiliate Member. Geiger Edelmetalle is a medium-sized, family-owned, leading precious metals trading house in Germany. Its customers are private and institutional investors and collectors from around the globe involved in gold, silver, platinum, palladium and copper.

LBMA also welcomes the recent admission of MMTC-PAMP India, a gold and silver Good Delivery List accredited refiner, as a Full Member. The company is a joint venture between Switzerland-based bullion brand, PAMP SA (LBMA Full Member), and MMTC Ltd, a Government of India Undertaking. It was founded in 2008, with full-scale commercial refining starting in 2012.

The LBMA Executive team is currently working on updating the Membership Rulebook to reflect last year's membership classification changes as voted at the AGM. The membership will review and vote on the changes to the Rulebook at this year's AGM.

If you are interested in applying for membership of LBMA, including the new Subscriber category, please email: mail@lbma.org.uk.

GOLD & SILVER HELD IN LONDON VAULTS

As at end April 2021, there were **9,440** tonnes of gold, valued at **\$536.5** billion, which equates to approximately **755,231** gold bars.

As at end April 2021, there were **35,867** tonnes of silver, valued at **\$29.8** billion and approximately **1,195,570** silver bars.

LBMA currently has vacancies on a number of its Committees and welcomes applications from the staff of Full Members and Affiliates.

Finance Committee (FC)

The FC's general purpose is to ensure that adequate financial records are maintained and that quarterly and annual accounts are prepared. In doing so the FC ensures that the accounts provide an accurate representation of LBMA's financial position and that adequate financial reserves are maintained.

In addition, our Regulatory Affairs Committee and our User Group always have space for new interested members.

To learn more, or to apply for any of the above vacancies, please email mail@lbma.org.uk and include details of your relevant market experience and reasons for applying.

LBMA VIRTUAL GENERAL MEETING & BOARD ELECTIONS 1 JULY 2021



Board Election – Market Makers and Full Member

Each year, LBMA holds an election for members of its Board at its General Meeting. Board members serve two-year terms, so the annual elections alternate between Full Member representatives and Market Maker representatives. This year, Market Maker Member representatives are up for election and one Full Member vacancy also needs to be filled. The existing Market Maker representatives and co-opted Full Member representative are all eligible to stand for re-election, provided they have not exceeded their maximum ten years of service.

This annual rotation between Full Member and Market Maker Member representatives ensures that Board membership is reconfirmed each year and that new directors or senior employees of Full Members or Market Maker Members are potentially able to join on an annual basis. It also ensures continuity through the Board members who are not up for election.

Nominations and the Role of the LBMA Board

Full Members and Affiliate Members will be invited to submit nominations for Board members on Tuesday, 1 June 2021. Nominees must be directors or senior employees of Full Members or Market Maker Members. Affiliate Members cannot join the Board, but this year, they can nominate Board members and vote in the election for the first time, thanks to last year's update to LBMA's Memorandum and Articles of Association.

The Board is chaired by independent Non-Executive Director, Paul Fisher. Full details of current Board members as well as Terms of Reference and minutes of meetings are all publicly available on our website.

Voting Procedures

Once the nominees have been announced on Monday, 21 June 2021, Official Contacts for Full Members and Affiliate Members (or their designated proxy) are eligible to vote. If you are not sure who your Official Contact is, please contact Membership Co-ordinator josh.robins@lbma.org.uk.

LBMA TRADE DATA

On Thursday, 10 June 2021, LBMA is hosting a further Trade Data webinar as we welcome back Adrian Ash (Head of Research, BullionVault) and David Gornall (Senior Advisor, LBMA) to explain what the latest trade data can tell us about the OTC precious metals market. Adrian and David will be joined by Saida Litosh (Manager, Precious Metals Research, Refinitiv).

LBMA Trade Data (provided by Nasdaq) is available via Nasdaq, Refinitiv Eikon or Bloomberg terminals. For more information on subscribing or contributing data, visit: <https://www.nasdaq.com/LBMA-Trade-Data>

Webinars



LBMA's fortnightly programme of webinars continues to prove very popular. You can catch up with any you may have missed by visiting our website. We have more exciting speakers and topics lined up, so look out for our weekly Members newsletter or check our website for further details.

UPCOMING EVENTS 2021



THUR 1 JULY
Virtual AGM

followed by a Summer
Social Event in the evening

MON 20 – TUES 21 SEPT
Virtual Annual Conference
including a Networking Event in
London on the Monday evening

WED 1 DEC 2021
LBMA/LPPM Annual Dinner

A New Participant in the GOLD & SILVER Auctions



With effect from 26 May 2021, DRW Investments, LLC have joined the LBMA gold and silver auctions as a Direct Participant. This takes the number of Direct Participants for gold to 16 and for silver to 13.

Any members interested in joining any of the LBMA price auctions should get in touch using the contact details below:

Gold or silver price auctions, ICE Benchmark Administration:
IBA@theice.com or **+44 (0)20 7429 7100**, or Platinum and palladium auctions, LME: **market.access@lme.com** or **+44 (0)20 7113 8888**.

**IT'S NOT JUST WHAT WE DO,
IT'S HOW WE'RE RESHAPING
THE WAY WE DO IT.**



RESHAPING VALUE



RESHAPING VALUE, FOR A CENTURY AND BEYOND.

There was a time when value in the industry was measured only in purity, and weight, but today provenance and ethical background play an important part in value. Which is why we are always evolving how we source our metal. Our commitment to responsible business practices and sourcing, allow us to not only preserve our business, but our industry and planet.



LBMA

GOOD DELIVERY
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RAND REFINERY

How is the INDIAN GOLD MARKET Coping with the Challenges of Covid-19?

BY SRIVATSAVA GANAPATHY, CEO OF EVENTELL GLOBAL ADVISORY PRIVATE LIMITED

While 2020 saw gold jewellery demand hit a multi-decadal low, it also witnessed a stupendous increase in subscriptions to gold ETFs and Sovereign Gold Bonds in India. Last year also brought out the best in innovations and reforms. However, the situation is very different in 2021. Although this year began with a lot of optimism, a devastating second wave of Covid-19 at a time when industries are limping back is not welcome. In this article we focus on how this is expected to affect the Indian gold and jewellery industry.

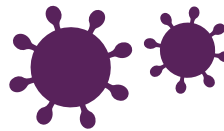
COVID-19 FIRST WAVE: JEWELLERY CONSUMPTION DOWN BUT GOLD WON

The first wave of Covid-19 had a devastating impact on gold jewellery consumption in India, pushing it to a multi-decadal low of 315.9 tonnes in 2020 against an annual average of 582.3 tonnes between 2015 and 2019 (Source: GDT, World Gold Council). However, 2020 reaffirmed Indian housewives' belief in gold, as gold gained larger acceptance as a must-have asset class in any portfolio.

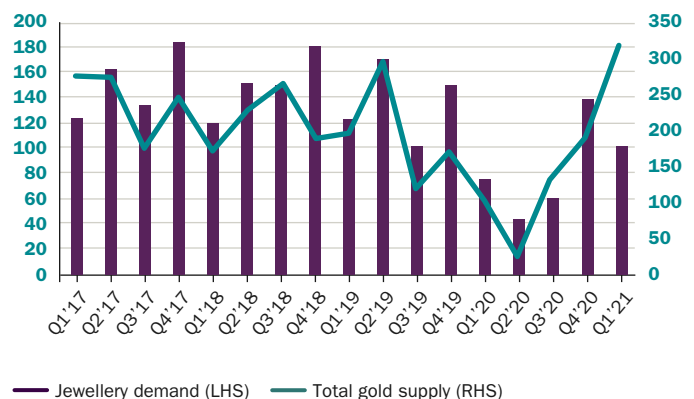
GOLD-BACKED PAPER PRODUCTS GREW EXPONENTIALLY IN 2020

2020 also saw increased acceptance of paper forms of gold in India, as these were convenient, accessible online and not limited by lockdown. For instance, Sovereign Gold Bonds (SGBs), a popular paper product issued by the Reserve Bank of India on behalf of the Government of India, witnessed an unprecedented subscription of 32,350kg through 12 issues during April 2020 to March 2021 alone, compared to 30,955kg subscribed over 37 issues between 2015 and March 2020.

**THE FIRST WAVE OF COVID-19
HAD A DEVASTATING IMPACT ON
GOLD JEWELLERY CONSUMPTION**
in India pushing it to a multi-decadal
low of 315.9 tonnes in 2020



INDIA JEWELLERY DEMAND HIT MULTI-DECADE LOW IN 2020, OPTIMISM LEAD SPIKE IN SUPPLIES IN Q1'21 (IN TONNES)



Source: World Gold Council

JEWELLERY MANUFACTURING WENT FOR A MAJOR OVERHAUL

One of the positive developments of Covid-19 in 2020 was technology integration into gold jewellery manufacturing. Every aspect of manufacturing – generation of new concepts, creation of design, development of prototypes, approvals of final design, manufacturing through multiple remote centres, B2B exhibitions, negotiation and payments – moved online. Many of these developments would become the new norm going forward.

JEWELLERY RETAILING (B2C) ALSO SAW A SLEW OF INNOVATIONS

The impact of technology at the B2C level was palpable too. Electronic catalogues, virtual reality (VR) rooms, jewellery at your doorstep and e-commerce channels are some of the innovations that jewellers have adopted to retain existing customers as well as to attract new ones. Here again, the retailers

that adopted these technologies have gained substantial advantage over the traditional players.

EXCHANGES LED THE INNOVATION IN THE MARKETPLACE IN 2020

The MCX, NSE and BSE¹ are the three major commodity derivatives exchanges that offer gold and silver contracts. Each of

these exchanges launched gold mini options contracts, as well as embracing the India Gold Delivery (IGD) norms and accepting IGD gold bars as deliverable against the gold mini options contracts.

In addition, the NSE launched a unique refiner accreditation programme for BIS² approved refiners comprising due diligence of the supply chain through third-party audits. Four refiners have qualified so far under the programme.

ONE OF THE POSITIVE DEVELOPMENTS OF COVID-19 IN 2020 WAS TECHNOLOGY INTEGRATION INTO GOLD JEWELLERY MANUFACTURING

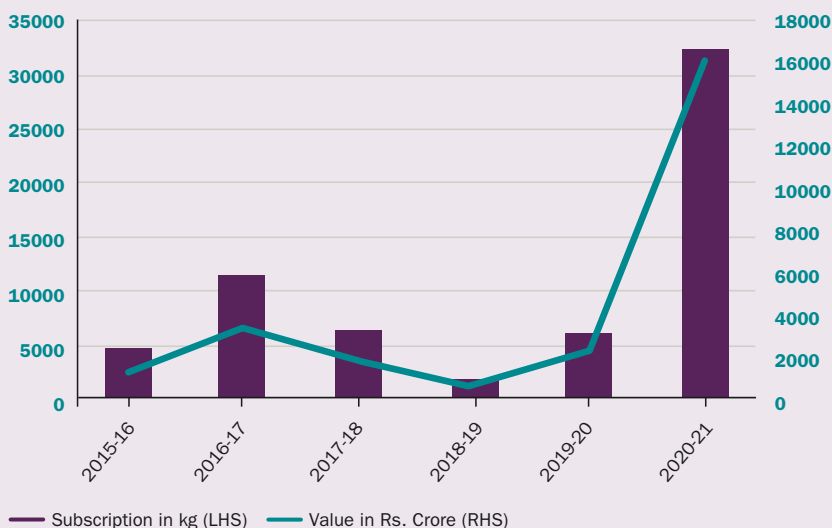
As of 31 March 2021, the total gold accumulated under SGBs was 63,307kg. Like-wise, Assets Under Management (AUM) of gold exchange-traded funds sky-rocketed to roughly US\$2 billion as at the end of December 2020, as against about US\$800 million as at the end December 2019, according to the Association of Mutual Funds of India.

The MCX, the market leader in gold and silver derivatives, also launched MCX Bulldex, an index comprising gold and silver as its constituents, which tracks the MCX futures prices of near-month gold and silver contracts. The product caters to portfolio diversification.

The BSE's India INX launched Gold Quanto and Silver Quanto futures contracts in August 2020. These contracts simply track the international price of gold and silver, without incurring currency risks and local duty change risks.

NSE LAUNCHED A UNIQUE REFINER ACCREDITATION PROGRAMME FOR BIS APPROVED REFINERS COMPRISING DUE DILIGENCE OF THE SUPPLY CHAIN THROUGH THIRD-PARTY AUDITS

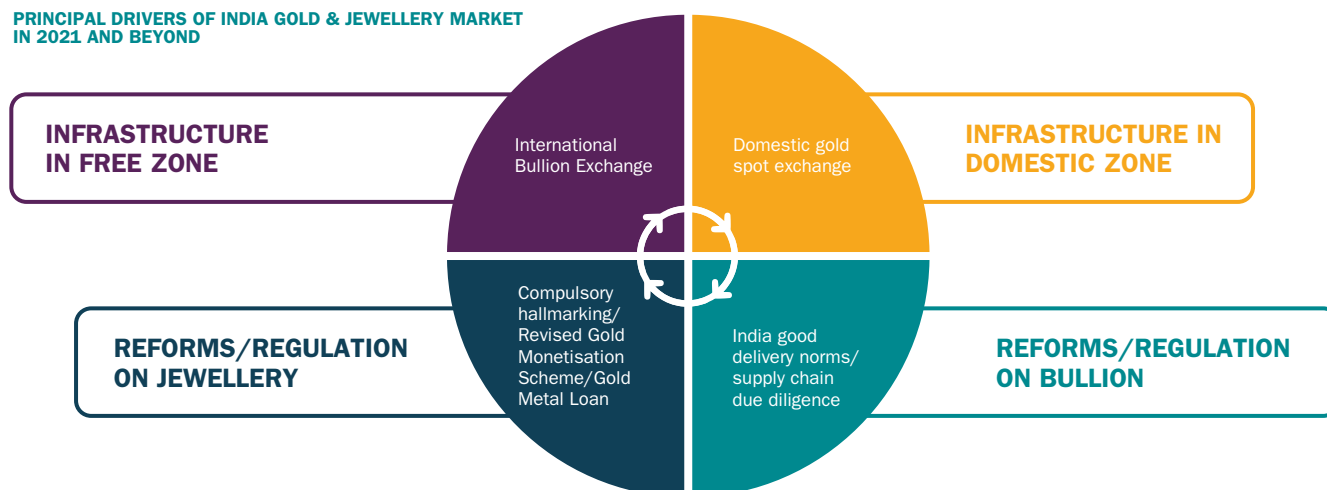
SOVEREIGN GOLD BOND: 2020-21 SUBSCRIPTION AT 32.35 TONNES EXCEEDS CUMULATIVE SUBSCRIPTION FROM 2015 TILL MAR-2020



1. MCX – Multi-Commodity Exchange of India Limited; BSE – Bombay Stock Exchange Limited; NSE – The National Stock Exchange of India Limited

2. BIS – Bureau of Indian Standards, a standards-setting body of the Government of India

PRINCIPAL DRIVERS OF INDIA GOLD & JEWELLERY MARKET IN 2021 AND BEYOND



2021 BEGAN WITH LOTS OF EXPECTATIONS

2021 began with a lot of expectations, especially following the excellent work by all the departments of the government and the healthcare sector in successfully containing the first wave of Covid-19. The icing on the cake was a gift from the Finance Minister in the form of a cut in customs duty on gold and other precious metals on 1 February 2021. This, coupled with the stable price of gold in the international market, led to a 10% drop in the price of gold in the Indian market in March 2021. Foreseeing a surge in demand for gold jewellery during the ensuing marriage season, scheduled to begin from the third week of April and continue for about 75 days, and to mark other important occasions such as Akshaya Tritiya (during mid-May) and Ramadan, imports of gold bullion increased during March 2021 to 98 tonnes. Then we were hit with the Covid-19 second wave.

COVID-19 SECOND WAVE AND ITS IMPACT

Unfortunately, nobody could have foreseen that the second wave of Covid-19 would, in such a short time, sweep across the entire country and cause such havoc. As we stand today, India reports one of the highest numbers of cases and faces the twin challenges of inadequate beds and insufficient oxygen supplies for patients.

The government along with the other agencies is doing its best to bring the situation under control. It is expected that positive results will be seen on the ground in a month or two.

Lockdowns have been reimposed in several states. Social gatherings are either prohibited or strictly monitored. As a result, marriages (an important demand driver

for jewellery) are getting either postponed or reduced to a small gathering. Micro, small and medium-sized companies, which were just getting back on their feet, are once again suffering the most.

Responding to these situations, jewellery retailers have either cancelled their orders or have reduced them significantly. Prominent manufacturers expect a drop in domestic demand of between 20% to 30% in the next two to three months. In so far as the export demand for gold jewellery is concerned, there is a slight improvement from 2020 levels, although they are still much lower than those in 2019.

NEW RECORDS SET DURING 2020 IN INDIAN GOLD AND SILVER MARKETS

- Gold and silver prices hit an all-time high during August 2020.
- Sovereign Gold Bonds amassed record subscriptions in 2020, well surpassing the cumulative subscriptions during 2015 to 2019.
- Gold ETFs inflows more than doubled during 2020 from 2019 levels.
- The MCX, the leading derivatives exchange for gold and silver, recorded its highest-ever traded volumes and highest-ever physical deliveries of gold and silver at its warehouses.
- Silver recycle flows (scrap flows) witnessed historic highs in 2020, pushing the market to a prolonged discount to the London spot price for the first time in several years.



2020 INDIAN GOLD & JEWELLERY INDUSTRY – REFORMS AND MARKET INNOVATIONS

- India Good Delivery norms released in January 2020 by the Bureau of Indian Standards (BIS).
- Options on gold announced in January 2020. Three commodity exchanges – BSE, NSE & MCX – launched gold mini options contracts in June. Physical delivery of India Good Delivery bars was also made at each of the exchanges.
- The International Financial Services Centre Authority (IFSCA) was created and members appointed to it. IFSCA is an integrated regulatory body that will be responsible for regulating all markets inside IFSC, Gujarat – India's first free zone for financial services. IFSCA will also soon host the International Bullion Exchange (IBE) of India.
- The Indian Government announced timelines in January 2020 for implementing the compulsory hallmarking of jewellery into three carats – 14, 18 and 22 – and retailing them through BIS-approved jewellers only. The implementation is rescheduled to commence from 1 June 2021.
- The Indian gold and jewellery industry engaged with the OECD to chalk out a workable implementation plan for embracing responsible sourcing guidelines in its supply chain.

The second wave has come at the most inappropriate time and, hence, could delay the recovery of the gold jewellery manufacturing industry. In addition, as gold purchases are strongly linked to growth in income levels, the second wave and its consequent economic loss could further hit demand for all forms of gold. So, the short-term prospects for gold and gold jewellery in India is bleak.

CONCLUSION

In India, the second wave of Covid-19 has caused a devastating impact on income, livelihood and health. It will take at least a month or two for normality to return.

THE RECOVERY OF THE JEWELLERY MANUFACTURING INDUSTRY IS EXPECTED TO BE A SLOW DRAWN-OUT PROCESS

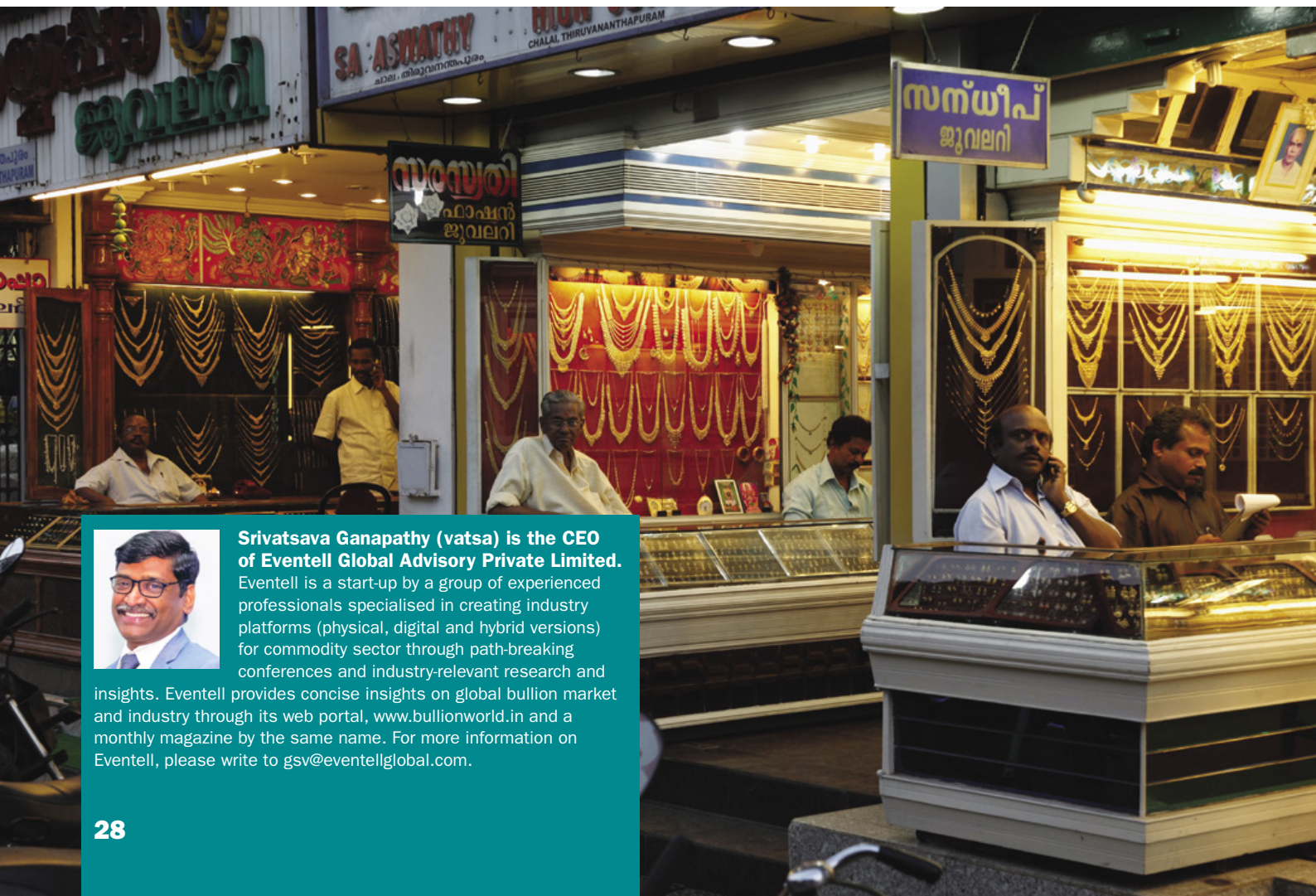
Given this scenario, the demand for gold jewellery is expected to fall by 20% to 30% over the next three months. In a falling market, investors will not be keen on buying paper products either. So, overall demand in the short-term is expected to be lacklustre. As a result, the recovery of the jewellery manufacturing industry is expected to be a slow drawn-out process.

However, the appeal of gold as a reliable asset is well entrenched among Indians. So, when the situation returns to normal, hopefully within three to six months' time, the demand for gold and gold jewellery is expected to jump steeply.



Srivatsava Ganapathy (vatsa) is the CEO of Eventell Global Advisory Private Limited.

Eventell is a start-up by a group of experienced professionals specialised in creating industry platforms (physical, digital and hybrid versions) for commodity sector through path-breaking conferences and industry-relevant research and insights. Eventell provides concise insights on global bullion market and industry through its web portal, www.bullionworld.in and a monthly magazine by the same name. For more information on Eventell, please write to gsv@eventellglobal.com.



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bullion coin. With a durable composition, timeless design, proven tradability, global liquidity and consistent delivery, the Krugerrand is an investment that withstands the test of time.



**PRESTIGE
BULLION**



FOUR SCREENS, TWO PHONES - life on a trading desk

BY JOSEPH STEFANS, HEAD OF TRADING,
MKS SWITZERLAND

I haven't always been in a trading seat, having started my career in the back office at HSBC in 2006, covering operations for both FX and Precious Metals in New York. Unlike many of my friends who had recently graduated college, I didn't have a clear idea of my career path, other than that I wanted to be involved in finance. Having had some exposure to the industry through my father during my childhood, markets had always fascinated me due to their unpredictability from day to day (little did I know that over the next 15 years we would see one of the biggest global financial crises, Brexit and a pandemic).

A year later, an opportunity arose in the NY dealing room and, three months later, I was asked to head to London for a short-term assignment of six months, which lasted about 12 years. I will never forget my first time walking into the HSBC dealing room in London. It probably had 1,000 traders and salespeople across two floors covering rates, credit, equities, FX and commodities (amongst others). Dealing floors have been much quieter over the years as electronic trading has become more prominent, but it was still a loud place in 2008, with most dealers looking at four screens and some with two phones in their hands, one clamped on each ear.

As soon as I arrived, one of my new colleagues yelled out, 'No brown in town!', referring to the brown shoes that I was wearing (something that was frowned upon in an English dealing room). I immediately went

out and bought a pair of black shoes during lunchtime, although the oversized pin-striped suit still gave away my nationality.

I had the good fortune of learning much of my craft under the tutelage of so many experienced, prominent names in the market, including Peter Drabwell, Philip Clewes-Garner, Paul Voller, Clive Turner, Jeremy Charles and David Rose, to name a few. These were names who had already been in the market for 20 years and understood the core marketplace, which in my eyes, always comes back to the physical market. I was the youngest on the desk by a good 15 years due to the gold market being so unattractive compared to some of the other asset classes in the 1990s and so I was able to annoy every one of

these guys every hour of the day in regard to the mechanics of the marketplace (to be honest, I am very surprised that I lasted as long as I did).

Every trader had their own routine, depending on the specific product they covered. The spot guys would focus more on charts and the technical side of the market as their view typically tended to be more short-term in nature, while the

physical/forward guys would focus more on liquidity reports, looking at inventory levels, borrowing costs, arbitrage, etc.

**I WAS ASKED TO
HEAD TO LONDON
FOR A SHORT-TERM
ASSIGNMENT OF
SIX MONTHS
WHICH LASTED
ABOUT 12 YEARS**

That said, these guys were always on the phone (Bloomberg and other mediums were used, but they always placed a huge value on speaking on the phone), consistently exchanging with every customer sector in the market, providing colour, swapping ideas, gathering information, etc.

We always placed a huge amount of value in the fundamentals across all four precious metals. My days for the next few years at HSBC were very much routine in terms of schedule, but at the same time always different, as economic environments constantly changed. I would get in early and consume as much information as I could. This typically started with a call to the team in Hong Kong, who recapped the overnight price action and laid out any highlights, followed by discussion with the team in London on their views for the day, followed by more calls to customers and counterparts, providing colour and exchanging views. As stated, we were very involved in the physical space at HSBC and we all felt that the fundamental picture could add so much value to our overall viewpoint.

I vividly remember the last quarter of 2008, shortly after the bankruptcy of Lehman brothers. I had about a year under my belt and the market was entering one of the worst financial crises since the Great Depression. All assets were being sold, including precious metals. Silver was particularly under pressure, nearly halving in price from July to October. During this time, the market saw incredible physical demand from India. With the market nose-diving through \$10, the silver premiums in India were trading north of \$1 (possibly more). During the months of October/November, I worked alongside the head of our physical trading and logistics team to ship nearly 1,000 tonnes to our Indian customer base. I would spend the entirety of my day on the phone with our various Indian customers negotiating premiums and potential arrival dates. In the heat of it, we couldn't find available airspace for weeks as all passenger planes were already booked with shipments. I knew of India's affinity with gold and silver, but to see it firsthand was astonishing. We were helping to supply the world's largest physical consumer, who simply couldn't get enough. From there, silver bounced straight back through \$10 and made its way back up to \$20 within the next year, eventually peaking in 2011 at \$50. A macro event that fuelled a large sale of assets to raise cash was followed by a huge boom in consumption, which helped to provide a floor in the market and eventually signalled a bull start for silver for the next few years.

Fast forward and I have left the banking world to join one of the leading physical names in the industry, MKS. I am now privileged enough to work alongside distinguished names in the industry, including Marwan Shakarchi, Karma Liess, Mehdi Barkhordar and Clive Turner, again.

I had about a year under my belt and the market was entering one of the **WORST FINANCIAL CRISES SINCE THE GREAT DEPRESSION**



Even though we are in a different sector of the market to that of HSBC, with two refineries within the group, my day-to-day activities are somewhat similar. I still have my four screens and two phones, and spend much of the morning on the phone with the team in Sydney to get a rundown of the previous night's flow/activity, again followed by phone calls with customers, counterparts, and colleagues to exchange views and ideas, so that we can have an idea of risk management for the days and months to come.

I do look more at charts and data, as I know we live in a world where algorithms and high frequency trading are much more prevalent, but I still place significant value on the fundamentals when I look at entering into any positions. In these last 18 months, our market has seen the palladium market at 25% backwardation and rhodium trade from \$4k to \$30k due to supply constraints, the CME gold arbitrage trade \$80 above London while the SGE arbitrage traded at a \$100 discount, all the while with gold trading up nearly 40% from its lows to highs and silver more than doubling in price. Again, a macro event that initially caused a fire sale of all assets, including precious metals, then led to a huge boom, especially in gold and silver.

The importance of owning physical assets very much played into the mentality of most over the last year.

The joys for me of being in a marketplace where real business is being done by producers and users of material is something that I was immediately drawn to as a trader. I absolutely love speaking with all sectors of our market, whether it be producers, consumers, banks, fabricators, etc.

Over the last 15 years, the precious metals markets have offered countless challenges and opportunities, and you really cannot ask for much more as a risk taker. People keep telling me that these markets were quiet at some point, but it is something I have yet to see and I'm still not sure I believe.

WE COULDN'T FIND AVAILABLE AIRSPACE FOR WEEKS AS ALL PASSENGER PLANES WERE ALREADY BOOKED WITH SHIPMENTS



Head of Trading since 2019 at MKS Switzerland.

Joe previously worked in the precious metals industry for HSBC for 13 years, starting in operations in New York and eventually moving to London holding various dealing positions in the front office eventually overseeing EMEA Metals trading in 2016. He has served on the LPPM management committee from 2016 to 2019 as well as being a member of the LBMA Public Affairs Committee since 2015. He received a B.A. in Economics from the College of the Holy Cross in 2006.

MARKET MOVES



HENRIK MARX REPLACES HANS RITTER AS GLOBAL HEAD OF TRADING AT HERAEUS

With effect from 1 January 2021 Henrik Marx has replaced Hans Ritter as the Global Head of Trading at Heraeus Precious Metals.

Henrik joined Heraeus in 2005. Before moving to Trading he was running Heraeus Hong Kong as a General Manager and as a Director of Argor-Heraeus he was in charge of sales of minted products.

After 31 years at Heraeus Hans Ritter has decided to retire, although he will continue to provide support in his capacity as a consultant.

RENE BANSNER JOINS MKS PAMP GROUP

With effect from 25 March Rene Bansner joined MKS PAMP GROUP as Senior Sales Executive - Europe MKS (Switzerland),

He brings over 15 years of industry expertise, having worked for leading financial institutions where he built and developed the commodities desk for continental Europe. His extensive industrial experience spans from refineries, chemicals, automotive, and much more. He holds an MSc Economics from Humboldt-Universität zu Berlin.

PETER DRABWELL JOINS SUMITOMO CORPORATION

Peter Drabwell aka "Stretch" has joined Sumitomo Corporation Global Commodities, based in London, as Deputy Managing Director of Commodities.

He previously enjoyed a career spanning 30 years in the precious metals market, during which time he worked for JP Morgan, UBS, AIG, J.Aron & Co and HSBC before taking early retirement in 2017. He was also a former member of the LBMA Management Committee and Board, on which he served for 5 years from 2012.

IN REMEMBRANCE



Gerry participating in a panel discussion at the 2015 LBMA/LPPM Conference in Vienna

Gerry Schubert

BY JEFFREY RHODES

It is with deep sadness that we announce the passing of our dear friend and colleague Gerry Schubert, a true legend of the global bullion industry. He was 65.

Gerhard Max Schubert was born on 13 March 1956 in Witten, Germany, to parents Gertrude and Paul. He was the middle child of three, with an older brother Wolfgang and a younger sister Annika. Gerry passed away in Colchester, Essex, on 1 May 2021 after a long, and typically courageous and dogged battle with illness. He leaves behind Lynne, his wife of 31 years, and three children, Annika, Soren and Shen.

Gerry started in the international bullion market in 1978 at Bremer Landesbank, in Bremen, and soon joined DG Bank in Frankfurt in 1979 as its Silver Dealer. It was actually at that point that I first met Gerry. I was on my first-ever business trip, which was to Frankfurt with my old colleague at Samuel Montagu, Tony Casey, and I can honestly say that Gerry and his colleagues at DG Bank made it a most memorable introduction to the social side of the bullion industry. From those early days in Germany, Gerry moved to London in 1982 to join Shearson Lehman as Head of Precious Metals and then spent the next 30 years in Chief Dealer or Senior Management roles with Shearson Lehman, Credit Lyonnais Rouse (where he became very friendly with Nigel Farage, the former leader of the UKIP party), Mitsui, West LB, INTL FCStone, Fortis Bank, and ABN Amro. Gerry was truly an international bullion banker, with his role at West LB being based in Cologne, and his time with Fortis including stints in Hong Kong and New York.

This provided a perfect platform for Gerry to extend his global horizons to the Middle East, joining Emirates NBD in Dubai as Head of Precious Metals, a role that was later expanded to include a wide range of commodities, followed by a move to Arab Banking Corporation in Bahrain to set up its precious metals and commodity business. In March 2015, Gerry returned to the United Arab Emirates to set up Schubert Commodities Consultancy in the Dubai Multi Commodity Centre and he remained extremely active in the local and global bullion markets right up until his final days in this world.

As well as having an illustrious career working for leading bullion banks and trading companies, Gerry also gave a tremendous amount of his personal time and effort to support the London Bullion Market, where he served as an active member of LBMA's Management Committee between 2007 and 2010. He also provided tremendous support for the DMCC and was a key figure in the Dubai Gold Advisory Group from the time he came to Dubai in 2011.

GERRY SERVED AS AN ACTIVE MEMBER OF LBMA'S MANAGEMENT COMMITTEE BETWEEN 2007 AND 2010

Having first met Gerry in Frankfurt in 1979, I next came across Gerry in the early 1980s when playing against him in mid-week five-a-side soccer league organised by the London Bullion Market. I soon realised that Gerry was not only a formidable gold trader but an even better soccer player, and I learnt after our match that he had been on the books of Borussia Dortmund before turning his back on a career as a soccer professional in favour of becoming a precious metals trader. I am sure that everyone would agree that was indeed the correct decision and our lives have been enriched by his presence. However, Gerry never lost his love for soccer and was a massive Arsenal and Borussia Dortmund fan. I am proud to say that when my team, Spurs, was drawn to play Borussia Dortmund in the Champions League quarter finals in February 2019, Gerry invited me to join him and his brother Wolfgang for the match in Germany (see photo above right), paying for everything and being so gracious in defeat. That was typical Gerry, a really tough opponent but an absolute gentleman and one of the kindest and most generous human beings I have ever met.

Gerry will be sadly missed by his family, friends and colleagues, but his memory will live on and he will be forever in our hearts and minds.

Rest In Peace Gerry.

Mohamad Shakarchi

BY RAMI SHAKARCHI

Mohamad was born in May 1939 in the northern Iraqi city of Mosul (from where it is believed the fabric muslin originated) to his late parents Fawzie and Mahmoud. Mohamad left school early to follow the footsteps of his father, who was a prominent currency and commodity trader. They eventually left Iraq for Lebanon, finally settling in Switzerland.

Like his father, Mohamad had innate trading skills and was gifted with a sense of entrepreneurship and personal network that made him very successful. In 1972, he married Mireille Wyss, his Swiss wife to whom he was married for almost 50 years, and they moved together to Zürich where they had two sons.

Mohamad founded several trading companies in Switzerland before he developed a vision to establish a gold and silver refinery in the Middle East, which he saw as ideally located between gold producing and consuming countries. After receiving the coveted Swiss Citizenship in the 1990s, Mohamad chose to settle in Dubai, United Arab Emirates, where he founded 'Emirates Gold'.

Three decades later, Emirates Gold is recognised as a pillar of the refining and minting industry in the Middle East, with a strong reputation rooted in Mohamad's principles of integrity and commitment to quality products and services.

Thanks to the lessons his father taught him, his experiences and his pioneering spirit, Mohamad devoted the rest of his career to growing Emirates Gold and spearheading the development of the United Arab Emirates as a major refining hub.

Mohamad helped create a number of important initiatives for the precious metals industry, such as the Dubai Good Delivery (DGD)

**MOHAMAD WAS
RECOGNISED BY HIS
HIGHNESS SHEIKH
MOHAMMED BIN
RASHID AL MAKTOUM
FOR HIS IMMENSE
CONTRIBUTION OF
THE PRECIOUS
METALS TRADE**



standard for kilobars. In fact, Emirates Gold was the first refinery in the Middle East to be accredited DGD, in 2005, and it became an LBMA Associate (now Affiliate Member) in 2007.

Mohamad was also an important contributor to the local gold and jewellery trade as an acting member of the board of the Dubai Gold and Jewellery Group from 1998 to 2002, and as a senior member of the Dubai Gold Advisory Group, established by the Dubai Multi

Commodities Center (DMCC). Mohamad was also recognised by His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President of the UAE and Ruler of Dubai, for his immense contribution to the precious metals trade in the region.

Mohamad did it 'his way', driven by his entrepreneurial spirit, the love for his family and his love of life. He had a unique personality: he was funny, jovial and always full of energy. He was a great story teller, a careful listener, and treated everyone fairly and with respect. He loved fishing and appreciated good music (in particular, Fairuz and Sinatra). He faced adversity with fierce determination but was humble when he

succeeded. His long career and key contributions make him a legend of the precious metals industry.

Mohamad is survived by his devoted wife and his two proud sons, Karim and Rami.



Terry Barnes

We wish to inform you of the sad news that Terry Barnes passed away on 7 January 2021.

Terry was a stalwart of the precious metals market and a great character who will be sorely missed by all those whose paths he crossed. Our thoughts are with his family. A full obituary for Terry will be published in the August edition of the Alchemist.

Stewart Murray Reveals the Wonders of Gold

BY SHELLY FORD, DIGITAL MARKETING MANAGER, LBMA

Gold has fascinated mankind ever since the first nuggets were discovered in a stream bed many millennia ago. Indeed, the *Alchemist* was so named to reflect one of the goals of the ancient alchemists – the discovery of the philosopher's stone, which could turn base metals into gold.

an item had to be of interest, of significance and capable of being illustrated by a visually appealing image. "But there was no time limit on where I could start from," reflects Stewart. "As a result, the earliest item in our timeline – the Birth of Gold – even predates the formation of our own solar system some 4.5 billion years ago.

"We changed the name from our original moniker 'Centennial Online Exhibition' to the 'Wonders of Gold', which we felt better reflected the truly wondrous objects and stories that can be found in so many areas of human activity. Although I have spent most of my career looking at the gold market in one way or another, I soon found that there was such a lot that I had still to discover.

"Many colleagues and old friends of the market were willing to lend a hand, either with material and images from their companies' or their personal archives – or, in some cases, by providing the complete text for some specialist items. A page on the Wonders of Gold site thanks some of these contributors for their very generous help."

WATCH THIS SPACE

"I cannot claim that the items in the exhibition provide a comprehensive history of gold," continues Stewart. "But I hope it represents a good starting point. I plan to build on the exhibition over the coming months and I hope that visitors to the Wonders of Gold site may be inspired to suggest new exhibits, perhaps based on their own collections or memories.

"It has really been a privilege as well as a pleasure for me to put together this collection and I am eagerly anticipating the reopening of various archives temporarily closed by the COVID-19 pandemic to help me fill in some of the gaps in the story so far."

If you'd like to get in touch with Stewart to give feedback or suggest new exhibits, you can contact him at: curator@lbma.org.uk



Stewart Murray set up Gold Fields Mineral Services (GFMS) in 1989, where he served as Chief Executive for the next nine

years. Stewart's involvement with the World Bureau of Metal Statistics spans 20 years, during which time he was Chairman from 1989 to 1991.

As Chief Executive of the London Bullion Market Association, appointed in 1999, Stewart introduced many developments to the Association's Good Delivery system – widely regarded as its 'crown jewels.' Upon retirement from this role in 2013, Stewart established the precious metals consultancy London Precious Metal Services Ltd, and continues to advise LBMA on Good Delivery in a consultancy capacity.



Shelly supports the Head of Communications to create and develop content across digital channels that

engages LBMA's key stakeholders and supports the organisation's vision and objectives. She brings a wealth of content creation, strategy and campaign experience from previous roles in the professional and financial service industries, as well as Lloyd's of London insurance market and publishing houses.

And now, LBMA is pleased to announce that this precious metal has inspired a newly launched digital exhibition entitled 'The Wonders of Gold' – curated by Stewart Murray, GDL Consultant and LBMA CEO from September 1999 to December 2013.

The online exhibition – available to view at www.lbma.org.uk/wonders-of-gold – showcases no fewer than 150 items from around the world. From the Bimaran Casket and Croesus Stater to the discovery of Tutankhamun's Tomb to why modern-day world champions bite their gold medals, this exhibition reveals a fascinating insight into the history of gold – and hints at its future.

AN ATOM OF INSPIRATION

"LBMA celebrated the centenary of the first official London gold price in September 2019," explains Stewart. "Earlier that year, LBMA CEO Ruth Crowell had asked me to prepare an online exhibition of items that told the story of gold in a visually appealing way. I accepted with alacrity."

Ruth and Stewart decided that to be considered for inclusion in the exhibition,



Millennium Casket by Malcolm Appleby, 1999:

Commissioned by the Worshipful Company of Goldsmiths to mark the new millennium.
Image credit: © The Goldsmiths' Company 2019



Bracelets from the Hoxne hoard:

Some of the 19 bracelets from the Hoxne hoard, the richest find of treasure from Roman Britain.

Image credit: © The Trustees of the British Museum Shared under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International Licence



Yin-Yang Bars:

Between 1993 and 2000, the Japanese company Ishifuku manufactured this pair of cast gold bars in a special shape, that of the yin-yang symbol.

Image provided courtesy of Goldkammer/© Studio Hamm



The Oxus Chariot:

This tiny but remarkable model is one of the most outstanding pieces in the Oxus Treasure, which dates mainly from the fifth and fourth centuries BCE. Discovered ~1877 in Tajikistan.

Image credit: © The Trustees of the British Museum; Shared under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International Licence



Midas, Transmuting All into Paper:

James Gillray's 1797 satirical cartoon of Pitt the Younger as "Midas, Transmuting All into Paper".

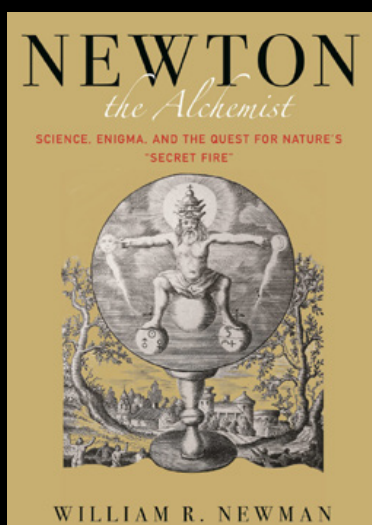
Image provided courtesy of the Bank of England Museum



Discovery of the West Wits Line:

Dr Krahmann almost single-handedly discovered the location of the missing gold reefs – subsequently known as the West Wits Line – pictured here with his magnetometer.

Image credit: GOLD – Their Touchstone by Roy Macnab



Newton and Alchemy:

The picture on the cover of William Newman's book is from the 1663 work 'Metamorphosis Planetarum' by Johann de Monte-Snyders.

By courtesy of Princeton University Press



Discovery of Tutankhamun's Tomb:

The golden mask of Tutankhamun discovered by British archaeologist Howard Carter
Jose Lucas/ Alamy Stock Photo



The Bimaran Casket:

Cylindrical reliquary casket made of gold and inset with garnets.

Image credit: © The Trustees of the British Museum. Shared under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International (CC BY-NC-SA 4.0) licence.



The Croesus Stater:

The world's first gold coin - a metallurgical triumph.

Image provided courtesy of Goldkammer/© Studio Hamm.



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FACING FACTS

Gold Physical Demand Rebounds in Q1, ETF Selling Accelerates

BY FEDERICO GAY, SENIOR ANALYST AND SAIDA LITOSH, HEAD OF PRECIOUS METALS DEMAND RESEARCH FOR EUROPE, REFINITIV METALS TEAM

HIGHLIGHTS

- Gold prices have come under significant pressure since the start of the year, correcting by 13% during the first three months and trading at near nine-month lows at the end of March. The quarterly average price of \$1,794/oz was down by 4% from the previous three months, but was still some 13% above the level seen over the same period last year.
- Total physical gold demand recovered by 25% during the first quarter, driven by a strong rebound in jewellery fabrication and retail investment. Following a sharp 34% drop in 2020, jewellery demand rebounded by 45% in the first three months of 2021, led by strong gains in key Asian markets as economies continued to reopen after the pandemic, aided further by lower local prices.
- Investment demand for bars and coins jumped by 40% over the same period, driven by bargain hunting and growing concerns about rising inflationary pressures and currency stability amidst unprecedented stimulus measures by governments and central banks battling the pandemic.
- By contrast, the growing optimism around economic recovery and a continuous roll-out of vaccination programmes witnessed a sentiment shift towards gold among the professional investor community, as evidenced by strong outflows from gold ETFs. ETF investors liquidated 175 tonnes in the first quarter of the year, which compares to net inflows of over 300 tonnes over the same period last year. This represents the largest level of net quarterly outflows since Q4 2013.

Following a spectacular performance in 2020, when we saw gold appreciate by 27%, touching a fresh all-time high in early August, the beginning of this year has not been as rosy as some might have expected.

TOTAL PHYSICAL GOLD DEMAND RECOVERED BY **25%** DURING THE FIRST QUARTER OF THE YEAR



With the growing optimism around economic recovery in light of the ongoing roll-out of vaccination programmes and the stimulus measures introduced by central banks and governments, gold came under significant pressure, correcting by 13% during the first three months of the year and trading at a near nine-month low at the end of March. Gold averaged \$1,794/oz in the first quarter, down by 4% from the previous three months but still some 13% above the level seen over the same period of last year.

PHYSICAL GOLD DEMAND

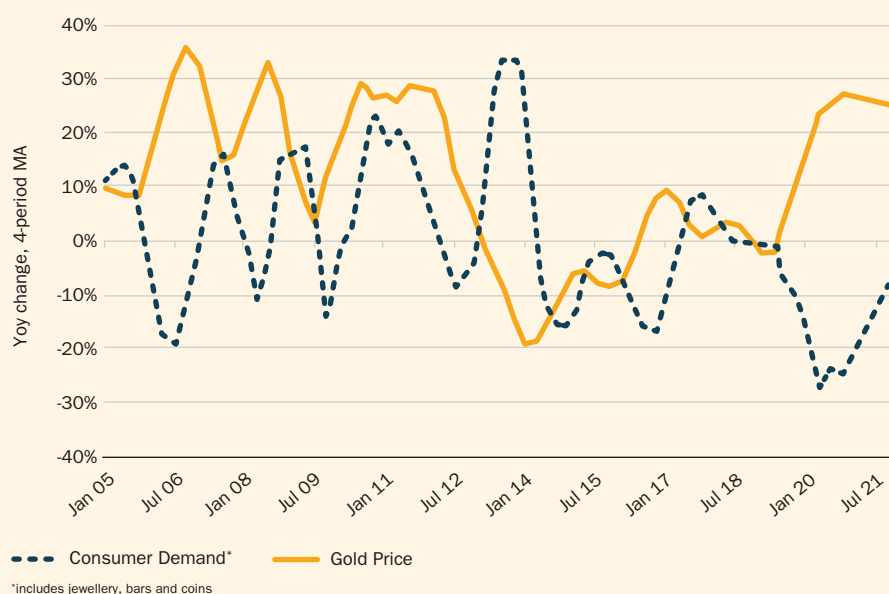
Total physical gold demand recovered by 25% during the first quarter of the year, driven by a strong rebound in jewellery fabrication and retail investment. Gold demand from the jewellery sector, which was the segment worst hit by the pandemic last year, rebounded by 45% in the first quarter of 2021, to a total of 459 tonnes. The recovery was driven largely by strong gains in key Asian markets, including China and India, where demand revived from the lockdown-hit Q1 2020, as the economies continued to re-emerge from the pandemic, helped by the festival period and lower gold prices in many local currencies. Despite strong year-on-year growth, demand remained relatively subdued on an historic basis and was down by 10% from the Q1 2019 level. Meanwhile, demand for gold used in industrial applications was broadly flat during the first quarter, following a double-digit decline in 2020, as gains in electronics offtake were offset by the ongoing weakness in some other areas.

RETAIL INVESTMENT DEMAND IS ESTIMATED TO HAVE REBOUNDED BY 40% YEAR-ON-YEAR TO A TOTAL OF 350 TONNES IN THE FIRST QUARTER OF 2021

RETAIL GOLD INVESTMENT

Turning to retail investment, which is the sum of bars and all coins, demand is estimated to have rebounded by 40% year-on-year, to a total of 350 tonnes in the first quarter of 2021. Physical bar investment soared by 58%, to an estimated 250 tonnes, led by a resurgence in demand in Asia as the economies continued to re-emerge from lockdown, helped further by lower prices in local terms, pushing offtake closer to pre-pandemic levels. In addition, gold bar demand remained strong in Europe, driven by ongoing concerns over the economic uncertainty, currency stability and inflationary pressures amidst the massive stimulus measures adopted by central banks and national governments to pull economies out of the deep economic recession caused by the pandemic. Coin demand rose by 9% during the first quarter, led by higher official coin fabrication and a rebound in Indian demand for medals and imitation coins.

CHART 1: GOLD CONSUMER DEMAND VERSUS GOLD PRICE



OFFICIAL SECTOR

Official sector net gold purchases were estimated at 81 tonnes in the first quarter of this year, down by 36% year-on-year. The first three months witnessed a steep rise in gross sales, led by Turkey and the Philippines, while gross purchases declined by 11%, although the year-on-year drop was far less pronounced than in the previous three quarters. Gold purchases were led by Hungary, which added 63 tonnes to its official gold reserves in March, for the first time since October 2018, with further additions from India, Uzbekistan and Kazakhstan.

GOLD PURCHASES WERE LED BY HUNGARY WHICH ADDED 63 TONNES TO ITS OFFICIAL GOLD RESERVES IN MARCH

ETF INVESTORS

Meanwhile, ETF investors liquidated more than 170 tonnes in the first quarter of this year, which represented the second consecutive quarter of net outflows (with net selling of 75 tonnes reported in Q4 2020). This compared to net inflows of over 300 tonnes in the first quarter of last year and represented the largest level of net quarterly outflows since Q4 2013. This

was largely a reflection of a shift in investor sentiment towards gold since the beginning of the year, with gold pressured by a firm US dollar, rising US Treasury yields and growing enthusiasm around economic recovery amidst the ongoing roll-out of vaccination programmes.

OUTLOOK

Looking ahead, the broader macroeconomic backdrop remains favourable for gold. We believe that gold will continue to benefit from ongoing concerns around the economic uncertainty, increased debt levels, negative interest rates and currency stability amidst unprecedented levels of stimulus measures launched by central banks and governments around the globe. Moreover, the ongoing battle against the virus and the risks associated with the development of new variants, and vaccine production and distribution will continue to support gold investment demand this year. Having said that, gold might remain vulnerable to further liquidation and sideways trading in the short term, particularly should we see a faster-than-expected economic

recovery, further rise in US treasury yields and a stronger dollar. We forecast gold to average \$1,764/oz in 2021.

THE BROADER MACROECONOMIC BACKDROP REMAINS FAVOURABLE FOR GOLD

GOLD MINING FACES FORWARD IN 2021

Since March 2020, more than 140 mines have been affected by Covid-19, either through complete or partial suspension of their operations. Refinitiv estimates that the total amount of gold production lost due to the pandemic has surpassed 150 tonnes.

But there is a silver lining ahead, the pandemic's impact on the mining industry seems to be dissipating, and data from companies and governments worldwide suggest that we are past the peak in terms of disruptions.

CHART 2: GOLD PHYSICAL DEMAND VERSUS ETP INVENTORY BUILD

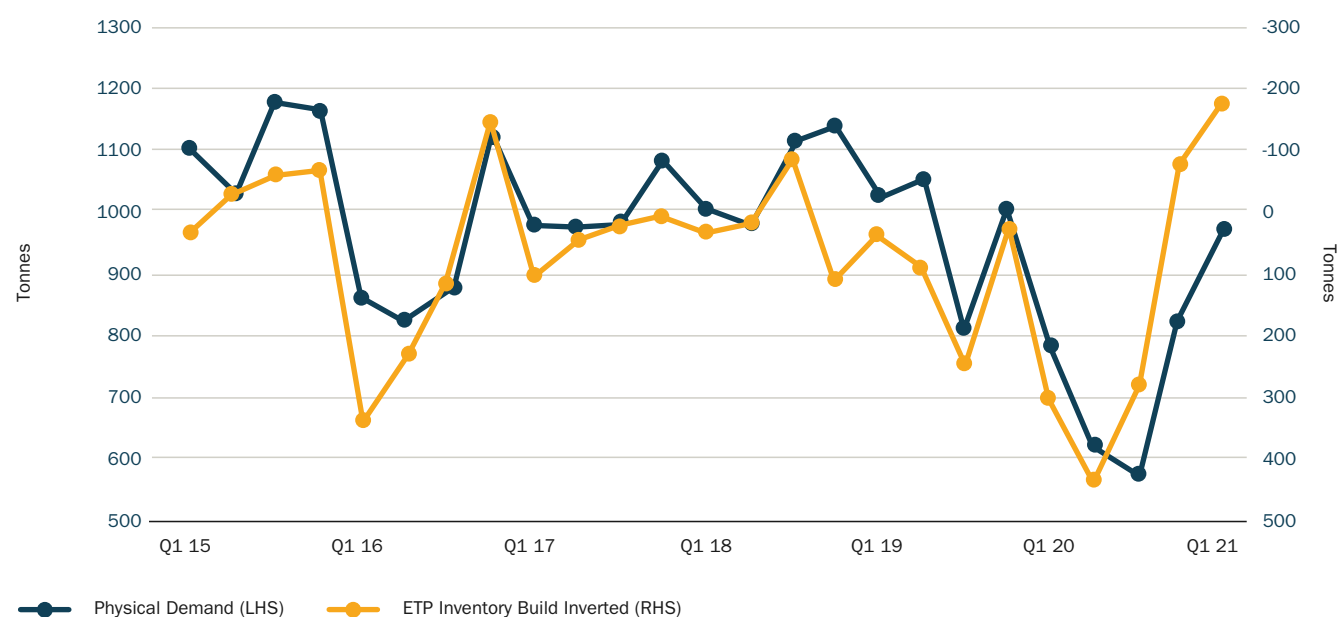
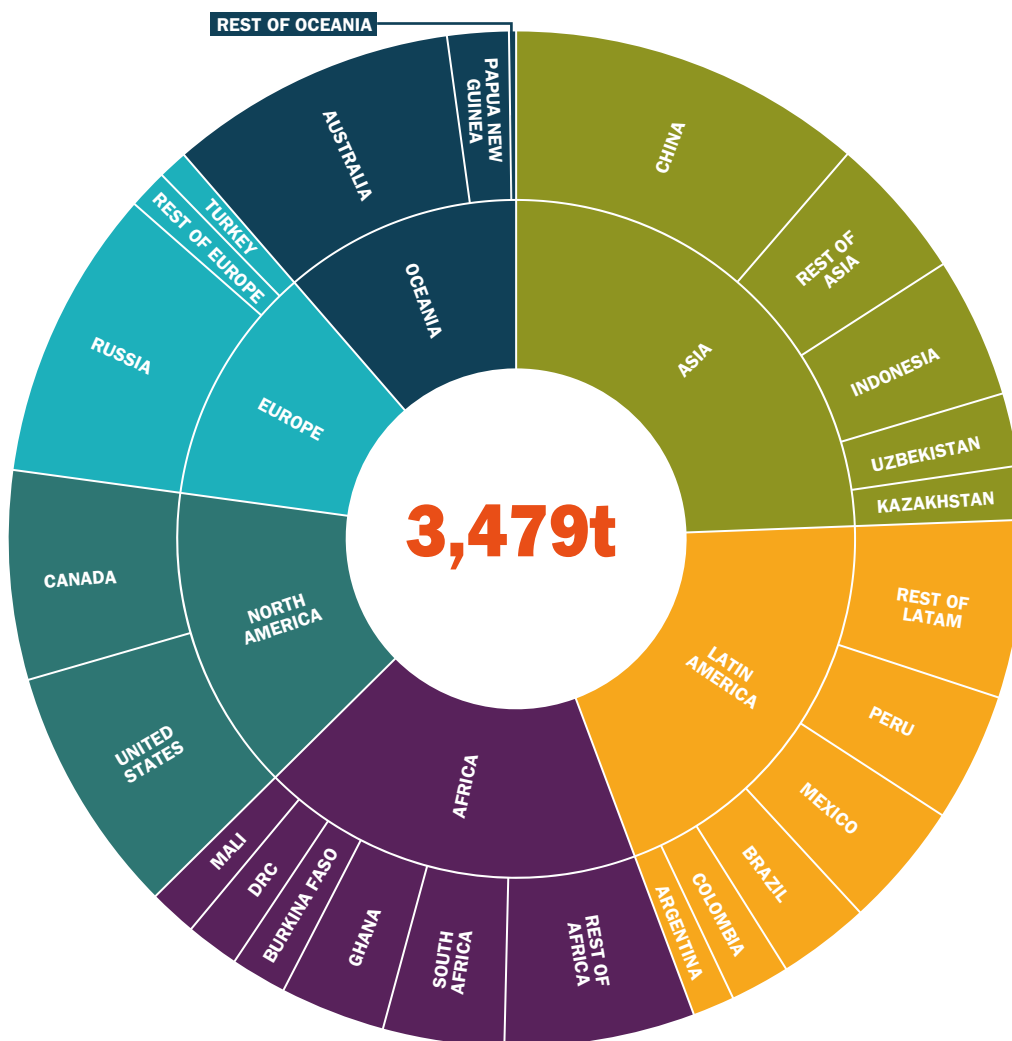


CHART 3: 2021 GOLD PRODUCTION FORECAST: LARGEST PRODUCING COUNTRIES AND REGIONS



Even though some operations in key producing countries such as Mexico, Peru and South Africa remain affected, preliminary results indicate that output has begun to recover, with gold production in the first quarter of 2021 increasing by around 4% year-on-year.

ESTIMATES FOR GLOBAL OUTLOOK IN 2021

Taking this into consideration, along with guidance provided by several companies, we forecast global output to increase, by 5.3% in 2021, reaching 3,479 tonnes. But the recovery will vary from country to country. At a regional level, we forecast considerable output growth in the Americas, particularly in Canada, Mexico and Peru, while Asia's share and Africa's share of global production are each projected to shrink by 1%.

Most of the recent gains can be associated with the easing of lockdowns and the vaccine roll-outs, but another trend is starting to play an important role: the balance between ageing mines and the addition of fresh ounces from new mining projects.

The simple reality is that there is an increasing lag between the discovery and development of new resources to compensate for mine depletion. Exploration budgets, especially for greenfield projects, represent a small fraction of what they did ten years ago, while most drilling targets are focused on brownfield ventures.

Most gold miners' balance sheets have maintained healthy profits during the last few years, relative to the gold price, but this has not necessarily translated into a sizeable surge in exploration budgets.

Refinitiv estimates that the total amount of gold production lost due to the pandemic has surpassed

150 tonnes

Last year, as the uncertainty caused by the pandemic grew, numerous companies cut their growth capital expenditure even further, resulting in several projects being halted.

According to Refinitiv forecasts, global output will continue to grow until 2023, when it is expected to stagnate and then start to decline slowly. The geographical distribution of advanced exploration projects helps us understand where the future supply is expected to grow the most, with almost three-quarters of all projects (both primary and those expected to produce gold as a by-product) based in the Americas. Australia, Turkey and some countries from West Africa also hold an interesting portfolio.

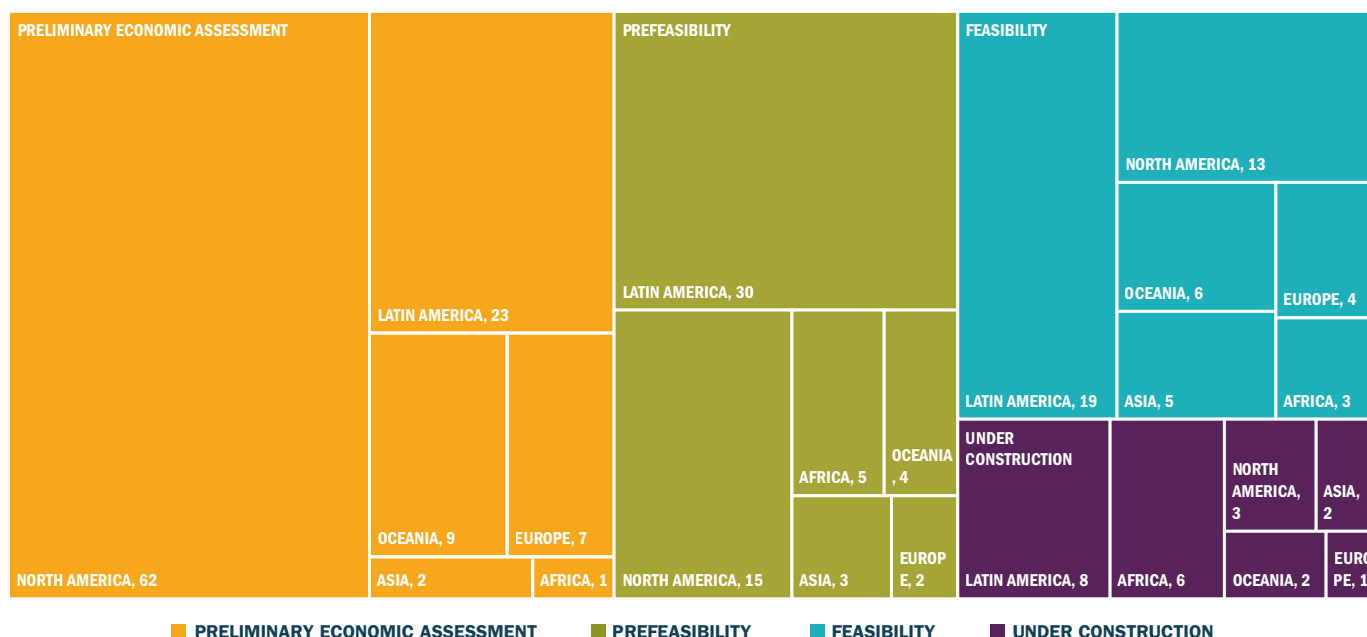
Although no considerable fluctuations are projected in the rankings for top producing countries in the immediate future, it is likely

that the gap between Australia, the third-largest producer, and the United States and Canada, in fourth and fifth place, will start to narrow. In the next ten years, the lion's share of newly mined gold will be sourced from Latin American countries, representing 36% of the total, in addition to a significant contribution from Canada and the United States, totalling around 32%.

We forecast global output to increase by

5.3%
in 2021 reaching
3,479 tonnes

CHART 4: ALMOST THREE QUARTERS OF ADVANCED PROJECTS ARE LOCATED IN THE AMERICAS



MERGERS AND ACQUISITIONS (M&A) ACTIVITY

After a tumultuous 2019 for M&A activity in gold, where reserves volumes and market share changed hands, altering the landscape significantly, the focus last year was mainly on smaller operations and developing projects. If margins remain favourable, more reserves might be unlocked in the near future. This is also confirmed by the fact that streaming and royalty companies are upping the ante on early-exploration project financing, surpassing 600 individual projects worldwide.



Federico Gay, Senior Analyst, Refinitiv, GFMS. Federico is a geologist with a BSc from the National University of the South, Argentina. He joined Refinitiv in London in November 2019, focused on precious metals supply modelling. Prior to Refinitiv, he worked over seven years in Chile in a wide range of assignments, including exploration, ore control, geological modelling and resource estimation for a Copper-Gold-Molybdenum mine in the Atacama Desert. He completed a master's program in Economic Geology from the Catholic University of the North, Chile.



Saida Litosh has been covering the metals markets since she joined the GFMS precious metals research team in 2011, focusing on investment and fabrication demand in Europe and playing a key role in covering precious metals research in Russia. In 2016, She joined Thomson Reuters Oil Research team, where her primary focus was analysis of crude, fuel oil and key refined product flows for Europe, Russia and Africa. She re-joined Refinitiv Metals team in late 2017 to head up precious metals demand research for Europe, in addition to leading gold analysis and economic forecasts. Saida holds a Master's degree in Economics from the London School of Economics.

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As featured in the newly launched
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Alchemy: Joseph Wright of Derby's 1771 painting of "The Alchemist, in Search of the Philosopher's Stone, Discovers Phosphorus". Image courtesy of the Derby Museum and Art Gallery/ Richard Tailby.

