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Challenges and Complexities Facing the PGM Industry

The dynamics of the South African platinum group metals (PGM) industry have changed considerably from a simple equation of balancing production targets with cost control, to a complex set of inter-relationships involving safety, health, the environment, sustainable development and proactive stakeholder management. It is not one or the other, but it is an integrated part of operating and managing a modern PGM mining or product manufacturing company.

It is against the above that PGM companies are measured and are being provided licenses (regulatory and/or socially) to perform their core activity, whether mining or manufacturing.

In fact, the PGM industry has developed strategies and action plans to address these challenges either individually or as part of their overall business strategy. Whereas safety and production are intrinsically inter-related, with safety as the overriding priority, the challenges of health and the environment are often driven by best practices and technological/scientific advances. The PGM industry has to conform to regulatory requirements, and company's specific programmes are designed to address specific needs associated with health questions such as HIV/AIDS, tuberculosis, noise-induced hearing loss and platinum salt sensitivity. These programmes are targeted towards a defined set of goals, and are in most instances aligned with respective governments' strategies.

Safety is vital

Safety has, and will always be, the number one priority in the PGM sector, and companies have different approaches of implementing safety practices, resulting in different levels of effectiveness. Whereas in the manufacturing and the distribution part of the PGM value chain safety approaches and implementation have generally been very effective, it is not true for the producers' and specifically the mining component of the PGM sector. Up till recently, most of these approaches at the producers' level have been focused on technical/engineering solutions, process systems and standards adherence, with some degree of emphasis on the behaviour-based part. However, the subjective drivers (often completely underestimated) of effective leadership, trust, caring, respect and values appreciation together with the outcomes of the technical/engineering output and process systems have never been so vigorously pursued as an integrated solution to the safety challenge as now. There is a definite and real belief and understanding that such an integrated approach will bring about a paradigm shift in the PGM sector's effectiveness of

safety outcomes. This not only requires clear and exceptional leadership, but a complete support of all stakeholders to drive this common goal.

The role of best practice

As in the case with health, the environmental demands are recognized by the PGM industry, and companies do indeed take responsibility to ensure that through their actions, the environment is not harmed. Although legal limits are adhered to, there is a genuine attempt from the PGM sector to "go beyond the legal limit". It can also happen that PGM mining companies are "caught in the middle" where fragmentation of legislation (e.g. separate governmental entities for water and environmental regulatory enforcement, which could be in conflict) create different interpretations and sometimes impractical executions. However, there is scope to improve these practices in the PGM industry, and the industry is acutely aware that these practices are not implemented uniformly across the sector. There is a tremendous challenge for all PGM players to learn from one another and, to at least ensure that a uniform best practice framework is implemented – an area where the International Platinum Group Metals Association (IPA) can play a critical role. *continued on page 2*

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Providing sustainable livelihoods

A particular challenge for the PGM producers is the interaction with their immediate communities who are impacted or affected by mining. The aim here will be to contribute to and compliment to the respective governments' role of developing sustainable communities. This will ensure that after mine closure, a viable alternative is in place for sustainable livelihoods to continue. In South Africa and in particular the Limpopo province – which in itself houses some of the poorest families in South Africa – , there is an expectation that mining will bring jobs, infrastructure and wealth. Although this certainly will be some of the outcomes of mining, the risk is that such expectations can overwhelm the reality of what is possible. Furthermore, this picture can be complicated through media and NGO messages, who often sketch this expectation as something that is owed to communities by industry. Whereas PGM producers do have well-designed Corporate Social Investment Programmes, there certainly has been a move from just being a good corporate citizen by “doing the right thing” to a more proactive stance of using the core business of mining more creatively to address developmental outcomes. In that sense, companies have started to use an integrated approach of health, environment, education and infrastructure development to interact with communities in a sustainable manner. This approach uses as a base government's

integrated development plans and ensures that the company programmes are either aligned or partnered with those of government. However, it is not always how many programmes, initiatives, trust funds, etc. are available for community development, but it is the effectiveness and the efficiency thereof. In this regard, there are numerous and not often recognized factors which inhibit the true spirit in which companies attempt to deliver on sustainable community development.

The complex community factor

Companies, in interacting with communities, have to operate through an acceptable and legitimate community structure. In South Africa, this is further complicated through the fact that within one community there could be a democratically elected structure as well as traditional leaders' structure, which could in certain instances be fundamentally opposed on specific key issues relating to the community. These differences could impact companies in a way that they need:

- To identify the impacted community or communities, and where the community boundaries are, keeping in mind that these communities are often not homogeneous in nature,
- To identify the right community representatives,
- To ensure that the community as a whole does experience the benefits of the respective community development

programmes, and not only a selective few,

- To ensure that there is a balance between what the communities say they need for sustainable development and a wish-list of demands, and
- To ensure that governance structures are in place (specifically in the case of trust funds for community development), as the lack thereof can severely affect good development outcomes.

It is clear that the challenges facing the PGM sector remain vast and complex, and that there will always be scope to improve on current practices through innovation and creativity.

The world needs – and will continue to need – PGMs and PGM products and the challenge is to ensure that these products are produced responsibly. The PGM sector needs to spread good practice more widely and needs to improve its communication and engagements with governments, NGOs, communities and the public. There is no doubt that the PGM sector is committed to ensure that the economic benefits of the PGM value chain extend to all facets of the community (in its broadest sense) without compromising safety, health and the environment, and at the same time enhances employment opportunities and skills development. ■

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The Development of Accumulation Plans for Precious Metals at Tanaka Kikinzoku Kogyo

In 1980, Tanaka Kikinzoku Kogyo became the first company in Japan, and perhaps in the world, to develop a gold accumulation plan (GAP) for the general public.

Under this plan, the company undertook the accumulation of gold in small monthly increments and the custody of this accumulation for the GAP subscribers. A platinum accumulation plan (PAP) followed in 1984 and sales of a gold and platinum (G&P) planner in 2002. Operated exclusively

through the Internet, the G&P planner enables the accumulation of both metals in a single account. Customers can readily subscribe to these plans, which allow monthly purchases in amounts as low as 3,000 yen at the minimum. The purchases are made through an automatic transfer of the payments each month



from the customer's bank account. The arrangement is a simple one; the funds are allotted in a certain daily amount, and purchases are made in that amount daily at the metal prices on that day. Subscribers can make purchases while >

avoiding the risks associated with price fluctuation, and may convert the gold and/or platinum in Tanaka's custody to cash or withdraw it in kind any time they wish. The number of customers taking advantage of these plans is projected to top 300,000 in total by 31 March 2008.

As this indicates, these plans have grown into some of the most important products in the field of precious metal investment in Japan.

Campaign activities for sales promotion

In September 2006, the extended number of precious metal accumulation customers passed the 240,000 mark. To celebrate this milestone (given this figure's association with the 24-carat grade), Tanaka launched the Thank You Campaign in October of the same year. The Campaign lasted until January 2007, and some 13,000 new subscribers could thereby be recruited. This big increase came in spite of the rising prices for both gold and platinum over the same months.

It presumably derived from the high ratings of the stability of these plans by the new customers because of Tanaka's application of dollar-cost averaging in purchases for the accumulation of precious metals. It should be noted that gold was far more popular than platinum at this stage; the gold-to-platinum subscription ratio was 7:3. For the Summer Campaign, which was launched in May 2007 and ran until that August, the company consequently offered the privilege of simultaneous subscription for gold and platinum. As a result, among the 21,000 new subscribers, the aforementioned ratio improved to 6:4.

Utilization of PAP bullion in custody

The bullion purchased by customers under the GAP, PAP, and G&P plans operated by Tanaka is kept in a special safe completely separate from its inventory, like the precious metal exchange-traded funds (ETF) listed on the stock markets of the world. Platinum is utilized in autocatalysts, glass manufacturing equipment, materials for anti-cancer drugs, and other items.

The demand for platinum is rapidly rising in such industrial product fields. Under Tanaka normal PAP, however, the fabricator was not able to utilize the platinum accumulated by subscribers. Under these circumstances, Tanaka started its PAP Premium Service in January 2008. This new service enables the effective use of the accumulated platinum. Tanaka borrows the platinum accumulated, and pays the subscriber a fee at a certain rate in return for the metals' application in the manufacture of industrial products and the like. The subscriber freely decides whether or not to make use of this service. Those who chose to use it can receive leasing fees at an annual rate of 0.55 per cent (the interest rate is reviewed every year).

Reinforcement of the drive for PAP subscription

Over the four-month period from December 2007 to March 2008, Tanaka has staged the Winter Campaign for precious metal accumulation. While campaigns had been conducted on a similar scale twice in the past, the activities under them focused mostly on gold. This time, however, publicity and sales promotion were focused on platinum, which has been positioned as a key product ranking alongside gold for the formation of personal assets. As a specific campaign measure, Tanaka is advertising PAP and GAP by running commercial messages on TV. Although TV commercials are the most costly advertising medium in Japan, the company decided to pay for them this time in order to cultivate new customer strata. The number of additional subscribers gained for the precious metal plans (PAP, GAP, and G&P) during the Winter Campaign is increasing at a smooth pace and projected to top 30,000.



Tanaka expects the campaign to attract more than 10,000 new subscribers than the same type of campaign conducted in the



Tanaka Technical Center in Tsukuba; source: Tanaka.

summer of 2007. One highlight is its impact on the number of new PAP subscribers in particular, which is rapidly expanding and anticipated to approach that of GAP new subscribers.

Platinum investment in the limelight

Platinum prices have remained above 7,000 yen per gram since the middle of February, and their soaring levels have made them a focus of much attention in the Japanese market as well. As prices for precious metals continue to reach record-highs, there is extensive interest in precious metals as assets in various quarters. In an unprecedented rally, the subject is being frequently taken up by TV news programs, the major dailies, and economic journals. In light of this situation as well, Tanaka thinks the campaign was able to seize a golden opportunity. Based on the increasing number of applications for PAP subscription received during the Campaign, it can be acknowledged that recognition of platinum as an investment subject is taking root even among the general public. Tanaka also believes that the PAP Premium Service, for which the company began accepting applications along with the campaign launch, also added impetus to the popularity of investment in platinum. ■

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REACH: Precious Metals Consortium Expands its Scope to Rhenium

In September 2007, companies from the precious metals community had joined forces and created their own Consortium for the handling of the Registration process under the European REACH regulation. Meanwhile, the Consortium has expanded its scope to include rhenium. In addition, the preparation for Pre-registration has shown that some questions regarding the obligation to register certain forms of precious metals can still not be definitely answered, for example, whether or not metal bullion ingots and bars fall under REACH.

Following the decisions taken at the last Assembly meeting (Brussels, December 2007), an adjusted version of the Precious Metals and Rhenium Consortium covering gold, silver, platinum group metals (PGMs) and rhenium under REACH has been circulated for approval to the 26 Members of the Consortium in March. Changes made to the Agreement include: expansion of scope to rhenium, improvement of administrative procedures, insertion of isolated intermediates in the cost-sharing formula as well as some minor clarifications in the text. A dozen additional companies have shown interest in joining the Consortium and are waiting for the adjusted version of the Agreement to be approved.

Preparing for Pre-registration, SIEF formation and "substance sameness" discussions

Meanwhile, the Work Groups of the Consortium continue their work to prepare for Pre-registration and future Substance Information Exchange Forum (SIEF) discussions on substance sameness. Reference files for each substance will be prepared in order to allow each Member of the Consortium to use similar names and identifiers when pre-registering their substance(s), aiming at ensuring a structured SIEF formation. Pre-registration requirements will be the key topic of the upcoming Consortium Plenary Meeting, to be organised in Toledo, Spain, on 20 June 2008. Moreover, an ad hoc task force of the PGMs Work Group has recently identified the most suitable method to produce spectra on PGM solutions in order to determine substance sameness following the European Chemicals Agency



Photo: Yuri Arcurs; source:Fotolia

(ECHA) Technical Guidance Document on Identification and Naming of Substances (RIP 3.10). The Members of the PGM sector of the Consortium have been invited to produce infra-red (IR) spectra for their solid PGMs and particle size distribution data for those PGMs having a particle size below 100µm in order to validate substance sameness and predict testing requirements, respectively. Consultancy

Research Organisations to support the PGMs project will be identified shortly.

Update on REACH interpretation

Naturally occurring minerals, ores and ore concentrates that have not been chemically modified do not need to be registered under REACH. Nevertheless, some materials that companies have traditionally referred to as

“ores” or “concentrates” may in fact be chemically modified according to REACH definitions¹; legally and scientifically sound interpretation is critical for deciding whether or not a material is subject to Registration requirements. In light of these definitions, the European Non-Ferrous Metals Association (Eurométaux) and the European Association of Mining Industries (Euromines) recommend that the full production chain of each material is considered case-by-case to decide at which point the first chemical modification takes place. A list of processing steps has already been examined from this specific viewpoint and is available on request from Caroline Braibant (EPMF).

Recovered precious metals

Article 2(7)d of the REACH regulation allows for substances resulting from a recovery process in the European Economic Area (EEA) to be exempted from Registration obligations provided that (a) the substance that results from the recovery process is the same as the substance that has already been registered; and (b) the information contained in the Safety Data Sheet or any other available and relevant information about the substance that is necessary to enable appropriate risk management measures to be identified and applied (including the Registration Number of the substance) is available to the establishment undertaking the recovery.

According to McDermott Will & Emery, as commissioned by Eurométaux, Article 2(7)d would not apply to recovery establishments which are independent and that are not part of a legal entity which has both refining and recovery activities, i.e.: independent recovery-only establishment would not necessarily have access to the information on the refined substance which has been registered nor necessarily the authorisation to use the Registration Number of another registrant. It is therefore recommended to all entities to consider both the refined and the recovered tonnages of the substance in their Preparation for Pre-registration and Registration, until additional corroboration or clarification is obtained from the European Chemicals Agency.

Precious metal bullion ingots and bars under REACH

Precious metals are chemicals in the context of European chemicals legislation. However the need to register precious metals in massive form under REACH depends on whether they are regarded as articles or substances by EU authorities. Precious metals have various applications, for which they are given specific forms; in some cases these can be considered as “article forms”. Under REACH, an article can be distinguished from a substance in that it has been given a specific shape, surface or design which determines its function to a greater degree than does its chemical composition. As long as it is the chemical composition which determines the function of the massive precious metal, it will be considered as a substance and it will have to comply with REACH.

An attempt has been made to apply the above statement to precious metal bullion ingots or bars. These are indeed given a specific shape to facilitate transport and storage but the composition, the precious metals content, the purity of the ingot or bar, still plays the key role in its function. Moreover, some ingots or bars can be re-melted to be used for other purposes, other functions. In order to confirm this interpretation, ECHA Technical Guidance Documents were carefully scrutinised and the question was ultimately asked of the ECHA. The ECHA responded that “precious metal ingots are regarded as substances”.

Accordingly, all those entities manufacturing bullion or importing it into the EEA in volumes of one tonne or more per year are potential registrants under REACH. In the event of a precious metal manufacturer and/or importer failing to pre-register or register, it will no longer be allowed to manufacture or import these precious metals. In light of this commercial risk, bullion manufacturers and/or importers are recommended to consider the tonnages of the bullion ingot or bar they manufacture and/or import in preparing for Pre-registration and Registration.

Readers are asked to understand that the information and opinions given in this article are based on the latest know-

ledge available to the Precious Metals (and Rhenium) Consortium. However, interpretation of the REACH regulation will continue to develop over the next few years and may in future change our understanding of these issues. ■

¹According to REACH, substances which occur in nature means “a naturally occurring substance as such, unprocessed or processed only by manual, mechanical or gravitational means, by dissolution in water, by flotation, by extraction with water, by steam distillation or by heating solely to remove water, or which is extracted from air by any means” and not chemically modified substance means “a substance whose chemical structure remains unchanged, even if it has undergone a chemical process or treatment, or a physical mineralogical transformation, for instance to remove impurities”.

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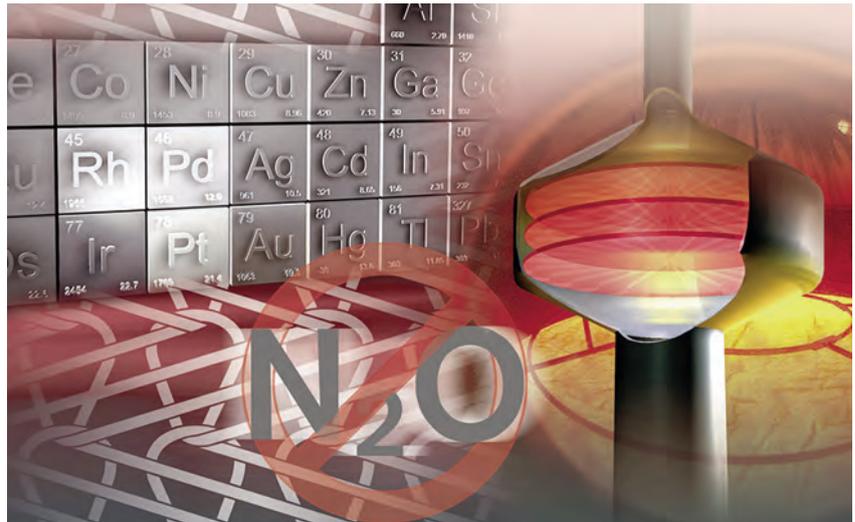
Red Card for Laughing Gas in the Fertilizer Production

Laughing gas contributes to global warming over 300 times as badly as carbon dioxide. An innovative secondary catalyst using platinum gauze reduces nitrous oxide emissions during the fertilizer production by up to 90 percent.

The world population is continually growing, and with it the ever increasing need for more food. Without the use of fertilizers not even a basic food supply would be a feasible project. However, what is good for fertilizing fields can prove harmful to the climate, as during the production of the main chemicals such as nitric acid, laughing gas is released as a by-product. Laughing gas is more than just a former fun-fair curiosity or an anaesthetic, it is also a “climate killer” that must be taken seriously. In the atmosphere it contributes to global warming over 300 times as badly as carbon dioxide. Heraeus employees, however, have developed an innovative multiphase catalyst system, with which the biggest producers can drastically reduce their emissions of this greenhouse gas – at low costs.

Multiphase catalyst for the selective elimination of N₂O

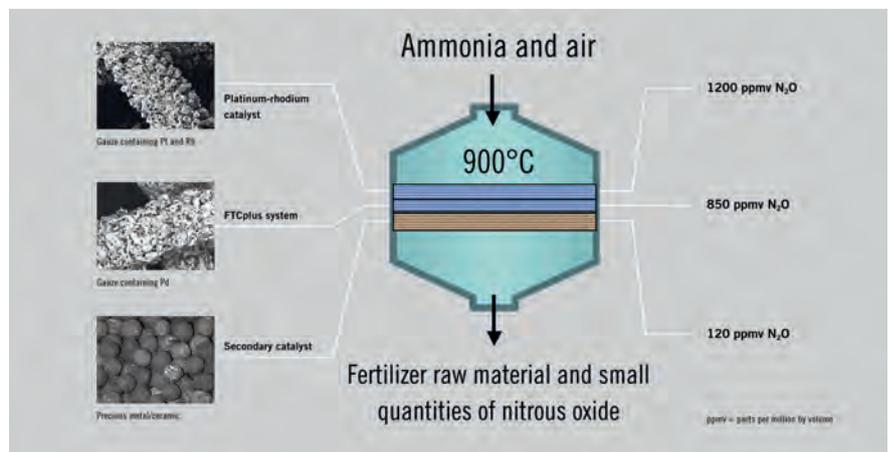
There are around 600 fertilizer plants worldwide, and all work on the same basic principle. Ammonia and air are guided over platinum gauzes at 900°C, where the gases break down and recombine to a certain extent, forming useful compounds such as nitric acid, from which the familiar nitrate fertilizers are later produced. The catalysts are used in the form of knitted gauzes with diameters as large as six meters. Heraeus is a world leader in the production of these precious metal catalysts. An unwanted by-product of the ammonia combustion process is laughing gas (N₂O). The research team of Dr. Uwe Jantsch (W. C. Heraeus) developed an innovative multiphase catalyst that makes it possible to significantly reduce laughing gas before it even forms in ammonia combustion.



A new multiphase catalyst system shows laughing gas in the fertilizer production the red card; source: Heraeus

One of the most important elements in the innovation is a downstream secondary catalyst that selectively destroys laughing gas when it is formed. In combination with the platinum gauzes directly above it, the emission of the greenhouse gas is reduced by more than 90 per cent. Every year, around 1.2 million

tons of N₂O are released from the smoke stacks of the acid producers. In relative terms, that is equal to the carbon dioxide climate pollution that around 80 million cars inflict on the atmosphere. In this case, the Heraeus innovation represents a major step forward for the environment. >



The innovative secondary catalyst reduces nitrous oxide emissions during fertilizer production by up to 90 per cent; source: Heraeus



Anti-nitrous oxide granulate: Small spheres encased in precious metals destroy nitrous oxide produced in reactors for manufacturing nitric acid.



A multistage catalyst from Heraeus is installed in a fertilizer plant; source: Heraeus

The secondary catalyst is made from porous ceramic, usually aluminium oxide, coated with precious metal. Due to its very large surface area and its thin catalytic layer this combination offers a high catalytic activity, but at the same time weighs very little. The granules are filled into flat, gas permeable cartridges made of stainless steel wire and built into the nitric acid reactors. Retrofitting of existing reactors is possible without any further investment costs. Yet another advantage is that no impurities can occur in the fertilizer due to the additional catalyst and the amount of nitrogen monoxide produced during the ammoniac combustion remains unaltered.

Emissions trading: several hundred thousand CO₂ certificates annually

Some fertilizer plants have already taken the step of installing the multiphase catalyst – for example the nitric acid manufacturer Sasol in South Africa.

Since early 2007, the firm has been using the multistage catalyst for the selective destruction of nitrous oxide in two of its nitric acid production plants. With this innovative catalyst technology, Sasol is making a contribution to climate protection. Not only does the environment benefit from the reduction of nitrous oxide but also the producer of nitric acid. Under the Kyoto Protocol, it can generate CO₂ certificates in developing and emerging countries and profit from their sale. If the producer reduces one ton of nitrous oxide, it is credited with 310 CO₂ certificates (based on the global warming potential compared with carbon dioxide). By selling these certificates to other companies, Sasol also profits financially from the upgrade. Regional projects for sustained environmental protection benefit from a portion of the proceeds. By using the Heraeus secondary catalyst, Sasol is able to generate several hundred thousand certificates annually. But regardless of how long it takes be-

fore all 600 plants join in, “The important thing is that someone is doing something. And because nitrous oxide is so much more harmful than carbon dioxide, and because the fertilizer market is so transparent, it is possible to achieve a great deal with little effort,” says Uwe Jantsch from the Engineered Materials Division of W. C. Heraeus. ■

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PGM Industry Convenes to Discuss Key Challenges

In November 2007, industry stakeholders including academia and government officials convened in Johannesburg for a series of workshops to discuss current developments and challenges to the platinum group metals (PGM) industry.

The workshops were organized as part of the IPA's 20th anniversary celebration and focused around the following topics:

- The future landscape of mining
- Research and development (R&D) opportunities in the PGM industry
- PGM beneficiation in South Africa
- Sustainable PGM production

The landscape of mining in South Africa will see a consolidation of existing junior mines and faces different challenges such as an infrastructure inadequate to sustain additional mining activities, shortages in water and power supplies, non-compliance to the safety regulations set up by the mining companies as well as severe skill shortages. The R&D workshop agreed on the continuous need for any raw materials industry to find new applications for its products. Consequently, also the expan-

ding platinum mining sector would need to find new applications for its by-product metals such as palladium and rhodium. Academia representatives claimed they wished more direct access to materials for research purposes and a broadening of the already existing loan schemes. The group agreed that critical skills needed to be increased already at school level through promoting interest in science topics in order to overcome the shortage of qualified workers. The workshop on beneficiation discussed how a comprehensive beneficiation strategy should be shaped and what conditions were required to implement such a strategy. One of the key findings was that beneficiation should be considered within the context of either removing disincentives or promoting incentives in order to facilitate faster value added downstream growth. The fourth workshop centred on the prerequisites of sustainable PGM pro-

duction. Participants agreed that there was an increasing demand from stakeholders to become more compliant to sustainability demands. Could a PGM industry cooperative model be the way forward to dealing with these challenges? The common answer was that the industry should voluntarily opt for a progressive stance vs. a reactive response to NGO pressures. It was also acknowledged that optimum sustainable development was clearly a business case too as it will result in a major competitive advantage for the PGM industry. ■

A summary of the workshops and 20th anniversary event can be downloaded at

<http://www.ipa-news.com/about/news/news/events/>

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