

REACH Regulation and the Platinum Group Metals

Preparation of the pgm sector for REACH and the likely impact of the legislation on the pgm market in Europe

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Introduction

The European Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH; Regulation (EC) No 1907/2006) (1) is a framework for the assessment of chemicals which aims to improve the European Union (EU) market in terms of innovation and competitiveness while also protecting human health and the environment. REACH requires chemical manufacturers and importers to register a technical dossier of information on substances which are used, produced or imported into the EU in quantities of one or more tonnes per year. The definition of 'chemicals' as used under this legislation includes metals and metal compounds, therefore the REACH regulation affects the platinum group metal (pgm) sector of the metals industry.

REACH was adopted in June 2007, with a series of deadlines for registration of phase-in substances beginning in June 2008 and continuing in step-wise fashion until May 2018, corresponding to the different tonnage ranges (see **Figure 1**) (2). Three years after its adoption, several industry sectors have now fully structured their response to comply with the various information requirements of the regulation.

A Collaborative Approach

Starting in 2006, leading companies including Heraeus, Johnson Matthey, Metalor, Norddeutsche Affinerie (now Aurubis), Umicore and many others recognised the importance and complexity of the REACH regulation and organised the sector into the Precious Metals and Rhenium Consortium (PMC). This dedicated consortium was formed on 15th September 2007 under the umbrella of the European Precious Metals Federation (EPMF), a member of Eurométaux. The PMC aims to prepare the technical dossiers for chemical substances on behalf of its member companies, as required by REACH. The International Platinum Group Metals Association (IPA) is a sister association of the EPMF from a cooperation point of view and as such, topics of relevance

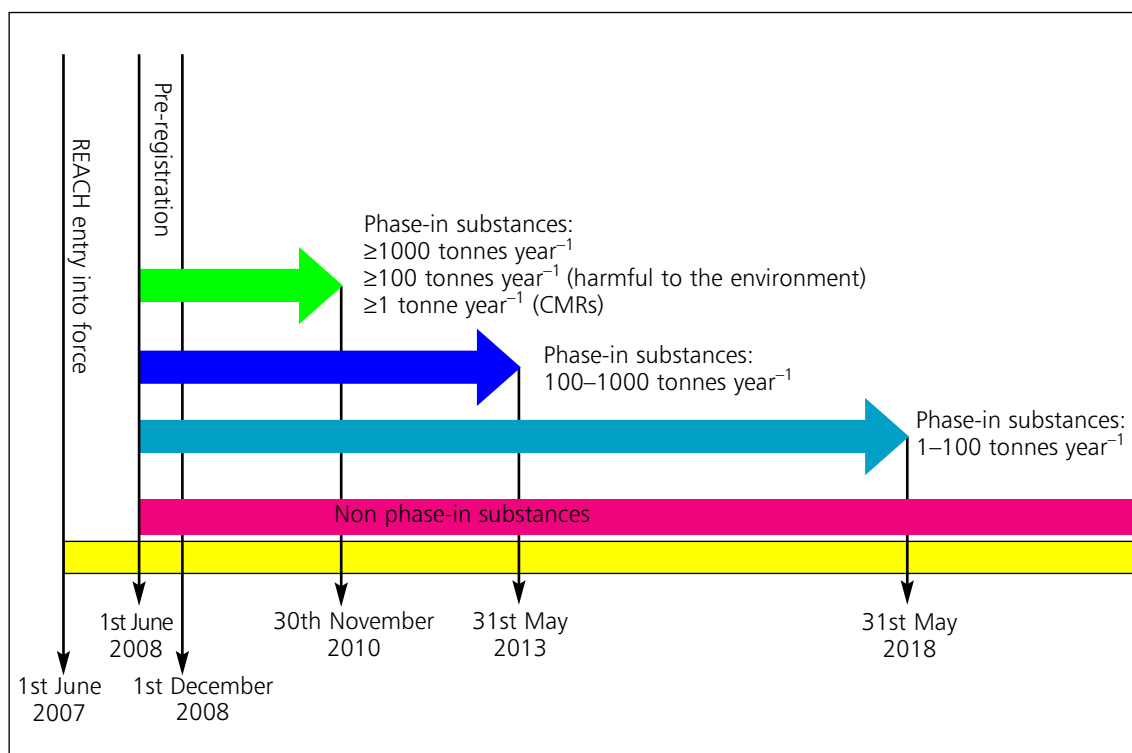


Fig. 1. Timeline of adoption for the REACH regulation. 'Phase-in' substances are those listed in the European inventory of existing commercial chemical substances (EINECS); 'non phase-in' substances are those not produced or marketed in the EU before the implementation of REACH; CMRs are substances that are potentially carcinogenic, mutagenic or toxic to reproduction (2)

to the pgms are shared between the two associations. Work on REACH is led by the EPMF and is fully supported by the IPA, especially as regards communicating updates to the pgm industry.

Setting up a joint structure for REACH involved many steps, including the drafting of a legal agreement defining the working scope, membership conditions and a cost-sharing formula in accordance with REACH's principles of fairness, transparency and non-discrimination. The design of a technical programme for all materials in the scope of the regulation was also carried out.

It is extremely difficult to accurately predict the total budget that is required to accomplish the various tasks and activities involved in the technical work, administration, testing and registration of substances. However it is far from negligible. On a more positive note, the data sharing and joint submission obligations imposed by the REACH regulation have encouraged the sector to work in a collaborative manner towards the common goal of successful

REACH registrations, in the process generating an improved data set to help protect human health and the environment. Across its activities, the PMC makes every effort possible to operate in a manner which is not only cost-efficient, but also fair and transparent to all.

The membership of the PMC has steadily grown from 25 Members in 2007 to 48 in 2010. Today, alternatives to consortia membership are being developed and proposed, such as 'Letters of Access' which would allow a more passive participation in the preparation of the registration dossier, while still fulfilling REACH's requirement for joint submission.

The PMC is working very closely with other non-ferrous metals consortia (under the umbrella of Eurométaux) to ensure that the approach taken by the PMC to fulfil the information requirements of REACH is consistent with the approach taken by other metals registrants, while still meeting the needs specific to precious metals and the pgms in particular. REACH has so far had a very positive impact on

the research, development and recognition of metal-specific testing, risk assessment and classification techniques. Most of the existing techniques were tailored to address the properties of organic compounds, and the need to respond to an equivalent set of information requirements for inorganic materials has boosted the development of appropriate testing protocols, exposure prediction models and tools to derive sound classifications for complex mixtures such as refining streams. Most of the guidance on risk assessments is detailed in the "Health Risk Assessment Guidance for Metals" (HERAG) (3) and "Metals Environmental Risk Assessment Guidance" (MERAG) (4) documents, which have been recognised by the European Chemicals Agency (ECHA) and included in REACH guidance where relevant. The overall exchange of experiences and views across the non-ferrous metals industry has also benefited from REACH, and all of the data thus gathered are being used in the preparation of the pgm registration dossiers.

Although the first official registration deadline on most of these pgm compounds is 31st May 2018, the PMC is putting accelerated effort into finalising

dossiers earlier, with a target of progressing pgm registrations by 2013. The core work programme is handled by a Secretariat consisting of three full-time equivalent Officers, and by the PMC member company experts. External consultant research organisations and specialised testing laboratories are also involved.

Registration of PGM Compounds

The pgms and over sixty of their compounds are being prepared for REACH registration by the PMC. More than three quarters of these compounds require registration as substances which will be placed directly on the market, while the rest will be registered as intermediates (substances used in a manufacturing process but not present in the final product) which will be handled under strictly controlled conditions. The platinum and palladium families are the two largest, with fifteen and twenty materials covered, respectively. Osmium and osmium compounds are out of the scope of work of the PMC since these are currently below the tonnage thresholds in the REACH regulation. Some of the pgm substances affected by REACH at the time of writing this article are listed in **Table I**. The complete and updated substance

Table I

Some of the Platinum Group Metals Substances Affected by the REACH Regulation

Substance name	Formula	CAS	EINECS
Platinum	Pt	7440-06-4	231-116-1
Platinum(IV) chloride	PtCl ₄	13454-96-1	236-645-1
Palladium	Pd	7440-05-3	231-115-6
Palladium(II) oxide	PdO	1314-08-5	215-218-3
Rhodium	Rh	7440-16-6	231-125-0
Rhodium(III) chloride	RhCl ₃	10049-07-7	233-165-4
Iridium	Ir	7439-88-5	231-095-9
Hydrogen hexachloroiridate(IV) hexahydrate	H ₂ IrCl ₆ ·6H ₂ O	16941-92-7	241-012-8
Osmium ^a	Os	7440-04-2	231-114-0
Osmium(VIII) oxide ^a	OsO ₄	20816-12-0	244-058-7
Ruthenium	Ru	7440-18-8	231-127-1
Ruthenium(IV) oxide	RuO ₄	12036-10-1	234-840-6

^aOsmium and osmium compounds are covered by the REACH regulation but are outside the scope of the Precious Metals and Rhenium Consortium as they are currently below the annual tonnage thresholds

inventories are available on request from the PMC by emailing Caroline Braibant, Secretary-General of the EPMF, at: braibant@epmf.be.

A variety of substances (pure and impure forms of the pgms, plus chlorides, hydroxides, oxides, tetraamines and other pgm salts) need to be prepared for registration in such a way as to minimise unnecessary or duplicate testing. To that end, so-called 'integrated testing strategies' are being applied, including grouping and 'read across' techniques. Grouping means that several materials are included in a common cluster based on the oxidation state of the metal, its known solubility, and other similar parameters in order to assess the (eco-)toxicity of the materials, on the assumption that they will behave similarly to each other in human cells, tissues or organs and/or in the environment. Read across is a technique for using the (eco-)toxicological information relating to one or several materials to describe another material of the same cluster or group. This is done as recommended by REACH to avoid unnecessary testing. In some cases, information on the metallic ion is sufficient to predict the overall behaviour of a given compound, while in other cases *ad hoc* physico-chemical and toxicity testing is needed to properly identify and characterise individual compounds.

A key step in the testing programme is the identification of a reference sample. In some cases this may not be straightforward, for example where the material is by nature of variable composition, such as one linked to refining operations. Ideally, the most representative sample should be selected as a reference, and this is done by selecting a sample coming from the largest registrant (assuming that the latter would be placing the majority of the material on the market). This will almost always be the Lead Registrant, who is also responsible for submitting the joint dossier. If other registrants consider that the Lead Registrant's sample is not representative of their own material, the following options may be considered: performing additional tests on a second sample; splitting the registration into groups of similar substances; or differentiating the substance on the basis of its classification, depending on the impurities that are present.

Impact on the PGM Supply Chain

Coupled with REACH, the new EU Regulation on Classification, Labelling and Packaging of Substances and Mixtures (CLP; Regulation (EC) No 1272/2008)

(5) requires all substances placed on the European market to be classified and labelled in accordance with their intrinsic hazardous properties under a globally harmonised system (GHS). Until now, most (if not all) pgms and pgm compounds have not been officially classified in this way. This will change in future with the generation of physico-chemical data and both (eco-)toxicological and environmental fate information under these two pivotal regulatory regimes.

In common with the situation for other metals, REACH risk assessments and the revised CLP/GHS classifications will have an influence on the European Economic Area (EEA) pgm supply chain. For example, it will most likely trigger adjustment of the existing risk management measures which are applied during the manufacture, transport, handling and elsewhere in the overall life cycle of pgms. This will be reflected in the need to update Material Safety Data Sheets which, in some cases, will be extended to include the new REACH exposure scenario information, aimed at better guiding users to protect health as well as the environment.

After the final REACH deadline in 2018, legal entities wishing to manufacture or import pgm substances onto the EEA market at or above quantities of one tonne per year will effectively require a licence to do so, in the form of a company-specific 'REACH registration number' (unless this has already been addressed *via* their upstream supply chain). This number will provide legal evidence of REACH compliance, and will be of particular importance during imports and exports of pgm materials (and subject to checks by customs authorities). Obtaining this licence through REACH registration procedures involves a number of human resource and financial commitments that not all companies may be able to make. Those companies who do not have enough capacity to follow REACH in detail can partially rely on the Consortium, its staff and Members. However, REACH is a continuous exercise that requires a minimum investment by each company, therefore relying on the Consortium is only a short-term solution.

It should be noted that some exemptions under REACH exist, for example in relation to articles not deemed to be chemical substances. In addition, certain naturally occurring substances are exempt from registration as long as they have not been chemically modified, and this includes some minerals, ores and ore concentrates. The REACH regulation is also not intended to apply to waste, since this is addressed *via*

a separate set of legislation. However, if waste is recovered back into substances that are then placed on the market for further commercial use, then, with some exemptions, REACH applies as it does to any other substance placed on the market from the point at which the recovered substance ceases to be waste (and therefore waste management controls no longer apply). One of the useful exemptions applies if the recovered substance is the same as its virgin equivalent that has been previously registered, and this could potentially be the case for pgm recovery from spent catalysts (provided that they are not imported from outside the EEA).

Conclusions

The above represents a very abridged summary of REACH and CLP/GHS requirements. The precise influence of these regulatory changes will be more apparent after the first registrations of the pgms and pgm compounds in 2013, and will continue to occupy the pgm sector until at least 2018 (the last registration deadline under the REACH regulation). Although to date REACH remains a piece of EU legislation, there are also signs that it is heavily influencing the thinking of other regulators around the world in relation to their local chemical control regimes. Clones of REACH – or at least revised regulations which incorporate some of its facets – are predicted to be introduced elsewhere in the world.

References

- 1 Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Regulation (EC) No 1907/2006, 18th December, 2006; *Official Journal of the European Union*, L 396/1, 30th December, 2006
- 2 European Commission, Environment Directorate-General, 'REACH in Brief', October 2007: http://ec.europa.eu/environment/chemicals/reach/pdf/2007_02_reach_in_brief.pdf (Accessed on 24th March 2010)
- 3 "HERAG: Health Risk Assessment Guidance for Metals", International Council on Mining and Metals (ICMM), London, UK, September, 2007
- 4 "MERAG: Metals Environmental Risk Assessment Guidance", International Council on Mining and Metals (ICMM), London, UK, January, 2007
- 5 Regulation on Classification, Labelling and Packaging of Substances and Mixtures, Regulation (EC) No 1272/2008, 16th December, 2008; *Official Journal of the European Union*, L 353/1, 31st December, 2008

Further Reading

More information for the EU and international metals industry on the REACH regulation can be found through the following websites:

REACH Metals Gateway: <http://www.reach-metals.eu/> (Accessed on 24th March 2010)

EUROPA, European Commission, Environment, Chemicals, REACH: http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm (Accessed on 24th March 2010)

The Author

Caroline Braibant is the Secretary-General of the European Precious Metals Federation (EPMF). She is the principal contact within the EPMF for further information about REACH as it applies to the platinum group metals. Prior to this, she was REACH Manager of EPMF from 2007 to mid-2008. She obtained a Master's degree in Environmental Sciences and Management from the Université Catholique de Louvain (Louvain-la-Neuve, Belgium) in 2006; a Postgraduate Diploma in Human Ecology at the Vrije Universiteit Brussel (Brussels, Belgium) in 2005; and became a Biotechnology Engineer at the Instituto Tecnológico de Costa Rica (ITCR) Cartago, Costa Rica in 2004.