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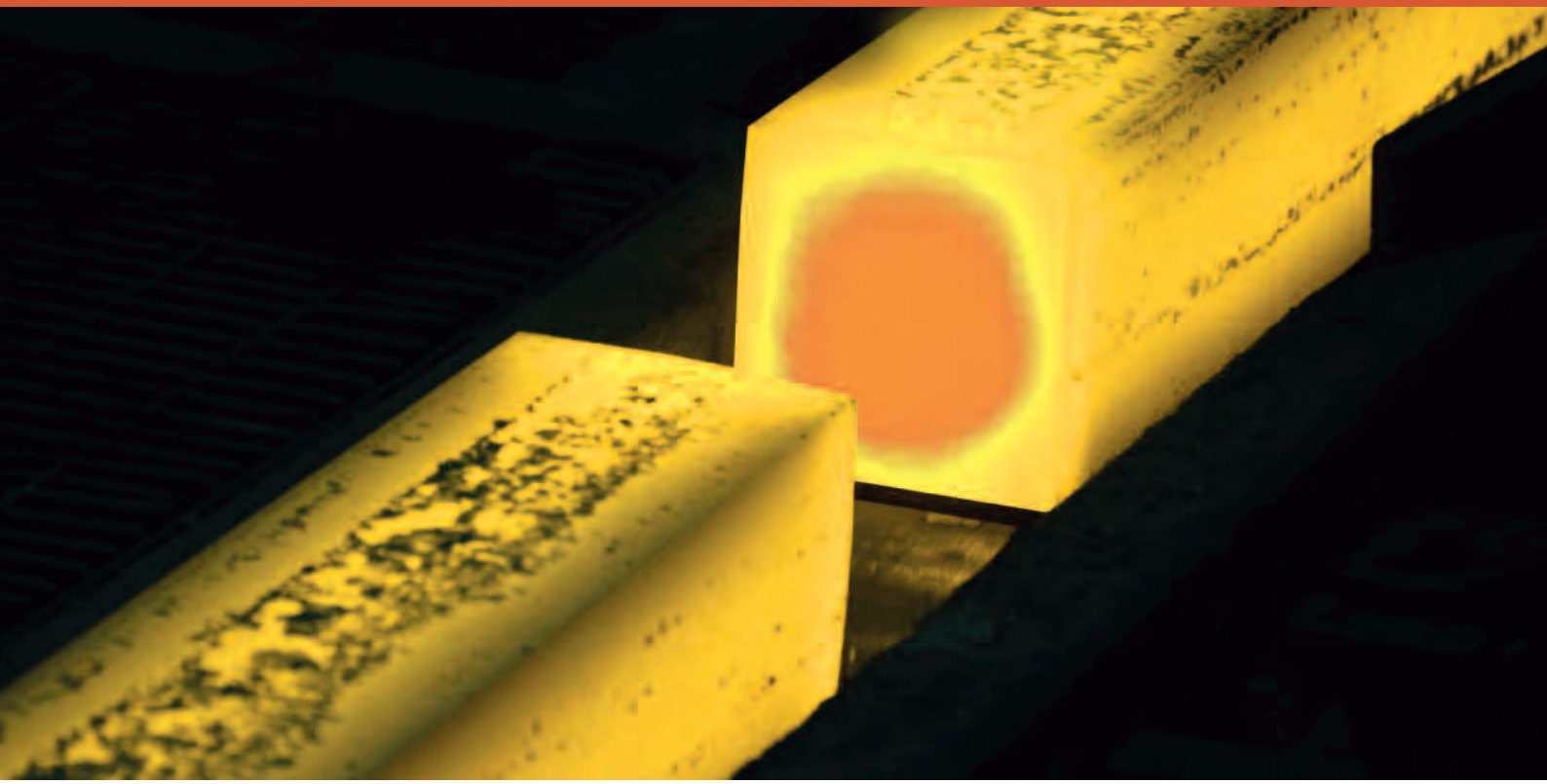
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ICMM
International Council on Mining & Metals

Report

Minerals and Metals Management 2020: a chemicals management progress report

Materials Stewardship
September 2012



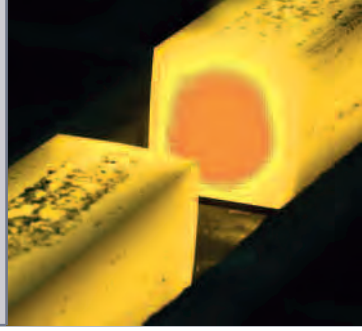
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This publication describes the progress made since the 2009 release of *Minerals and Metals Management 2020* – ICMM's action plan for chemicals management in the mining and metals sector.



Foreword



Mining and metal production requires chemicals. The products of the mining and metals industries are classified and regulated as chemicals and are precursors of yet other chemicals. All are most accurately described through the use of chemical symbols and nomenclature.

Thus, a large part of the management of mining and metal production is the management of chemicals: their sourcing, transport, storage, use, production, and the management of their occupational health and environmental risks through their life cycles.

The understanding and acceptance of this reality has grown over the decades. Moreover, in the industry and in the communities in which it operates, the lines and levels of responsibility are becoming better understood as expectations rise for the responsible use of chemicals.

With this evolution has come an increasing sophistication and commitment to the management of chemicals. It takes place on a number of planes: in the understanding and behaviour of individual employees; in corporate policies, practices, and expectations of their employees and their processes; in the cross-fertilization from other industry sectors; from regulatory initiatives such as REACH; and in the programs of the national, regional and global associations that help the industry co-ordinate, build and communicate chemical management norms.

The performance in different industrial sectors and societies is not perfect but the direction is clear. Various corporations and industrial sectors are establishing themselves as leaders in the management of chemicals, providing the benchmarks of best practice that others will be trying to match or better.

With this understanding, the International Council on Mining and Metals (ICMM) wanted to check on progress. What commitments had ICMM made and how did they reflect or respond to broader societal goals – particularly those reflected in the Strategic Approach to International Chemicals Management (SAICM)? Where was the mining and metals industry in relationship to those goals? What are the collective plans to ensure a position of leadership, to reach a particular goal, or to at least close the gap between an ultimate goal and present performance?

This publication is the result and it is, in the first instance, a report to the member companies and associations of ICMM as well as external stakeholders. Third parties will have their own views on the quality and speed of the industry's collective performance. ICMM welcomes their constructive criticism and hopes that this status report on performance and intentions contributes to the dialogue and future activities.

SECTION 1
Setting the scene

It has been 20 years since the Rio Earth Summit and Agenda 21, 13 years since nine of the largest mining companies launched the Global Mining Initiative to prepare for the World Summit on Sustainable Development, 11 years since the International Council on Mining and Metals (ICMM) was established, and 10 years since the World Summit on Sustainable Development and the Johannesburg Plan of Implementation.

It has been six years since SAICM, the most politically developed statement of purpose and objectives for chemicals management, was set out in the Dubai Declaration. It is time to see how we are doing.

What is SAICM asking for?

This document reviews the four central SAICM objectives to determine whether the global mining industry, and the members of ICMM in particular, are achieving a more responsible management of chemicals.[1] This includes actions so far and actions envisaged between now and 2020 at which time "chemicals [are to be] used and produced in ways that lead to the minimization of significant adverse effects on human health and the environment."

How has the mining and metals industry responded?

In terms of the speed of major advances in science research, organizational change, and patterns of development, 2020 is very close indeed. All the more important to take stock: what has been accomplished, what is underway, what is planned and where does that leave the industry in terms of the ambitious goals envisaged in SAICM?

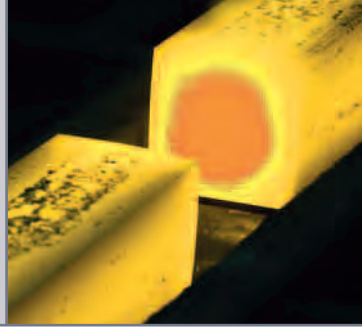
The "Minerals and Metals Management 2020" (MMM2020) action plan was developed as the mining and metals industry response to the challenges of SAICM and adopted in 2009. It has four organizational principles – "taking a system perspective", "building new and strengthening existing relationships", "optimizing the production and application of minerals and metals", and "contributing to a robust and accessible base of information to support decision-making". These link directly to the key objectives of SAICM and are given substance by 23 specific commitments to action (see page 21).

The MMM2020 action plan does not exist in isolation nor is it the first ICMM undertaking in chemicals management. It flows from the high-level statements contained in the 10 Principles of the ICMM Sustainable Development Framework, itself agreed to by the members of ICMM in 2003. At least six of those principles are directly relevant to SAICM and all 10 of them are compatible with and supportive of SAICM objectives.[2]

The following pages report on some of the significant chemicals management products of the mining and metals industry relevant to the SAICM objectives. Throughout the report, these examples are associated with numbers that refer to one or more of the 23 actions in the MMM2020 action plan – e.g. 1 2 3

1 The Dubai Declaration has a fifth objective: the suppression through various means of the international traffic in toxic, hazardous, banned and severely restricted chemicals. While an important issue, it is narrower in scope than the four principle objectives, has its own international instruments such as the Basel Convention, and is less relevant for the global mining and metals industry. For more information on the fifth SAICM objective, see "Strategic Approach to International Chemicals Management", UNEP, 2006, especially p.20.

2 For more on the ICMM Sustainable Development Framework and the 10 Principles, see: www.icmm.com/our-work/sustainable-development-framework



MMM2020 organizational principles	SAICM objective
1. Taking a system perspective	**Risk reduction** **The systems approach is a natural way to begin to meet the objectives of SAICM with regard to risk reduction throughout the life cycle. This recognizes the importance of scientific understanding to systematically identify, characterize and ultimately manage potential risks to the environment and human health. The approach should be inclusive of all stakeholders and encourage transparency throughout the materials supply chain.**
2. Building new and strengthening existing relationships	**Governance** **Building relationships is key to SAICM, which recognizes that governance needs to be addressed through a multi-sector and multi-stakeholder approach in pursuing the sound management of chemicals. There is therefore a need to recognize the roles that all stakeholders, from producers to consumers to the broader civil society, play in the life cycle of a material and the ways in which they can be impacted. SAICM acknowledges that there are currently gaps, overlaps and duplication in both policy and practice at many levels which, if addressed, will lead to more effective management of chemicals.**
3. Optimizing the production and application of minerals and metals	**Capacity-building and technical assistance** **Optimizing the application of minerals and metals will require increased capacity to develop concepts and act, coupled with improved technical assistance to support others in the life cycle. SAICM recognizes the widening gap in such capacity between developed countries, developing countries and economies in transition. Strengthening stakeholder capacities will result in more widespread application of sound chemicals management practices.**
4. Contributing to a robust, accessible base of information to support decision-making	**Knowledge and information** **Contributing transparently to the global knowledge base to share information, data and tools in pursuit of a more integrated approach to chemicals management responds directly to this objective. Knowledge, information and public awareness are basic needs for decision-making, which will be enhanced with more co-operation throughout the value chain.**

The order in which the objectives appear in SAICM have their own logic but they are not numbered nor are they weighted. This reflects the reality that they are all important and all are compromised if one or more of the objectives are not achieved. Thus in this publication the activities related to SAICM objectives are examined, not in the same order as they appear in the Dubai Declaration but in ways appropriate to the issues faced by the mining and metals industry. The early activities of industry favoured certain SAICM objectives more than others. A more complete and balanced accounting will be possible by 2020.

A more exhaustive list of activities and products appears at the end of the publication, together with the relevant URLs.

SECTION 2
Delivering on the MMM2020 commitment

This informal review does not attempt to provide quantitative measures of progress. Indeed there is little plausible congruity between the country-orientated reporting structure formalized within SAICM and the membership structure of ICMM. It focuses instead on industry-led developments in science and the methodologies needed for hazard classification and risk assessment of inorganic chemicals. These have and are being applied in activities that address SAICM objectives as a whole.

Links to documentation for the tools, programs and institutions mentioned in this report can be found in section 4.

Theme 1

SAICM objective:

"**Risk reduction** is a key need in pursuing the sound management of chemicals throughout their entire life cycle including, where appropriate, products and articles containing chemicals."

Mining and metals industry response:

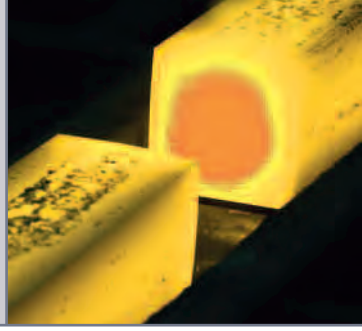
Building the tools in the context of a systems perspective: MMM2020 commitments to develop tools, develop guidance, provide scientific input.

Risk reduction measures undertaken with data derived from inappropriate methodologies has led to inappropriate decisions. In the past, there were no reliable comparisons to be made and regulatory and process control decisions were made that could be either excessive or insufficient.

This critical deficiency has been the subject of intense scientific examination over the last two decades. The REACH (Registration, Evaluation, Authorization and restriction of CHemicals) initiative of the European Union and its data requirements forcefully underlined the need for appropriate and practical methodologies and had the effect of greatly accelerating the efforts already underway.

Extraordinary progress has been made. There have been solid advances in science that, with technical, financial and data support from industry, have come from academics and public and private laboratories. The examples described below either did not exist a decade ago or were unperfected concepts. Protocols and methodologies that yield accurate and reproducible results for different human and environmental endpoints now exist and many of them have achieved international acceptance. They are increasingly considered "standard practice".

Risk reduction measures are now undertaken with greater confidence. The efforts are better targeted and the results are relevant to the various environments, the understanding of what is being done and why it is shared, understood and discussed between stakeholders, including regulators and NGOs.



Risk reduction

Metals Environmental Risk Assessment Guidance (MERAG) and Health Risk Assessment Guidance for Metals (HERAG)

1 19

Metals are natural components of the earth and exist in many forms – each with its own specific chemical characteristics that define its interactions with the environment and with living organisms. The process of mining and metals production alters the levels of these natural components in different ecological compartments. It becomes important, therefore, to know how bioavailable they are, what levels can be tolerated, and how the metals are mobilized or sequestered or neutralized. Equally the mining and metals industry must assess and manage potential health risks from their operations in ways that at least comply with regulations and which engender confidence in their workforces and the communities in which they operate. Ultimately, the survival of the corporation or, in some instances, the ability to place a chemical on the market depends on this. It is not a trivial responsibility.

In the past, the majority of risk assessments for the environment and health, and consequently guidance materials, have focused on organic chemicals. In many cases such guidance has failed to adequately address specific characteristics that must be taken into account to perform risk assessments for metals that reflect their behaviour in the environment.

The MERAG and HERAG initiatives address that and have consolidated the extensive scientific progress that has been made in this field. The critical concepts are set out in discrete fact sheets. Collectively they enable regulators, scientists in government and academia as well as in industry, to create new or adapt local, national or regional risk assessment systems to reflect the behaviours of metals and their compounds in local environments. These fact sheets are living documents and are updated as the science evolves and new challenges emerge.

MERAG guidance sections

- **Risk Characterization**
- **Exposure Assessment**
- **Effects Assessment: Data compilation, selection and derivation of PNEC values for the risk assessment of different environmental compartments (water, STP, soil, sediment)**
- **Marine Risk Assessment: Use of freshwater data for the derivation of ecotoxicity thresholds for marine species**
- **Bioavailability – Water and Sediment**
- **Bioavailability – Soils**
- **Uncertainty Analysis**
- **Classification for effects on the aquatic environment of metals/metal compounds and alloys**
- **Weight of Evidence**

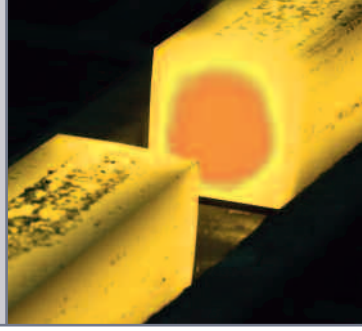
HERAG guidance sections

- **Assessment of occupational dermal exposure and dermal absorption for metals and inorganic metal compounds**
- **Assessment of occupational inhalation exposure and systemic inhalation**
- **Indirect exposure via the environment and consumer exposure**
- **Gastrointestinal uptake and absorption, and catalogue of toxicokinetic models**
- **Mutagenicity**
- **Quality screening procedures for health effects literature**
- **Essentiality**
- **Choice of assessment factors in health risk assessment for metals**



"THE REACH REGULATION IN THE EU HAS SEEN AN UNPRECEDENTED REQUIREMENT FOR DATA AND INFORMATION ON THE MATERIALS OUR INDUSTRY PRODUCES AND USES. INDUSTRY, THROUGH THE LEADERSHIP OF EUROMETAUX AND THE METALS COMMODITY ASSOCIATIONS HAS RESPONDED WITH A HUGE INVESTMENT IN MODELS AND CONCEPTS THAT ENABLE COMPANIES TO ASSESS THE CHEMICAL SAFETY OF THEIR MATERIALS PRIOR TO MARKETING. OF COURSE THESE RESOURCES ARE VALID BEYOND THE EU. THROUGH THE MMM2020 PROGRAM WE ARE ENSURING THAT COMPANIES AROUND THE WORLD ARE ABLE TO BENEFIT EQUALLY FROM THIS SOUND BASE OF SCIENTIFIC KNOWLEDGE."

Guy Thiran, Director General, Eurometaux



Risk reduction

Hazard and risk reduction tools and models

1 6

Insights and understandings of mechanisms are the starting point. They then have to be applied by technicians and managers, both up and down the value chain and in situations far removed from the expert bodies that developed those insights. Responsible managers, concerns of employees and communities, and initiatives of governments and in particular REACH, require that there be ways to translate knowledge into management protocols for everyday use. The mining and metals industry, and in particular the commodity, regional and national associations, have been instrumental in making it possible for manufacturers and users of metals to meet their regulatory obligations and internal management goals. Examples include:

- Best Available Technology Reference (BREF) Notes (revisions)
- Biotic Ligand Models (BLMs)
- Downstream User Scaling Tool
- The GARD Guide
- The International Cyanide Management Code
- The Metals Classification Tool (MeClas)
- The Metals Occupational Exposure Assessment Tool for REACH (MEASE)
- Specific Environmental Release Categories (SPERCS)

Links to additional information on these and other developments in support of chemicals management are found in Section 4: Resources.

Risk reduction

Partnership with the UNEP/SETAC Life Cycle Initiative to improve life cycle impact assessment for metals

4

Life Cycle Impact Assessment (LCIA) translates the inventory of emissions from a product's life cycle (through resource acquisition to use and disposal or end-of-life management) into an environmental profile of the product – representing its potential contributions to a wide range of environmental impacts.

For each impact category (e.g., global warming or ecotoxicity), model-derived factors are used to provide indicators of a substance's impact to the environment or human health. For metals there has always been a significant shortcoming with existing models because of the lack of necessary parameters such as spatial and temporal information, comprehensive assessment of stocks and consideration of factors such as bio-availability and speciation. This can result in greatly exaggerated predictions of resource depletion or environmental impact and inappropriate ecotoxicology predictions for metals – as recognized in the 2004 Apeldoorn declaration.

Through the UNEP-SETAC partnership, ICMM has been supporting research on methodologies to incorporate the necessary metals-specific parameters. The outputs of this 4-year partnership have recently been peer-reviewed and published and work is underway to incorporate this new approach into commercial LCIA models.

Theme 2

SAICM objective:

"**Governance** is an important issue that needs to be addressed through a multi-sector and multi-stakeholder approach in pursuing the sound management of chemicals."

Mining and metals industry response:

Building new and strengthening existing relationships: MMM2020 commitments to convene/support workshops, develop guidance, undertake materials stewardship, engage stakeholders.

Governance is under examination more than ever in the 21st Century. How institutions organize and govern themselves has become more transparent and the consequences of failure more evident. Good governance is essential if there is to be sustainable development and that includes the sound management of chemicals as envisaged by SAICM.

The recognition of the existence and importance of a social licence to operate and the understanding of the economic, social and ethical implications of poor management: these have led to profound changes in how the mining and metals industry organizes itself. The internal and external resources dedicated to chemicals management – both in amounts and in sophistication – are directly related to this increased understanding of the importance of the issues.

There are hundreds if not several thousand examples of how this is working at the plant and community level. It includes changes in management and operational practices and the training and education of work forces as well as those in the community responsible for emergency measures. In the context of the SAICM objective, the existence, activities and growth of ICMM is significant evidence of the evolution of governance in the industry.

Governance

Partnering with international institutions and NGOs

7

ICMM can be described as a collaboration of industry actors. That idea of collaboration very naturally extends to other stakeholders in the life cycle of metals and minerals. It reflects the legitimate interests of society as well as the reality that many sources of expertize exist outside the industry. It is also where authority – in the form of rules, regulations and enforcement – lies.

This interdependence has been recognized from the beginning. Virtually every workshop or seminar – organized by industry or third parties – includes participation from a variety of stakeholders, including academics, NGOs, governments and communities. A sampling of longer standing relationships relevant to the objectives of SAICM include the United Nations Environment Programme (UNEP), the OECD Chemicals Program, the International Labour Organization (ILO), the Minerals Industry Safety and Health Centre/University of Queensland, Society of Environmental Toxicology and Chemistry (SETAC), and the World Conservation Union (IUCN).

The form of partnering varies. It can be formal financial support for operations, commissioned research, granting access to facilities for measurements and experiments, making data available and discussion of policy aims and means. The range of engagement is very large, is tailored to the needs of the issues and is continuing.



"WE APPRECIATED THE CONSTRUCTIVE PARTNERSHIP WITH THE METALS SECTOR IN BUILDING APPROPRIATE RISK ASSESSMENT AND HAZARD CLASSIFICATION GUIDANCE FOR METALS AND METAL COMPOUNDS, A GROUP THAT IS TECHNICALLY NOT EASY TO DEAL WITH. THE MERAG AND HERAG PUBLICATIONS CERTAINLY FOSTERED THE SCIENTIFIC/TECHNICAL DEBATE IN THE EU AND WERE A GOOD BASIS FOR ECHA TO BUILD PRACTICAL GUIDANCE."

Jack de Bruijn, Director, Directorate of Risk Management, European Chemicals Agency (ECHA)

SECTION 2
Delivering on the MMM2020 commitment

Governance

Integration of MERAG concepts into EU Guidance

7

The comprehensive REACH regulation process in the EU required chemical safety assessment reports. In developing guidance for their drafting, the European Commission recognized that metal-specific aspects of environmental risk assessment needed to be summarized in an annex of its own.

It was possible to develop this annex in a timely way because MERAG already existed. The basic MERAG concepts, along with related experience obtained during the discussions of EU-focused risk assessment reports prepared for several metals under the EU's Existing Substances Regulation, were translated into the relevant guidance format and were formally adopted by the REACH Competent Authorities.

Governance

Creating opportunity – Zinc Saves Kids

10

Many metals are essential to human life and health. It can make sense, then, to see an effort to address a metal deficiency as just another facet of chemicals management.

The Zinc Saves Kids initiative, established by International Zinc Association (IZA), quickly gained the endorsement of UNICEF. It supports programs that are getting supplemental zinc to zinc-deficient children in developing countries who would otherwise be at higher risk of death from diarrhoea, pneumonia and malaria. In this way, up to 50,000 child deaths per year are being avoided.

Governance

Fostering shared knowledge – co-ordination among a global network of associations

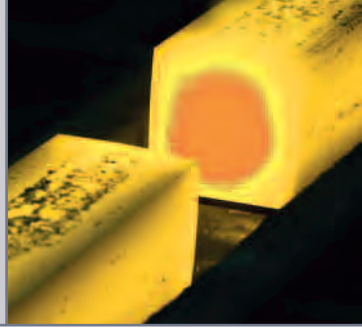
7 8 10

Since 1995, and currently known as the Minerals and Metals Technical Working Group (MMTWG), scientists and technical experts within the mining and metals industry have met on a regular basis. Collectively they have worked to identify the issues associated with a science-based understanding of the behaviour of metals and their alloys and compounds, in different environments and exposure scenarios. The breadth of disciplines and interests in the group ensures cross-fertilization of ideas and rapid spread of knowledge. MMTWG members interact with peers in academia and other institutions that have an interest in metals and collaboratively they have helped define issues, refine research directions and undertake or support research.

The MMTWG membership has evolved with the issues and reflects the increasingly significant sources of scientific competence that lie within industry associations. The interaction of the MMTWG members makes them essential conduits of information, understanding and good practice between commodities and down to operational levels.

There is an additional element at work. The regional and national associations are part of their community. In languages and ways appropriate to their political and regulatory systems, they take the knowledge and the tools of chemicals management to the broader community including many small and medium-sized companies and sub-national authorities.

The Minerals Council of Australia for example is such an association, defined by geography. Its activities are not unique but provide a comprehensive example of what such an association does in support of its membership and, by extension, the entire sector. It has produced guidance documents with local relevance and international credibility on risk communication, chemical substances of relevance to community and environmental health. It has collaborated with the Government of Australia in the development of guidance documents on hazardous materials management and materials stewardship. Similarly, Euromines, the recognized representative of the mining industry to European institutions, provides services to its members with regard to EU chemicals policy and serves as a network for exchange of information throughout the sector. In close collaboration with Eurometaux and ICMM, Euromines has raised awareness, developed guidance documents and managed the preparation of regulatory submissions related to new chemicals regulations in the EU.



Governance

Corporate sustainable development reporting

13 16 22

The importance of managing materials responsibly throughout their life cycles is reflected in the ICMM Sustainable Development Framework.

All ICMM members are required to implement the Framework. In practice this includes integrating a set of 10 Principles and seven supporting position statements into corporate policy, as well as setting up transparent and accountable reporting practices and external assurance. The framework emerged out of the Mining, Minerals, and Sustainable Development project – a two-year consultation process with stakeholders to identify key issues relating to mining and sustainable development – and has been developed continuously since.

Since 2010, ICMM has conducted an annual assessment of member performance against their commitments - measured against the five elements of sustainability performance addressed in ICMM's assurance procedure. Each year a member performance table is published as part of ICMM's Annual Review.

We have already seen our members make significant progress as set out below.

2011
Seventeen out of 21 member companies obtained a G3 A+ application level and 18 companies sought external assurance.

2010
Fifteen out of 18 member companies obtained a G3 A+ application level and 16 companies sought external assurance.

2009
Eight out of 19 companies obtained a G3 A+ application level and 13 companies sought external assurance.

Theme 3

SAICM objective:

"**Capacity-building and technical assistance** in relation to all aspects of the sound management of chemicals are among the essential elements of the successful implementation of the Strategic Approach."

Mining and metals industry response:

Applying the tools and optimizing the production and application of minerals and metals: MMM2020 commitments to develop guidance, promote integration, workshops, best practices, supply chain outreach, hazardous waste minimization, mercury stewardship.

If there is to be sound management of chemicals, the science needs to be sound and the tools derived from that science need to be used knowledgeably. The existence of relevant knowledge is just the necessary beginning. Now, however, the science for inorganic chemicals has advanced sufficiently for there to be serious and sustained propagation of the insights achieved. Over the past five years ICMM and its members have organized many capacity-building workshops and events – both for industry and stakeholders such as regulatory policy makers – to share and promote the basis of sound science that has been developed.

Every company, and national, regional and commodity association organizes, sponsors or participates in dozens of interactions with stakeholders every year on matters that touch on chemicals management. Knowledge and experience is shared and open to examination, challenge and improvement.

SECTION 2
Delivering on the MMM2020 commitment

Capacity-building

Developing and applying technical expertise

12 17

While the organizational models vary, all the non-ferrous metals associations have long conducted or sponsored research in universities and research laboratories.

One example of a commodity-specific centre of excellence is the Nickel Producers Environmental Research Association (NiPERA). For more than 30 years a strong mixture of knowledge, competence and integrity has allowed NiPERA's scientists to contribute to the understanding of the mechanisms that determine human and environmental impacts. At the same time NiPERA has worked with the nickel industry and the nickel value chain, as well as with research institutions and governments, to ensure that the science drives changes in industry practice.

In addition to issues of specific interest to nickel, NiPERA scientists have collaborated with scientific personnel specialized in other metal commodities on the development of resources such as the MERAG and HERAG documents.

Capacity-building

Mercury stewardship

13

The toxicity of mercury is not in doubt, and the consequences of mercury poisoning are part of the human record going back several thousand years. Even as the use of mercury is being designed out of products and alternatives are actively sought, mercury still has end uses. Chief among them is for the amalgamation of gold produced by small and artisanal mining (ASM) in developing countries. The potential for human exposure and releases to the environment through this use is very high and the consequences severe.

In spite of its known dangers, mercury has value and finds its way into the hands of those least able to manage it.

With this knowledge, the member companies of ICMM have made commitments specific to mercury, commitments that go beyond those made in the context of SAICM. They flow directly from the Principles contained in the ICMM Sustainable Development Framework and speak directly to the capacity-building objective of SAICM. In précis, those mercury-specific undertakings include:

- not to develop any mine for the production of mercury
- promote responsible management of by-product mercury
- identify, quantify and minimize point source emissions
- report emissions
- support low- or no-mercury technology transfer for ASM
- support continuing environmental research
- assist development of strategies that would end the flow of mercury into the marketplace.



"MANY OF THE INITIATIVES OUTLINED IN THE MMM2020 ARE HELPING TO ENSURE THAT MINING AND METALS COMPANIES ARE ABLE TO IDENTIFY AND COMMUNICATE ANY POTENTIAL HAZARDS AND RISKS THROUGHOUT THE SUPPLY CHAIN – FOR EXAMPLE THROUGH THE CREATION OF ROBUST SAFETY DATA SHEETS AND LABELS. THIS IS THE KEY STEP IN ENSURING OUR PRODUCTS ARE USED SAFELY AND SUSTAINABLY IN THE YEARS TO COME."

Sandra Carey, HSE Executive, International Molybdenum Association

SECTION 2
Delivering on the MMM2020 commitment

Capacity-building

Protecting the workforce – development of Health Impact Assessment methods

1 3 14

Planning and managing for the health of workers has a long history and current best practices are reflected in the ICMM publication "Good Practice Guidance on Occupational Health Risk Assessment". Similar investments in the health of communities have been made but often in reaction to observed impacts: the first concern was for the workers and the workplace. In recent years, however, there has been increasing rigour and formalization of the health assessments that go beyond the boundaries of operations to the environments where the workers and their families live and play. The World Health Organization has actively promoted this Health Impact Assessment (HIA) approach.

HIA is a systematic way of predicting and managing the potential health outcomes of policies, plans, programs and projects on communities regardless of their proximity to an operation. It can have merit on its own but is increasingly an element of the broader and still evolving practice of doing Integrated Environmental, Social and Health Impact Assessments (ESHIA).

The use of HIA as part of a broader risk management strategy is increasing in the mining and metals industry. In the 2010 ICMM publication "Good Practice Guidance on Health Impact Assessment", HIA processes are described and a methodology provided that in-house practitioners can use, secure in the knowledge that all the right questions and end-points will be captured in their assessment.

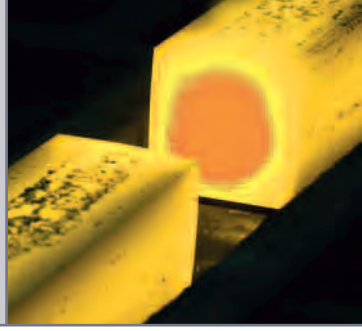
Capacity-building

ICMM Health and Safety Conferences

14

It is essential that knowledge is continually developed and that experience in the application of that knowledge is shared. Building on the success of its first International Health and Safety Conference in 2006, ICMM is holding its second, entitled "Sharing successes and challenges – learning from each other", in Santiago, Chile, in November 2012.

At these conferences participants learn about and discuss the challenges their colleagues in the industry face, the lessons learned, what is being done to continually improve, and how good practices can be embedded in the corporate culture. Issues discussed include leadership in occupational hygiene, exposure control effectiveness and how health and safety become integrated into value chains.



Capacity-building

GHS: delivering the tools for global implementation

15 20

Many countries have developed their own standards for classifying the hazards posed by chemicals. In many cases, differences among these national standards have caused confusion for companies that market chemical products globally. This is particularly true for the mining and metals industry, with diverse supply chains and market geographies. An attempt to provide a common basis for classification for all the different target audiences, through the UN's Globally Harmonized System (GHS) is therefore of high relevance and welcomed by industry.

The on-going work to revise safety data sheets and labelling, consistent with GHS health and environmental criteria, is substantial. Many mining and metals companies have responded through the creation of dedicated GHS groups with managers from all business units co-ordinating to ensure a smooth and effective transition.

Implementing GHS also represents a large and on-going investment by both governments and industry in scientific concepts. To ensure that this investment is productive, ICMM has embarked on a program of outreach and interaction in areas with significant mining and metals operations. This has seen workshops aimed both at industry and policy makers in Australia, Brazil, China, Canada, Japan, South Africa and the United States.

In addition, written guidance documents have been published on general aspects of implementation of GHS as well as aspects that are particularly challenging for the sector – including assessment of complex mixtures such as ores and concentrates.

Theme 4

SAICM objective:

"**Knowledge, information and public awareness** are basic needs for decision-making for the sound management of chemicals..."

Mining and metals industry response:

Sharing the tools and contributing to a robust, accessible base of information to support decision-making: MMM2020 commitments to publish risk assessment and LCA data, publish methodologies, convene/support workshops, publish emissions data, maintain database of occupational exposure limits.

For the chemicals and mixtures that are the business of the mining and metals industry it was early determined that the tools needed to produce and organize information upon which risk management decision-making could be based were either lacking or insufficient to the task. The absence of data – or the presence of data generated from protocols that did not account for the specificity of inorganic chemicals and compounds – prevented informed classification actions or effective risk reduction measures. The tools necessary to develop that knowledge had to come first as described in Theme 1. However, having developed many of the necessary tools, the data arising from their use need to be widely available.

ICMM develops guidance documents based on science data, regulatory requirements, and best practice associated with the use of tools appropriate to the chemicals and processes of the metals industry. Much of this is applicable to the whole value chain, from mining to end-of-life management of metal-containing product systems. In addition, it is a requirement for ICMM member companies to report under the GRI Mining and Metals Sector Supplement. As well, "sustainability reports" have increased in number and sophistication and they, with GRI, bring a high level of transparency to industry performance.

The commitment goes beyond just the existence of information. The continuing practice of workshops, partnerships and collaborations, and activities of the commodity and mining associations noted elsewhere all assist in the dissemination of knowledge relevant to chemicals management.

SECTION 2
Delivering on the MMM2020 commitment

Knowledge

Documents, workshops, toolkits

18 19 20

The existence of tools relevant to the tasks makes successful risk reduction possible. Just as important is the knowledgeable application of those tools so that consistent reproducible results are obtained by different operators. When designers and users of the tools share their knowledge and experience, the most efficient and reliable approaches to different risk scenarios are realized.

This process has, in fact, been the largest sustained project of ICMM in the first decade of its existence. ICMM has been the catalyst and platform for leading corporations and industry associations to share – in a variety of languages and forms of delivery – expertise and experience with miners, metal producers and users, and those responsible for regulating inorganic chemicals through their life cycles.

Because of their importance and originality, MERAG and HERAG have been mentioned several times. In addition, all the major areas of professional interest now have guidance documents and others will be developed as the need arises. Existing guidance documents – especially those associated with the management of risk – will be revised in the light of operational experience and further scientific and regulatory developments.

Investments in risk reduction knowledge
Freely available guidance

Search "guidance" on the ICMM website to find the 143 guidance documents, workshop reports and "toolkits" that teach and offer good practice insights for the mining and metals industry. This selection is particularly relevant to SAICM objectives.

Human health

- **Health Risk Assessment Guidance for Metals**
- **Leadership Matters: Managing fatal risk guidance**
- **Good Practice Guidance on Occupational Health Risk Assessment**
- **Good Practice Guidance on HIV/AIDS, TB and Malaria**

Environment

- **Metals Environmental Risk Assessment Guidance**
- **Good Practice Guidance for Biodiversity Conservation (under development in collaboration with the World Conservation Union – IUCN)**
- **Good Practice Guidance for Mining and Biodiversity**
- **IUCN-ICMM Roundtable Discussion on Restoration of Legacy Sites**
- **Ores and concentrates: An EU Guide to hazard classification**

Knowledge

ICMM/OECD partnership for international data sharing

18 21

The OECD plays a significant role in chemicals management, by screening effects data sets for relevance and quality under their globally recognized Co-operative Chemicals Management CoCAM program (formerly the High Production Volume Chemicals or HPV program). These data sets become a worldwide reference for all OECD countries implementing national legislation on chemicals management.

ICMM has joined with the OECD to manage a mining and metals sector component which will introduce metals-specific concepts and effects datasets for evaluating the health and environmental hazards of chemicals. The development of this methodology has until now been driven largely by the requirements of the REACH legislation in the European Union but this program will assist in broader uptake around the globe consistent with the aim of SAICM.

The initiative was launched in early 2011 and has received strong support from OECD members with enthusiastic backing from the EU, US and Canada in particular, where elements of the industry's MERAG concepts (see Theme 1) have already been used in the design of national guidelines.

In tandem with the OECD program, ICMM is developing a web portal to ensure that its work is accessible to all stakeholders. This will be launched by the end of 2012.



"DEVELOPING APPROACHES TO THE ENVIRONMENTAL AND HEALTH ASSESSMENT OF OUR METAL PRODUCTS IS A CHALLENGE THAT THE INDUSTRY HAS BEEN RESPONDING TO FOR OVER TWO DECADES. THE TOOLS AND MODELS THAT WE ARE NOW ABLE TO APPLY REPRESENT THE INTENSE EFFORT AND COMMITMENT OF THE ACADEMIC AND REGULATORY COMMUNITIES AS WELL AS THAT OF INDUSTRY. A WEALTH OF PEER-REVIEWED SCIENTIFIC LITERATURE, AS WELL AS PRACTICAL INDUSTRY GUIDANCE, ENSURES THAT THIS INFORMATION IS AVAILABLE TO ALL AND THAT THIS FIELD OF ACTIVITY WILL CONTINUE TO EVOLVE."

Dr William Adams, Rio Tinto (Chair of ICMM's Minerals and Metals Technical Working Group)

SECTION 3
Building on what we have begun

Effective chemicals management remains essential to the achievement of sustainable development.

"The Future We Want", the outcome document of the recent Rio+20 conference, called for "the effective implementation and strengthening of the Strategic Approach to International Chemicals Management as part of a robust, coherent, effective and efficient system for the sound management of chemicals throughout their life cycle, including to respond to emerging challenges".

The ICMM membership remains focused and committed to making its contribution to the achievement of this goal.

Now as never before, the sector has the structures in place and expertise at hand to ensure that these challenges are met and that the contributions to society – in materials and quality of life and environment – are optimized and made sustainable.

This report provides a representative example of the activities taking place within the context of the Minerals and Metals Management 2020 action plan and the table opposite provides a snapshot of where the work stands in 2012. The work will continue and evolve but always reflect the sector's commitment to the principles and objectives of SAICM.

How is the industry doing?

Challenges remain but the progress, as the table opposite shows, has been significant – especially in the creation of the tools for the job. Equally, it is understood that the needs and thus the agenda will evolve and actions not foreseen in 2009 will become necessary.

However, having begun the "responsible and integrative chemicals management" journey, the mining and metals sector believes that the direction remains clear. The commitments of 2009 remain valid and the progress made to date positions the industry for success in meeting the industry and SAICM objectives in the coming years.

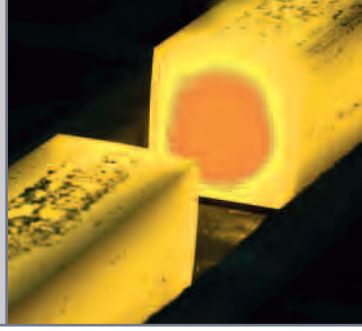
Assessing the true contribution of a global industry

Many of the future work challenges will arise as a result of the increasing global harmonization of regulatory systems for chemicals management. Over the past decade, the emergence of regional systems such as REACH in the EU has been an important driver but similar systems are emerging or in the planning stages elsewhere.

For an industry that operates and trades internationally this is profoundly welcome. Implementation, however, will pose challenges. Greater co-ordination than ever before will be required at a global level as well as a broadening of expertise into previously unfamiliar territory. It will require application of the new metals-specific tools and concepts documented here beyond the current geographic boundaries. This will require training, capacity-building and an open sharing of knowledge – both within industry and with regulatory authorities. The industry has begun building the necessary systems to facilitate this but more will be done.

One fundamental shift already seen in other policy areas in recent decades is an increasing recognition of the importance of considering benefits and impacts throughout the whole life cycle of any product system and the materials that go into it. This is fundamental to assessing the real contribution to society and underlines the importance of taking a systems approach. In the same way that the "carbon footprint" of a material has driven action by policy makers and consumers alike, it is anticipated that the "chemical footprint" will become part of a more holistic consideration of materials in coming years.

This thinking will lead to the consideration in more detail than ever before of the balance between the socio-economic benefits and potential chemical risks of materials. As it was with risk assessment, the integration of socio-economic factors will require validated approaches that can be applied to inorganic materials. This will increase the imperative for the mining and metals sector to ensure that tools and concepts appropriate to its products are developed in a consultative manner, peer-reviewed and supported with education and training for deployment in every economy regardless of its state of development.



SAICM objective	Risk reduction	Governance	Capacity-building and technical assistance	Knowledge and information
ICMM MMM2020 Action Plan element	**Taking a systems perspective**	**Building new and strengthening existing relationships**	**Optimizing the production and application of minerals and metals**	**Contributing to a robust, accessible base of information to support decision making**
Actions and status Activities completed or well advanced (note some of these are enduring) Begun but significant development still to be undertaken Yet to be commenced	1. Develop and implement hazard and risk assessment tools addressing the specific properties of metals, metal compounds, alloys and other inorganic substances and any related effects on health and the environment	7. Promote integration of specific assessment tools into broader risk characterization systems and government policy frameworks at the national, regional and international level	12. Develop guidance on chemicals management in the mining and metals sector	18. Make available high quality hazard and risk assessment information on specific metals and metal compounds
	2. Encourage the development of guidance on a harmonized approach to the setting of occupational exposure limits	8. Convene workshops with commodity associations to exchange experiences and information on chemicals management	13. Encourage the prevention and minimization of hazardous waste generation within ICMM member operations	19. Publish and disseminate fact sheets on new and revised hazard and risk assessment tools intended to address the specific properties of metals, metal compounds, alloys and other naturally occurring inorganic substances
	3. Establish guidance for identification, assessment and control of occupational health risks	9. Provide guidance for member companies on terms of reference for engagement with local communities and host governments on chemicals management, particularly in developing countries	14. Promote and exchange information on successful experiences and projects related to environmental site management and occupational health and safety	20. Convene training workshops for companies and organizations within the mining sector on key chemicals management topics such as the UN GHS and risk characterization
	4. Provide scientific input to the development of protocols for characterization of ecotoxicological and human health impacts in life cycle assessment	10. Encourage metal commodity associations to include chemicals management information and resources in their materials stewardship programs	15. Provide guidance on implementation of the UN Globally Harmonized System of Classification and Labelling	21. Develop a web-portal to provide common access to life cycle inventories for specific metals and metal compounds
	5. Promote eco-efficiency indicators to encourage efficient and effective use of materials and energy from a life cycle perspective	11. Develop a dialogue with the World Bank Group on chemicals management and poverty alleviation	16. Develop and implement mercury stewardship activities	22. Develop a sector specific framework for monitoring and public disclosure of emission levels of substances to air and water from ICMM member companies consistent with the Global Reporting Initiative guidelines
	6. Develop guidance on socio-economic assessment in risk management decision making for metals		17. Promote dissemination of existing guidance and address gaps relating to the safe handling of metals throughout the supply chain and specific metal containing products during recovery and recycling	23. Develop and publish a database of regulatory occupational exposure limits for substances linked to the production of minerals and metals

SECTION 4
Resources

Further information on institutions, tools and guidance referenced in this report

Institutions

For many more examples of the work that is being undertaken on chemicals management policies and their implementation linked to the MMM2020 program visit our company and association members' websites.

ICMM member companies and associations
www.icmm.com/members

Tools and guidance

All ICMM Guidance Documents
www.icmm.com/library

Best Available Technology Reference (BREF) Notes (revisions)
http://eippcb.jrc.es/reference/nfm.html

Biotic Ligand Model (BLM)
www.hydroqual.com/wr_blm.html

GARD Guide
www.gardguide.com/index.php/Main_Page

HERAG
www.icmm.com/page/1213/health-risk-assessment-guidance-for-metals-herag

International Cyanide Management Code
www.cyanidecode.org

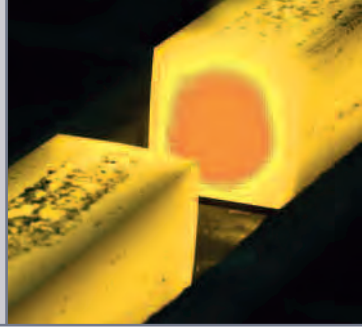
MeCLAS
www.meclas.eu

MERAG
www.icmm.com/page/1185/metals-environmental-risk-assessment-guidance-merag

Ores and Concentrates: An industry approach to EU hazard classification
www.icmm.com/library/oresandconcentrates

Transformation Dissolution Protocol
www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev01/English/14e_annex10.pdf

Zinc Saves Kids
www.zincsaveskids.org



EU REACH implementation tools and guidance

REACH Regulation
http://echa.europa.eu/web/guest/regulations/reach

REACH Metals Gateway
www.reach-metals.eu

Information on REACH-registered substances
http://echa.europa.eu/web/guest/information-on-chemicals/registered-substances

REACH Guidance on environmental risk assessment for metals and metal compounds:
http://echa.europa.eu/documents/10162/13632/information_requirements_r7_13_2_en.pdf

Downstream User Scaling Tool
www.arche-consulting.be/Metal-CSA-toolbox/du-scaling-tool

Metals Classification Tool – MeCLAS
www.meclas.eu

Metals Occupational Exposure Assessment Tool for REACH (MEASE)
www.ebrc.de/industrial-chemicals-reach/projects-and-references/mease.php

Specific Environmental Release Categories (SPERCS)
www.arche-consulting.be/Metal-CSA-toolbox/spercs-tool-for-metals

Life cycle impact assessment

Apeldoorn Declaration
Int J Life Cycle Assess. 2004, 9(5): 334

New method for calculating comparative toxicity potential of cationic metals in freshwater: application to copper, nickel, and zinc.
Gandhi N, Diamond M, van de Meent D, Huijbregts M, Peijnenburg W, Guinee J.
Environ. Sci. Technol. 2010, 44: 5195–5201

The Clearwater Consensus: the estimation of metal hazard in fresh water.
Diamond M, Gandhi N, Adams W, Atherton J, Bhavsar S, Bullé C, Campbell P, Dubreuil A, Fairbrother A, Farley K, Green A, Guinée J, Hauschild M, Huijbregts M, Humbert S, Jensen K, Jolliet O, Margni M, McGeer J, Peijnenburg W, Rosenbaum R, van de Meent D, Vijver M.
Int J Life Cycle Assess. 2010, 15: 143–147

Implications of geographic variability on Comparative Toxicity Potentials of Cu, Ni and Zn in freshwaters of Canadian ecoregions.
Gandhi N, Huijbregts M, van de Meent D, Peijnenburg J, Guinée J, Diamond M.
Chemosphere. 2011, 82(2): 268–277

Implications of considering metal bioavailability in estimates of freshwater ecotoxicity: examination of two case studies.
Gandhi N, Diamond M, Huijbregts M, Guinée J, Peijnenburg W, van de Meent D.
Int J Life Cycle Assess. 2011, 16(8): 774–787

SECTION 4
Resources

ICMM member companies

African Rainbow Minerals
Anglo American
AngloGold Ashanti
Areva
Barrick
BHP Billiton
Codelco
Freeport-McMoRan
Goldcorp
Gold Fields
Hydro
Inmet
JX Nippon Mining & Metals
Lonmin
Minerals and Metals Group
Mitsubishi Materials
Newmont
Rio Tinto
Sumitomo Metal Mining
Teck
Vale
Xstrata

ICMM member associations

Cámara Argentina de Empresarios Mineros
Cámara Asomineros Andi – Colombia
Cámara Minera de México
Cámara Minera de Venezuela
Chamber of Mines of the Philippines
Chamber of Mines of South Africa
Chamber of Mines of Zambia
Cobalt Development Institute
Consejo Minero de Chile A.G.
Eurometaux
Euromines
Federation of Indian Mineral Industries
Ghana Chamber of Mines
Instituto Brasileiro de Mineraçao
International Aluminium Institute
International Copper Association
International Iron Metallics Association
International Lead Association
International Manganese Institute
International Molybdenum Association
International Wrought Copper Council
International Zinc Association
ITRI
Japan Mining Industry Association
Minerals Council of Australia
Mining Association of Canada
Mining Industry Associations of Southern Africa
National Mining Association – USA
Nickel Institute
Prospectors and Developers Association of Canada
Sociedad Nacional de Minería – Chile
Sociedad Nacional de Minería, Petróleo y Energía – Peru
World Coal Association
World Gold Council

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The ICMM team included John Atherton, Ben Davies and Laura Pocknell.



"A LOT HAS BEEN ACCOMPLISHED, MUCH IS BEING DONE, MORE IS PLANNED. IT WILL NEVER BE COMPLETE. THERE WILL BE SHORTFALLS AND LAPSES ALONG THE WAY. BUT IT IS UNDERSTOOD THAT THE MANAGEMENT OF CHEMICALS IS A CONTINUING RESPONSIBILITY AND AT THE CORE OF THE BUSINESS OF MINING AND METALS. THIS REALITY IS REFLECTED AT ALL THE DIFFERENT LEVELS – INDIVIDUALS, CORPORATIONS, ASSOCIATIONS OF VARIOUS KINDS – AND THE FOUR CENTRAL OBJECTIVES ARTICULATED UNDER THE SAICM BANNER RESONATE WITH THE INDUSTRY IN BOTH BUSINESS AND SOCIETAL TERMS."

International Council on Mining and Metals, 2012

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