

March 15, 2002

Mr. Luke Danielsen
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U.K.

Dear Luke:

Re: MMSD Draft Report

We would like to take this opportunity to congratulate your team on a readable, all-embracing report that presents a wide diversity of views. They have done a very commendable job.

The comments that follow summarise the comments of our group in the very short time that was available for review.

1. The Recommendations

As they stand, the recommendations are very ambitious. We would suggest that to increase the chance of adoption and ultimate success, you should narrow the focus to two core ideas:

- a) Establishing a global multi-stakeholder institution or “stewardship council”, who would develop a charter, codes of best practice and ultimately, possibly, certification. This organization (possibly ICMM) could then administer or police this and use adherence to the codes as a condition of membership. This follows the “Responsible Care” model established by the chemicals industry, which has worked well in most areas.
- b) A continuing global forum on minerals and sustainable development as you suggest.

We see all other recommendations as achievable if these two are in place.

2. The Role of Technology

The Mining and Minerals Industry has been in a technological upheaval of unprecedented magnitude for the last decade, after 50 years of relative technological stability. This upheaval is still in progress, largely driven by the central issues of this report.

It is important that the non-technical audience for the reports be given a balanced view of what science and technology can and can't do. This applies particularly to technologies for production, protection, remediation, monitoring or any other activity with a scientific basis. It is also important to recognize and highlight the very long timescales required to introduce new

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material production or environmental technologies, or changes to manufacturing and (re) use patterns.

There is also a significant potential for introduction of “intermediate” or “appropriate” technologies in the artisanal and small mining sectors. There are potentially huge benefits of many kinds at relatively low costs. This should be addressed.

3. Legislative and Regulatory Issues

The current structure of regulations governing the movement of wastes and hazardous materials, starting with the Basel Convention, is a major impediment to many intelligent recycling or waste alternative use opportunities.

Accounting requirements must evolve to credibly and appropriately recognize closure costs and potential liabilities.

4. The Reports

While well written, Chapters 2 – 6 could be consolidated on a metal-by metal basis. There is a wealth of good information but key messages are diluted by the presentation format.

Attached is a tabulation of other specific comments and corrections. In particular, we would point out the attached rewrite of Page 2-9 “Processing and Fabrication”, where paragraph 2 is much too narrow in its scope and Paragraph 3 is factually wrong.

A key omission in the “civil participants” is the Press, with its enormous ability to influence (based on correct or incorrect information).

Should any of your staff wish to discuss or clarify any comments, please do not hesitate to contact me or Jacques Gerin (514) 864-5515, jgerin@hatch.ca.

We look forward to discussing these ideas with you further in Toronto if not before.

Yours very truly,

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CT-M:aa
Ref CO01200.076.MMSD.DOC
Enclosure

cc: J. Gerin

COMMENTS ON THE

MMSD DRAFT REPORT

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ISO 9001-94

PR01200.003
FL01200.
Rev. 0, March 15, 2002

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1. General Comments

The linkage to poverty alleviation is critical and is a key theme throughout the report. There should somewhere be at least a passing mention that population stabilization is ultimately more important.

The role of the press is ignored.

There is an underlying assumption that the mining companies have a “right” to continue business. As this is not uniformly shared, there are implied risks that have not been discussed.

The role and protection of whistleblowers is critical to identification of abuse of codes, regulations, etc.

Until Accounting codes address the issues of closure liability, little substantial and widespread progress will be made.

It's apparent that only enlightened companies, who build and operate highly engineered and innovative facilities, will be left standing in 20 years. The survivors are also going to require different kinds of managers, i.e. ambassadors of extraordinary skill on the ground locally, nationally, and transnationally to ensure their projects reach the operational stage.

From one of the most backward of industries just 150 years ago, Mining and Metals companies now find themselves on the cutting edge of social, economic, political and business development across the world. It has been an enormous transformation for the industry, one that will produce significantly profound contributions to international understanding and production. For example, health, safety, environmental and labor matters will be pulled, project by project, into the 21st century within nations where no progress has been evident for centuries.

The general characterization of participants as “actors” using the unfortunate connotation of “performing for the benefit of others”. Substitution of “participant” for “actor” throughout would strengthen the flow.

2. Suggestion for Re-write of Page 2-9, “Processing and Fabrication”

Most metallic minerals go through many processing steps in the transformation to a saleable metal or metallic-based product:

The steps from the in-situ material to the processing plants also varies widely. In a classical “concentrator” ore is crushed, ground down to very fine particles (which is very energy intensive) and then put through a range of processes to optimize the separation of valuable minerals from waste (or gangue). These processes include gravity separation, floatation, magnetic separation, electrostatic separation and a range of other pre-treatments, involving an array of chemical processes or reagents.

2.1 Aluminum

In the aluminum sector there is one generic process to commercial aluminum. Bauxite is mined and digested (or dissolved) in caustic soda at high temperature and pressure. From this liquor, pure hydrated alumina is precipitated. It is heated to drive off water of crystallization and shipped globally as pure alumina powder. At the smelter sites the alumina and fluxes are fed to a “pot line” where electricity is applied to reduce the alumina to aluminum metal. The metal is removed from the pots as a liquid and cast directly as ingots for shipping or future alloying, reheating, rolling and shaping.

Auxiliary plants for power, anode production, gas cleaning and utilities result in aluminum smelters being very complex facilities.

2.2 Base Metals (Copper, Nickel, Zinc, Lead, Tin)

Base metals occur normally as either sulphide or oxide minerals. The major processing routes are dictated by the specific valuable minerals, by the mix of minerals and the minor commercially interesting elements such as silver, gold or platinum group metals that can be present.

The minor components that present significant environmental or OH&S risk may also dictate processing route, such as arsenic, bismuth, selenium, cadmium, etc.

Base metal extraction plants are generally all different, but fall in two major process groupings: pyrometallurgical, working with very high temperature molten materials or hydrometallurgical, working with normally aqueous solutions.

Pyrometallurgical plants will typically contain separate or combined steps for melting, crude metal production, primary refining, casting, re-refining, alloying and product casting. There will be additional steps for minor and by-product treatment and production.

For hydrometallurgical processing, there is a primary ore dissolution step. This can be in acid or alkali at high or low temperature and pressure, or bacterially assisted (bioleach), depending on the ore and economically desirable products.

Similar generic routes apply to gold and platinum group metals.

The solution is then typically purified by selective precipitation, of products, by-products or impurities. Depending on the metal and the desired product, electrodeposition of product from solution is often used (electrowon copper, electrolytic nickel or cobalt and commercial zinc).

There are normally auxiliary plants for by-product production, air and water effluent elimination or treatment, and waste stabilization.

2.3 Iron and Steel Sector

In the Iron and Steel Sector there are three main route to steel for shipping:

2.3.1 Scrap-based Electric Arc Melting

This is the world's largest organized recycling business and is the route which now accounts for approximately 10 – 15% of world steel production. Scrap steel is remelted, refined and cast into intermediate shapes. These shapes typically, with reheating, are passed through a variety of rolling mills that reduce the size and finalize the shape to specific commercial tolerances. Historically scrap based steel was used in low value products. In the last decade technology has allowed casting of sheet and plate of commercial quality to challenge the "integrated" mills.

2.3.2 Integrated Steelmaking

Integrated steel mills use iron ore as a feed. Iron ore is mined and may be upgraded prior to shipping to the steel works by a range of techniques. A major percentage of iron ore is shipped as hardened pellets, which involve crushing and grinding the ore, upgrading, forming into pellets and heating to give the pellets strength for shipping and for proper operation of the blast furnaces where they are used.

The heart of an integrated mill is the blast furnace where iron ore (typically as a pellet) is mixed with coke in a high temperature reduction process to produce liquid iron. The coke is produced by heating coal in an oxygen free atmosphere. Fuel gas is simultaneously produced and used in other parts of the steel works.

The liquid iron is then typically "blown" to steel by injecting oxygen, again producing a usable fuel gas. The steel is then refined and cast into slabs or shapes for downstream rolling to commercial product for shipping.

2.3.3 Other Hybrids

Over the last 20 years a substantial portion of electric arc furnaces feed has switched to Direct Reduced Iron in place of scrap. In this, high quality iron ore pellets are typically reduced to iron with natural gas products (CO and H₂) or other carbon reducing agents. The Direct Reduced Iron is substituted for scrap (up to 100%) and typically results in higher quality steels.

There is a wide range of emerging processes and the Holy Grail of direct steelmaking (bypassing ironmaking) is actively being developed.

The steel industry is highly complex with an astonishing array of product specifications to be met by the myriad uses in every society.

2.4 Other Materials

By far the largest tonnage of materials mined are coal, sand and gravel. All of these have basic processing steps involving sizing, screening, washing and other waste separation steps prior to shipping.

3. Comments by Section

Executive Summary

P. 7 The Industry

Only seems to consider the mining companies. The steel industry should also be addressed. Should it include also those who service the mining companies, the consultants, engineers, contractors and equipment and service suppliers?

Civil Society

The Press cannot be ignored.

Financial Institutions

The Multilateral Investment Guarantee Agency is becoming an important player.

Consumers

Have a critical impact on recycling behaviour and achievement, as well as purchasing decisions on criteria that can be influenced; i.e. green products.

P.8 Needs and Availability

If developing countries aspire to the metals intensity of the developed world, it **will** clearly be unsustainable.

P.11 – Para 1

“Benchmarking is needed to ...determine occupational exposure limits”. This appears to be a throwaway line implying that both the reporting and the current limits are inadequate or not rigorously based. This is not the case and for most of the limits there has been a significant amount of science put into their development.

Para 5

Re **right to say no**. The ability of veto on the part of those affected by mining will be a part of the political process for the country. It may be preferable to say that those affected by mining must have the right to input to decision-making.

However it may not be “democratic” in the political sense but it will have to be participatory.

P. 19 – Para 3 - Mine Closure

Prepare accounting practices for closure costs and liabilities will be central to moving this issue forward.

Para 5 – Improved SIA

There could be serious capacity limitations due to scarcity of competent professionals which will take years to redress.

P. 25 - Access to Information

Again the role of the press cannot be ignored.

P27: para 5 – re Recycling

In the final sentence, consider adding the words “Consumer desire for the latest hi-tech equipment does, however, pose challenges for re-manufacture and re-use, **but opportunities for use of alternative materials are increased.**”

P38: Para 3 – re SD Support Facility

Re: SD Support facility and the discussion of whether non-industry players only be involved. This raises the question of where industry relevant experts would come from if not the industry?

Para 6 & 7

A separate global SD fund raises questions about who contributes to it, how levied and governance issues of who decides where to spend it.

Many of these issues are also addressed or raised again as they relate to the body of the report.

1. Introduction

P. 1-2 The Context

...the need for minerals is **fundamental** to economic and social development

P. 1-16 National Economic and Social Development - Bullet Point 4

The practicalities of working in non-democratic regimes should be recognized (most of the Middle East, etc.). Only companies can effectively introduce these principles within repressive regimes.

P. 1-17 Community Development

There is a need for systematic medical research on chronic environmental health issues. The mining industry should be partners in this not adversaries.

2. Producing and Selling Minerals

P. 2-9 Processing and Fabricating (Para. 1)

A significant % of diamonds now come from very large facilities (Ekati, Argyle, DeBeers and Russian Operators, etc.).

P. 2-26

The silver price spike is an aberration due to the Hunt Brothers manipulating the market in the early 80's. This chart confuses the message that metal prices, including gold, are in a long-term price decline.

In this Chapter supply elasticity with swing plants/mines coming "on" and "off" line depending on commodity prices is critical but not discussed.

3. A Profile of the Minerals Sector

Table 3-2 columns are not ordered correctly. Peabody is a US Company. Norsk Hydro & VAW combined is now #3 in Aluminum. Does the Grupo Mexico number include copper from majority-owned Southern Peru Copper?

In gold, Newmont is now #1.

P. 3-16 Financial Institutions

The role of MIGA – the Multilateral Investment Guarantee Agency is important.

P. 3-17 Consumers

Consumers must culturally accept the individual responsibility to drive many low value recycling initiatives, such as separating household waste.

5. Case Studies on Minerals

This Chapter is out of balance. For example: there is one page on steel (a \$300 billion/year sector) and 8 pages on gold (a \$22 billion/year sector).

6. Viability of the Minerals Industry

P. 6-7 The Business Case for Sustainable Development

Mention of the growth of public corporate evaluation and rating tools, such as the Dow Jones Sustainability Group Index and the Innovest Index, are becoming important investment influencers.

P. 6-31 Paragraph 3

Antamina was very large, but not “the” largest mining project ever. The qualification is not needed for the point to be made.

P. 6-29 Box 6-3

High pressure acid leaching is claimed to have lower capital and operating costs. After 3 commercial plants have operated with difficulty for about 3 years, these claims are definitely not substantiated.

P. 6-28 The Role of Technology

This is a very weak section in the context of industry viability. A huge amount of innovation in technology of all sorts is driving the industry, to major revolutions in some sectors.

Typical Examples Include:

- Direct steelmaking
- Direct thin strip steel casting
- Direct coal-based ironmaking
- Pressure acid leaching (Nickel, Copper, Cobalt)
- Bioleaching (Cu, Ni, Zinc)
- High Pressure oxidation (gold)
- Residue Fixation Technologies

- Production of New high-value products
 - High purity metals
 - Metal matrix composites (i.e. Dural)
 - Metallic foams, powders, fibres, coatings (Ni, Fe, Al, Se, etc.)
 - Aerial geophysics for discovery
 - Use of satellite imagery for discovery
 - Underground mine automation
 - Acid mine drainage elimination
 - In situ underground processing
 - Guided drilling
 - Non-blasting rock fragmentation
 - Hot briquetted iron production
 - Iron carbide production for steelmaking
 - Powder metallurgical net shape forming
 - Permanent anode technology for aluminum pot lines
- and many others.

P. 6-33

The role of MIGA is again omitted in the third paragraph.

12 . Access to Information

P. 12-23 NGOs and other civil society actors

The press's enormously important contribution (both helpful and unhelpful) to debate and process is totally ignored.

13. Artisanal and Small-Scale Mining

P. 13-16 Last Paragraph re Bulyanhulu (N.B. Spelling)

As there are real proven examples of artisanal miners being killed in mine development activities (Venezuela, Bolivia, etc.) it should be not be necessary to use an "alleged" events to illustrate a valid point.

14. Roles, Responsibilities and Instruments of Change

P. 10, Para 1

“Many standards are established using little science and much guesswork.” These words are not effective and convey the wrong meaning. The issue is whether Standards prescribe methods to establish quantitative criteria or list criteria which are not based on real world measurability of impact. Further, many standards are currently underpinned by a huge body of science.

P. 12, Para 3

Financial liabilities for mine closure and rehabilitation should be reported as part of a company’s annual balance sheet. Without this approach this issue will continue to haunt the industry.

P. 14, Para 5 National policy framework, dot point 1

Accounting standards will have to change and be enforced to achieve this. The item needs to consider how to assess when enough strengthening of the framework has been done. It is more an evolutionary process which should follow an on-going continuous improvement approach.

16 . Agenda for Change

Protection of whistleblowers is vital in both industry and governments. (Example, the Russian scientist recently jailed for exposing the nuclear contamination of the high Arctic by spent fuel disposal).

P. 16-7 – Box 16-2

How will a company determine when or where active involvement in Community SD plans will be necessary? Some guidance will be required. This section also deals mainly with the mine, without reference to the processor.

P. 16-9 – Box 16 –2

End of life plans and costs or liabilities associated with these should be reported annually (noted above).

P.16-13 Community Lead Cooperation

“Factory” is an old-fashioned word and in this context it is really “Mineral and Metals Processing Facilities”.

P.16-15 Lower 3 bullet points; repeat last 3 bullet points on P. 16-12.

P. 16-16 Abandoned Mineral Sites Facility – Para. 2.

“Approval” would be a stretch, if it is a global facility, recognizing all the jurisdictional issues.

P. 16-17 Central Bank

Central Bank gold sales makes no sense because the payee (The Central Bank) may have no mining, past or present, in their national territories.