CANADIAN INSTITUTE FOR ENVIRONMENTAL LAW & POLICY

25th Year 1970-1995

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COMMENTS ON SUSTAINABLE DEVELOPMENT AND MINERALS AND METALS

CIELAP BRIEF 95/5

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Comments on Sustainable Development and Minerals and Metals

Canadian Institute for Environmental Law and Policy

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1. Introduction

The Canadian Institute for Environmental Law and Policy (CIELAP) welcomes Natural Resources Canada's efforts to integrate the principles of environmentally sustainable development into its work, reflected in the discussion document entitled Sustainable Development and Minerals and Metals released in September 1995.

Unfortunately, NRCan's discussion document is a major disappointment in a number of ways. The paper's treatment of the issue of the role of the minerals and metals sector in an environmentally sustainable Canadian and global economy is especially weak. The role of government in the promotion of the sector is also poorly addressed. In addition, the discussion of the question of the environmental impacts of mining, particularly with respect to the assessment of the "toxicity" of minerals and metals requires further attention. Finally, the paper's discussion of Canada's international role with respect to the metals, minerals, and the environment is disturbing, especially in light of the position taken by Canada on a number of recent international initiatives related to metals and the environment.

2. Sustainable Development Framework (Part I)

This section of the discussion paper is a major disappointment. It fails to address many of the key issues related to the minerals and metals sector in an environmentally sustainable global economy. The paper simply assumes a continued expansion of the global consumption of metals and minerals.

This approach ignores the recent conclusions of a number of major international research bodies, including the World Watch Institute and the Wuppertel Institute, regarding the issue of materials consumption and environmental sustainability. It has been suggested, for example, that a 50% reduction in worldwide materials consumption will be needed to arrest global environmental degradation, and that to achieve it, industrial countries need to aim for a 90% reduction.[1] The current rates of materials consumption

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[1].For excellent summaries of these issues see: J.E. Young Mining the Earth (World Watch Paper 109) (Washington, D.C.: Worldwatch Institute, 1994); and J.E. Young, The Next Efficiency Revolution: Creating a Sustainable Materials Economy ((World Watch

are considered unsustainable, not so much due to shortages of materials themselves, but rather due to the extent of the environmental costs associated with their extraction and processing.[2] This is especially true with respect to metals, minerals, and fossil fuels and their derivative chemicals and materials.

The paper's discussion of the relationship between environmental protection requirements and innovation and competitiveness is also disappointingly primitive. The paper reflects the traditional view of the relationship between environmental protection and economic performance as a zero-sum game. Within such a framework, additional environmental protection requirements are seen to impose non-productive costs on regulatees, and to act as deterrents and barriers to innovation, investment and job creation.

This position reflects an economic perspective rooted in the past, and ignores the growing consensus regarding the potential convergence between pollution prevention and economic efficiency. In a paper recently publish in the Harvard Business Review, for example, Professors Michael Porter of Harvard University and Claas van der Linde of St. Gallen University commented on the relationship between strong environmental programs and good economic performance, demonstrated in the experiences of Germany, Japan and other jurisdictions. They noted that:

> "Properly designed environmental standards can trigger innovations that lower total cost of a product or improve its value. Such innovations allow companies to use a range of inputs more productively - from raw materials to energy to labour - thus offsetting the costs of improving environmental impact and ending the stalemate. Ultimately, this enhanced resource productivity makes companies more competitive, not less."[3]

These conclusions regarding the potential linkages between well-designed environmental protection requirements, innovation and improved efficiency have been reflected in numerous other studies completed over the past decade by the Organization for Economic Cooperation and Development,[4] the U.S. Congress' Office of Technology

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Paper 121) (Washington, D.C.: Worldwatch Institute, 1995).

[2]. Ibid.

[3].M.E.Porter and C. Van der Linde, "Green and Competitive: Ending the Stalemate," Harvard Business Review (September/October 1995).

[4].See, for example: "Industry's response to environmental regulations," in Environmental Protection and Technological Change (Paris: Organization for Economic Cooperation and Development, 1985); P.Ph. Barde and P.F. Teneire Buchot, The Promotion and

Assessment,[5] the U.S. Environmental Protection Agency[6] and others.[7]

3. Government Role in Minerals and Metals (Part III)

This section is surprisingly thin and contains little substance. There is no serious discussion of the roles played by government in general, and by NRCan in particular, in the promotion of the mineral and metal mining sector. The absence of any discussion of the direct and indirect subsidies provided by the federal government to the exploration and development of minerals resources is particularly surprising in the context of a document intended to address the issue of environmental sustainability.

Numerous studies, include one recently completed for the Canadian Council of Ministers of the Environment (CCME),[8] have concluded that the tax expenditures provided by the federal and provincial governments to support the development and production of basic materials introduce significant distortions into the materials market and, in particular, provide a bias against the use of recycled materials. This bias is likely reinforced by the other forms of subsidy provided by governments to the mineral and metal mining industries, such as the provision of infrastructure and below full cost energy supplies, and protection from environmental liability. The removal of these kinds of subsidies is essential to achieving the full-cost pricing of resources central to the principle of sustainable development.

Diffusion of Clean Technologies in Industry (Paris: Environment Directorate, OECD, 1987); and M. Mathieu Glachant, Voluntary Agreements in Environmental Policy (Paris: Environment Directorate, OECD, 1994).

[5].Office of Technology Assessment, Industry, Technology and the Environment: Competitive Challenges and Business Opportunities (Washington, D.C.: Office of Technology Assessment, United States Congress, 1993).

[6].Technology Innovation and Economics Committee of the National Advisory Committee Council for Environmental Policy and Technology, (NACEPT) Permitting and Compliance Policy: Barriers to U.S. Environmental Technology Innovation (Washington, D.C.: Environmental Protection Agency, 1991).

[7].For a good overview of recent academic working in this area see, for example, K.Fisher and J.Schot, eds., Environmental Strategies for Industry (Washington, D.C.: Island Press, 1992).

[8].J.Mintz and K.Scharf, A Comparison of Tax Incentives for Extraction and Recycling of Basic Materials in Canada (Winnipeg: CCME, 1995).

4. Sustainable Development Challenges (Part IV) - Metals Toxicity

This section contains a lengthy discussion of the issue of risk vs. hazard based approaches to the assessment of the toxicity of metals. It is clearly related to the current debates occurring within the government regarding the government's response to the Recommendations of the House of Commons Standing Committee on Environment and Sustainable Development's June 1995 report on the review of the *Canadian Environmental Protection Act* (CEPA).

The NRCan paper essentially declares, following the approach of the Canadian Chemical Producers Association, that only a full risk assessment based approach to the evaluation of the toxicity of substances can be considered "good" science. This not a valid statement. Both risk and hazard assessment approaches to the assessment of substances constitute "good" science if they are carried out in a competent and honest manner. The NRCan document itself admits that a hazard based approach, such as that proposed by the Standing Committee on Environment and Sustainable Development reflects the traditional scientific definition of toxicity "based on the intrinsic potential of a substance to damage organisms."[9]

A hazard assessment approach was employed by the Ontario Ministry of Environment in the Development of its April 1992 Candidate Substances List for Bans or Phase-Outs. In addition, a hazard-based criteria approach to the assessment of the toxicity of substances was agreed to by all stakeholders, including industry, in the Accelerated Reduction/Elimination of Toxics (ARETS) process. In both programs systems were developed for prioritizing action on substances on the basis of such intrinsic characteristics as bioaccumulative potential, persistence and toxicity, including acute toxicity, chronic/sub-chronic toxicity, carcinogenicity, teratocenicity, genotoxicity and mutagenicity.[10]

The choice between risk and hazard based approaches is fundamentally one of policy, not "good" or "bad" science. A hazard based approach is essentially precautionary in nature, and provides the basis for taking preventative measures with respect to substances due to their potential to cause harm to the environment or human health. Risk-based approaches, on the other hand, are fundamentally reactive in nature, and essentially wait for absolute proof of actual harm to the environment or human health before action can be taken. In this context, it is hardly surprising that economic interests that produce potentially toxic substances prefer the more conservative, risk-based approach to the precautionary, hazard-based model.

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[9]. Sustainable Development and Minerals and Metals: An Issues Paper by Natural Resources Canada (Ottawa: Natural Resources Canada, September 1995), p.41.

[10]. The ARETS criteria are attached.

With respect to the treatment of naturally occurring substances (e.g. metals) with toxic characteristics, the existence of natural sources of these substances has long been recognized in policy discussions regarding environmental contaminants. It is reflected, for example, in the "virtual elimination" concept contained of the 1978 *Great Lakes Water Quality Agreement* with respect to persistent toxic substances. It is acknowledged in the TSMP as well. However, this does not alter the fact that very significant negative human health and environmental effects have been clearly established in relation to certain metals, such as mercury and lead. Indeed, these two substances were included in the original 1988 CEPA Toxic Substances List.

While it may not be possible to eliminate natural sources of these elements in the environment, action can and should be taken against anthropogenic sources. These include direct discharges to the air and water from extraction and industrial activities, the use of substances in the production of other products (e.g. batteries and flouresent lamps), and releases which occur as a direct result of human disturbances of the environment, such as mining, or the creation of large reservoirs.

5. Sustainable Development Challenges (Part IV) - International Cooperation

The NRCan issues paper proposes that Canada "play a leadership role in international fora to ensure that environmental and occupational health and safety issues relating to minerals and metals are dealt with on the basis of sound science and in a manner that supports sustainable development."[11]

This proposal is disturbing in light of the position that Canada as taken at a series of international environmental negotiations over the past six months related to the environmental effects of metals. During these discussion Canada has consistently made efforts to weaken proposed international actions. This has been particularly evident with respect to the proposed ban on the export of hazardous wastes for recycling under the *Basel Convention on the Control of the Transboundary Movements of Hazardous Wastes and Other Wastes and their Disposal*, from OECD to non-OECD countries. In addition, Canada has actively sought to weaken the United Nations Economic Commission on Europe initiative to control the transboundary air pollution by heavy metals, and the OECD Chemical Groups Risk Reduction Program's efforts to move towards the phase out of certain uses of lead.

CIELAP expects Canada to be a leader in international environmental negotiations. Unfortunately, the NRCan paper suggests that it intends to continue this obstructionist pattern of behaviour. Canada has already embarrassed itself on the international stage over the past few months in this way, and we hope that this pattern will not continue.

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[11]. Sustainable Development and Minerals and Metals, p.61.

6. Conclusions

CIELAP welcomes NRCan's efforts to begin to integrate the principles of environmentally sustainable development into its programs, policies and activities. However, the department needs to strengthen its understanding of the implications of sustainable development for the minerals and metals sector. In addition, the department should re-examine its role in relation to the sector in a sustainable development context. The subsidization of natural resources development activities deserves particular attention in this sense.

Furthermore, NRCan should consider taking a more precautionary approach to the assessment of potentially toxic substances, rather than holding to traditional risk-based models. The choice between risk and hazard based approaches is fundamentally one of policy, not "good" or "bad" science. A hazard-based approach is essentially precautionary in nature, and provides the basis for taking preventative measures with respect to substances due to their potential to cause harm to the environment or human health. Risk-based approaches, on the other hand, are fundamentally reactive in nature, and essentially wait for absolute proof of actual harm to the environment or human health before action can be taken.

Finally, the department needs to review its role in the development of Canada's position on international environmental initiatives. Canadians expect their government to be a leader in international environmental negotiations, not a force for obstruction and delay. In the development of its international positions, Canada must ensure that the long-term environmental and health interests of Canadians and other citizens of the world take precedence over the short-term concerns of particular economic interests.

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December 5, 1995

The Hon. Anne McLellan
Minister of Natural Resources
Rm 323-West Block
House of Commons
Ottawa, Ontario
K1A 0A6

Dear Ms. McLellan,

Please find enclosed the Canadian Institute for Environmental Law and Policy's response to Natural Resources Canada's (NRCan) September 1995 discussion paper, Sustainable Development and Metals and Minerals. CIELAP welcomes NRCan's efforts to integrate the principles of sustainable development into its work.

Unfortunately, NRCan's discussion document is a major disappointment in a number of ways. The paper's treatment of the issue of the role of the minerals and metals sector in an environmentally sustainable Canadian and global economy is weak, as is its treatment of the question of the role of government in the promotion of the sector in a sustainable development context.

In addition, CIELAP is concerned by the paper's discussion of the environmental impacts of mining, particularly with respect to the assessment of the "toxicity" of minerals and metals. The paper's discussion of Canada's international role with respect to the metals, minerals, and the environment is also disturbing, especially in light of the position taken by Canada on a number of recent international initiatives related to metals and the environment.

CIELAP would be pleased to discuss its concerns regarding NRCan's discussion paper with you, your staff, or your officials, should you have any questions regarding our views on these matters. I enclose, for your information, CIELAP's recent publication Putting the Environment in Green Industry Strategies: The Role of Environmental Industries in Restructuring for Sustainability. This document deals with a number of issues related to the transition to environmental sustainability for industrial economies like Canada's and, consequently, may be of interest to you.

Yours sincerely,

Anne Mitchell,
Executive Director

cc: The Hon. S. Copps, Deputy Prime Minister and Minister of the Environment
The Hon. C. Caccia, Chair, House of Commons Standing Committee on the Environment and Sustainable Development.
R.D. Nault, M.P., Chair, House of Commons Standing Committee on Natural Resources
Cathy Wilkinson, Coordinator, Mining Caucus, Canadian Environment Network
Craig Boljkovac, Coordinator, Toxics Caucus, Canadian Environment Network

ARET

Table 2. Scoring Criteria – Toxicity

ELEMENT NAME	ENDPOINT & UNITS	0	2	4	6	8	10
Acute lethality	oral LD_{50} (mg/kg)	> 5000	> 500- 5000	> 50- 500	> 5- 50	> 0.5- 5	≤ 0.5
	dermal LD_{50} (mg/mg)	> 5000	> 500- 5000	> 50- 500	> 5- 50	> 0.5- 5	≤ 0.5
	inhal LC_{50} (mg/m³)	> 15000	> 1500-15000	> 150-1500	> 15-150	> 1.5- 15	≤ 1.5
	aquatic LC_{50} (mg/L)	> 1000	> 100- 1000	> 10- 100	> 1- 10	> 0.1- 1	≤ 0.1
Chronic/Sub-chronic toxicity, Non-Mammals	aquatic						
	EC_{20} (mg/L)	≥ 20	2 - < 20	0.2 - < 2	0.02 - < 0.2	< 0.02*	< 0.02*
	MATC (mg/L)	≥ 2	0.2 - < 2	0.02 - < 0.2	0.002 - < 0.02	< 0.002*	< 0.002*
	NOAEC (mg/L)	≥ 0.2	0.02 - < 0.2	0.002-<0.02	0.0002 - <0.002	< 0.0002*	< 0.0002*
	terrestrial						
	subchronic (NOEL mg/kg/d)	≥ 1000	100 - < 1000	10 - < 100	1 - < 10	< 1*	< 1*
	chronic (NOEL mg/kg/d)	≥ 500	50 - < 500	5 - < 50	0.5 - < 5	< 0.5*	< 0.5*
						*in one genus	*in different genera
Chronic/Sub-chronic toxicity, Plants (water, mg/L) (air, mg/m³) (soil, mg/kg)	% growth reduction:						
	≤5 (= NOEL)						
	water	> 10	> 1 - 10	> 0.1- 1	> 0.01-0.1	0.001-0.01	< 0.001
	air	> 100	> 10 - 100	> 1 - 10	> 0.1- 1	0.01- 0.1	< 0.01
	soil	> 100	> 10 - 100	> 1 - 10	> 0.1- 1	0.01- 0.1	< 0.01
	>5-50 (=EC_{50})						
	water	> 100	> 10 - 100	> 1 - 10	> 0.1- 1	0.01- 0.1	< 0.01
	air	> 1000	> 100 -1000	> 10 - 100	> 1- 10	0.1- 1	< 0.1
	soil	> 1000	> 100 -1000	> 10 - 100	> 1- 10	0.1- 1	< 0.1
	>50						
	water	> 1000	> 100 -1000	> 10 - 100	> 1- 10	0.1- 1	< 0.1
	air	> 10000	> 1000 - 10000	> 100 -1000	> 10- 100	1- 10	< 1
	soil	> 10000	> 1000 -10000	> 100 -1000 .	> 10- 100	1- 10	< 1
Chronic/Sub-chronic toxicity, Mammals (These criteria are based on studies of ≥ 90 days duration. If only shorter-term subchronic studies are available, the NOEL is divided by 5, prior to scoring for toxicity.)	oral NOEL (mg/kg/day)	> 1000	> 100- 1000	> 10- 100	> 1- 10	> 0.1- 1	≤ 0.1
	inhal. NOEL (mg/m³)	> 3000	> 300- 3000	> 30- 300	> 3- 30	> 0.3- 3	≤ 0.3
Teratogenicity	mg/kg/day	no teratic or teratic only at > 1000	teratic or developmental anomalies at > 50-1000	teratic or developmental anomalies at > 10-50	teratic or developmental anomalies at > 1-10	teratic > 0.1-1, without overt maternal toxicity	teratic at ≤0.1 without overt maternal toxicity
Carcinogenicity	human and animal bioassay data	no tumours in adequate studies on at least two species, and does not interact with genetic material	tumours in only one animal species, negative results in others	causes benign tumours in more than one species, and does not interact with genetic material, promoter only, or causes cell transformation *in vitro* only (negative evidence *in vivo*)	tumourigenic in bioassay; at doses causing metabolic enzyme saturation, or associated with lesions that predispose to tumours. No interaction with genetic material	indirect-acting carcinogen, no interaction with genetic material	direct-acting carcinogen that interacts with genetic material or IARC Group 1, 2A, 2B or U.S. EPA Group A, B1 or B2 carcinogenicity classification
Genotoxicity/ Mutagenicity (This data element is only used if no reliable data is available on carcinogenic or reproductive endpoints.)	*in vivo* and *in vitro* cell assays	not genotoxic or mutagenic, negative results *in vivo* and *in vitro*	mutagenic in *in vitro* assays only, negative *in vivo*	mutagenic in prokaryote cells only, negative results in eukaryotic cell assays	causes DNA induction or repair, with no direct interaction with nuclear material	causes clastogenic effects, sister chromatid exchange, crosslinks; no evidence of mutation	mutagenic *in vivo* (no negative results from *in vitro* assays)

*Adapted from Table 1.6, in the Ontario Ministry of the Environment document "Candidate Substances List for Bans or Phase-outs" (Ref. ISBN 0-7729-9764-0).

LD_{50} - lethal dose for 50% of test organisms
LC_{50} - lethal concentration for 50% of test organisms
EC_{50} - effective concentration resulting in a 50% reduction in a test parameter relative to a control population
MATC - maximum acceptable toxicant concentration
NOAEC - no-observed adverse effect concentration
NOEL - no-observed effects level