



# MiningWatch Canada

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**The need to shift Canadian tax incentives  
to reduce the impact of the mineral industry  
on the environment and local communities**

**Seventh Annual Global Conference on Environmental Taxation  
Ottawa, October 23, 2006 (revised November 10, 2006)**

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## **The need to shift Canadian tax incentives to reduce the impact of the mineral industry on the environment and local communities**

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### **Abstract**

This paper describes Canadian mineral tax regimes and examines their impacts on the environment and local communities. Canadian fiscal incentives favour the extraction of virgin materials in remote and environmentally sensitive areas, rather than providing support for value-added manufacturing, the recycling industry and the conservation of minerals. It makes recommendations for shifting incentives to metals recycling and conservation measures.

The minerals industry in Canada and around the world is rapidly depleting mineral reserves. In addition, mineral and metal extraction leaves an enormously damaging and lasting environmental footprint, and the consequences of mining accidents, such as tailings dam failures, are potentially calamitous. In addition to major disturbances of the landscape, the destruction of fish, wildlife, and plant habitat, and the disruption of surface and ground water flows, mining generates enormous quantities of waste, and consumes large amounts of energy and water.

The Organization for Economic Cooperation and Development (OECD) recommended in its 2000 country report on Canada that, "the preferential tax treatment of conventional resource sectors, such as oil and gas, and minerals and metals should be eliminated" on both environmental and economic grounds. It has been estimated that, to achieve sustainability worldwide, the material intensity of each unit of economic output will need to be reduced by 50% and, in industrial countries like Canada, it will have to fall by factors of between 4 and 10.

### **Introduction and summary**

MiningWatch Canada is a pan-Canadian coalition of twenty Canadian organizations: Aboriginal, environmental, social justice, labour and church groups – that are concerned about the heavy toll on natural capital, the environment, human rights, health and communities caused by irresponsible mineral extraction. We undertake research, provide support to communities affected by mining, and advocate for policy change.

Mining has a big footprint: acid mine drainage, toxic effluents, air pollution, occupational hazards, enormous consumption of energy and water, roads and rail transportation hazards, community disruption and public tax costs. Local communities bear the brunt of these costs, and are often ill equipped to protect their interests. Most mining and exploration in Canada and around the world takes place on indigenous lands.

The awesome cost of the minerals we take for granted must be respected in government policy and industry practice. To us, this means treasuring the minerals that have already been extracted and reducing the need for mining wherever possible. Many more jobs and more sustainable economies can be created in the minerals industry if the focus shifts from mining to the re-use and conservation of minerals already taken from the ground and to value-added production in Canada.

## 1. The mining footprint at all stages of mining

The scale of the environmental and social impacts of mining has been central to arguments regarding the need to reduce the consumption of newly extracted materials. The current rates of materials consumption are considered unsustainable, not so much due to shortages of materials themselves, but rather due to the extent of the environmental and social costs associated with their extraction and processing.<sup>1</sup>

Mineral and metal extraction leaves an enormously damaging and lasting environmental footprint, and the consequences of mining accidents, such as tailings dam failures, are potentially calamitous.<sup>2</sup> In addition to major disturbances of the landscape, the destruction of fish, wildlife and plant habitat, and the disruption of surface and ground water flows, mining and metal and diamond mining in particular, generates enormous quantities of waste.

Mining requires removing from the Earth metal bearing ore together with “overburden,” the dirt, rock and biological systems that cover the ore. Only a very small portion of the material removed is actually used. For example, one pair of gold wedding rings leaves behind from 6 to 30 tonnes of waste rock and tailings<sup>3</sup>. The ratios are likely to deteriorate further as existing high-grade reserves are exhausted and lower-grade resources developed.

The Canadian mineral industry generates at least 1 million tonnes of waste rock and 950,000 tonnes of tailings per day, totalling 650 million tonnes of waste per year.<sup>4</sup> This is more than twenty times the amount of municipal solid waste generated each year by all of the residences, industries, commercial establishments and institutions in Canada combined.<sup>5</sup> Globally, humans now move more earth by mining than is carried to the sea by all the world’s rivers.<sup>6</sup>

In 1996, the mineral extraction industry in Canada had a combined water intake of 518 million cubic metres. Although mining recycles water from tailings ponds, most of its water intake came from freshwater bodies (82%) and most of the discharges – often of questionable quality – (78%) went into freshwater bodies.<sup>7</sup>

Mine operations are a major source of water pollution. Mine water and waste mill slurry may be extremely acid or alkaline, and may contain suspended solids, residual mine-mill chemicals, heavy metals, ammonia, and, in the case of uranium mines, radioactive substances. Run-off from tailings may be acidic and contain dissolved solids, heavy metals and other toxic substances due to acid mine drainage (AMD).

In 1993, it was estimated that in Canada there was a cumulative total of 700 million tonnes of waste rock and 1.8 billion tonnes of sulphide tailings with the potential to cause Acid Mine Drainage.<sup>8</sup> Even properly closed mines require “Perpetual Care and Maintenance” the cost of which is estimated at millions of dollars per operating mine.

While we may hope that mining companies will commit to ongoing care and maintenance of these sites into “perpetuity”, realistically, we have to realize that most of these sites will revert to the Crown down the road.

There are currently some 10,000 abandoned mines in Canada<sup>9</sup>. The Mining Association of Canada has estimated the cost of clean up of these sometimes-toxic sites at \$6 billion dollars<sup>10</sup>. The federal Auditor-General estimated the clean-up for federal abandoned mines in the North at \$555 million in 2002<sup>11</sup>. The actual costs of clean-up is going to be much higher.

While many Canadian mines provide economic benefits for some 9-15 years, the costs associated with containing and treating the huge amounts of Acid Mine Drainage waste they produce will need to be borne by Canadians for hundreds if not thousands of years after the mine closes.

In addition, ore extraction and concentration operations, refining and smelting, and tailings areas are major sources of air pollution and Green House Gas Emissions. Over 60,000 tonnes of particulate matter are released into the atmosphere from tailings in Canada each year, while the metal smelting

sector is a leading source of a range of heavy metals, including cadmium, mercury, lead, nickel and arsenic, as well as acid rain precursors such as sulphur dioxide.<sup>12</sup>

Metal and non-metal mining, smelting, and refining (exclusive of iron and aluminium smelting) accounted for about 7.8% of total industrial energy consumption and about 8.7% of direct industrial GHG emissions (including process emissions) in 2001<sup>13</sup>.

Mining also results in socio-economic costs including: health impacts; work injuries; boom and bust economic cycles; the destruction of indigenous livelihoods; and dramatic changes in regional cultures.<sup>14</sup>

## 2. Depletion or stewarding our mineral resources for the future

“Canadian mineral reserve levels are declining, and have been declining for over two decades. Copper reserves have declined from 17 million tonnes in 1980 to less than 6 million tonnes at present. Zinc reserves have fallen from 28 million tonnes to 5 million tonnes, while silver and lead reserves have shown similar 80% declines during this quarter-century period. Gold reserves increased in the 1980s, reaching a new peak in 1996, but have since dropped by 40 percent and have now returned to the lower levels experienced in the early 1980s. At current rates of production, Canada has 5.5 years of lead reserves remaining, seven years of zinc, 10.5 years of copper, 15 years of gold and 21 years of nickel reserves.”<sup>15</sup>

The Canadian Mining Industry approaches this problem by asking for more support to the exploration industry, so that more reserves will be discovered and in turn, depleted. Without policies and incentives to protect any remaining reserves from immediate and total pillage, future generations are likely to find themselves with no metals left to mine at all.

In a study published on January 17, 2006 in the *Proceedings of the National Academy of Sciences*, Yale University researchers said that their findings had determined that supplies of copper, zinc and other metals cannot meet the needs of the global population forever, even with the full extraction of metals from the Earth’s crust and extensive recycling programs, and that depletion will be an immediate problem for some precious metals like platinum.<sup>16</sup>

It has been estimated that, to achieve sustainability worldwide, the material intensity of each unit of economic output will need to be reduced by 50%<sup>17</sup> and, in industrial countries like Canada, it will have to fall by factors of between 4 and 10.<sup>18</sup>

Resource extraction and excessive material consumption are central to these stresses on the biosphere. The centrality of issues was recognized in Principle 8 of the 1992 Rio Declaration, committing the Parties to the elimination of unsustainable patterns of production and consumption, and in Chapter 4 of *Agenda 21 — Changing Consumption Patterns*.<sup>19</sup>

Society’s demand for goods and services can be achieved through waste prevention and reduction in the design and delivery of goods, and the recycling and reuse of existing materials stocks, rather than disposing of used materials at one end of the materials cycle and inputting newly extracted ones at the other.<sup>20</sup> Although the use of certain metals, such as mercury, should be phased out due to their extremely toxic properties,<sup>21</sup> other metals are especially good candidates for these approaches. Metals do not lose their mechanical or metallurgical properties when recycled and moreover, retain their economic value. As a result metals can be re-used and cycled through the economy almost without limit.<sup>22</sup>

The Organization for Economic Cooperation and Development (OECD) recommended in its 2000 country report on Canada that “the preferential tax treatment of conventional resource sectors, such as oil and gas, and minerals and metals should be eliminated” on both environmental and economic grounds. A 1999 study by the Institute for Fiscal Studies (U.K.)<sup>23</sup> concluded that our tax system “significantly favours the use of virgin materials rather than recycled materials in the case of metal and glass products”. This is exemplified by corporate income and mining tax incentives at the exploration and

extraction stages of production, as well as by provincial sales taxes on capital and on business inputs which are borne more heavily by scrap firms than by resource and manufacturing firms.

Another report, prepared in 1995 for the Canadian Council of Ministers of Environment (CCME), found taxation by the federal and provincial governments demonstrated a bias against recycling.<sup>24</sup> The authors estimated that, for Ontario, recycled materials should be taxed at a rate 4.5% lower than at present in order to be taxed at the same rate as virgin minerals. Furthermore, to achieve optimal waste management, the taxation rate for recycled materials would have to be 13 percentage points less than virgin materials.

Energy savings realized when metals are produced from secondary sources versus primary sources are: zinc, 60%; steel, 74%; lead, 76%; copper, 85%; aluminum, 95%.

Additionally, the reduction in pollution realized from recycling can be immense. For aluminum, there is a 79% material conservation, a 95% reduction in emissions and a 97% reduction of effluents through recycling. For steel, one sees a 90% virgin materials savings, an 86% emissions reduction, a 40% effluent reduction, a 76% water pollution reduction and a 97% mining waste reduction through recycling.<sup>25</sup>

Most of the jobs in the mineral industry in Canada are actually in smelting, refining, and manufacturing, and in mining supply and services, not in extraction. The metal mining industry in Canada currently employs fewer than 24,000 people. The Canadian metal recycling sector salvages an estimated 10 million tonnes of metal each year, valued at roughly \$3 billion. Shifting from extraction to reuse and recycling would be unlikely jeopardize the downstream jobs.

### **3. The tax regime for mining – brief description**

In 2002, Statistics Canada began to use NAICS industry codes to segregate tax data. This is a huge improvement in data collection from previous years which used the SIC codes. Mining – NAICS Code 21 – is also separated from oil and gas, which has the same code number for reporting purposes. Mining does, however, still include quarries and gravel pits. The total taxes paid by NAICS Code 21 (excluding oil and gas) in 2004 were \$702 million, broken down into \$493 million to the federal government and \$208 million to the provinces and territories.<sup>26</sup>

#### Layers of taxation paid by mining companies

##### The federal government imposes:

- corporate income taxes under the *Income Tax Act*, currently 28%, to be reduced to 21% by 2007, based on net income (The Resource Allowance is being phased out by 2007.)
- capital tax (a tax on assets and inventory) which applies only to companies with assets over \$50 million, to be phased out totally by 2008
- the GST (6% of purchases – export sales are zero rated so GST does not apply and producers are entitled to a refund for tax paid on inputs)
- payroll levies such as EI and CPP
- excise taxes and customs duties – there are numerous exemptions and rate reductions

##### Provincial governments and territorial governments impose:

- income taxes varying from 9.4% to 15% based on value of production
- mining tax varying from 5-14 % on defined mining profits
- capital tax of less than 1%. Six provinces have a capital tax; Ontario is phasing it out.
- health tax, sales tax, etc.

A number of expenses and deductions specific to the mining industry operating in Canada are allowed in the computation of income for tax purposes:

##### Resource Allowance

The federal resource allowance is being phased out by 2007. However, it used to allow 25% deducted from profits [revenues minus operating expenses (not including Crown royalties and mining taxes) and minus the Capital Cost Allowance] before the calculation of taxable income.

#### Canadian Exploration Expenses (CEE)

These are expenses incurred for the purpose of determining the existence, location, extent or quantity of a mineral resource, including prospecting, geo-chemical and geophysical surveys, drilling, trenching and preliminary sampling, removing overburden, sinking a mine shaft (pre-production development costs). They do not include costs for environmental assessment or the purchase of mineral claims. Any portion not used in the year the expenditure was incurred can be carried forward indefinitely. This creates a pool of expenditures that can be transferred to subsidiaries and upon sale of the company. It is often a reason to keep a floundering mining company alive rather than wind it up.

#### Canadian Development Expenses (CDE)

These are expenses incurred in sinking and excavating a mineshaft, acquiring new resource properties, underground workings AFTER the mine came into production. CDE is accumulated in a pool call the Cumulative Canadian Development Expenses. Up to 30% of the unclaimed balance in the pool may be claimed each year. The pool is transferable and can be carried forward indefinitely.

#### Flow Through Shares (FTS)

Companies are allowed to renounce or flow through CEE and CED expenses to shareholders so that the investor can use them as a tax loss. Investors get a 100% tax deduction for the money they invested in the shares, and they get to speculate on the value of the share over time. The federal government also provides a 15% tax credit to investors under the "Super Flow through Share Program"

#### Investment Tax Credits for Exploration (ITCs)

ITCs are available federally and in many provinces for scientific research, for investments in some regions of Canada, and to individual purchasers of flow-through shares where the funds are spent on mineral exploration. The federal government has 10% tax credit for companies that are engaging in "grass roots" mineral exploration.

#### Deduction of Mine Reclamation Trust Contributions

Income earned is subject to tax, as are withdrawals from the trust. Reclamation costs are fully deductible at the time incurred.

#### Tax Planning considerations – the Valuation Allowance

The valuation allowance is a method of raising or lowering the current value of a company by adjusting the value of its assets to reflect market value. The valuation adjustments may be accumulated and released to the operating account as required to affect taxation. For example, in 2003, because of higher gold prices, Barrick Gold was faced with paying an accumulated income tax expense of \$44 million. The company was able to offset the potential tax expense by releasing valuation allowances of \$39 million. The tax valuation allowance had been created by a construction start-up at Veladero in Argentina and by a corporate reorganization that enabled it to take advantage of certain tax assets.

Valuation allowances can also be accumulated by changes in tax law and regulation, by currency exchange rates, by re-evaluation of the extent and quality of ore bodies, by changes to "good will and reputation" – in effect, by anything that affects the realizable value of the company assets.

#### The Provincial Mining Tax Regimes

There are usually three levels of taxation on mines provincially/territorially: corporate income tax, Mining Tax, and capital tax. Some provinces have no capital tax.

With the elimination of the federal Resource Allowance, most provinces will no longer allow a comparable deduction provincially, and instead will allow a deduction for actual federal taxes paid. However, in the last budget, Ontario gave in to pressure from industry and is keeping the 25% deduction.

Provincial governments have different approaches to mine revenue for mining tax purposes. BC considers the valuation of the resource to be the ultimate selling price by the mining company. Other provinces tax mineral wealth at “mine mouth”; i.e., they tax the unrefined product and deduct estimated costs for processing it. This allowance for processing is set arbitrarily based on a percentage of the cost of the assets (buildings, equipment, etc) used for the processing, subject to a maximum, usually 65%. The rate varies from a low of 8% (no processing – Québec, New Brunswick, Newfoundland) to the maximum (65% – smelter/refinery in the province).

For the purposes of the Mining Tax, companies can also deduct Mining and Processing Asset Depreciation – often at 100% in the year of purchase. Deductions are also made for Pre-production Development Expense, Exploration Expenses and Mine Reclamation Fund contributions. Ontario exempts the first \$500,000 of mining income annually; New Brunswick exempts the first \$100,000.

#### Tax holidays

Some provinces also provide Mining Tax holidays for new mines. Ontario provides a \$10 million tax exemption for new mines as well as a three-year tax holiday, and 10 years for mines in remote locations (north of North Bay). Quebec has tax credits for new mines in northern Quebec. British Columbia exempts new mines from the net profits portion of mining tax until all costs have been recovered. Saskatchewan exempts new mines from mining tax until accumulated profits exceed the investment in the mine. The definition of a “new mine” for tax purposes can often be stretched to include new shafts on the same ore body.

#### **4. More detail on “Super” flow-through shares**

The ‘super’ flow-through program, a tax incentive for “grassroots” mineral exploration, was introduced in October 2000 as a temporary measure to help moderate the effect of a global downturn in mineral exploration in the 1990s. The original three-year program has been extended four times since its inception, each time for additional one-year periods. The program enables mining companies to allocate a portion of their exploration losses to investors to use as a loss on their tax returns. It also provides a 15% tax credit to these investors. This tax credit expires in March 2007, although it has already been renewed a number of times.

The federal Investment Tax Credit enables certain mineral exploration companies to receive another 10% credit for their investment in a mineral exploration project on previously undeveloped land. The ICTE was institutionalized with Bill C-48 introduced at the end of 2004.

The flow-through shares and Investment Tax Credit enrich speculative investors by reducing the after-tax cost of a \$1,000 investment in exploration in Canada to as little as \$207 in Quebec and \$333 in BC.<sup>27</sup>

It is important to note that most provinces also have Flow Through Shares and tax incentives for mines in remote areas, which are in addition to the federal program.

Increased commodity prices in the past two years have provided an unprecedented stimulus to mineral exploration in Canada. There is no doubt that this has resulted in increases in all the indicators currently used to evaluate the FTS program.

However, the unmeasured costs to communities and eco-systems have also been rising. Two examples illustrate the problem.

Fortune Minerals, a junior mining company registered in Ontario has made a number of private placements of FTS to its investors.<sup>28</sup> The company proposes to mine anthracite coal in the “Sacred Headwaters” of the Tahltan people: the headwaters of five major rivers in British Columbia. Elders from the community have been blockading their exploration activities, arguing that the rivers need to be protected and their cultural heritage is at risk. The Tahltans are faced with five major new mining projects on their lands as well as infrastructure to support them all at the same time. The exploration alone is damaging trout streams and fragile wilderness, but – more seriously- the resources required to deal with

all these mining exploration requests is more than these small and fragile communities can handle. Choices about which projects will benefit them the most and which are not even serious is a divisive and difficult process that draws energy from other work in the community.

In northern Ontario, seven First Nations have issued mining moratoria to stop the exploration activities of Platinex, Metallex, Superior Diamonds and other mining companies on their traditional territories. They say the companies are infringing their rights and damaging their land. They also say that, until their communities have been able to develop strategic level land use and economic planning, they are notable to benefit from any proposed mining projects. The companies refuse to go away, and continue to badger the band councils for access. These companies are all dependent on the Flow through Share program to raise equity.

It is clear that the FTS offerings are enabling these junior companies to sustain investor interest in their operations. *But at what price?*

There is an obvious need to rethink the system of taxation that has evolved for mining in Canada. The subsidies, incentives and tax planning rules result in most companies paying little or no tax and do not serve the Canadian public well.

## 5. The need for appropriate data gathering and analysis

It is extremely difficult to sort out the tax and royalty benefits of the mining and concentrating industry for a number of reasons. Many figures are confidential. Mining data is frequently aggregated with data from downstream industries like smelting, refining and metals manufacturing – industries which would still exist if the inputs were recycled materials. Mining data is also often aggregated with tar sands, oil and gas. Neither government nor the public has the tools they need to develop policies for sustainable minerals management. The federal, provincial and territorial Departments of Finance should annually provide Canadians – and countries with which we do business – with updated and disaggregated information about the actual contribution in taxes that are made by the mining industry and other sectors to the Canadian economy.

In December 2002, the Pembina Institute and MiningWatch Canada released a study assessing the value of government support for the metal mining industry in Canada, entitled Looking Beneath the Surface. The research for this study took more than a year and involved pouring through public accounts, industry and Statistics Canada reports, analyzing and digesting what we found. The work was hampered by the lack of data available from government. Governments generally were unable to provide estimates of the value of a number of important tax measures introduced to support the industry. Other information was considered confidential for commercial or privacy reasons. In many cases, closure and long-term care costs were not estimated at all or were underestimated. Most mines in Canada leave behind tones of toxic waste rock and tailings which need to be monitored and treated in perpetuity.

As an example, the Canadian government's Bill C-48 received royal assent on November 7, 2003, doing away with the Resource Allowance and reducing the corporate tax rate for mining from 28% to 21% by 2007. The data on which they had to rely for this legislation was based on modeling from data from 1997, the most recent year for which complete data was available<sup>29</sup>. When we were undertaking our report, we were told that governments did not keep records of the amount of tax foregone for a number of significant measures. In Ontario, this included the production allowance, which can be as much as 65% of a company's revenues, and provincial flow-through shares. In British Columbia it included the new mine allowance and the investment allowance. Federally, it included the accelerated capital cost allowance and any disaggregated information about actual taxes and royalties received from the industry.

The benefits from the industry were measured in jobs and GDP. Again, it took considerable detective work to dig through industry exaggerations. Government figures usually aggregate jobs for all stages of the mineral industry, not just for mining and milling, which produces a figure of "386,000 direct jobs"



instead of the 24,000 that were mining and milling; the GDP for the industry was mixed together with tar sands or with quarries.

## 6. Recommendations – Shifting incentives: Protecting Resources for Future Generations

Looking Beneath the Surface did find and bring to light many of the government incentives and subsidies to the mining industry, including tax deductions and credits, and program expenditures. The total value of the incentives/subsidies to the metal mining industry (that we were able to identify) was staggering: over \$580.2 million in the 2000-2001 fiscal year. This figure did not include the costs for reclaiming abandoned mines, unfunded liability for mine closures nor the costs for the subsidies and incentives we were unable to track.<sup>30</sup> Most of the subsidies and incentives were directed to prospecting and exploration. Special subsidies – such as those described in Looking Beneath the Surface – for mining exploration, should be ended and the public resources transferred to community re-investment strategies, abandoned mine reclamation and metal conservation and recycling research and development

Policies that de-emphasize mining and incent mineral re-cycling, re-use and value-added make sense on many levels:

- depletion of natural capital: no less prestigious a body than the OECD has called for a reduction in all material inputs – including metals. Mining is a heavy user of water and energy; and our mineral deposits are being depleted;
- toxic legacies: mining pollutes water, air and soil, increasing human health costs and creating lost opportunity costs for the fishery, tourism and farming;
- distorted land-use planning: the perceived need for more mineral extraction sites distorts land use planning and local economies and leaves behind toxic legacy sites and mining dependent communities.

We recommend that the federal and provincial governments:

- Facilitate an ecological analysis of tax measures (through Statistics Canada and the Department of Finance);
- End flow-through shares and other incentives for virgin mineral extraction and exploration;
- End provisions for the pooling and transfer of Canadian Exploration and Development Expenses (CEE and CDE);
- Require full reclamation bonding in realizable securities; and
- Incent recycling, conservation and re-use of minerals.

## Endnotes

<sup>1</sup> J.E. Young, Mining the Earth, Worldwatch Paper 109, (Washington: Worldwatch Institute, 1992).

<sup>2</sup> As illustrated by the August 1995 Omai Gold mine tailings dam collapse in Guyana (for a detailed discussion of this incident see <http://www.probeinternational.org>); the March 1996 Marcopper tailings dam failure in the Philippines (for a detailed discussion of this incident, see [http://www.miningwatch.ca/publications/Marinduque\\_backgnd.html](http://www.miningwatch.ca/publications/Marinduque_backgnd.html)), and April 1998 Boliden tailings dam failure in Spain (for a detailed discussion of this incident see <http://www.antenna.nl/wise/uranium/mdaff.html>). On the potential for mining tailings dam collapses in Canada, particularly in the context of climate change, see P.E. Perkins, "Climate Change and the Canadian North: Ecological Economic Implications Related to Mining," paper presented to conference of Canadian Society for Ecological Economics, October 1997.

<sup>3</sup> G. Gardner and P. Sampat, Mind over Matter: Recasting the Role of Materials in Our Lives, Worldwatch Paper 144, (Washington: Worldwatch Institute, December 1998), p.18.

<sup>4</sup> Government of Canada, The State of Canada's Environment, (Ottawa: Minister of Supply and Services, 1991) p.11–19.

<sup>5</sup> Total municipal solid waste generation in Canada is estimated to be approximately 30 million tonnes per year.

<sup>6</sup> J.E. Young and Sachs, The Next Efficiency Revolution: Creating A Sustainable Materials Economy, Worldwatch Paper 121, (Washington: Worldwatch Institute, 1994).

<sup>7</sup> David Sharf, David Burke, et al, Industrial Water Use 1996, Environment Canada. This represents the most recent survey of its kind in Canada.

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<sup>8</sup> G. Feasby and R.K. Jones, Report on the Results of a Workshop on Mine Reclamation — Toronto, Ontario, March 10–11, 1994, (Ottawa: Natural Resources Canada, 1994) p.10.

<sup>9</sup> Mackasey, W.O. Abandoned Mines in Canada, MiningWatch Canada, 2001.

<sup>10</sup> Globe and Mail: September 14, 1994.

<sup>11</sup> Office of the Auditor-General of Canada, the 2002 Report of the Commissioner of the Environment and Sustainable Development, Chapter 3, Canada, 2002.

<sup>12</sup> *Ibid.*, pp.8–10.

<sup>13</sup> John Nyboer, Michelle Bennett, Alison Laurin. A Review of Energy Consumption and Related Data: Canadian Mining and Metal Smelting and Refining Industries 1990 to 2001, prepared for Mining Association of Canada, Canadian Industry Energy End-use Data and Analysis Centre, Simon Fraser University, August, 2003.

<sup>14</sup> See Mining and Communities: A Literature Review and Annotated bibliography (Ottawa: MiningWatch Canada, 2000).

<sup>15</sup> Mining Association of Canada presentation to Mines Ministers Conference, Whitehorse, August 2006.

<sup>16</sup> National Science Foundation <http://www.physorg.com/printnews.php?newsid=9971>

<sup>17</sup> The report of the High-Level Advisory Group on the Environment to the Secretary-General of the OECD; November 25, 1997, p.10.

<sup>18</sup> The need for a 90% reduction in material intensity in OECD countries was acknowledged in the October 1994 Carnoules Declaration, endorsed by prominent individuals including the former executive directors of the Business Council for Sustainable Development and the Brundtland Commission (in T. Green, Lasting Benefits from Beneath the Earth, 1998:69). See also G. Gardner and P. Sapat, Mind over Matter: Recasting the Role of Materials in Our Lives, Worldwatch Paper 144, (Washington: Worldwatch Institute, 1998); J.Young and Aaron Sachs, The Next Efficiency Revolution: Creating a Sustainable Materials Economy, Worldwatch Paper 121 (Washington: Worldwatch Institute, 1994). Fresenius Environmental Bulletin (special edition on The Material Intensity Per Unit of Service (MIPS) project of the Wuppertal Institute fur Klima, Umwelt und Energie in Wuppertal, Germany, Vol.2, No.8, 1993.

<sup>19</sup> See, in particular, Art. 4.18.

<sup>20</sup> On these approaches see Strategic Waste Prevention: OECD Reference Manual ENV/EPOC/PPC(2000)5/FINAL (Paris: OECD, August 2000), Chapters 2 and 3. Also G. Gardner and P. Sapat, Mind over Matter: Recasting the Role of Materials in Our Lives, Worldwatch Paper 144, (Washington: Worldwatch Institute, December 1998).

<sup>21</sup> For a good overview of the toxic properties of mercury see Mercury Study Report to Congress (Washington: US EPA, December 1997). See also <http://www.scorecard.org>.

<sup>22</sup> Natural Resources Canada, Metals and Minerals Policy of Canada, (Ottawa: Government of Canada, 1996), p.12.

<sup>23</sup> K. Scharf, "Tax Incentives for Extraction and Recycling of Basic Materials in Canada", Fiscal Studies, 20(4), pp 451-477, 1999.

<sup>24</sup> EMCBC publication, "Protecting the Future through Action Today", (30/08/2004).

<sup>25</sup> Fothergill, Jay. Scrap Mining: An Overview of Mineral Recycling in Canada, the Canary Research Institute, October 2004

<sup>26</sup> Statistics Canada, <http://cansim2.statcan.ca/results/2006092710263616673.CSV>

<sup>27</sup> Natural Resources Canada March 2003 presentation to World Bank Extractive Industries Review, p. 28.

<sup>28</sup> They have had at least four FTS issuances to date:

November 10, 2005: 833,334 flow-through common shares to raise gross proceeds of approximately \$3-million

September 15, 2003: 899,930 shares @ \$0.67

August 5, 2003, 375,000 shares @ \$0.67

March 10, 2003: 560,572 shares @\$0.70

<sup>29</sup> The estimate in the Technical Paper of the fiscal cost of the measures ultimately contained in Bill C-48 was based on confidential corporate income tax (so-called T2) data from the Canada Revenue Agency (CRA) for 1997, the most recent year for which complete data was available. To estimate the impact going forward, forecasts for factors such as commodity prices and gross domestic product were derived from internal analyses performed by Finance Canada and from external sources. The revenue impact was then determined based on the proposed transition path using a micro-simulation model, which replicated the changes in tax rates and the tax structure.

The pie chart on page 10 of the Technical Paper written for Bill C-48 presents an estimate of the total value of royalties, income taxes and capital taxes paid to federal and provincial governments in 1997 by the mining industry. The estimate excludes indirect taxes (for example, excise and sales taxes) and property taxes and hence, understates total revenues. Federal income and capital tax figures are based on confidential CRA data for the 1997 taxation year, the most recent year for which complete data were available. Provincial income and capital tax figures are estimates based on federal data. Provincial mining tax and royalty figures are based on Public Accounts data. Obviously in a highly cyclical industry like mining, the figures can vary significantly from one year to another.

All types of mining are included in the data, including quarries. Since the data is enterprise-level, corporations are assigned to a particular industry category based on the activity that represents the greatest value-added. For that reason, the data may include some smelting and refining as well as mineral extraction. On the other hand, it may exclude some extraction carried on by companies for which this is not the primary source of value-added.

<sup>30</sup> Finance Canada says they did not agree with the modeling methods we used to calculate this figure, but have yet to provide a specific critique of any of the report.