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FINAL REPORT

**PROMOTING
SUSTAINABLE MINING
IN THE AMERICAS**

**Environmental Law Institute
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I. INTRODUCTION

A. The USAID Partnership to Promote Clean Technology in the Mining Sector in Latin America and the Caribbean

The United States Agency for International Development launched its "Partnership to promote Clean Technology in the Mining Sector in Latin America and the Caribbean" in order to identify the policy, technical and financial options for promoting pollution prevention in the mining sector. Pursuant to Grant Award No. LAG-G-00-97-00016-00, the Environmental Law Institute (ELI) conducted one of three studies supported by the Partnership. ELI's study provides an overview of the legal and policy options. A second report, prepared by Hagler Bailly, pursuant to the EP3 Project, addresses the technical issues. A third report, providing information on financial mechanism, is being prepared by SAIC.

B. The ELI Program

According to the grant award, ELI, in partnership with leading environmental law centers in the hemisphere, was to prepare suggested regional guidelines for use by national policymakers in developing effective national legislative frameworks for understanding and controlling the environmental impacts of expanded mining in the region. During the first phase of the project ELI and its partners were to research existing national and subnational laws and policies in their respective countries for regulating the environmental aspects of mining. The seven national case studies were to focus on the different policy approaches, including economic incentives, used in these countries to promote the concept of pollution prevention, as well as the development and transfer of "state of the art" pollution prevention technology and services. The national case studies also were to identify gaps or inadequate mechanisms in these regulatory frameworks.

During the second phase of the project, ELI was to review and edit the national case studies and prepare a draft of the suggested regional guidelines. This draft was to be circulated to the project partners as well as representatives of the mining industry and government for comment. In the final phase of the project, ELI was to disseminate the final report to key policy makers in the region active in the development of mining regulations and present the project results at state and national events.

ELI's partners for the project included: *Fundación Ambiente y Recursos Naturales* in Argentina, *Centro Especializado de Derecho y Política Ambiental* (CEDPA) in Bolivia, *Instituto Socioambiental* (ISA) in Brazil, Canadian Institute for Environmental law and Policy (CIELAP) in Canada, *Comité Nacional Pro Defensa de la Fauna y Flora* (CODEFF) in Chile, *Centro Mexicano de Derecho Ambiental* (CEMDA) in Mexico, and *Sociedad Peruana de Derecho Ambiental* (SPDA) in Peru.

1. Activities

Activities included preparation of a research methodology, conducting research, preparation of seven national case studies, preparation of a final report and related outreach work to promote pollution prevention in the mining sector throughout the region.

2. Budget and Expenditures

Through the life of the project, USAID obligated \$80,000 to fund the project and ELI has since expended all of these funds. ELI's contribution to the project was \$61,560.

II REPORT ON PROGRAM ACTIVITIES AND ACHIEVEMENTS

A. Research and Policy Activities

To guide the research activities, ELI first created, in early 1998, a common methodology for the project partners to use in conducting the research for the national case studies. The methodology defined key concepts and legal tools and presented an outline of issues for the development of the case studies. The methodology was circulated to project partners for comment, and ELI incorporated the comments into a new draft of the methodology. From January 10-20, 1998, ELI senior staff attorney Byron Swift traveled to Peru, where he worked on the project methodology with Manuel Pulgar Vidal of the Sociedad Peruana de Derecho Ambiental (SPDA), one of ELI's partners in the project, and discussed SPDA's participation in the project.

During the spring of 1998, ELI finalized the methodology for national case studies and circulated English and Spanish versions to the project partners. ELI also compiled and distributed to the project partners a package of background information concerning pollution prevention in the mining sector and the environmental impacts of mining to provide a context for their national case studies. All of the project partners began work on answering the comparative questionnaire. During this period, Luke Danielson, a lawyer and international expert on mining, began assisting ELI on the project and consulted with the project partners on responding to the project's research questionnaire.

During the summer and fall of 1998, the project partners completed first drafts of the national case studies. ELI Visiting Scholars Sergio Mújica and Lorenzo de la Puente worked on translating these drafts, while ELI staff and Luke Danielson reviewed the national case studies and provided comments to the local organizations. In 1999, ELI received final drafts of the national case studies from the project partners and completed edits to the national case studies based on comments from ELI staff and Luke Danielson. ELI staff analyzed the information in the case studies and prepared a preliminary draft of the the proposed hemispheric framework as well as an overview of the actual status of the different legal and policy tools based on selected

examples from the case studies. This draft was circulated to the project partners for comment.

In January 2000, ELI published the final report entitled *Pollution Prevention and Mining: A Proposed Framework for the Americas*, which summarized existing legal tools and cross-cutting policies for pollution prevention in mining sector and proposed a hemispheric framework for pollution prevention in mining. Printed copies of the ELI report were disseminated to key stakeholders (distribution list attached as Exhibit A). The report is also available on ELI's website. In April 2000, the report was written up in BNA's *International Environment Reporter*, and this publicity has generated much interest.

B. Outreach Activities

1. U.S. Bureau of Land Management Activities

Throughout the course of the project, ELI staff and visiting scholars engaged in a series of outreach efforts to introduce their work into various policy making arenas. As one form of outreach, ELI played a major role in supporting U.S. participation in the annual Conference of Mining Ministries of the Americas (CAMMA) and promoting the inclusion of pollution prevention.

On February 24, 1998, ELI senior staff attorneys Susan Bass, James McElfish met with Bob Armstrong, Assistant Secretary for Land & Minerals at the U.S. Department of the Interior; Dave Albertswerth, Special Assistant to Armstrong and Acting Deputy of Congressional Affairs; and Pat Shea, Director of the Bureau of Land Management. The group discussed possibilities for U.S. participation at CAMMA and the upcoming Santiago Summit.

On October 2, 1998, ELI hosted luncheon for the following people to discuss the November 1998 Conference of Mining Ministries in Buenos Aires: Pat Shea, Director of BLM; Brooks Yeager, Director of the Office of Policy Analysis, Department of Interior; Cathy Washburn, International Affairs, Department of the Interior; Bob Anderson, Department of Interior; Dave Alberswerth, Acting Director of Congressional and Legislative Affairs, Department of Interior; and Mike Shelton, Deputy Director, Summit Coordination, State Department. The purpose of the luncheon was to brief the participants on ELI's project on pollution prevention in the Americas and to encourage the participants to promote a pollution prevention agenda at CAMMA, to which Pat Shea led the US delegation.

At the request of the Department of Interior, ELI prepared background material for Pat Shea's presentation at the Conference of Mining Ministries on the health and environmental effects of mining and opportunities for pollution prevention and reclamation. ELI also assisted in organizing meetings with pro-environment academics, NGOs and mining companies that were in Buenos Aires. Immediately prior to the Ministerial, ELI staff members Byron Swift, Susan Bass and visiting scholar Lorenzo de la Puente met with Pat Shea and Bob Anderson at the Department of Interior to view and comment on the DOI presentation scheduled for CAMMA

In December 1998, Pat Shea, Dave Alberswerth, and Bob Anderson of DOI visited ELI to brief the staff on the results of the Ministerial and to discuss strategies for future cooperation on promoting pollution prevention. Pat Shea also presented the final version of the PowerPoint presentation he made in Argentina. Mr. Shea was very positive about the U.S. participation at CAMMA. Twenty-two ministers were representatives, and the conversations were very cooperative. The U.S. presentation provided a definition of unsustainable mining, which was mining that involves irreparable harm to human health or irreparable harm to the environment. Other key messages included (i) the need for pre-mining planning, (ii) the need for mitigation, and (iii) the need for permanent restoration, including backfilling and re-vegetation. Mr. Shea returned convinced that this was a meeting of international significance that the U.S. should attend, and he conveyed this message to the White House and Office of the Secretary of the Interior.

In 1999, ELI continued to coordinate with the Bureau of Land Management on promoting the pollution prevention agenda on the agenda at CAMMA. ELI also has been assisting BLM in the preparation of a seminar on mining and sustainable development scheduled for October 2000 in Las Vegas. ELI is organizing a panel on pollution prevention for the seminar. The seminar will follow the CAMMA meeting in Canada and will coincide with the World Mines Expo, an event attended by over 40,000 people.

2. Conference Presentations

ELI also has been conducting policy outreach through presentations at key conferences and seminars in the region. For the March 30-31, 1998 Institute of the Americas conference in Lima, Peru, entitled "Mining, Investment, & the Environment in the Andean Region," ELI prepared background information for a presentation by Gil Jackson of USAID. In addition, ELI assisted project partner Manuel Pulgar of SPDA in preparation for his presentation at the conference.

From June 27-29, 1998, Mark Winfield, a project partner from CIELAP in Canada, participated in an IDRC workshop on "Mining and Sustainable Development in the Americas" which was held in Lima, Peru and in conjunction a meeting for IDRC's Mining Policy Research Initiative. Luke Danielson led this initiative and, along with ELI, worked to coordinate the IDRC and ELI projects.

From June 2-3, 1999, ELI International Associate and former Visiting Scholar Lorenzo de la Puente delivered a presentation at the Institute of the Americas conference on "Keys to Success in Latin American Mining: Infrastructure, Regulation, and Risk Management" in Keystone, CO. (A copy of Mr. de la Puente's presentation is attached as Exhibit C, along with the overall agenda for the conference and a list of participants.) The presentation provided a definition of pollution prevention; described legal tools that serve the pollution prevention objective (Environmental Impact Assessment, planning, permits, financial incentives, monitoring and disclosure requirements, public participation, and environmental management systems); and

described components of pollution prevention strategies during exploration, active mining operations, and closure. The presentation concluded that pollution prevention offers the mining industry the opportunity to address environmental problems and at the same time take advantage of economy and efficiency in operations. Mr. de la Puente emphasized the importance of linking economic incentives to pollution prevention policies and how pollution prevention is good choice in the long term. Based on his experience at the conference he suggested the need to listen to the perspective of private companies in addition to that of NGOs in order to view the whole picture.

Lorenzo de la Puente delivered a presentation similar to his June 2-3 presentation at the business forum held in connection with the Third Conference of Mining Ministries held in Caracas, Venezuela, October 25, 1999. Several industry representatives attending the conference expressed interest in working with ELI on this initiative.

C. Visiting Scholars

Over the course of the project, ELI hosted several visiting scholars from throughout Latin America who assisted with research, the preparation of project materials, communications with project partners and translating the national case studies. These visiting scholars included Martha Aldana and Lorenzo de la Puente of Peru, Sergio Mújica of Chile, and Andres Tissera of Argentina.

3. Other Activities

During March - June 1998, Marco González of the *Comisión Centroamericano de Ambiente y Desarrollo* (CCAD) asked ELI to expand the Sustainable Mining in the Americas Project to include the Central American region. This request was endorsed by a resolution recently adopted by the CCAD to that effect. Unfortunately, USAID was unable to support this request.

In October 1998, ELI staff Susan Bass, Byron Swift and visiting scholars Sergio Mujica (Chile) and Lorenzo de la Puente (Peru), along with Daniel Ryan of FARN (Argentina), met with Gil Jackson of USAID and Jack Mozingo of SAIC to discuss the upcoming Mining Ministerial. They also discussed Jack Mozingo's AID-funded project on the role of private capital in influencing the environmental regulation of mining.

While in Buenos Aires in late 1998, ELI Senior Attorney Byron Swift met with members of the US and Argentine delegations to the Ministerial as well as Luke Danielson, a consultant to ELI who was based in Montevideo, Uruguay and headed the IDRC research initiative on mining.

On October 6, 1999, Jay Pendergrass of ELI met with Martin Scurah, Director of Oxfam America's Programa America del Sur to discuss Oxfam's work with indigenous groups in Ecuador, Peru and Bolivia to support them in protecting their homelands from the environmental

impacts of mining and oil and gas development. Oxfam works on capacity building, including training in negotiating, legal and policy development, and advocacy (legislative and litigation). Oxfam's partners in this effort include the Sociedad Peruana de Derecho Ambiental (SPDA). ELI, SPDA and Oxfam America have since begun collaboration on setting up a certification program for the mining industry. This project would initially focus on the Americas and emphasize protection of the environmental, social, and cultural values of local communities.

From May 4-6, 2000, Susan Bass participated in a strategic planning workshop hosted by the International Institute for Environmental and Development (IIED) in London to launch their new global "Mining, Minerals and Sustainable Development" project. At this meeting, Ms. Bass discussed and disseminated ELI's final report for this project.

IV. CONCLUSIONS

A. Program Impact

As the previously stated activities suggest, ELI's work advanced efforts to promote pollution prevention in the mining sector in a number of ways. First, the project improved the capacity of the local environmental law groups that served as ELI's partners to understand, analyze and develop environmental laws and policies. Second, the project produced seven national case studies, available through the local partners, which provide a comprehensive picture of what is happening at the national level in the Americas. Further, in January 2000, ELI published the final report for the project, *Pollution Prevention and Mining: A Proposed Framework for the Americas*. This report constitutes a major first step in the development of hemispheric framework for promoting pollution prevention by 1) summarizing and analyzing existing national frameworks across the region; and 2) offering a preliminary framework for the region by providing an overview of the legal and policy tools for pollution prevention at the local, national and regional levels while taking into consideration specific legal, social and economic contexts.

The report concludes with a series of eight recommendations that specifically target some of the key problems with national laws. These recommendations include:

- Incorporating a broadly defined goal of pollution prevention in a general environmental framework law or specific environmental media laws.
- Developing specific goals, measures, and technical guidance to achieve pollution prevention in the context of specific tools applicable to mining.
- Improving planning tools for pollution prevention, especially closure planning requirements.

- Creating effective and adequate financial assurance mechanisms.
- Setting policies and strategies for addressing pollution prevention in the context of remining or privatization.
- Strengthening mechanisms for public participation.
- Creating economic and other incentives for the development and use of pollution prevention technology.
- Implementing strong liability systems.

In addition, ELI conducted a series of outreach activities which included the following activities:

- Educating key policy makers, industry, government regulators and the public about pollution prevention in the mining sector through a number of conference presentations;
- Educating and involving the U.S. government through collaboration with the U.S. Bureau of Land Management on activities associated with events such as meetings of the hemisphere's Mining Ministers; and
- Advancing the understanding and discussion of pollution prevention issues through these and other events.

B. Recommendations for Future Activities

ELI has identified a number of next steps for promoting a hemispheric agenda for pollution prevention in the mining sector. The proposed activities include continuing ELI's capacity-building and outreach activities and initiating new research activities to build on ELI's work up to this point. Specific tasks identified for the near future include:

- Translating both the report (into Spanish) and the national case studies (into Spanish or English as needed) to allow wider distribution to industry and government at major international policy meetings in the near future.
- Assisting BLM in developing and presenting materials on pollution prevention at the upcoming BLM symposium, "Mine Operations and Sustainable Development" to be held October 11-12, 2000 in Las Vegas, Nevada.
- Launching a program of capacity-building and outreach activities to promote adoption of the recommendations on pollution prevention at the national and local

level in Latin America.

- Conducting policy research and analysis to improve public participation in the EIA process and help foster the incorporation of pollution prevention concepts into the process.
- Continuing collaboration with Oxfam America and SPDA on developing a certification program for the mining industry with a focus on protection of the environmental, social and cultural values of local communities in the Americas.
- Continuing coordination with BLM for promoting the pollution prevention agenda at future CAMMA events.

Exhibit A:

Distribution List for ELI's Report, *Pollution Prevention and Mining: A Proposed Framework for the Americas*

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Exhibit B:

**April 2000 Article on ELI's Report in BNA's
*International Environment Reporter***

Cochran said that companies such as BP Amoco, Royal Dutch Shell, United Technologies Corporation, and others are looking at greenhouse gas reporting.

Builds on Effort Announced in 1999. Last June, an international group of business, governmental, and environmental organizations announced that it had formed a partnership to develop an international protocol for measuring and reporting greenhouse gas emissions from business. The group included BP Amoco, the Pew Center, the World Resources Institute, the World Business Council for Sustainable Development, Arthur D. Little, Consolidated Edison Company of New York, GEMI, the United Nations Environment Program, and others (22 INER 540).

The protocol being developed by the group will aim to help businesses simplify reporting and improve the credibility, comparability, and usefulness of information.

Cochran said that companies considering reporting their greenhouse emissions have to decide whether to report "direct" emissions only or also "indirect" emissions from upstream or downstream sources.

In developing an inventory, she added that companies should take a number of steps, including:

- identifying the key sources of their greenhouse gases;
- establishing baselines against which to measure trends; and
- preparing for possible governmental programs to give credit to companies that make early reductions in greenhouse gas emissions.

Cochran said that companies have a variety of approaches available to them in developing their inventories. They should, however, ensure that the inventory is comparable to other firms' efforts, that the process for developing it is "transparent," and that it reflects the emissions the company can control.

During the session where Cochran spoke, companies present were asked whether they expect the Kyoto Protocol on climate change to be implemented in its current form. Of the more than 75 participants in the workshop, fewer than 10 said they expected the Kyoto Protocol to be the final word on greenhouse gases. Most of the participants said they expect to see a replacement measure in the future.

New GEMI Web Site for Businesses. GEMI also announced that it has developed a new Web site to help its members and others stay abreast of information and innovations relating to global climate change. It said this new tool will provide site-useful information and case studies.

The Web site, for instance, provides information on the scientific theories and the risks and opportunities for business; an on-line survey for companies to fill out that will help them to rank their exposure on climate change and give a customized list of recommendations; tips for collecting data and for calculating greenhouse emissions; and practical ways to cut emissions.

—BY MARLON B. ALLEN

The GEMI Web site address is <http://www.businessandclimate.org>.

General Policy

Economic Globalization Seen as Likely To Result in More Environmental Treaties

More international and regional environmental agreements are a likely outgrowth of economic globalization, an expert in international studies said April 7.

"It's important that the trend be toward more effective agreements," Scott Barrett, a professor at the Johns Hopkins University School for Advanced International Studies, said.

Barrett spoke at a seminar sponsored by the U.S. Chamber of Commerce on the Internationalization of Environmental Issues.

Nearly 160 agreements exist that are either international, bilateral, or regional in scope, he said. Many, however, are ineffective because enforcement of these treaties tends to encroach on sovereignty, he said.

One agreement that stands out as successful and should be a model for other agreements is the Montreal Protocol on Substances that Deplete the Ozone Layer, he said. This agreement has had near universal success in curbing the production and use of compounds such as chlorofluorocarbons that can harm the ozone layer (INER Reference File 1, 21:3151).

"We're hoping to be able to do something like that for climate change," Barrett said, adding that that issue will be much more difficult to address.

Kristalina L. Georgieva, director of environment programs at the World Bank, said successful global agreements occur when a shared resource, such as the ozone layer or the Baltic Sea, is at risk and the cost of inaction is high.

However, agreements are more difficult to reach if the cause of action is far off or uncertain, as is the case with climate change, or when cross-border damage is occurring but no political body can enforce action, she said.

William Mansfield, senior adviser to U.N. Environment Program Director Klaus Töpfer, said governments can help facilitate agreements by encouraging better use of incentive programs and voluntary measures.

Mining

Report Proposes Framework to Prevent Pollution From Mining in the Americas

A new report offers a plan aimed at avoiding or minimizing significant environmental impacts of hard rock mining in the Northern Hemisphere through a framework to promote pollution prevention.

"The environmental impacts of hard rock mining can be highly adverse if the proper pollution prevention technology and regulatory framework are not in place and properly functioning," according to an ~~Environmental Law Institute~~ research report, *Pollution Prevention and Mining: A Proposed Framework for the Americas*. The report was released by the Washington, D.C.-based institute March 28.

In a press release, ELI noted that a mining boom is occurring in Latin America, but "[u]nfortunately, regu-

lations governing mining in the countries of the region are often weak and ineffective."

The report said a regionwide approach to preventing pollution from mining would help "to set a common playing field" as well as to avoid "the complexity of having different standards in different regions."

In releasing the report, ELI senior attorney Susan Bass said, "Pollution prevention should be a strategic management principle for the hard rock mining industry. It offers the opportunity to avoid or minimize environmental impacts while also identifying and promoting economy and efficiency in design and operation of mining facilities. It enhances recovery of minerals while helping to minimize impacts on the environment and preventing the creation of long-term hazards."

Tools, Policies to Promote Pollution Prevention. For its report, ELI conducted studies of national legal frameworks for pollution prevention in the mining sector in Argentina, Bolivia, Brazil, Canada, Chile, Mexico, Peru, and the United States. It was assisted in its research by environmental agencies and institutes in Latin America and Canada.

Among the tools and policies contained in the national reports were environmental impact assessments, planning, permitting, regulatory standards, financial assurances, and environmental management systems, as well as public participation and economic incentives.

The report noted that EIAs are "gaining great popularity in the Americas as a tool for preventing the environmental impacts of mining," adding that in Bolivia and Chile, "the EIA is the linchpin of the [pollution prevention] program."

However, in general, EIA laws in the region "do not set pollution prevention as a goal." And another common problem is that "guidance and regulations concerning preparation of the EIAs rarely recommend or require specific measures and techniques for pollution prevention, even though the company may be subject to a general requirement to describe the steps it would take to prevent pollution."

Another tool, planning, "plays a significant role in many of the countries studied," the ELI report said. Plans may be required in connection with different phases of operations—exploration, operations, and closure—or to address specific environmental problems, it said. But again, while "many countries have the regulatory structure in place to use planning as a tool for pollution prevention, the substantive planning requirements necessary to meet this goal are missing in most cases."

And regarding the use of permits and licensing requirements to control pollution from mining, the report found that several of the countries studied were using a "wide range of permits or licenses . . . to address pollution prevention" but "[a]gain, as with the EIA processes and planning, the national case studies reveal that few substantive requirements for addressing pollution prevention are part of the permitting process."

In terms of regulatory standards, "only very limited progress" has been made in the region toward creating standards specifically to promote pollution prevention, it said.

Management Systems. While environmental management systems are generally not required by law, they "can nevertheless serve to improve the efficiency of

mining operations and hence, their avoidance of unnecessary and wasteful pollution," the report said.

Furthermore, these systems can give investors and purchasers of commodities greater confidence in the operations "and thus benefit the company's operations," it noted.

The report suggested that a number of countries' adoption of the International Standards Organization's ISO 14000 environmental management systems standards "may drive mining companies toward greater pollution prevention in their operations."

However, the voluntary use of such systems is just beginning in some countries, the report said, adding that few have formally incorporated EMS into their regulatory structures.

Proposed Framework. After analyzing the tools and policies available in the national frameworks for pollution prevention, ELI and its partners came up with a proposed hemispheric framework for preventing pollution from mining that calls for source reduction—strategies to reduce or eliminate pollutants at the point of generation.

The framework also calls for recycling, treatment, and secure disposal. Recycling "provides for the use or reuse of wastes as a substitute for a commercial product or material in an industrial process," the report said, and can include "strategies such as closed-loop processes for handling acids and cyanides and maximizing the reclamation/reuse of tailings water."

Treatment "is any method, technique, or process that changes the physical, chemical, or biological characteristics of waste materials in a way that eliminates harmful characteristics, recovers energy or useful materials in the waste materials, leave[s] them capable of being reused or safely contained, or reduces their volume," ELI said.

Secure disposal is defined as "any method, technique, or process that prevents residual wastes from posing a threat to the environment," including use of designed disposal units to prevent sulfide materials from coming into contact with air and water and generating acid mine drainage.

The report also suggests that changes in post-mining configuration of land can reduce the threat of pollution after the mine is closed.

The report is one of three complementary studies supported by the U.S. Agency for International Development's Partnership to Promote Clean Technology in the Mining Sector in Latin America and the Caribbean.

—BY JANEY COHEN

"Pollution Prevention and Mining: A Proposed Framework for the Americas" is available for \$10 from ELI by calling (202) 939-3844, (800) 433-5120, or via e-mail at orders@eli.org. It is also available in PDF format on the World Wide Web at <http://www.eli.org>.

Exhibit C:

Presentation Delivered by Lorenzo de la Puente at the Institute of Americas conference on "Keys to Success in Latin American Mining: Infrastructure, Regulation, and Risk Management," June 2-3, 1999.

(Conference agenda and participant list also attached)

**TOWARDS A REGIONAL
LEGAL FRAMEWORK
FOR POLLUTION PREVENTION**

Presented by

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and

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May 1999

TOWARDS A REGIONAL LEGAL FRAMEWORK FOR POLLUTION PREVENTION

By Lorenzo de la Puente

1. INTRODUCTION

1. The Environmental Impacts of Mining

The environmental impacts of mining can be highly adverse if the proper pollution prevention technology and regulatory framework are not in place and properly functioning. For example, groundwater and surface water supplies can be permanently or temporarily contaminated by improper use of chemicals in the ore extraction process or by uncontrolled runoff from poorly placed mining waste, creating a hazard for the local community, wildlife, and other biological resources. Specific pollutants, such as acid mine drainage or introduced toxics, can have a particularly devastating and long-term negative impact on the environment, as exemplified by the use of mercury for gold mining in sensitive ecosystems such as the Amazon basin. Strip and underground mining practices may destroy soils and vegetation, leading to erosion, loss of habitat and other negative environmental consequences. Furthermore, ore smelters can emit hazardous air pollutants that are especially harmful.

The costs of not addressing environmental impacts up front in a mining project can be quite high. Clean up costs for contaminated groundwater and soil alone for large operations may run into the millions of dollars. In the United States, for example, it is estimated that the cost for cleaning up the Summitville mine site could be as high as \$120 million. Other countries in the Americas face similar challenges as they begin to discover the pollution legacy of years of contamination.

Pollution prevention should be a strategic management principle for the hardrock mining industry. It offers the opportunity to avoid or minimize significant environmental impacts of hard-rock mining while also identifying and promoting economy and efficiency in the design and operation. It enhances recovery of minerals while at the same time helping to minimize impacts on the surrounding environment and prevent the creation of long-term environmental hazards and risks.

2. The Need for a Regional Approach

Mining is a growth sector in Latin America and is primarily export-oriented. As free trade expands, environmental sustainability of mining operations will become increasingly important. In order to assure that trade in mineral products does not exact downward pressure on environmental protection in the hemisphere, it will be essential for governments to have a common basis of understanding and evaluating mining operations.

The current realities of economics and free trade in the region emphasize the critical and timely need for Inter-American collaboration on regulating the environmental impacts of mining. Latin American countries are vigorously seeking to expand their mining operations in order to attract foreign investment, create local jobs, and increase exports. Over the next ten years, for example, Peru estimates \$8 billion dollars of investment in the sector. Argentina expects to receive \$1 billion of investment in mining over the next five years. In 1997 alone, \$1 billion was invested in the mining industry in Mexico, with about 45 percent of the investment coming from abroad. At the same time, U.S. and Canadian companies are looking to Latin American countries for opportunities to expand their operations and to transfer clean mining technology.

The case for addressing the environmental issues connected with mining on a regional basis is compelling. Many of the mining companies are operating as multinationals. They may bring their experience to bear on their operations -- experience not shared by many of the national and local government authorities. A regional approach to environmental regulation helps avoid the complexity of different standards in different regions as well as setting a common playing field.

Several countries in the region have had the opportunity to explore different policy and technology options for promoting pollution prevention and protecting common ecosystems or natural resources; these countries can learn these lessons through regional dialogue. The federal government and state governments in the United States, as well as provincial governments in Canada, are experiencing pressure for decreasing domestic environmental regulation of mining to avoid creating competitive disadvantages for local mining industries vis-a-vis Latin American mining operations. Further, many of the natural resources potentially threatened by mining have common characteristics or may be shared by countries in the region. As the environmental laws of most countries -- especially those regulating mining -- are still in the formative stages, now is the time to initiate regional policymaking initiatives in this area.

C. Developing a Framework for a Regional Approach

Since 1997, the Environmental Law Institute (ELI), with the support of the United States Agency for International Development (USAID), the Tinker Foundation, and the John D. and Catherine T. MacArthur Foundation, has worked in partnership with a number of regional environmental law centers throughout the Americas to develop a regional framework for pollution prevention in the mining industry throughout the region. ELI and its partners -- *Fundacion Ambiente y Recursos Naturales* (FARN) in Argentina, *Centro Especializado de Derecho y*

Política Ambiental (CEDPA) in Bolivia, *Instituto Socioambiental* in Brazil, the Canadian Institute for Environmental Law and Policy (CIELAP) in Canada, the *Comite Nacional Pro Defensa de la Tierra y Flora* (CODEFF) in Chile, *Centro Mexicano de Derecho Ambiental* in Mexico, and *Sociedad Peruana de Derecho Ambiental* (SPDA) in Peru – each developed a national case study of legal and policy approaches to sustainable mining in their respective countries. These national case studies focus on the different policy approaches, including economic incentives, used in these countries to promote the concept of pollution prevention as well as the development and transfer of “state of the art” pollution prevention technology and services. The national case studies also identify gaps or inadequate mechanisms in these regulatory frameworks.

Based on the results of the natural case studies, ELI has developed a preliminary framework for a regional approach for promoting pollution prevention. This framework first defines what pollution prevention means in the context of mining operations. Next, the framework briefly identifies the legal approaches that can be used for pollution prevention. Finally, the framework identifies for each of the three major phases of mining (exploration, active mining operations, and closure), (i) the potential sources of pollution prevention, (ii) the opportunities for pollution prevention, and (iii) the specific legal, policy and management tools that can be used to address the relevant pollution problems. Select examples of pollution prevention tools currently in place in the countries studied are included

II. A PROPOSED REGIONAL FRAMEWORK

1. Defining Pollution Prevention

Pollution prevention in the mining context under the proposed framework would mean source reduction, recycling, treatment, and secure disposal. It would mean designing operations to avoid or minimize the use, generation, or mobilization of pollutants; recycling materials and substances that might otherwise be released into the environment; and treating and securely disposing of hazardous substances, pollutants, and materials that could degrade the environment. In other words, taking all the steps necessary to avoid creating costly contamination, while at the same time creating economies and efficiencies in the use of resources.

The terms source reduction, recycling, treatment, and secure disposal would have the following meanings under the proposed framework:

Source reduction reduces or eliminates the quantity or hazard of pollutants at the point of generation. Source reduction includes strategies to predict the occurrence of acid-forming materials, arsenic, and toxic metals likely to be mobilized by mining activities and design operations to avoid or minimize contact with these materials and/or assure their isolation. Source reduction can also include such strategies as substitution of cleaner processes for more hazardous processes - such as prohibition of mercury processes.

Recycling provides for the use or reuse of wastes as a substitute for a commercial product or material in an industrial process. It can include strategies such as closed-loop processes for handling acids and cyanides, and maximizing the reclamation reuse of tailings water.

Treatment is any method, technique, or process that changes the physical, chemical or biological characteristics of waste materials in a way that eliminates harmful characteristics, recovers energy or useful materials in the waste materials, leave them capable of being reused or safely contained, or reduces their volume. It can include such strategies as decontamination of tailings.

Secure disposal is any method, technique or process that prevents residual wastes from posing a threat to the environment. This includes use of designed disposal units to prevent sulfide materials from coming into contact with air and water and generating acid mine drainage. It may include placement of tailings in engineered structures with appropriate management and diversion of water to prevent mobilization and migration of pollutants.

1. Laws that Can Serve the Pollution Prevention Objective

Environmental laws, policies, and management techniques can help make pollution prevention a key component of sustainable mining operations. A variety of legal approaches can require the identification and integration of pollution prevention into metallic mineral mining operations. This section briefly identifies the role that each kind of legal instrument can play.

Environmental impact assessment (EIA), if properly structured, can require the mining operation (or the approving governmental agency) to identify potential sources of pollution and ways to avoid or minimize them through alternative designs for the operation. It can require the examination of cumulative impacts on the environment by projecting both direct and indirect impacts of the mining operations and the impacts of other existing and foreseeable projects (and environmental stressors) in the same vicinity. It can require the evaluation of alternative methods of excavation, beneficiation of ore, and treatment and disposal of tailings. It can be used to identify monitoring requirements and mitigation measures to be implemented during and after the mining process. It can be used to identify closure requirements, post-closure care, and contingency plans. It can also engage the public by allowing them to identify issues of significance to them that might otherwise not be studied; and by affording an opportunity for affected persons or agencies or local governments to identify needs for additional data on points of particular concern, as well as to suggest alternative mining or disposal methods, timing of activities, or monitoring approaches. All of these can help improve the quality of mining operations and increase the confidence of governments and local citizens that pollution prevention is integrated into the entire mining process from beginning to end.

Planning, too, can serve to increase the efficacy of pollution prevention. Often the preparation of plans is integrated with environmental impact assessment. However, whether it is or not, preparation of exploration plans (where there is to be significant disturbance of land or water), mining plans, closure plans, and contingency plans, can help assure that operations do not produce unintended pollution, even if conditions change. It is important to design an operation so that it can be safely closed. If closure planning is postponed until the middle or end of the mineral extraction phase, it may be too late to use certain pollution-preventing approaches. Moreover, given the volatility of markets for metallic minerals, such issues as treatment, disposal, closure, and contingency planning cannot be left unaddressed until a time when revenues may be insufficient to allow them to be properly carried out. Various legal regimes require different plans, and have different timing requirements for the preparation and submission of plans. While these need not follow the same pattern, nevertheless, planning for each phase of the mining operation is important if pollution prevention techniques for the mine are to be properly designed and implemented.

Permits are used under some legal regimes to assure governments' ability to review proposed operations and to take enforcement action against operations that do not carry out their legal commitments. In many countries, the permit and the EIA approval are the same thing. In others, they are distinct (or a permit may even be required in some instances where an EIA is not). Many of the potentially pollution-preventing functions of permits have been discussed above under EIA and planning -- identification of alternatives, pollution control measures, monitoring, mitigation. But permits also present opportunities to address enforcement and evaluation of an operator's fitness to operate the proposed mine (viz. does the operator have a bad record in the past, does the operator have sufficient financial resources to carry out the commitments identified in the plan, permit, or EIA?). In addition, permit review and renewal processes may provide the public with an opportunity to submit comments, and insist upon appropriate monitoring and satisfaction of operator commitments. Permits often require the submission of financial assurance guarantees (performance bonds, reclamation bonds, insurance, letters of credit, etc.) to assure that the mine is closed and reclaimed in accordance with the permit conditions even if the financial condition of the mine or parent company is impaired.

Concessions are legal agreements between governmental owners of mineral rights and the mining companies who want to extract them. While the terms of concessions typically address financial issues such as royalty rates, lease rates, taxation, and similar economic concerns, they also may address planning and operating issues, as well as the provision of financial guarantees for the performance of environmental obligations.

Regulatory standards – which may be incorporated into permits, incorporated into EIA, or that may operate directly on operators independent of either – can prescribe the use of pollution prevention techniques. Such standards may include limitations on the use or handling of toxic substances introduced to the mine site (such as cyanides, acids, flocculents, oils). Standards may also address construction and maintenance of ore beneficiation units

(mills, heap leach pads and ponds, etc) to prevent releases of introduced substances; and they may address the handling of ores and waste rocks to avoid or minimize the release of naturally occurring toxic substances (such as acid, metals, arsenic). Standards may impose requirements for treatment, disposal, and management of tailings, and for management of storm water and ground water. Regulatory standards that require operators to justify the use of mining and beneficiation methods that may produce pollutants, and to minimize such uses and provide for clean production may help promote pollution prevention in the metallic mineral mining sector.

Financial incentives may provide means to encourage mining operations to adopt pollution prevention techniques. Such incentives may include preferential tax treatment for pollution prevention equipment, programs for rebates or credits against royalties for successful pollution prevention, and other approaches. While such incentives do not take the place of other legal tools, they may provide sufficient inducement to improve the functioning of these other tools in the protection of the environment and human health and safety.

Monitoring and disclosure requirements can provide information that allows both mine operators and governments to adjust management practices as needed in order to prevent pollution. In addition, the public accountability provided by such disclosure may help encourage the adoption of pollution-preventing methods of mining, beneficiation, and closure.

Public information and participation typically interacts with the other legal tools discussed in this study. Required disclosures by mining operations, and opportunities for members of the public (and local governments) to participate in evaluation of mining approaches can improve the responsiveness of mining operations to local environmental and social concerns.

Environmental management systems, while not generally required by law, can nevertheless serve to improve the efficiency of mining operations – and hence their avoidance of unnecessary and wasteful pollution. In addition, such systems can give investors and purchasers of commodities confidence in the operations and thus benefit the company's operations. Adoption of ISO 14000 standards in a number of countries may drive mining companies toward greater pollution prevention in their operations.

Rules for re-mining of abandoned sites and/or privatization of existing government-owned mines may provide some opportunities to remedy problems of the past while providing new jobs and more modern, pollution-preventing techniques.

Land-use restrictions can also serve to prevent pollution. For example, areas of particular ecological value and fragility may be designated "unsuitable" for mining or for certain mining methods. Similarly, areas with high concentrations of sulfide ores may be designated off-limits to mining under most circumstances because of their high potential for the generation of acid mine drainage – with mining allowed only under the strictest, best-

capitalized, technologically advanced methods and conditions.

These represent complementary legal tools that can help to integrate pollution prevention into the mining of metallic minerals.

III. INTEGRATING LEGAL TOOLS INTO A POLLUTION PREVENTION STRATEGY

Mining operations have the potential to prevent pollution at three phases: exploration, active mining operations, and closure. The following discussion highlights how legal and policy tools can be integrated into a strategy for preventing pollution in each of these phases.

I. Exploration

Potential sources of pollution

Exploration operations can result in the disturbance of the land surface and the creation of air or water pollution with naturally occurring materials as well as with materials introduced to the exploration site during drilling and related activities. Drilling associated with exploration can lead to the contamination of groundwater, by creating new paths for the migration of contamination. Excavations associated with exploration can produce acid drainage and mobilize metals, as well as produce sediment and erosion. Finally, road building and clearing activities can directly cause pollution through sedimentation and erosion, but can also lead (in some remote forest areas) to secondary environmental impacts through induced development.

Pollution prevention opportunities

Pollution prevention during the exploration phase requires substantial attention to limiting the extent of disturbance. This may include minimizing the area disturbed to that needed for exploration, and taking particular care in likely acid-generating areas to limit exposure of acid-forming materials. Plugging of wells and drill holes is important. Plans for abandonment of roads and suitable reclamation and revegetation of drill sites and other disturbed areas are important as well to assure that introduced contaminants or naturally occurring pollutants are not permitted to migrate, as well as in order to prevent unwanted development or degradation of lands.

Legal, policy, and management tools

During the exploration phase, it is important to assure that disturbances are those needed to locate and characterize the ore body, while minimizing impacts on adjacent lands and waters. Standards and planning can help assure that undue degradation does not occur as a result of exploration, and reclamation requirements can help prevent contamination of

ground water, erosion of drill sites and roads, and the formation of acid drainage. Requirements for financial assurance, such as bonding, can also help assure that exploration areas are not left to become pollution hazards. Environmental management systems can help exploration operations assure that materials are properly handled and accounted for, and that exploration is both efficient and environmentally sustainable. Because exploration operations establish the basis for future mining activities, it is important to assure that they are conducted in ways that facilitate future mining while not impairing areas that will not be mined or where mining may not occur for a significant length of time.

2. Active Mining Operations

Potential sources of pollution

Mining operations can cause the production of acid drainage. Such drainage can mobilize metals, making them water pollutants. Mining can mobilize other naturally occurring toxic substances such as arsenic, which may become air or water pollutants. Active mines also are subject to accidental releases of cyanides, acids, or other introduced materials used in the mining and beneficiation process. Such releases may be due to process upsets, failure of equipment, or to precipitation events not adequately contained or controlled by the engineered design of the systems. Mines may expose wildlife (and particularly birds) to such substances even where releases from the mine site are prevented.

Active mines can generate substantial volumes of tailings and waste rock, which may produce air pollution and water pollution during the operation. They also produce large volumes of waste materials. These include mine tailings and spent ores that may be contaminated with cyanides, acids, or other introduced materials – leading to potential releases into the air, surface water, or ground water.

Pollution prevention opportunities

One of the keys to prevention of long-term water pollution is careful characterization of ore and waste rock characteristics to determine what to disturb and how to handle and dispose of the disturbed materials. Early and thorough understanding of the materials present at the site can lead to avoidance of acid-forming or toxic material where feasible, and careful control of its disposal when it is disturbed.

Pollution prevention also involves use of cleaner processes. For example, it may lead to use of techniques that do not introduce cyanides, acids, or certain beneficiation reagents to the site; and that avoid use of mercury - still a problem in some countries. In addition, better design of processes can lead to use of a reduced amount of cyanides, acids, in the beneficiation process – chiefly through use of closed loop processes designed to minimize quantities used and released to the environment. These techniques make more efficient use of the materials and improve recovery of metals at the same time. Operations can also be

designed to minimize the exposed area of process ponds, or to use closed loop recovery systems with no exposed ponds, in order to reduce exposure of wildlife and the surrounding environment to substances such as cyanide used in leaching operations.

Control of site drainage is critically important to minimize the contact of precipitation, surface water, and ground water on the site with contaminants or acid-generating materials. Acid drainage controls include designs of mining approaches that exclude water or air from contact with acid-generating materials, and control of the bacteria that promote acid generation; as well as the use of on-site and imported neutralizing materials to reduce acid generation. Mine operations should also use designs that separate clean drainage from contaminated drainage in order to reduce the volume of water for which control and treatment is required. For example, pollution preventing designs separate storm water drainage from contact with materials in tailings impoundments. Such systems also recycle water used in beneficiation processes and from tailings slurries.

Pollution prevention during the mining phase also includes use of leak detection systems and monitoring of groundwater, water, and air. In addition, mines should provide for spill collection systems and containment structures for potential spills of hazardous substances. The mining plan should also include contingency planning, equipment, and training to enable operators to deal with foreseeable process upsets, leaks, and releases.

Pollution preventing techniques include the control of dust using nontoxic materials and with attention to the fate of dust suppressants. This may include recycling of water used as a dust suppressant.

Pollution prevention techniques useful during the active mining phase may include contemporaneous reclamation, where feasible, to reduce the "footprint" of the mine on the landscape and reduce exposure of disturbed area to the elements – thus reducing the potential for air pollution and water pollution. In order to accomplish better reclamation, operators can segregate and stockpile topsoil early in the mining operation for later use.

Legal, policy, and management tools

Virtually all of the legal, policy, and management tools discussed in this report are applicable to the mining phase, and each may play some role in assuring that mining activities are efficient, clean, and produce impacts of limited duration on the surrounding environment. Important tools include environmental impact assessment, standards for the prediction of acid drainage and for characterization of wastes, environmental management systems to provide for the handling of toxic substances, financial incentives and financial assurances to assure complete reclamation, as well as planning for the operation, for closure, and for post-closure. These tools can improve the efficiency of mining by integrating environmental concerns into the operation at each stage: this results in savings over attempting to do environmental protection after the fact, and can also reduce costs. Cost savings may be achieved through such measures as limiting the amount of material requiring special handling - due to early and

accurate characterization of overburden and waste materials with acid-generating or toxic potential; and through measures such as segregation of topsoil for reuse in reclamation and revegetation; and through control and recycling of process waters and introduced substances

Mining plans and systems that account for all materials and that minimize the need for double-handling of rock and other materials can integrate efficient recovery of metals with environmental protection.

3. Closure

Potential sources of pollution

At closure, mines can generate substantial pollution from the exposure of materials in the pits and the waste rock and tailings disposal areas. Acid drainage can occur after the conclusion of mining and can worsen over time. Similarly, contaminants contained in the tailings and spent ore from the beneficiation process may be released into the water and groundwater after closure of tailings disposal areas and heaps.

Impoundments remaining after mining may become contaminated with acid drainage, metals, and other pollutant, posing a hazard to wildlife and (if impoundments are hydrologically connected to surface or ground water) to other water users and the environment.

Dust particles from tailings and spent ore areas can cause air pollution after mining and closure has been completed, if they are not properly stabilized and/or covered.

Pollution prevention opportunities

Pollution prevention techniques relevant to closure include isolation and containment of acid-producing materials. Use of neutralizing and other materials to prevent acid mine drainage and metals transport in pits, impoundments, and other waters is important. Topsoil and revegetation can help stabilize and control waste areas in their post-mining configuration, to limit movement and water infiltration.

Rinsing, decontamination, and covering of spent ores and tailings, coupled with drainage controls to prevent migration of contaminants remaining in place after closure, are important techniques. These measures may also include dewatering of mine tails and/or hydrologic controls for tailings impoundments to ensure long term stability. Such measures should generally be accompanied by monitoring and maintenance to assure hydrologic controls are working to control drainage and to prevent water from contacting and mobilizing contaminants of concern.

Changes in the postmining configuration of the land can also reduce the threat of pollution. Such approaches may include filling of pits where feasible in order to reduce the

potential for collection and contamination of pit water and to reduce the exposure of waste rock to oxygen and water, where it may contribute to possible acid drainage. Plugging wells and adits can help prevent water pollution and the discharge of metals-laden mine site waters to surface and ground water.

Removal of introduced material including pollution control wastes, beneficiation chemicals and reagents, laboratory chemicals, oil, etc., is also an important part of preventing pollution after mine closure.

Legal, policy, and management tools

Closure of mine waste units, such as tailings impoundments and spent ore dumps, is best accomplished if fully planned prior to the commencement of active mining. Planning, environmental impact assessments (to help consider alternative sites and methods for disposal areas), environmental management systems, and financial assurance can all improve post-mining performance. Standards for closure, if incorporated into the project design, can provide a key benchmark by which to assess performance. In addition, public information and transparency can improve the effectiveness of post-mining controls – assuring that disposal areas remain undisturbed after closure and do not create any risks to local populations.

IV. POLLUTION PREVENTION AND EXISTING NATIONAL LAWS

A preliminary review of the national case studies indicates that the countries studied are just beginning to incorporate pollution prevention into their laws regulating the environmental impacts of mining. In general, countries have focused on pollution prevention more in the initial stages of mining (exploration and start-up) than in the course of actual operations and closure. Moreover, the use of financial incentives and environmental management systems to promote pollution prevention in the mining sector appears to be very limited. The following discussion highlights some of the areas of progress as well as gaps in national legislation promoting pollution prevention.

IV Environmental Impact Assessment

The environmental impact assessment procedure is gaining great popularity in the region as a tool for preventing the environmental impacts of mining. However, there still remains a need fine tune the use of this tool to actually promote pollution prevention. For example, in Peru significant exploration activities are only required to present an “Environmental Evaluation” rather than an “Environmental Impact Study.” The “Environmental Evaluation” differs from the “Environmental Impact Study” in the issues that must be addressed, the periods for approval and the requirement for conducting a public hearing. As a result, opportunities for promoting pollution prevention may be lost. In addition, even in the case of operations subject to preparation of an “Environmental Impact Study,” the focus is on controlling and mitigating environmental impacts rather than preventing them in the first place. This is because the applicable environmental standards are

oriented towards control of contamination at the end of the process and compliance with maximum permissible limits. It is interesting to note that in contrast to this situation, Peru's environmental laws for the manufacturing and fishing sector now incorporate methods promoting pollution prevention.

IV Standards

While several countries have general pollution control standards that could be interpreted to promote pollution prevention, only very limited progress in the region has been made towards establishing standards specifically promoting this objective. Environmental standards tend to establish general limits on emissions or limits on environmental concentrations rather than promote specific pollution prevention practices such as source reduction or recycling. Peru, for example, has maximum permissible limits for liquid effluents that regulate Ph, suspended solids, lead, copper, zinc, iron, arsenic and cyanide, as well as maximum permissible levels for certain air contaminants, including lead, arsenic and particulates. In addition, Peru has suggested practices outlined in a number of environmental management guides on topics such as water in mining operations, acid mine drainage and tailings management. Other than measurements for the prediction of acid mine drainage, these guides do not promote any specific pollution prevention practices.

Concerns over the adequacy of existing approaches have led to some unexpected results. For example in 1998 the citizens of the State of Montana in the United States voted in a referendum enacting a law to prohibit the establishment of any **new** surface mining operations using cyanide. Likewise, the State of Wisconsin adopted a moratorium on the mining of sulfide ores until companies could present evidence of successfully closed mines that did not generate acid. The U.S. Bureau of Land Management has proposed regulations that would require operators to "minimize water pollution (source control) in preference to water treatment" and to "handle earth materials and water in a manner that minimizes the formation of acidic, toxic, or other deleterious pollutants of surface water systems" and manage excavations and other disturbances to "prevent or control the discharge of pollutants into surface waters" among other pollution prevention requirements including "minimiz[ing] the likelihood of acid formation and toxic and other deleterious leachate generation." Controversy surrounding each of these moves suggests that the process of setting and communicating standards with a pollution prevention objective in mind deserves more attention.

IV Public Participation

National laws are beginning to incorporate mechanisms for public participation at a variety of stages of operations. Peru, for example, requires a public hearing in connection with the preparation of the environmental impact assessment for mining operations. However, the effectiveness of this mechanism may be limited because individuals are not guaranteed participation in the hearing, questions may only be posed in written format, the hearings are only held in the central headquarters of the Ministry of Energy and Mines in Lima and the authorities are not required to consider the contributions made in the hearing. Mexico has established a procedure, "denuncia popular," that allows any person to file a complaint with the appropriate federal, state or municipal authority concerning environmental problems. Canadian citizens, through mechanisms in some environmental legislation, have the opportunity to request an investigation of an alleged offense and, if pollution prevention practices are substandard, also can file a petition through the newly constituted Commissioner of Environment and Sustainable Development with the responsible federal department.

IV Financial Incentives and Environmental Management Systems

National laws have not focused significantly on financial incentives as a tool for promoting pollution prevention in the mining sector. In part the problem may lie in more general policies, such as exist in Peru, precluding the use of financial incentives such as tax credits, for this purpose.

While some countries are begin to experience the voluntary use by the mining sector of environmental management systems such as ISO 14000, such tools have not formally been incorporated into the regulatory structure. Mexico, for example, has a Voluntary Management Program in which the mining industry can participate. The most significant voluntary environmental program in Canada, the Accelerated Reduction and Elimination of Toxics Program (ARET), includes as members 31 of the 34 members of the Mining Association of Canada. However, due to a number of problems with the ARET program -- including, among others, allowing baselines to be set too early, the lack of third party verification of emissions reduction claims, and inconsistent monitoring and reporting methods -- as well as the combination of poor enforcement records in Canada and decreased department and/or ministry capacity for enforcement, the current voluntary programs may have serious consequences for Canada's environmental regulatory framework. One problem in the U.S. and possibly other countries associated with the use of these environmental management systems is that potential liability under environmental laws may discourage some operators from disclosing operational problems and/or violations on a voluntary basis.

5. CONCLUSION

Pollution prevention offers the mining industry the opportunity to address

environmental problems while at the same time taking advantage of economies and efficiencies in operations. While national governments have begun to incorporate pollution prevention strategies in their laws and policies, considerable work remains to be done in this area to produce a comprehensive approach to pollution prevention in all phases of mining operation: exploration, operations and closure. The development of a regional framework for promoting pollution prevention would greatly assist governments in this task. In addition it would assure that as trade and investment in mining operations in the hemisphere expands, governments are not confronted with downward pressure on environmental protection. Mining companies would also benefit from a consistent approach in the regions towards regulation of their operations.



THE INSTITUTE OF THE AMERICAS

**KEYS TO SUCCESS IN LATIN AMERICAN MINING
INFRASTRUCTURE, REGULATION, AND RISK MANAGEMENT**
Claves para el éxito de la Minería Latino Americana
Infraestructura, Reglamentación y Análisis de Riesgos

Sponsored by: Bechtel, The Chase Manhattan Bank, Rio Algom Limited, Unipure Environmental, Placer Dome Inc., Raytheon Engineers and Constructors, Inc., and USAID.

Wednesday, June 2, 1999
Miércoles, 2 de Junio de 1999
Quarta-feira, 2 de Junho de 1999

8:30 **Welcome & Opening Remarks/
Bienvenida y Apertura/ Palavras de Abertura**
Paul H. Boeker, President, Institute of the Americas

8:45 **Macroeconomic Conditions for Mining
Investments in Latin America** *Condiciones
Macroeconómicas para Inversiones Mineras en
Latinoamérica* *Condições Macroeconômicas para
Investimentos Mineiros na América Latina*
Michael Wilson, Vice Chairman, RBC Dominion
Securities

**Issues and Trends in the Latin American Mining
Industry** *Consideraciones y Tendencias de la Industria
Minera Latinoamericana* *Questões e Tendências da
Indústria Mineira Latino-Americana*
Bernard J. Guarnera, President & CEO, Behre
Dolbear, Inc.

9:35 **Fine-tuning the Legal Framework - A
Survey of Best Practices** *Depuración del Marco
Regulatorio - Revisión de los Mejores Modelos* *Refinação
do Marco Regulatorio - Revisão dos Melhores Modelos*
Moderated by **Paul H. Boeker**

Honduras' New Mining Law *La Nueva Ley Minera
de Honduras* *A Nova Lei Mineira de Honduras*
Ernesto Bondy, Vice-Minister, Secretary of Natural
Resources and Environment, Honduras

**Concession Regulations/ Reglamentación de
Concesiones** *Reglamentação de Concessões*
Carlos Alfaro, Resident Partner, Alfaro-Navarro,
LLP

**Towards a Legal Framework for Pollution
Prevention** *Hacia un Marco Legal para Prevenir la
Contaminación* *Em Direção a Um Marco Legal para
Prevenir a Contaminação*

Lorenzo de la Puente, International Associate,
Environmental Law Institute, Associate, Estudio
Grau Law Firm, Peru

11:15 **Overview of Risk Evaluation in the Latin
American Marketplace** *Síntesis sobre Evaluación de
Riesgos en el Mercado Latinoamericano* *Síntesis sobre
Evaluación de Riscos no Mercado Latino-Americano*
Moderated by **Peter Dupak**, The Chase Manhattan
Bank

**Financing Mining Projects in Latin America - Has
the Bubble Burst?/ Financiamiento de Proyectos en
América Latina- ¿Se Acabó el Entusiasmo?**
*Financiamento de Projetos na América Latina- Acabou
o Entusiasmo?*

Peter Dupak, Vice-President & Technical Director
Chase Manhattan Bank

Regulatory Risk *Riesgos Regulatorios* *Riscos
Regulatorios*

Eul-Soo Pang, Professor, Colorado School of Mines

Political Risk *Riesgos Políticos* *Riscos Políticos*
David Waldorf, Senior Vice President, J&H Marsh
& McLennan

**Latin American Project Development- Risk
Reduction through Firm Price Conversion**
Desarrollo de Proyectos Latinoamericanos *Redução de
Riesgos Utilizando la Conversión de Costos a Precio Fijo*
Desenvolvimento de Projetos Latino-Americanos *Redução
de Riscos Utilizando a Conversão de Custos a Preço Fixo*
Robert T. Battenhouse, Denver Product Line
Manager, Metals and Mining, Raytheon Constructors
and Engineers, Inc.

1:30 **Outlook for Financing Mining Projects in
Latin America/ Perspectivas sobre Financiamiento de
Proyectos Mineros en Latinoamérica** *Perspectivas sobre
Financiamento de Projetos de Mineração na América
Latina*

Introduction by **Robert Battenhouse**, Raytheon
Constructors and Engineers, Inc.

Hugo Dryland, N M Rothschild & Sons
(Washington)

2:00 **Financial Regulation and Taxation Issues in Latin America** *Reglamentación Financiera y Temas Impositivos en Latinoamérica* *Regulamentação Financeira e Questões Impositivas na América Latina*

Moderated by **Colleen S. Morton**, Vice-President, Institute of the Americas

Mining Taxation and International

Competitiveness *Tributación Minera y Competitividad Internacional* *Tributação Mineira e Competitividade Internacional*

James Otto, Professor, Colorado School of Mines

Impact of Tax Regulations on Mining Investment

Impacto de la Tributación en la Inversión Minera *Impacto da Tributação no Investimento Mineiro*

Fernando Sánchez Albavera, Regional Consultant for Mining and Energy, CEPAL

Argentina and the Royalties Debate *Argentina y el Debate de las Regalías* *Argentina e o Debate das Regalias*

Pedro Arieu, Socio Senior, Fretes & Arieu - Abogados

3:45 **Understanding the Local Operation in the Social and Political Context** *El Contexto Socio-político de las Actividades Locales* *O Contexto Socio-político das Atividades Locais*

Reconciling Artisanal & Formal Mining Projects

Como Reconciliar los Proyectos Mineros Artesenales y Formales *Como Reconciliar os Projetos Mineiros Artesenais e Formais*

Thomas Hentschel, Med-Min COSUDE, Bolivia

A Bottom-line Approach to Community Relations/

Perspectiva Económica de las Relaciones Comunitarias *Perspectiva Económica das Relações Comunitarias*

Ian Thomson, Consultant, ITC, Canada

Louis Guay, Director General, Genel Dominicana

Thursday, June 3, 1999

Jueves, 3 de Junio de 1999

Quinta-feira, 3 de Junho de 1999

8:30 **Update on Mining In Venezuela** *La*

Minería en Venezuela *A Mineração na Venezuela*

Introduction by **Paul H. Boeker**

Alvaro Silva Calderón, Under Secretary of Mining, Ministry of Energy and Mines, Venezuela

9:00 **Sustainable Development Roundtable I**

Mesa Redonda sobre Desarrollo Sustentable I *Mesa*

Redonda sobre Desenvolvimento Sustentavel I

Moderated by **Don East**, President and CEO, Knight Piesold, Chairman, International Committee, Colorado Mining Association

Early Stage Environmental Scoping *El Rol de la Inspección de Medio Ambiente* *Papel da Inspeção de Meio Ambiente*

Mark Hardin, Environmental Group Leader, Golder Associates

Pollution Control and Environmental Permitting

Control de Contaminación *Permisos Ambientales*

Controle da Contaminação e Licenças Ambientais

Jack Mozingo, Vice President Manager, Mining-Environment Program, SAIC

The Role of Science in Site Remediation *El Papel*

de la Ciencia en la Remediation en una Zona de

Operación *O Papel da Ciência na Remediação em uma Zona de Operação*

Martha Power, Program Scientist, Minerals Program, USGS

Environment and Social Responsibility

Responsabilidad Social y Ambiental *Responsabilidade Social e Meio-ambiental*

José Chang, Superintendente de Administración, Minera Yanacocha

11:00 **Sustainable Development Roundtable II/**

Mesa Redonda sobre Desarrollo Sustentable II *Mesa*

Redonda sobre Desenvolvimento Sustentavel II

Moderated by **Don East**

Setting Mine Closure Requirements *Requisitos para*

la Clausura de una Mina *Requisitos para o Encerramento de uma Mina*

Luke Danielson, Mining Policy Research Initiative Director, Centro Internacional de Investigaciones para el Desarrollo

Sustainable Minerals Use *El Uso Sostenible de las*

Minerales *O Uso Sustentavel das Minerais*

Wanda Hoskin, Senior Policy Advisor, International Division, Minerals and Metals Sector, Natural Resources Canada

Environmental Technology Transfer through

Commercial Channels/ *Los Canales Comerciales de la*

Transferencia de la Tecnología Ambiental *Os Canais*

Comerciais da Transferência da Tecnologia Meio-ambiental

Barbara McMurray, The Kenan Institute

1:00 **The Triple Bottom Line: Balancing Economic Growth, Development and Social**

Progress *El Tripode* *El Equilibrio entre Crecimiento*

Economico *Desarrollo y Progreso Social* *O Tripe* *O*

Equilibrio entre Crecimiento Economico *Desenvolvimento e Progreso Social*

Introduction by **Colleen S. Morton**, Vice President, Institute of the Americas

Patrick James, President and CEO, Rio Algom

1:30 **Managing Community Relations/**

Administración de las Relaciones Comunitarias

Administração das Relações Comunitarias

Moderated by **Paul Warner**, Minera Antamina

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Building Partnerships with Local Communities: *Desarrollo de Alianzas con Comunidades Locales / Desenvolvimento de Alianças com as Comunidades Locais*
Paul Warner, Director, International Institutional Relations, Cia. Minera Antamina

A Shared Program: a Novel Approach/ Un Nuevo Entoque: El Programa Conjunto / Um Novo Entoque / O Programa Conjunto

Jorge Villaseñor, Director de Desarrollo, Luismin
Mining and the Community - Best Practices

Analysis *Mineria y la Comunidad / Análisis de las Mejores Practicas / Mineração e a Comunidade / Análise das Melhores Práticas*

Felix Remy, Principal Mining Specialist, The World Bank

Edmund Gus, Manager, Center for Traditional Knowledge, Canada

The Role of the Junior Mining Sector in Latin

America *El Roi de la Pequeña Minería en América Latina / O Papel da Pequena Mineria na América Latina*

W.J. McGuinty, Industry Liaison Geologist, Ontario Ministry of Northern Development and Mines

4:00 **Leaders' Roundtable on Cooperative Efforts to Boost Latin American Competitiveness in Global Mining/ Mesa Redonda de Líderes sobre Esfuerzos Cooperativos para Estimular la Competitividad de América Latina en la Minería Mundial / Mesa Redonda dos Líderes sobre os Esforços Cooperativos para Estimular a Competição da América Latina na Mineração Mundial**
Moderated by **Colleen S. Morton**

Challenges for the Third Millennium: Sustainable Development *Desafíos para Tercero Milenio / Desarrollo Sostenible / Desafíos para o Terceiro Milenio / Desenvolvimento Sustentavel*

Daniel Meilán, Undersecretary of Mines, Argentina
Policy and Strategy for the Brazilian Mining Sector/ Política y Estrategias para el Sector Minero Brasileño / Política e Estrategias para o Setor Mineiro Brasileiro

Luciano de Freitas Borges, Under Secretary of Mining and Metallurgy, Brazil

Latin American Competitiveness in Global Mining: The CVRD Example/ La Competitividad de América Latina en la Minería Mundial / El Ejemplo de CVRD / Competição da América Latina na Mineração Mundial / O Exemplo de CVRD

José Francisco Martins de Viveiros, President, Doce Geo, Brazil

Mexican Mining Industry General Overview/ Sinopsis de la Industria Minera Mexicana / Sinopsis da Indústria Mineira Mexicana

Guillermo Lopez Escamilla, Director of Mining Promotion, SECOFI, Mexico

Enrique Loncan, Director, Camara Argentina de Empresarios Mineros; President, Barrick

Exploraciones Argentina S.A.

Cooperative Efforts to Boost Latin American Competitiveness in Global Mining: The Case of Peru/ Esfuerzos Cooperativos para Estimular la Competitividad de América Latina en la Minería Mundial / El Ejemplo Peruano / Esforços Cooperativos para Estimular a Competição da América Latina na Mineração Mundial / O Exemplo Peruano

Maria Chappuis, Jefe Consultores Tecnicos Peru

List of Participating Companies at *Keys to Success in Latin American Mining*

Company Name	Country
Barrick Exploraciones Argentina S.A.	Argentina
Fretes & Arieu - Abogados	Argentina
Secretaria de Indústria y Minería	Argentina
Corporacion Minera de Bolivia (COMIBOL)	Bolivia
COSUDE	Bolivia
Doce Geo	Brasil
Secretaria de Minas e Metalurgia	Brasil
Center for Traditional Knowledge	Canada
Fluor Daniel, Metal and Mining	Canada
ITC	Canada
J&H Marsh & McLennan Ltd.	Canada
Natural Resources Canada	Canada
Ontario Ministry of Northern Development and Mines	Canada
RBC Dominion Securities	Canada
Rio Algom Limited	Canada
Teck Corporation	Canada
CEPAL	Chile
Noranda Exploración Chile Ltda.	Chile
Genel	Dominican Republic
Secretaria de Recursos Naturales y Medio Ambiente	Honduras
Luismin S.A. de C.V.	Mexico
Minera Kennecott, S.A. de C.V.	Mexico
SECOFI - Secretaria de Comercio y Fomento Industrial	Mexico
Compañía Minera Antamina S.A.	Peru
Estudio Grau	Peru
G.C. Perú, S.A.C.	Peru
Minera Yanacocha S.A.	Peru

Minera Yanacocha	Perú
Mining Policy Research Initiative/International Development Research Centre (CIID)	Uruguay
Alfaro-Navarro & Tozzini-Freire	USA
Bechtel	USA
Behre Dolbear, Inc.	USA
Brambles Security Services	USA
Cambior USA Inc.	USA
Colorado International Trade Office	USA
Colorado School of Mines	USA
Enviro Net Inc.	USA
Fluor Daniel	USA
Golder Associates Inc.	USA
Hecla Mining Company	USA
Holland & Hart, LLP.	USA
Hydro-Triad/V3 Colorado, LLC	USA
JME Company	USA
Knight Piésold Services Inc.	USA
Marsh Inc.	USA
Metallica Resources Inc.	USA
N.M. Rothschild	USA
Newmont Gold Company	USA
Raytheon Constructors and Engineers, Inc.	USA
Science Applications International Corporation (SAIC)	USA
The Chase Manhattan Bank	USA
The Kenan Institute	USA
The World Bank	USA
United States Geological Survey	USA
URS Greiner Woodward Clyde	USA
Vista Gold Corporation	USA