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FOREWORD

This guide summarizes a market study conducted by Brandt Meio Ambiente Ltda. for the Commercial Division of the Canadian Embassy in Brasilia.

The text aims the Canadian exporter who wishes to consider growing market opportunities in any of the states of Brazil.

MINING AND THE ENVIRONMENT IN BRAZIL: EQUIPMENT AND ENGINEERING NECESSITIES

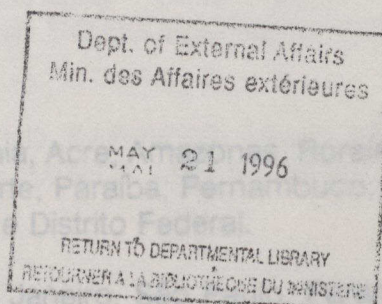
Further assistance and more details in the extensive report can be obtained by addressing requests directly to the Commercial Division of the Canadian Embassy in Brasilia and to the Canadian Consulate General in Sao Paulo at the following addresses:

Commercial Division of
the Canadian Embassy
Caixa Postal 07-0961
70.410 Brasilia D.F.
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Canadian Consulate General
Caixa Postal 22002
01499 Sao Paulo SP
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phone: (011-55-11) 287-2122
fax: (011-55-11) 251-5057

The Embassy is responsible for the states of Rondonia, Acre, Amapa, Maranhao, Piaui, Ceara, Rio Grande do Norte, Paraiba, Pernambuco, Sergipe, Bahia, Minas Gerais, Espirito Santo, Goias and Distrito Federal.

The Consulate General covers the states of Rio de Janeiro, Santa Catarina, Rio Grande do Sul, Mato Grosso do Sul and Mato Grosso.



DECEMBER, 1991

A MARKET STUDY PREPARED BY
CANADIAN EMBASSY IN BRASÍLIA
COMMERCIAL DIVISION

43-276-185

FOREWORD

This guide summarizes a market study conducted by Brandt Meio Ambiente Ltda. for the Commercial Division of the Canadian Embassy in Brasília.

The text aims the Canadian exporter who wishes to consider growing market opportunities in environmental control and recuperation, in the Brazilian mining sector. Although not exhaustive, this text provides a perspective of an economic activity that is growing, given the relevance of mining and the pressures for environmental conservation in Brazil.

Further assistance and more details in the extensive version of the study can be obtained by addressing requests directly to the Commercial Division of the Canadian Embassy in Brasilia and to the Canadian Consulate General in Sao Paulo at the following addresses:

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1. BACKGROUND ON MINING

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1. BACKGROUND ON MINING

The search for minerals was introduced in Brazil during the colonial period, when the Portuguese Crown decided to provide incentives for missions organized to quest for gold. This practice inaugurated the "Gold Cycle" in Brazil, which was focused in the central part of the present day Minas Gerais state.

Today's mineral activities in Brazil result from a mix of resource endowment, chance and scientific discoveries and public policies adopted along this century. Most important among these are:

- the discovery of sizable high grade iron ore deposits in Minas Gerais (1907/1909). Later on this iron ore would be mined by a government owned enterprise founded in 1942, "Companhia Vale do Rio Doce - CVRD" which is currently the largest iron ore exporter in the world;
- the sanctioning of the Brazilian Mineral Code (1934) and the establishment of the National Mineral Production Department-DNPM (1938);
- the expansion of large-scale siderurgy, with the founding of a state-owned steel plant called Companhia Siderurgica Nacional - CSN (1940s);
- the establishment of a national oil monopoly and the creation of "Petroleo Brasileiro S/A - PETROBRAS" (1953);
- the liberalization of regulations concerning foreign participation in the mineral sector, following changes in the Mineral Code (1967);
- the implementation of large scale projects aimed at import substitution , specially in steel products, non-ferrous minerals, cement and fertilizers (1970s);
- the discovery of extensive mineral deposits in the Amazon, which, because of their importance, transformed the national mineral scene (1960s and 1970s).

2. BRAZILIAN MINERAL ECONOMY

2.1 Main indicators

In 1989, mineral production alone was responsible for three percent of the Gross National Product (GNP). However, when the value added by the industrial transformation of minerals is included, such as in metallurgy and in the production of steel, fertilizers, cement and petrochemicals, the mineral sector contribution to GNP reaches over one fourth of the total (as much as 26.3% or US \$100 billion).

The main items in the Value of Mineral Production (VMP) are energy products which respond for 48.48% (41.01% oil, 5.20% natural gas and 2.26% coal). Metallic substances follow, with 27.58%, while non-metallic materials respond for 22.77%.

Brazil has a broad mineral wealth which tends to concentrate in ten main substances. Indeed, if oil and natural gas are excluded, the following minerals represent about 70% of the MPV: iron (20.46%), gold (11.72%), granite (8.88%), limestone (5.98%), clay (5.61%), bauxite (4.29%), cassiterite (3.68%), coal (3.68%), phosphate (3.59%), and sand (2.11%).

2.2 Exports

Exports play an important role in Brazilian mineral economy. Between 1973 and 1988, exports of mineral substances, excluding oil and gas, grew from US\$ 447 million to as much as US\$ 2,240 million. At the same time, exports of industrialized products made with mineral inputs plummeted from US\$ 130 million to US\$ 6,100 million, as indicated in Table 1.

Table 1

Brazilian exports of products with mineral origin, 1973/88* - US\$ million

| Year | Mineral Substances | Downstream Products | Total |
|------|--------------------|---------------------|-------|
| 1973 | 447 | 130 | 577 |
| 1974 | 686 | 211 | 897 |
| 1975 | 1,067 | 249 | 1,316 |
| 1976 | 1,120 | 300 | 1,420 |
| 1977 | 1,012 | 355 | 1,367 |
| 1978 | 1,143 | 630 | 1,773 |
| 1979 | 1,443 | 1,091 | 2,534 |
| 1980 | 1,800 | 1,341 | 3,141 |
| 1981 | 2,050 | 1,614 | 3,664 |
| 1982 | 2,017 | 1,443 | 3,460 |
| 1983 | 1,757 | 2,304 | 4,061 |
| 1984 | 1,877 | 3,166 | 5,043 |
| 1985 | 1,898 | 3,063 | 4,961 |
| 1986 | 1,872 | 3,072 | 4,944 |
| 1987 | 1,846 | 5,311 | 7,157 |
| 1988 | 2,240 | 6,100 | 8,340 |

Source: Anuário Mineral Brasileiro

* Excluding oil and gas

While the annual rate of growth of mineral substances in the period was significant - 11.3% -, the growth rate for downstream products, including metals and more elaborated products, was even more impressive - 29.2%. Iron and manganese ores were the leading mineral export items in the period, joined by bauxite in recent years. In 1988, these three substances accounted for 92.5% of mineral exports. The leading downstream exports were iron and steel products (45%), followed by petroleum by-products (21.6%), aluminum (16.1%) and tin (4.4%).

2.3 Imports

Between 1973 and 1988, imports of mineral substances rose from US\$ 110 million to US\$ 1,167 million, with an annual average increase of 17% in the period. Metallurgical coal, potash fertilizers, sulphur and copper concentrate alone accounted, in 1988, for 83.4% of these imports.

Between 1973 and 1988, mineral downstream products weighted most in the minerals import schedule, accounting for 51.4% of the total (excluding oil and natural gas). Mineral substances followed, with 28.5%, while chemical compounds accounted for 20%.

3. MINERAL AND ENVIRONMENTAL LEGISLATION

In Brazil, mineral deposits are considered and defined by law as part of the union's endowment. Presently, under the 1988 constitution, the federal government only transfers the right of mineral extraction, for the period in which mining activities are performed and in which all applicable legislation is followed. According to the constitution, prospecting and mining of mineral resources may only be carried out by Brazilians or by companies in which the ownership of the majority of the voting capital is held by individuals domiciled and resident in Brazil.

The present legislation also regulates the activity of prospectors, known as **garimpeiros**. It determines the creation of special areas in which prospectors, organized in cooperatives, can operate.

The federal government agency which oversees mining in Brazil is the National Department for Mineral Production (DNPM), part of the Ministry of Infrastructure's Secretariat of Mines and Metallurgy.

During the late nineteen seventies, the Brazilian government started the structuring of the present day network of environmental control agencies. The National Council of the Environment (CONAMA), is the agency in charge of preparing all regulations required by the constitution in order to provide a federal legislative body on the environment. In each state an equivalent council exists.

Linked to these councils are agencies in charge of enforcing the legislation and controlling potentially polluting activities. At the federal level, the enforcement arm of CONAMA is IBAMA (Brazilian Institute for the Environment and Renewable Resources).

At the states level, the enforcement arms of the state councils are agencies whose mandates include assessing the environmental impact of projects before they obtain licences for development and operation. However, when the activity is to take place in environmentally protected areas under the federal jurisdiction or in interstate or country boundary zones, the environmental impact analysis must also be submitted to federal agencies.

In recent years, the restrictions and legal obligations for mining activities have increased.

Air and water quality standards and acceptable limits for effluent discharges mainly correspond to international standards, particularly to American legislation. There are numerous regulations with fairly extensive lists of acceptable levels of pollutants in water and air. Disposal methods for solid residues, such as mine waste rock and mineral processing tailings are also subject to controls.

4. MINING COMPANIES AND ENVIRONMENTAL MEASURES

In view of the growing national and international concern about the environment and of governmental action to restrict potentially harmful activities, mining companies in Brazil have started to invest in environmental control.

This study gathers information about environmental action in the mineral sector, obtained through a research based on a sample among the main companies in each of the sub-sectors listed below:

- mining companies (sample of 48 companies)
- manufacturers and representatives of environmental control equipment (sample of 56 companies)
- consulting and engineering companies (sample of 40 companies).

The environmental control equipment and products were classified as follows:

1. atmospheric effluent treatment
2. water and liquid effluent treatment
3. solid residue treatment
4. noise pollution control
5. control **garimpos** impacts.

The study shows that around 70% of the mining companies have been engaged in environmental control for at least five years. Most efforts were directed towards tailings disposal, effluents containment, and reclamation of impacted areas.

Increased action towards environmental preservation and recuperation was a result of the 1988 Constitution, which raised the environmental standards for the mineral sector. Besides having to present environmental impact studies in order to obtain preliminary licences for mining activities, companies are required to prepare projects for reclamation of impacted areas for all mines in operation. As a consequence, the market for consulting companies expanded.

In recent years, the number of companies actively adopting some form of environmental protection grew considerably. Their main tendency has been to direct action towards the most immediate problems. In this context, a demand for equipment to control water and air pollution appeared.

Most companies polled estimate that this market is expanding, even after considering the present crisis and uncertainties of both the Brazilian economy and the mineral sector. The analysis of the information obtained indicates that, despite the existence of well

established environmental equipment industries, service firms and consulting companies in Brazil, there is room for international products and services. The modern characteristics of the Canadian environmental sector and its approach to environmental issues places Canadian potential participation in the Brazilian market at a very high level.

5. OPPORTUNITIES FOR CANADIAN COMPANIES

It is worth stressing the presence of a diversified national market in the mining environmental control area. Those wishing to enter this market should realize that significant needs exist. In addition, the governmental effort to promote import liberalization and modernization of production makes it easier for Canadian companies to export equipment, products and services to Brazil.

The most common forms of international participation in the Brazilian market are:

- direct exports;
- agreements with sales representatives;
- agreements with distributors;
- licensing agreements or technology transfers;
- joint ventures;
- direct investment.

It is relevant to note that penetration in the Brazilian market will also open the door to the larger market of MERCOSUL (Southern Cone common market) and to Chile and Bolivia. Presently, Argentina, Chile and Bolivia represent the largest environmental market for Brazilian products (especially in mining environmental control equipment).

Listed below are the most important items of the demand for technology in environmental control in mining in Brazil:

- biological treatment of liquid effluents containing metallic ions and cyanides;
- substitution of some toxic compounds used in flotation by other biodegradables;
- treatment of liquid effluents containing toxic compounds used in flotation;
- recovery kits applied to tailings dams presenting eutrophication problems;
- field kits for analysis of water quality following international standards;
- projects for recycling of solid residues involving waste rock, tailings and precipitates produced by chemical treatment of effluents;
- low-cost, small-scale plants equipped with unit operations that perform well as mercury amalgamation for gold winning in the **garimpo** operations.

In brief, the Brazilian public, government and companies are increasingly concerned with environmental control, particularly in the mineral sector. Given the importance of mining in Brazil, the opportunity is ripe for Canadian companies to position themselves in this market. Therefore, companies experienced enough to explore the international markets are encouraged to pursue the contacts listed in the annexes.

ANNEX 1
MANUFACTURERS AND REPRESENTATIVES OF
ENVIRONMENTAL CONTROL EQUIPMENT BY AREAS OF INTEREST

1. Treatment for Atmospheric Effluents

1.1 Equipment

1.1.1 Systems for gas control (gas scrubbers, desulphurization systems, degasification systems, absorption towers, mist eliminators):

AAF Controle Ambientale Ltda
 CBC Ind. Pesadas S.A.
 Codistil S/A Dedini
 Efluentes Com. E Equipamento Prod. Ltda
 Equipamentos Villares S.A.
 Filsan Equipamento E Sistemas S.A.
 Kepler Weber Controle Ambientale S/A
 Klockner-Humboldt-Deutz Brasil Ltda
 Strigal Equipamento E Revest. Ind. Ltda
 Sulzer do Brasil S/A
 Tecnar Têc. do Ar Ltda

1.1.2 Systems for solid particle control (cyclones, settling separators, filters, precipitators, air curtains, water sprays):

AAF Controle Ambientale Ltda
 Capmetal Ind. Com. Ltda
 CBC Ind. Pesadas S.A.
 Codistil S/A Dedini
 Efluentes Com. E Equipamento Prod. Ltda
 Equipamentos Villares S.A.
 Filsan Equipamento E Sistemas S/A
 Giusiti & Cia Ltda
 Kepler Weber Controle Ambientale S/A
 Klockner-Humboldt-Deutz Brasil Ltda
 Lavrita Eng. Cons. E Equipamento Inds. Ltda

1.1.3 Fans systems, air blowers, and gas nozzles:

Kepler Weber Controle Ambientale S/A
 Stringal Equipamento E Revest. Ind. Ltda

1.2 Samplers and analysers (isokinetic samplers, low-vol samplers, hi-vol samplers, sequential samplers, fluoride gas samplers, sulphur dioxide samplers, flue dust analyzers, electrical conductivity analyzers, electrochemical cell analyzers, oxygen analyzers with paramagnetic cell, infrared gas analyzers, field kit analyzers):

Technar Tec. do Ar Ltda
VDC Instrumentos Cientificos Ltda

1.3 Services

1.3.1 Projects (feasibility studies, treatment specifications, processes):

AAF Controle Ltda
also any of the consulting companies listed in Annex 4

1.3.2 Monitoring and efficiency evaluation (of industrial pollution control equipment, emission factors determination, pollutant dispersion determination, air quality evaluation and sampling):

consulting companies listed in Annex 4

2. Treatment for Water and Liquid Effluents

2.1. Equipment

2.1.1 Systems for solid-liquid separation (screens, filters, centrifuges, clarifiers, belt press, densifiers, degritters, thickeners, hydrocyclones, flocculators, flotation plants, flocc-decantators, sand boxes, flocculating & sedimentation tanks):

ATAG - Mecalpe Equipamento Proc. Ltda
Cimaq S/A Dedini
Decremont San. e Trat. de Aguas Ltda
Efluentes Com. e Equipamento Prod. Ltda
Equipamento Villares S.A.
Filsan Equipamento e Sistemas S/A
Giusiti & Cia Ltda
Imbras Equipamento P/Mineracao Ltda
Klockner-Humboldt-Deutz Brasil Ltda
Maqbrit Com. E Ind. Maq. Ltda
Mineraltec Industrial Ltda
Miningtec Equipamento Ind. S/A
Pak Industrial Ltda
Proeco Equipamento Eltr. Ltda
Sanidro Trat. de Agua Ltda
Stringal Equipamento e Revest. Ind. Ltda
Sulzer do Brasil Ltda

2.1.2 Neutralization systems, chemical precipitation systems, demineralization and ion exchanging:

Degremont San. e Trat. de Aguas Ltda
 Filsan Equipamento e Sistemas S/A
 Proeco Equipamento Eltr. Ltda
 Sanidro Trat. de Agua Ltda
 Sulzer do Brasil S/A

2.1.3 Biological treatment systems:

Degremont San. E Trat. de Aguas Ltda
 Maqbrit Com. e Ind. Maq. Ltda

2.1.4 Other (deaerators, mixers, oil/sand separators, oil skimmers, degasification, cutters, chlorinators and feeders and pumps):

ATAG - Mecalpe Equipamento Proc. Ltda
 CBC Ind. Pesadas S.A.
 Cimaq S/A Dedini
 Degremont San. e Trat. de Aguas Ltda
 Efluentes Com. e Equipamento Prod. Ltda
 Equipamento Villares S.A.
 Fisan Equipamento e Sistemas S/A
 Proeco Equipamento Eltr. Ltda
 Sanidro Trat. de Agua Ltda
 Sulzer do Brasil S/A
 Videosan Saneam. Ist. Ltda

2.2 Samplers and analyzers on-line and for laboratory:

ATAG-Mecalpe Equipamento Proc. Ltda
 VDC Instrumentos Cientificos Ltda
 Wallace & Tiernan do Brasil S/A

2.3 Implements

2.3.1 Chemicals (coagulants, flocculants, filter aids, dispersants, others (antiscaling compounds, corrosion inhibitors, water treatment chemicals):

Aquatec Quimica S/A
 Arauquimica Com. e Rep. Ltda
 Argal Quimica S/A Ind. e Comercio
 Nalco Produtos Quimicas Ltda

2.3.2 Stock Material (hoses, filter cloth, filter media, activated carbon, special screens, collectors, separators for suspended solids):

Aticarbo Ind. de Carvao Ativ. Ltda
Pak Industrial Ltda

2.4 Services

2.4.1 Projects (fesibility studies, treatment specifications, processes):

ATAG-Metlpe Equipamento Proc. Ltda
Audiolab Sistemas Eletr. Ltda
Filsan Equipamento e Sistemas S/A
Maqbrit Com. e Ind. Maq. Ltda
Sulzer do Brasil S/A

plus consulting companies listed in Annex 4

2.4.2 Monitoring (surface water monitoring and groundwater monitoring):

consulting companies listed in Annex 4

3. Solid Waste Treatment

3.1 Equipment (incinerators, nodulizers, disc pellitizers, feeders, dryers):

Equipamentos Villares S.A.
Maqbrit Com. e Ind. Maq. Ltda
Sulzer do Brasil S/A

3.2 Implements (drains, gabion, geomembranes, sheet piles):

Adcon Projetos e Repres. Ltda
Engequipe Eng. Com. Ltda
Kanaflex Ind. de Plastico Ltda
Propex do Brasil Prod. Sint. Ltda

3.2 Services

3.3.1 Solid waste classification:

consulting companies in Annex 4

3.3.2 Process optimization and waste recycling (industrial process optimization aimed at lime reduction and reduction of residue hazard levels; development of waste recovery processes; studies on toxic waste treatability):

consulting companies in Annex 4

3.3.3 Reactive solid waste disposal:

Adcon Projetos e Repres. Ltda
 Propex do Brasil Prod. Sint. Ltda

4. Noise Pollution Control Equipment, Monitoring & Projects:

AAF Controle Ambiental Ltda

5. Impact Control in "Garimpos" (concentrators, retorts and amalgamators):

Cimaq S/A Ind. e Com.
 Maqbrit Com. e Ind. Maq. Ltda
 Mineraltec Industrial Ltda
 Spimec- Ind. e Com. de Equipamentos Ltda

ANNEX 2
MANUFACTURERS AND REPRESENTATIVES OF
ENVIRONMENTAL CONTROL EQUIPMENT INTERESTED IN
DOING BUSINESS WITH CANADA

AAF Controle Ambiental Ltda.

Av. Presidente Wilson, 1716 - Moooca
 São Paulo - SP
 03107 - Brazil
 Contact: Mr. Alfredo Maia Reggio
 Tel: (011) 274-6055

Adcon Projeto e Repres. Ltda.

Rua Correa Dias, 337
 São Paulo - SP
 04104 - Brazil
 Contact: Mr. E. Del Monaco Caiuby
 Tel: (011) 549-3061

Aquatec Química S.A.

Av. Sampaio Viana, 452
 São Paulo - SP
 04004 - Brazil
 Contact: Mr. Renato Araújo da Silva
 Tel: (011) 884-4466
 Fax: (011) 884-0747
 Tlx: 11-39203 AQTC

Araquímica Com. e Rep. Ltda.

Rua César Penna Ramos, 306
 São Paulo - SP
 02563 - Brazil
 Contact: Mr. Edgard Lobo Galtikf
 Tel: (011) 857-3194

Argal Química S.A. Ind. e Comércio

Rua Major Carlos Del Prete, 1596
 São Caetano do Sul - SP
 09530 - Brazil
 Contact: Mr. Odair da Silva Kassia
 Tel: (011) 442-5688
 Fax: (011) 441-9759
 Tlx: 11-45201 ARGQ

ATAG-Mecalpe Equipamento Proc. Ltda.

Av. Dona Ruyce Ferraz Alvim, 127/149
 Vila Nogueira
 Diadema - SP
 09990 - Brazil
 Contact: Mr. Antonio de Primo
 Tel: (011) 456-1355
 Tlx: 11-44365

Aticarbo Ind. de Carvão Ativ. Ltda.

Av. Senador Vergueiro, 2310
 São Bernardo do Campo - SP
 09740 - Brazil
 Contact: Mr. Luiz Szente
 Tel: (011) 455-3911
 Fax: (011) 455-3126
 Tlx: 11-44611 ATCA

Audiolab Sistemas Eletr. Ltda.

Rua Aimorés, 388
 Belo Horizonte - MG
 30140 - Brazil
 Contact: Mr. Leonardo Fares
 Tel: (031) 224-5352

Capmetal Ind. Com. Ltda.

Rua Idalina Senra, 45
 Rio de Janeiro - RJ
 20941 - Brazil
 Contact: Mr. Paulo Mandarinio
 Tel: (021) 284-5445
 Fax: (021) 254-1058
 Tlx: 21-36957 APLI

CBC Ind. Pesadas S.A.

Rua Manoel da Nóbrega, 1280
 São Paulo - SP
 04001 - Brazil
 Contact: Mr. Edson Ferrari
 Tel: (011) 582-9233

Cimaq S.A. Ind. e Com.

Av. Jacubá, 790 - Hortolândia
 Sumaré - SP
 13175 - Brazil
 Contact: Mr. Mário Luiz Duarte
 Tel: (0192) 65-1188
 Fax: (0192) 65-1595
 Tlx: 19-2443

Codistii S.A. Dedini

Rod. Rio Claro-Piracicaba, km. 26,3
Cruz Caiada
Piracicaba - SP
13400 - Brazil
Contact: Mr. Celso B. Garcia
Tel: (0194) 21-3222
Fax: (0194) 21-3222
Tlx: 19-1109 CDDE

Degremont San./Trat. de Águas

Alameda Santos, 1827 - Cerqueira César
São Paulo - SP
01419 - Brazil
Contact: Mr. P. Pereira Neto
Tel: (011) 283-1188
Fax: (011) 283-1537
Tlx: 11-24993

Efluentes Con./Equip. Prod.

Rua Ferreira de Araújo, 385
São Paulo - SP
05428 - Brazil
Contact: Ms. Terezinha Nunes
Tel: (011) 813-7400

Engequipe Eng. Com. Ltda.

Rua Marconi, 94 Conj. 611
São Paulo - SP
01042 - Brazil
Contact: Mr. R.W. de Maranhão
Tel: (011) 255-1396

Equip. Villares S.A.

Rua Alexandre Levi, 202
São Paulo - SP
01520 - Brazil
Contact: Mr. Roberto Benotti
Tel: (011) 277-6844

Filsan Equip. e Sistemas S.A.

Rua José Alves da Cunha Lima, 172
São Paulo - SP
05360 - Brazil
Contact: Mr. José Carlos Garcia
Tel: (011) 261-4899
Fax: (011) 869-3102
Tlx: 11-82359

Giusiti & Cia. Ltda.

Rua Itália Giusiti, 324
São Paulo - SP
08260 - Brazil
Contact: Mr. Francisco A. de Souza
Tel: (011) 944-6755
Fax: (011) 205-6755
Tlx: 11-62221 GIUS

Inbrás Equip. para Mineração Ltda.

Rua Adoniran Barbosa, 71
Diadema - SP
09980 - Brazil
Contact: Mr. Carlos Roberto Meilus
Tel: (011) 445-1177
Fax: (011) 456-6871
Tlx: 11-45218

Kanaflex Ind. de Plástico Ltda.

Av. Caxingui, 546 - Butantã
São Paulo - SP
05579 - Brazil
Contact: Mr. Francisco José Gill
Tel: (011) 815-4555
Fax: (011) 813-8044
Tlx: 11-80848 KANA

Kepler Weber Controle Ambiental

Av. Antonio Piranga, 582
Diadema - SP
09920 - Brazil
Contact: Mr. Sertório Canedo Filho
Tel: (011) 445-2477
Fax: (011) 456-4943
Tlx: 11-44081

Klockner-Humboldt-Deutz Brasil

Av. Paulista, 460 - Cerqueira César
São Paulo - SP
01310 - Brazil
Contact: Mr. Pompeyo Sobarzo
Tel: (011) 285-2611

Lavrita Eng. Cons. e Equip. Industriais Ltda.

Rua Tenente Manoel Eufrásio, 10
São Paulo - SP
04211 - Brazil
Contact: Mr. José R. Molina Inocente
Tel: (011) 418-5277

Maqbrit Com. e Ind. Maq. Ltda.

Rua Faustolo, 1758 - Conj. 02
 São Paulo - SP
 05041 - Brazil
 Contact: Mr. Nello Ferri Rencinai
 Tel: (011) 864-6211
 Fax: (011) 864-6283
 Tlx: 11-83722

Mineraltec Industrial Ltda.

Estrada SP 88 - km 93
 Caixa Postal 44
 Salesópolis - SP
 08970 - Brazil
 Contact: Mr. Sílvio Cristoni
 Tel: (0123) 76-1129

Miningtech Equip. Ind. S.A.

Rua And. dos Prazeres Gonçalves, 114
 Embu - SP
 06800 - Brazil
 Contact: Mr. Celso Tessarotto
 Tel: (011) 494-4422
 Fax: (011) 494-2930
 Tlx: 11-71859

Nalco Prod. Químicos Ltda.

Rua Américo Brasiliense, 998
 São Paulo - SP
 04715 - Brazil
 Contact: Mr. Mauro P. dos Reis
 Tel: (011) 246-1099
 Fax: (011) 523-3543
 Tlx: 11-56902

Nortec Com. Rep. Ltda.

Al. Vicente Pinzon, 162 - Vila Olímpia
 São Paulo - SP
 04547 - Brazil
 Contact: Mr. Artur Granato
 Tel: (011) 829-5222

PAK Industrial Ltda.

Rua Santa Cruz, 2099
 São Paulo - SP
 04121 - Brazil
 Contact: Mr. Leonel M. Prado
 Tel: (011) 914-3177
 Fax: (011) 215-9718

Proeco Equip. Eletr. Ltda.

Rua Bruno Hering, 716
 Blunemau - SC
 89.035 - Brazil
 Contact: Mr. Rodrigues de Lima
 Tel: (0473) 33-1735

Propex do Brasil Ltda.

Rua Prof. Arthur Ramos, 183
 São Paulo - SP
 01454 - Brazil
 Contact: Mr. Hérzio A. Ranzani
 Tel: (011) 211-9111

Sanidro Tratamento de Água Ltda.

Rua José Neves, 612/625
 São Paulo - SP
 04650 - Brazil
 Contact: Mr. Walter Grecco Jr.
 Tel: (011) 548-2944
 Tlx: 11-57038

Spimec Ind. e Com. de Equip. Ltda.

Rua Dr. Pedro de Mustre Portuga, 23
 Vila Mirante - Pirituba
 São Paulo - SP
 02952 - Brazil
 Contact: Mr. Carlos Humberto Kohle
 Tel: (011) 875-3577
 Fax: (011) 875-0972
 Tlx: 11-80653

Stringal Equip. e Revest. Ind. Ltda.

Rua Elias Feres Geraissati, 191 - Alvinópolis
 São Bernardo do Campo - SP
 09890 - Brazil
 Contact: Mr. Luiz Antonio Cottom
 Tel: (011) 448-4266
 Fax: (011) 458-0037

Sulzer do Brasil SA.

Av. Brasil, 22.693 - Guadalupe
 Rio de Janeiro - RJ
 21670 - Brazil
 Contact: Mr. Sérgio Silveira
 Tel: (021) 450-1000
 Fax: (021) 450-1400
 Tlx: 21-31934

Tecnar Tec. do Ar Ltda.

Rua Jaci, 03 - Penha
 Rio de Janeiro - RJ
 21070 - Brazil
 Contact: Mr. Carlos Eduardo da Fonseca
 Tel: (021) 260-2655

Ternoplástico Belfano Ltda.

Av. Santa Catarina, 489

Diadema - SP

09930 - Brazil

Contact: Mr. J. Diesendruck

Tel: (011) 456-2244

Fax: (011) 456-2735

Tlx: 11-44257 BELF

VDC Instrumentos Científicos

Rua José Bonifácio, 458

Rio de Janeiro - RJ

20771 - Brazil

Contact: Mr. Luiz Carlos Nery

Tel: (021) 593-8223

Videosan Saneam. Inst. Ltda.

Av. Santo Amaro, 6974 - Santo Amaro

São Paulo - SP

04702 - Brazil

Contact: Mr. E. Rodrigues Mota

Tel: (011) 523-8655

Wallace & Tiernan do Brasil

Rua General Calado, 52 - Água Rasa

São Paulo - SP

03334 - Brazil

Contact: Mr. Tadeu Campos

Tel: (011) 217-8311

Fax: (011) 217-8213

Tlx: 11-63545

Machin Com. e Ind. Med. Ltda.

Rua Fausto, 1788 - Conj. 02

São Paulo - SP

05041 - Brazil

Contact: Mr. Nello Ferrarini

Tel: (011) 854-8288

Fax: (011) 854-8283

Tlx: 11-83732

Minitech Industrial Ltda.

Estado SP - São Paulo

Caixa Postal 44

Salesópolis - SP

06970 - Brazil

Contact: Mr. Sérgio

Tel: (0128) 76-1129

Tlx: 11-71858

Minitech Equip. Ind. S.A.

Rua Antônio Passos Gonçalves, 114

Embu - SP

08800 - Brazil

Contact: Mr. Celso

Tel: (011) 484-4122

Fax: (011) 484-2929

Tlx: 11-71858

Milco Prod. Químicos Ltda.

Rua Américo Bittencourt, 998

São Paulo - SP

04715 - Brazil

Contact: Mr. Mauro R. dos Reis

Tel: (011) 248-1099

Fax: (011) 5230-5400

Tlx: 11-86902

Noher Com. Rep. Ltda.

Al. Vicente Pinzon, 182 - Vila Olímpia

São Paulo - SP

04547 - Brazil

Contact: Mr. Auro

Tel: (011) 829-5222

Contact: Mr. Pomodoro

Tel: (011) 829-5222

PAK Industrial Ltda.

Rua Santa Cruz, 2099

São Paulo - SP

04751 - Brazil

Contact: Mr. Leoni M. Ribeiro

Tel: (011) 914-8177

Fax: (011) 914-8177

Tlx: 11-71858

Lawry Eng. Equip. e Ind. Ltda.

Rua Jaci, 03 - Faria

Rio de Janeiro - RJ

21070 - Brazil

Contact: Mr. Carlos Eduardo da Fonseca

Tel: (021) 288-9628

**ANNEX 3
MINING COMPANIES INTERESTED IN
DOING BUSINESS WITH CANADA**

Alcan Alumínio do Brasil S.A.

Av. Paulista, 1106 - 15º andar - Bela Vista
São Paulo - SP
01310 - Brazil
Contact: Mr. Antonio C. Brant Filho
Fax: (011) 252-0123
Tlx: 11-36391

Alcoa Alumínio S.A.

Rod. Poços de Caldas-Andradas, km. 10
Poços de Caldas - MG
37700 - Brazil
Contact: Mr. Don Duane Williams
Tel: (035) 721-3577

Arafertil S.A.

Usina Péricles Nestor Locchi
Araxá - MG
38180 - Brazil
Contact: Mr. Ricardo Manoel de Oliveira
Tel: (034) 661-3100
Fax: (034) 661-3741
Tlx: 34-1175

Carbonífera Criciúma S.A.

Rod. Gabriel Arns, km. 5 - Vila Ouro Negro
Forquilha - SC
88815 - Brazil
Contact: Mr. Roberto Romano Neto
Tel: (0484) 33-5111

Carbonífera Próspera S.A.

Rua Gal. Oswaldo Pinto da Veiga, 328
Criciúma - SC
88800 - Brazil
Contact: Mr. Alfredo Febel
Tel: (0484) 33-6433

Companhia Mineração e Participações - CMP

Av. FAB, 380 - Centro
Macapá - AP
68900 - Brazil
Contact: Mr. Luiz Fernando Barbosa Quirino
Tel: (096) 223-4188

Companhia Brasileira Met. e Mineração - CBMM

Córrego da Mata, s/nº
Caixa Postal 08
Araxá - MG
38180 - Brazil
Contact: Mr. Antonio José Vieira de Vielo
Tel: (034) 661-5544
Fax: (034) 661-1011
Tlx: 34-1204 CBMM

Companhia Brasileira do Cobre

Av. João Pessoa, 155
Porto Alegre - RS
90040 - Brazil
Contact: Mr. Aira Gonzales
Tel: (0512) 27-4222
Fax: (0512) 27-4162
Tlx: 51-1179

Companhia Materiais Sulfurosos - MATSULFUR

Av. Amintas Jack de Moraes, 4545
Distrito Industrial
Montes Claros - MG
39400 - Brazil
Contact: Mr. Sérgio Cavalieri
Tel: (038) 222-2600

Companhia Mineira de Metais

Estrada da Usina de Concentração, s/nº
Vazante - MG
38780 - Brazil
Contact: Mr. Antonio Eimar Rigobello
Tel: (034) 813-0188
Tlx: 11-23328

Companhia Vale do Rio Doce

Av. Graça Aranha, 14 - 14º andar
Rio de Janeiro - RJ
20005 - Brazil
Contact: Mr. Paulo Eduardo Therago
Tel: (021) 272-4960

Companhia Estanífera do Brasil

Rua do Carmo, 43 - 12º andar
Rio de Janeiro - RJ
20011 - Brazil
Contact: Ms. Cláudia Rocha Oliveira
Tel: (021) 292-4499

**Companhia Pesq. e Lav. Minerais
COPELMI**

Largo Visconde de Cairu, 12 - 2º andar
Porto Alegre - RS
90030 - Brazil
Contact: Mr. Otelo Laurenti Jr.
Tel: (0512) 24-0722

Companhia Riograndense de Mineração - CRM

Rua Botafogo, 610
Porto Alegre - RS
90060 - Brazil
Contact: Mr. Nilo Antonio Rigotti
Tel: (053) 242-2033
Fax: (0512) 33-9828
Tlx: 51-1918 CRM1

Cimento Caué S.A.

Rod. MG-424, km. 18
Pedro Leopoldo - MG
33600 - Brazil
Contact: Mr. Eduardo Aguiar
Tel: (031) 661-1533

Cimento Mauá S.A.

Rod. MG-424, km. 31
Matozinhos - MG
35720 - Brazil
Contact: Mr. Francisco J. Piffer Leme
Tel: (031) 941-1344

Cimento Nacional de Minas S.A. - CIMINAS

Várzea Alegre, s/nº
Caixa Postal 20
Pedro Leopoldo - MG
33600 - Brazil
Contact: Mr. Rolando Chacon
Tel: (031) 661-2044

CODEMIN S.A.

Estrada do Município, km. 56
Caixa Postal 53
Niquelândia - GO
76420 - Brazil
Contact: Mr. Luiz Carlos Braga
Tel: (062) 754-1551

EIMCAL Ltda.

Av. Nossa Senhora do Carmo, 251 - Sion
Belo Horizonte - MG
30330 - Brazil
Contact Mr. Antonio Castilho de Souza
Tel: (031) 221-3077
Fax: (031) 221-3683
Tlx: 31-3337

Empresa de Águas São Lourenço

Parque das Águas, 505
São Lourenço - MG
37470 - Brazil
Contact: Mr. Rene Simões
Tel: (035) 331-1576
Tlx: 35-2174

Empresa de Caolim S.A.

Rua Hum, s/nº
Dis. Ind. Paulo Camilo Pena
Betim - MG
32650 - Brazil
Contact: Mr. Justino Faria Lemos Pinheiro
Tel: (031) 591-1306

Ferteco Mineração S.A.

BR-040, km. 593
Congonhas - MG
36404 - Brazil
Contact: Mr. Hans Heep
Tel: (031) 721-2544

Fosfertil S.A.

Fazenda Boa Vista, Rod. MG-341, km. 25
Araxá - MG
38180 - Brazil
Contact: Mr. Nelson F. Nakati
Tel: (0340) 661-2234

IBAR - Ind. Brasileira Artigos Refratários

Av. Major Pinheiro Frões, 2329
Suzano - SP
08600 - Brazil
Contact: Mr. Tomas Teodoro da Cruz
Tel: (011) 476-2310
Tlx: 31-1102

INCO Mineração Serras do Sul Ltda.

Rua Lauro Muller, 166 - Grupo 1606
Torre do Rio Sul - Botafogo
Rio de Janeiro - RJ
20000 - Brazil
Contact: Mr. Luis Werneck de Castro
Tel: (021) 275-1196
Fax: (021) 275-0846

ITAMINAS Com. de Minérios S.A.

Rua Santa Rita Durão, 19
Belo Horizonte - MG
30140 - Brazil
Contact: Mr. Nívio Vaden Lasmar Pereira
Tel: (031) 223-5977



Magnesita S.A.

Praça Lovis Ensoh, 240
 Cidade Industrial
 Contagem - MG
 32210 - Brazil
 Contact: Mr. Célio Augusto Bandeira
 Tel: (031) 329-1312
 Fax: (031) 333-1261
 Tlx: 31-1147

Mineração Caraíba Ltda.

Fazenda Caraíba
 Pilar Jaguará - BA
 48967 - Brazil
 Contact: Mr. José Gualberto Costa Melo
 Tel: (071) 832-1010

Mineração Curimbaba Ltda.

Av. João Pinheiro, 3665
 Poços de Caldas - MG
 37700 - Brazil
 Contact: Mr. Lúcio Rampazzo
 Tel: (035) 714-1786

Mineração Morro Agudo S.A.

Caixa Postal 55
 Paracatu - MG
 38600 - Brazil
 Contact: Mr. Sérgio Roberto Fragua
 Tel: (061) 671-1460

Mineração Morro Velho S.A.

Praça do Mineiro, 83
 Nova Lima - MG
 34000 - Brazil
 Contact: Mr. João Carlos Coelho
 Tel: (031) 541-2777

Mineração Rio do Norte S.A.

Praia do Flamengo, 200 - 5º andar
 Rio de Janeiro - RJ
 22210 - Brazil
 Contact: Mr. Flávio Soares Pereira
 Tel: (021) 205-1595

Mineração Rio Novo Ltda.

Av. Álvares Cabral, 1600 - 5º andar
 Belo Horizonte - MG
 30180 - Brazil
 Contact: Mr. Helvécio Ferreira Soares
 Tel: (031) 337-9484

Mineração Serra Grande S.A.

Shopping Center Sul - sala 70
 Setor Oeste
 Goiânia - GO
 74120 - Brazil
 Contact: Mr. José Maria Fleury
 Tel: (062) 241-9212

Mineração Taboca S.A.

Alameda Santos, 1827 - 13º andar
 Conj. 132
 São Paulo - SP
 01419 - Brazil
 Contact: Mr. Clóvis Zingoni
 Tel: (011) 285-6544

Minerações Brasileiras Reunidas S.A. - MBR

Rua Rio Doce, 26 - São Lucas
 Belo Horizonte - MG
 30240 - Brazil
 Contact: Mr. José Maurício Ramos
 Tel: (031) 225-9188

Morro do Níquel S.A.

Estrada Estadual Itaú-Jacuí, km. 2
 Pratápolis - MG
 37970 - Brazil
 Contact: Mr. Walter José Simoni
 Tel: (035) 536-1386

Nacional do Grafite Ltda.

Rod. MG-164, km. 04
 Caixa Postal 12
 Itapeçerica - MG
 35560 - Brazil
 Contact: Mr. Nelson Nunes
 Tel: (037) 341-1155

Pedreiras Valéria Ltda.

Av. Tancredo Neves, 1672 - 5º andar
 Salvador - BA
 41820 - Brazil
 Contact: Mr. Marcos Nunes Marques
 Tel: (071) 230-8866

Petrobrás S.A.

Av. Chile, 65 - sala 2267
 SUSEMA/COAM
 Rio de Janeiro - RJ
 22035 - Brazil
 Contact: Ms. Maria Cristina C. e Silva
 Tel: (021) 534-2204
 Fax: (021) 272-7618

Rio Paracatu Mineração S.A.

Estrada do Machado, s/nº

Paracatu - MG

38600 - Brazil

Contact: Mr. Jeferson Rosa dos Santos

Tel: (061) 671-2929

S.A. Indústrias Votorantim

Praça Ramos de Azevedo, 254

São Paulo - SP

23992 - Brazil

Contact: Mr. José Antonio Branquinho

Tel: (011) 223-8211

S.A. Mineração da Trindade - SAMITRI

Fazenda da Alegria

Caixa Postal 16

Mariana - MG

35420 - Brazil

Contact: Mr. Paulo Barcellos

Tel: (031) 551-2200

S.A. Mineração de Aminato - SAMA

Minas de Canabrava

Caixa Postal 01

Minacu - GO

76450 - Brazil

Contact: Mr. Flávio Gonçalves

Tel: (062) 778-1460

Samarco Mineração S.A.

Rua Parafba, 1122 - Savassi

Belo Horizonte - MG

30130 - Brazil

Contact: Mr. Pierre Echternach

Tel: (031) 239-8787

Fax: (031) 239-8800

Tlx: 31-3068

São Bento Mineração S.A.

Mina São Bento

Santa Bárbara - MG

35960 - Brazil

Contact: Mr. Tarcísio de Moura Carvalho

Tel: (031) 837-1691

Serrana S.A. de Mineração

Rod. 116, km. 488

Parque Industrial Jacupiranga

Kajati - SP

11950 - Brazil

Contact: Mr. Fábio José Prati

Tel: (0138) 54-1210

Sociedade Mineira de Mineração Ltda.

Rua Duque de Caxias, s/nº

Conselheiro Lafaiete - MG

36400 - Brazil

Contact: Mr. Tagides Ferreira Jr.

Tel: (031) 721-2022

Soecom S.A.

Av. Portugal, 700

Vespasiano - MG

33200 - Brazil

Contact: Mr. Arnaldo Dias de Andrade

Tel: (031) 621-1144

TVX Participações Cia. Nacional de Mineração

Rua da Assembléia, 10 - Suite 3711 - Centro

Rio de Janeiro - RJ

20011 - Brazil

Contact: Mr. Eliezer Batista

Tel: (021) 221-1846

ANNEX 4
CONSULTING AND SERVICES COMPANIES IN ENVIRONMENTAL CONTROL
INTERESTED IN DOING BUSINESS WITH CANADA

Ambiental Consultoria Proj. e Const. Ltda.
 Rua 134, nº 155 - sala 80
 Shopping Center Sul
 Goiânia - GO
 74120 - Brazil
 Contact: Mr. Edson Luis Fagundes
 Tel: (062) 241-4424

Ambiental Lab. e Equipamentos Ltda.
 Av. Horácio Lafer, 132
 São Paulo - SP
 04538 - Brazil
 Contact: Mr. Marco Aurélio de Oliveira
 Tel: (011) 829-1799
 Fax: (011) 820-0800
 Tlx: 11-38323

Ambio Geo. e Engenharia Ambiental Ltda.
 Rua Estados Unidos, 08
 Belo Horizonte - MG
 30330 - Brazil
 Contact: Mr. Roberto Nogueira Cardoso
 Tel: (031) 227-1403

Aquaconsult Cons. Proj. Engenharia Ltda.
 Av. Rio Branco, 785
 Vitória - ES
 20055 - Brazil
 Contact: Mr. Paulo de Melo Freitas Jr.
 Tel: (027) 225-0890

CEMA - Cons. Engenharia Meio Ambiente Ltda.
 Av. Prudente de Moraes, 621
 Belo Horizonte - MG
 30380 - Brazil
 Contact: Mr. Marco Antonio Pereira
 Tel: (031) 344-9424

CNEC - Cons. Nacional Engenharia Cons. S.A.
 Av. Alfredo Egydio S. Aranha, 100
 São Paulo - SP
 04726 - Brazil
 Contact: Mr. Paulo Vilela
 Tel: (011) 545-1086

Cons. e Empreendimentos Rec. Miner. Ltda. - CE
 Rua Prof. Estevão Pinto, 437
 Belo Horizonte - MG
 31210 - Brazil
 Contact: Mr. Nívio Tadeu L. Pereira
 Tel: (031) 225-1851

DPA - Cons. Ass. Ltda.
 Rua Dominicanos, 165/306 - Serra
 Belo Horizonte - MG
 30210 - Brazil
 Contact: Mr. Ronaldo César V. de Almeida
 Tel: (031) 223-5018

Ecos Geo. Cons. Serv. Ltda.
 Rua Paraíba, 1317 - Conj. 506
 Belo Horizonte - MG
 30130 - Brazil
 Contact: Mr. João Alberto P. de Moraes
 Tel: (031) 221-9188

ECP - Engenharia Cont. Poluição Ltda.
 Av. Pedroso de Moraes, 89
 Conj. 03 - 1º andar
 São Paulo - SP
 05419 - Brazil
 Contact: Mr. Michael Epelbaum
 Tel: (011) 210-8163

ECTA Engenharia Cons. Técnica Águas Ltda.
 Av. São Carlos, 2705 - 2º andar
 salas 203/204
 São Carlos - SP
 13560 - Brazil
 Contact: Mr. Benedito dos Santos Rodrigues
 Tel: (0162) 71-1459

Enerconsult Engenharia Ltda.
 Rua Rego Freitas, 289
 São Paulo - SP
 01220 - Brazil
 Contact: Mr. Francisco Del Corso
 Tel: (011) 221-8000

Energética - Ener. Ecco. e Inf. Ltda.

Rua Inabu, 155
Rio de Janeiro - RJ
20971 - Brazil

Contact: Mr. Frandisi
Tel: (021) 241-1998

ENGE - Rio Engenharia e Consultoria S.A.

Rua México, 03 - 9º andar
Rio de Janeiro - RJ
20031 - Brazil

Contact: Mr. Robertson Werner
Tel: (021) 272-1222

Engevix Engenharia S.A.

Rua Senador Pompeu, 46-60
Rio de Janeiro - RJ
20080 - Brazil

Contact: Mr. Sérgio Tolipan
Tel: (021) 223-1382

EP Engenharia do Processo Ltda.

Rua Claudino Barbosa, 650
Guarulhos - SP
07110 - Brazil

Contact: Mr. Rogério Toledo de Almeida
Tel: (011) 913-1577

EPA Engenharia de Proteção Ambiental Ltda.

Rua Dr. Paulo Vieira, 153/165
São Paulo - SP
01257 - Brazil

Contact: Mr. Fernando Emílio V. Pinheiro
Tel: (011) 263-0553

EPC - Engenharia Proj. Cons. Ltda.

Rua da Bahia, 504 - 12º andar
Belo Horizonte - MG
30160 - Brazil

Contact: Mr. Antonio Berti
Tel: (031) 273-2344

Geoconômica Minas Ltda.

Rua José Ribeiro, 144
Belo Horizonte - MG
30350 - Brazil

Contact: Ms. Neusa Lourdes Malaquias
Tel: (031) 223-9850

Geosol Geologia Sondagens Ltda.

Rua Aimorés, 200 - Funcionários
Belo Horizonte - MG
30140 - Brazil

Contact: João Henrique Grossi
Tel: (031) 221-5566

Hidroquímica Eng. de Lab. Ltda.

Rua Santa Alexandrina, 535
Rio de Janeiro - RJ
20261 - Brazil

Contact: Mr. Robson de Oliveira Nogueira
Tel: 273-8140

Hidrossistemas Eng. Recursos Hídricos Ltda.

Rua Alerita, 131 - Conj. 301 - Cruzeiro
Belo Horizonte - MG
30310 - Brazil

Contact: Mr. Sérgio Meni T. de Souza
Tel: (031) 227-6733

IESA Internacional de Engenharia S.A.

Rua Pinheiro Machado, 22
Rio de Janeiro - RJ
22231 - Brazil

Contact: Mr. Ralph Hanjdlar
Tel: (021) 246-4150

Iguatemi Cons. Serv. Engenharia Ltda.

Rua Santos Soraiva, 1730
Florianópolis - SC
88070 - Brazil

Contact: Mr. Adão dos Santos
Tel: (0482) 48-2633

Jaakko Poyry Eng. Ltda.

Rua do Verbo Divino, 1061
São Paulo - SP
04719 - Brazil

Contact: Mr. Mário Kaato
Tel: (011) 524-4422

Monasa - Cons. e Projetos Ltda.

Rua Teixeira de Freitas, 31 - 3º/6º-7º andares
Rio de Janeiro - RJ
20021 - Brazil

Contact: Mr. Ronaldo Lopes de Miranda
Tel: (021) 292-5355

Mage Cons. Assessoria Amb. Ltda.

Rua Ferreira Cantão, 239
Belém - PA
66020 - Brazil

Contact: Mr. Glenio Bruck
Tel: (091) 241-9865

Natron Cons. e Proj. S.A.

Rua Teófilo Otoni, 61-63 - 11º andar
Rio de Janeiro - RJ
20090 - Brazil

Contact: Mr. José Alberto Gemal
Tel: (021) 296-3966

Oikos - Pesquisa Aplicada Ltda.

Av. Presidente Vargas, 446 - sala 503
Rio de Janeiro - RJ
20210 - Brazil
Contact: Mr. Edson Pitone
Tel: (021) 233-1194

Paulo Abib Engenharia S.A.

Rua Capitão Francisco Teixeira Nogueira, 180
São Paulo - SP
05307 - Brazil
Contact: Ms. Célia Manzoni de Souza
Tel: (011) 864-6922

Plenum - Assessoria e Cons. Ltda.

Av. do Contorno, 6.040 - 13º andar
Belo Horizonte - MG
30110 - Brazil
Contact: Ms. Marilene Pavão
Tel: (031) 448-1236

Prameq - Ind. Com. Ltda.

Rua Gandavo, 363
São Paulo - SP
04023 - Brazil
Contact: Mr. Alcides Shoitti Kondo
Tel: (011) 572-0624

Pro-Ambiente - Análise Química Ltda.

Rua São Luis, 293
Porto Alegre - RS
91000 - Brazil
Contact: Mr. Carmelo Amazarray
Tel: (0512) 23-3982

Promon Engenharia Ltda.

Praia do Flamengo, 154
Rio de Janeiro - RJ
22210 - Brazil
Contact: Mr. Carlos Cota Ribeiro
Tel: (021) 555-2244

Quimi San Cons. S.C. Ltda.

Rua Álvaro Muller, 910
Campinas - SP
13023 - Brazil
Contact: Mr. Fausto Igberto Coppi
Tel: (0192) 52-9833

Sanear Eng. Sanitária Ltda.

Rua Ituitaba, 155 - Prado
Belo Horizonte - MG
30460 - Brazil
Contact: Ms. Maria Letícia Manna Julião
Tel: (031) 295-2202

Semco Recursos Ambientais Ltda.

Rua Don Aguirre, 438
São Paulo - SP
04671 - Brazil
Contact: Mr. Rubens de Oliveira Júnior
Tel: (011) 523-0055

Serengo Serv. Eng. Cons. Ltda.

Rua Lamenha Lins, 62 - 4º andar
Curitiba - PR
80250 - Brazil
Contact: Mr. Paulo Roberto Wielewadsk
Tel: (041) 223-9519

SGS do Brasil S.A.

Rua Rio Grande do Sul, 940
Belo Horizonte - MG
30170 - Brazil
Contact: Mr. Newton Pascao T. de Oliveira
Tel: (031) 275-2199

Vetor Engenharia e Cons. Ltda.

Av. Raja Gabaglia, 2720 - 2º andar
Belo Horizonte - MG
30350 - Brazil
Contact: Ms. Lídia Maria Corrêa
Tel: (031) 344-7200

**ANNEX 5
EQUIPMENT, IMPLEMENTS AND SERVICES USED FOR MITIGATION BY TYPE OF
ENVIRONMENTAL IMPACT AND BY TYPE OF ORE**

IRON

Air pollution by solid particles

- equipment: water sprays
- implements: wetting chemicals
- services: sampling and air quality assessment, eolian barrier projects

Surface water pollution by solid particles

- equipment: hydrocyclones and thickeners
- implements: flocculants and coagulants
- monitoring and projects: drainage, dikes, dams and waste rock piles

LIMESTONE

Air pollution by solid particles

- equipment: sprays, cyclones, air curtain, filters
- implements: wetting chemicals
- services: sampling and quality assessment, eolian barrier projects

Surface water pollution by solid particles

- projects: drainage, dikes and waste rock piles (dumps)

Noise

- equipment and project

CRUSHED AND DIMENSION STONES

Air pollution by solid particles

- equipment: water sprays
- implements: wetting chemicals
- services: sampling and air quality assessment, eolian barrier projects

Surface water pollution by solid particles

- projects: drainage, dikes and waste rock piles (pumps)

Noise

- equipment and project

GOLD

Air pollution by gases

- equipment: coils and retorts

Surface water pollution by solid particles

- alluvial: discharge of claysized tailings outside the river bed (improvement of dredge lay out) in clarifiers
- underground: clarifiers, filters

Surface water pollution by dissolved species

- chemical cyanide degradation and arsenic precipitation systems
- projects: degradation dams

Underground water pollution

- impervious lining of dams

TIN

Surface water pollution by solid particles

- clay sized tailings discharge in clarifiers outside the river bed (improvement of dredge lay out)
- underground: clarifiers, filters

CLAY

Surface water pollution by solid particles

- projects: drainage, filtering and decating dams

COAL

Surface water pollution by solid particles

- equipment: filters and clarifiers
- implements: wetting chemicals
- projects: filtering dikes, clarifiers and dams

Surface water pollution by dissolved species

- chemical neutralization on systems (sulphide bearing water)

Underground water pollution

- impervious lining of dams

ALUMINUM

Air pollution by solid particles

- equipment: water sprays
- implements: wetting chemicals
- services: sampling and air quality assessment, eolian barrier projects

Surface water pollution by solid particles

- equipment: hydrocyclones and thickeners
- implements: flocculants and coagulants
- monitoring/projects: drainage, dikes, dams and waste rock piles

COPPER

Surface water pollution by solid particles

- equipment: hydrocyclones and thickeners
- implements: flocculants and coagulants
- monitoring/projects: drainage, dikes, dams and waste rock piles

Surface water pollution by dissolved species

- chemical precipitation systems (heavy metals)

Underground water pollution

- impervious lining of dams

SAND

Surface water pollution by solid particles

- equipment: filters and clarifiers
- projects: filtering and decanting dikes

KAOLIN

Air pollution by solid particles

- equipment: sprays, cyclones, air curtain, filters
- implements: wetting chemicals
- services: sampling and quality assessment, eolian barrier projects

Surface water pollution by solid particles

- equipment: hydrocyclones and thickeners
- implements: flocculants and coagulants
- monitoring/projects: drainage, dikes, dams and waste rock piles.

Surface water pollution by dissolved species

- equipment: pressure filters, chemical precipitation systems (zinc)

Underground water pollution

- controlled disposition of reactive residues

PHOSPHATE

Air pollution by solid particles

- equipment: water sprays
- implements: wetting chemicals
- services: sampling and air quality assessment, eolian barrier projects

Surface water pollution by solid particles

- equipment: hydrocyclones and thickeners
- implements: flocculants and coagulants
- monitoring/projects: drainage, dikes, dams and waste rock piles

Surface water pollution by dissolved species

- aeration systems in dams
- studies for eutrophication inhibition and correction

GEMS

Surface water pollution by solid particles

- projects: drainage, dikes and waste rock piles

Notes:

For both mines in operation and new undertakings, projects for reclamation of impacted areas are required by law. These reclamation projects generally involve a description of the enterprise and mitigation systems to be adopted. Some companies have already started environmental zoning, aiming to minimize negative impacts on the cultural and natural endowments. Sensitive environments such as the Atlantic Forest, the Amazonian Forest, river margin forests, and other special areas have demanded reclamation work.

For iron, gold, copper and phosphate: impacts caused by flotation chemicals in water streams have not been fully investigated. Public sector lack of knowledge and current priorities to treatment schemes for solid and heavy metals. Mitigation systems technology is not commonly used and is a clear necessity.

For gold, coal, copper and kaolin: biologic treatment systems for liquid effluents, especially for cyanides and heavy metals, are presently being studied in national research institutions.

COPPER

Surface water pollution by solid particles

- equipment: hydrocyclones and thickeners
- implements: flocculants and coagulants
- services: sampling and air quality assessment, eolian damer projects
- monitoring/projects: drainage, dikes, dams and waste rock piles

Surface water pollution by dissolved species

- chemical: precipitation systems (heavy metals)

Underground water pollution

- impervious layer of dams

FACT SHEET - BRAZIL

Area: 8,512,000 km²

Capital: Brasília

Head of State: Fernando Collor de Mello

GDP: US\$ 522 b (90) est.

Population: 150 million (1990)

System of Government: Democratic

Language: Portuguese

Currency: Cruzeiro (Cr\$)

Major Trading Partners (1989):

| Exports | (Total: US\$ 34.4 b.) % | Imports | (Total US\$ 18.3 b.) % |
|-------------------|----------------------------|-------------------|---------------------------|
| 1. USA | 26.0 | 1. USA | 20.7 |
| 2. Netherlands | 07.8 | 2. Germany | 09.4 |
| 3. Japan | 07.1 | 3. Japan | 06.6 |
| 4. Germany | 04.3 | 4. Argentina | 04.6 |
| 5. United Kingdom | 03.2 | 5. United Kingdom | 02.8 |

Canadian Trade Statistics (C \$ millions):

| | 1987 | 1988 | 1989 | 1990 | 1991 (est.) |
|---------|-------|-------|-------|-------|-------------|
| Exports | 636 | 517 | 529 | 490 | 550 |
| Imports | 850 | 1193 | 1130 | 789 | 650 |
| Balance | (214) | (676) | (601) | (299) | (100) |

Major Cdn Exports 1990 (C\$ millions)

| | |
|-----------------------|------|
| 1. Turbines & parts | 92.4 |
| 2. Coal | 68.2 |
| 3. Wheat | 55.6 |
| 4. Potassium Chloride | 43.8 |
| 5. Copper ores | 37.7 |

Major Cdn Imports 1990 (C\$ millions)

| | |
|------------------------|------|
| 1. Fruit juices | 81.4 |
| 2. Footwear | 57.9 |
| 3. Iron and steel | 53.8 |
| 4. Coffee and extracts | 30.0 |
| 5. Aluminum | 29.4 |

Main Sectors of Opportunity for Canadian Business:

1. Advanced technology products and services
2. Industrial equipment and capital goods
3. Transport equipment
4. Agriculture and forest products, equipment and services
5. Mine, metal, mineral production and services
6. Environmental equipment and services

Resident Canadian Banks: Royal, Montreal, CIBC, BNS

Canada Reps in Brazil:

Ambassador (Brasília) - William L. Clarke
 Consul General (São Paulo) - William C. Ross

Department of External Affairs/LGT Trade Contact: Ruth Zeisler, (613) 996-6547



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FACT SHEET - BRAZIL

Area: 8,515,000 km²
 Capital: Brasilia
 Head of State: Fernando Collor de Mello
 GDP: US\$ 225 b (90) est
 Currency: Cruzeiro (Cr\$)
 Language: Portuguese
 System of Government: Democratic
 Population: 120 million (1990)

Surface water pollution by solid particles

Major Trading Partners (1989):
 Exports (Total US\$ 34.4 b):
 Imports (Total US\$ 18.3 b):

Notes:

| | | | |
|------------------|------|------------------|------|
| 1 USA | 28.0 | 1 USA | 20.7 |
| 2 Netherlands | 01.6 | 2 Germany | 00.4 |
| 3 Japan | 07.1 | 3 Japan | 06.8 |
| 4 Germany | 06.2 | 4 Germany | 04.8 |
| 5 United Kingdom | 00.5 | 5 United Kingdom | 00.5 |

For both mines in operation and new undertakings, projects for reclamation of impacted areas are required by law. These reclamation projects generally involve the design of the enterprise and mitigation systems to be adopted. Some companies have already started environmental zoning, aiming to minimize negative impacts on the cultural and natural endowments. Sensitive environments such as the Atlantic Forest, river margin forests, and other special areas have demanded reclamation work.

For iron, gold, copper and phosphate impacts caused by flotation chemicals in water streams have not been fully investigated. Public sector lack of knowledge and current priorities to treatment schemes for solid and heavy metals. Mitigation systems technology is not commonly used and is a clear necessity.

| Major Exports 1989 (C\$ million) | Major Cdn Imports 1989 (C\$ million) |
|----------------------------------|--------------------------------------|
| 1. Turbines | 1. Fresh fruit |
| 2. Coal | 2. Iron and steel |
| 3. Wheat | 3. Iron and steel |
| 4. Potassium Chloride | 4. Coffee and extracts |
| 5. Copper ores | 5. Aluminum |

For gold, coal, copper and kaolin biologic treatment systems for effluents, especially for cyanides and heavy metals, are being studied in several research institutions.

Main Sectors of Opportunity for Canadian Business:

- Advanced technology products and services
- Industrial equipment and capital goods
- Transport equipment
- Agriculture and forest products, equipment and services
- Iron, metal, mineral production and services
- Environmental equipment and services

Resident Canadian Banks: Foyr, Montreal, CIBC, BNS
 Canada Reps in Brazil:
 Ambassador (Brazil) - William L. Carter
 Consul General (Sao Paulo) - William C. Ross
 Department of External Affairs/OT Trade Contact: Ruth Zeller, (613) 993-2247