

CETEM

CENTRE FOR MINERAL TECHNOLOGY



TRIENNIAL PROGRAM

2000 - 2002

CT
BRASIL

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PRESENTATION

CETEM

CETEM completed, in April of 2000, 22 years in operation. During the first decade - 1978 to 1988 - CETEM was operating under the administration of the Ministry of Mines e Energy, on the basis of the DNPM-CPRM agreement. In 1989, CETEM became one of CNPq's institute, in the frame of the Ministry of Science and Technology - MCT. In this new phase, CETEM initiated action in the field of environment and later in studies related to sustainable development of the mining-metallurgical sector. In 2000, CETEM and the other institutes of CNPq are being linked directly to the MCT, through the Coordination Bureau of the Research Units.

CETEM has always been operating through *Triennial Programs*, defined on the basis of consultation with the productive sector, consulting companies, government and academic institutions, on the perception of its researchers and by the appreciation and approval of its Technical-Scientific Council - CTC. The present Program, relative to the 2000-2002 period, which discussion was initiated in the end of 1999, reflect thus, the continuous transformation of the sector. In the studies focusing on environmental issues, there is a clear emphasis on the support to the development of the small and medium enterprises and the improvement of the Brazilian mineral product with the goal to increase its international competitiveness. One important project we are developing, related to environmental issues, is the *Rehabilitation of Mined Areas*.

The structure of CETEM is composed of 5 Co-ordinations: Mineral Processing, Extractive Metallurgy, Studies and Development, Special Projects and Analytical Chemistry. This last coordination gives support with analyses for the projects under development. In addition, we have the Administrative Coordination. To execute the present Program, CETEM, nowadays, counts on 60 researchers: 25 doctors and 10 doctorate students in its permanent staff of Researchers and Technologists, plus 10 doctors and 10 master fellows as scholarship holders (PCI, CNPq, FAPERJ). We also count on 36 scholarship holders of scientific initiation, in addition to technicians and laboratory assistants. CETEM also opened its facilities for masters and doctorate students from various Universities to develop the experimental phase of their thesis, co-advised by CETEM's researchers.

2000-2002 PROGRAM

In line with the pluri-annual Program of the Federal Government - PPA, the present program is divided in *four Programs*, each of them with specific projects, as follows:

- (1) *Environmental Technology and Recycling*
- (2) *Innovation in Mining-Metallurgical Processes*
- (3) *Industrial Minerals and Rocks*
- (4) *Sustainable Management of Mineral Resources*

We included two *Special Projects*, which were thus denominated for their upstart character and special relevance. Both of these projects should integrate, regularly, the next Program. The Special Projects are:

- *Science and Technology for Adding Value to Minerals for Exportation (by demand of MCT)*
- *Water Resources in Mining.*

We also have an internal Program with the aim to improve the management of the Center, that is, *Quality, Productivity and Information.*

A significant part of the projects of the present Program will be totally or partially supported by extra-budget resources from PADCT, CTPETRO or from other programs/agencies that foster research. This certifies the competitiveness of the presented projects, as well as the approval by the mining-metallurgical community, which, as usual, has been involved in all stages of our research. For the next years, we should count, in addition, with the support of the sector funds, in particular with the funds of *mining, oil, water resources and energy.*

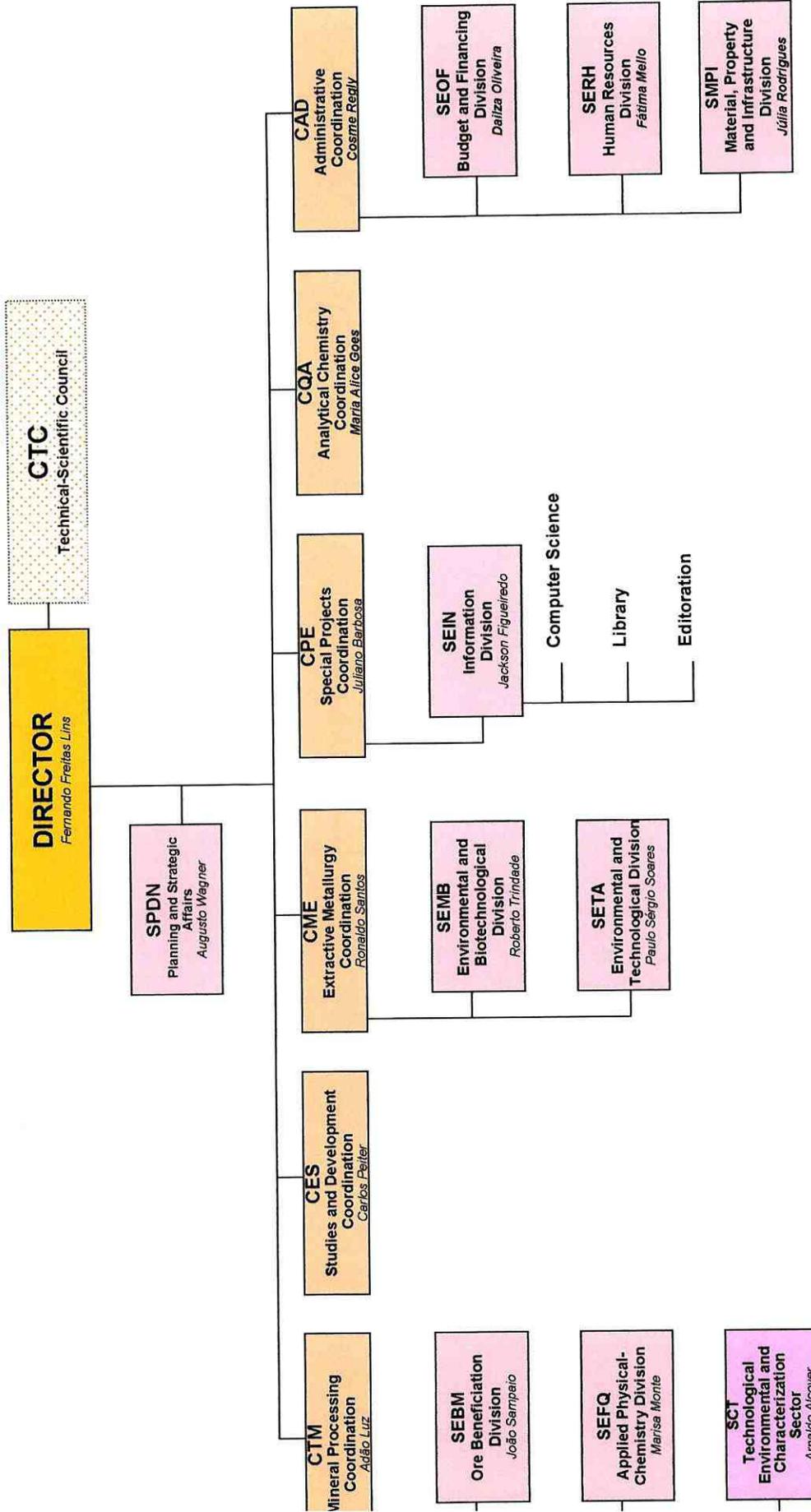
As relevant facts for the 2000-2002 period, it is worth to mention the accomplishment of the *Symposium Brazil 500 years: the Construction of Brazil and of Latin America by Mining*, in June of 2000. We are also organizing the *VI International Meeting of the Southern Hemisphere on Mineral Technology Mineral*, to be held in Rio de Janeiro, in May of 2001, in partnership with COPPE/UFRJ and PUC-Rio. In July of 2001, we will organize the *First Winter School of Mining and Metallurgy*, focusing on "*Ecotecnia*", for the best bachelor students of the mining-metallurgical sector, from Universities of Brazil, South America and originating from Portuguese speaking Communities. This enterprise will consist on courses and talks ministered by specialists from CETEM and known professionals and authorities of the sector.

Rio de Janeiro, June 2000.

Fernando Freitas Lins
Director

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MCT/SECUP



Program 1

ENVIRONMENTAL TECHNOLOGY AND RECYCLING

Objective: To accomplish studies, diagnostics, research and development of clean technologies, of recycling of materials of the productive cycle and the safe disposal of waste materials, with the perspective of the sustainability of the mining-metallurgical industry and correlative areas.

Project 1.1 – Rehabilitation Technologies and Environmental Control in Mining

Joint projects for the recovery of areas degraded by mining.

Project 1.2 – Effluent Treatment Technologies

Chromium removal; heavy metals removal by bio-reactor; hydrocarbons removal; electrolytic recovery of cyanide and heavy metals; coal utilization for effluent treatment; gaseous effluent retention by limes and clays; sorption of organic pollutants by vermiculite.

Project 1.3 – Recycling and Reutilization of Materials

A case study on the selection of automotive materials for recycling, reutilization of plastic materials and metals from the automobile industry; plastic recycling processes; hydro-metallurgical recycling of automobile batteries; recycling of domestic batteries; technical-economical viability of the utilization of wastes of phosphoric acid production.

Project 1.4 – Environmental Impact Studies of Heavy Metals

Applicability of the historic evaluation of heavy metal pollution and identification of heavy metal accumulation at the Paraíba do Sul river; immobilization of As; organic acids effect on bio-accumulation of Hg; analyses of Hg bio-accumulation from a sampling selective approach; quick/simple analyses of Hg in fish.

Program 2

INNOVATION IN MINING-METALLURGICAL PROCESSES

Objective: To accomplish studies, research and development or to improve technologies, in order to amplify the productivity, diminish costs, or to obtain differentiated products, to enlarge the technological competitiveness of the mining-metallurgical sector.

Project 2.1 – Gold Processing Technologies

Gold separation from sulfide ores; optimization of gold ore cyanidation; direct electro-oxidation of refractory ores.

Project 2.2 – Applied Technologies to Improve Mineral Processing

Molecular modeling of flotation reagents; optimization of fine minerals recovery by micro-classification and centrifugal concentration; coal processing for low level of ash and sulfur; microbial action as reagent for selective flotation of hematite and quartz; improvement of technological characterization techniques.

Project 2.3 – Applied Technologies to Recovery of Special Metals

Alkaline leaching of xenotime; rare earth recovery by solvent extraction; technological routes for the utilization of anatase concentrate.

Project 2.4 – Publication of Books in Mineral Technology

Ore processing plants in Brazil; non-ferrous metallurgical plants in Brazil; gold extraction in Brazil; mineral processing.

Project 2.5 – Molecular Modeling of Oil Behavior in Refine Process

To select and test analytical techniques for molecular information; structural modeling.

Program 3

INDUSTRIAL MINERALS AND ROCKS

Objective: To turn the country's production of industrial minerals and industrial rocks more competitive, through the development of technologies that allow to improve its functionality or to find new uses for these commodities.

Project 3.1-Qualification of Mining Methods and Technological Characterization of Dimension stones

New methods for processing and environmental control.

Project 3.2 – New Fertilizer Industries at the Brazilian Northeast

Characterization and concentration of phosphate ore; identification of phosphate, potassium and nitrogen production sources; alternative route for the production phosphoric acid.

Project 3.3 – Technologies for the Valorization of Industrial Minerals

Enhancement of caulim whiteness; improvement of diatomite processing; modification of minerals for new properties; calcite-dolomite separation via flotation; purification of nepheline syenite via selective flocculation; characterization of industrial minerals used in oil well perforation.

Project 3.4 – Precious Gems and Stones: Non-destructive Techniques for Identification and Information

Qualification in immersion microscopy, infrared spectroscopy and UV-VIS-NIR; implementation of a gem site at CETEM's home page; establish a practical course at the bachelors level.

Program 4

SUSTAINABLE MANAGEMENT OF NON RENEWABLE RESOURCES

Objective: To develop methodologies and instruments of management and information to help the decision making, planning and implementation of activities and projects in order to improve the level of sustainability of the economical exploration of the non renewable resources in Brazil, especially in relation to the mineral wealth.

Project 4.1 – Management of Cooperative Network of Research and Information

To strengthen CETEM's cooperative network; development of technological cooperative network in dimension stones; evolution of the dimension stone sector, elaboration of a catalogue of dimension stones.

Project 4.2 – The Challenge of Sustainability of Mining in the Amazon: Social, Economical, Environmental and Legal Aspects

To know and evaluate the present situation of mining, including the "garimpo", mining in indigenous areas, to analyze the efficiency of sustainable policies and management instruments.

Project 4.3 – Globalization and Regional Integration

To update dispersed information on globalization related to mineral trade, to organize the data bank of MERCOSUL and to propose management tools.

Special Project 1

SCIENCE AND TECHNOLOGY FOR ADDING VALUE TO MINERALS FOR EXPORTATION

Objective: To develop prospective studies with the aim to identify opportunities and priorities of technological research for adding value to minerals for exportation, as well as to implement research for the most promising identified opportunities.

Special Project 2

WATER RESOURCES AND MINING

Objective: To develop prospective studies with the aim to understand and control the quality of water in mining and in mineral processing, in the frame of specific objectives, such as:

To study the utilization of water in mining in face of new policies and restrictions.

Survey of the best management practices of water use in mining and in the metallurgical process.

To develop methodology for water balance in mining and in the mineral processing plant, involving the primary fluxes, recycling and effluents

To study the impact of the mining-metallurgical process in the groundwater reservoir.

Development of control technologies and strategies.

Internal Action Program

QUALITY, PRODUCTIVITY AND INFORMATION

Objective: To elevate the level of qualification of the human resources of the Center's staff, in the areas of: evaluation systems and quality control, certification of products and laboratory services, production management, commercialization of generated technologies, structure and management of information systems.