Aracruz Cellulose And Sustainable Pulp Production in Brazil

Carlos Alberto Roxo and Luiz Fernando Brandao

INTRODUCTION

Aracruz Cellulose S.A. is the world's leading producer of bleached eucalyptus market pulp, holding a 20% share of the global market for the product, which is used to manufacture high value-added and consumer products such as tissue, high-quality printing and writing, and specialty papers.

Operations are totally integrated, including eucalyptus plantations, the world's largest market pulp mill, and a specialized private port terminal, Protocel, located just 1.5 km from the mill. More than 90% of the Company's production is exported through Portocel. The 213,000 hectares of land (523,000 acres) owned by the Company comprise 138,000 hectares (341,000 acres) of eucalyptus plantations intermingled with 61,000 hectares (150,000 acres) of native forest reserves. The industrial complex consists of two pulp production lines, with nominal annual capacity of 1,240,000 tonnes, three recovery boilers, four bleaching and drying lines, an electrochemical plant, and facilities for chemicals recovery, water treatment and biomass energy gereration. The mill is equipped with advanced systems to treat all solid, Liquid and gaseous wastes in order to minimize environment impact.

Aracruz' firm endorsement of the concept of sustainable development is reflected not only in its lifetime practice of exclusively using wood from planted forests for pulp production and preserving native forests, but also in its commitment of constantly improving environmental practices, maintaining a comprehensive social care system for employees and their dependents, and continuously making significant contributions to the welfare of the neighboring communities in the regions in which the Company operates.

Estimated replacement value of total investments made over the past three decades in land, plantations, mill, port, operational, environmental and social infrastructure is US$3.0 billion. The Company's voting shares are almost entirely held by four major controlling shareholders: the Lorentzen (28%), Mondi Minorco Paper (28%) and Safra (28%) groups and the Brazilian National Economic and Social Development Bank - BNDES (12.5%). Aracruz non-voting class B shares, comprising 54% of total shares, are traded on the Rio de Janeiro, Sao Paulo and New York Stock Exchanges.

SOCIAL PERFORMANCE

Wealth Generation

Aracruz has been giving a substantial contribution to Brazil's economic development, particularly in the states of Espirito Santo and Bahia. Over US$200 million per year have been injected in the region's economy, and more than US$4 billion of economic wealth has been generated by the Company between 1989 and 1997.

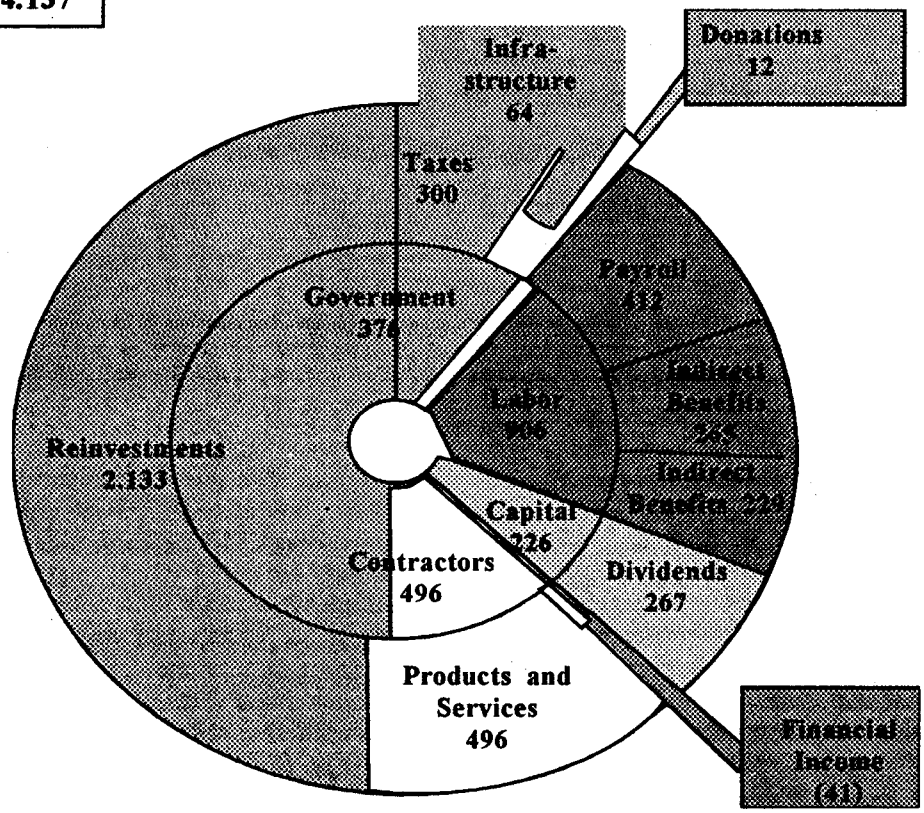
The 1997 Figures are in line with the Company's historical performance:

IPPTA sincerely thanks the authors for the "Social and Environmental Report on Aracruz Cellulose S.A." prepared specially for our Association Journal.
Ved P. Leekha
Vice President-IPPTA

Aracruz Celulose S.A.
Rua Lauro Muller - 116-22nd Floor
22299-900 Rio De Janeiro
Brazil

Generation of Economic Wealth - 1989/1997
(In US$ million)

Total : 4.137



1997 Social Indicators	
Number of Jobs	
Direct	2,393
Indirect	3,706
Total	**6,099**
Expenses (US$million)	
Wages and salaries	103.4
Taxes	21.9
Purchase of goods and services	209.9
Support to community projects	3.7
Total	**338.9**

Social Action

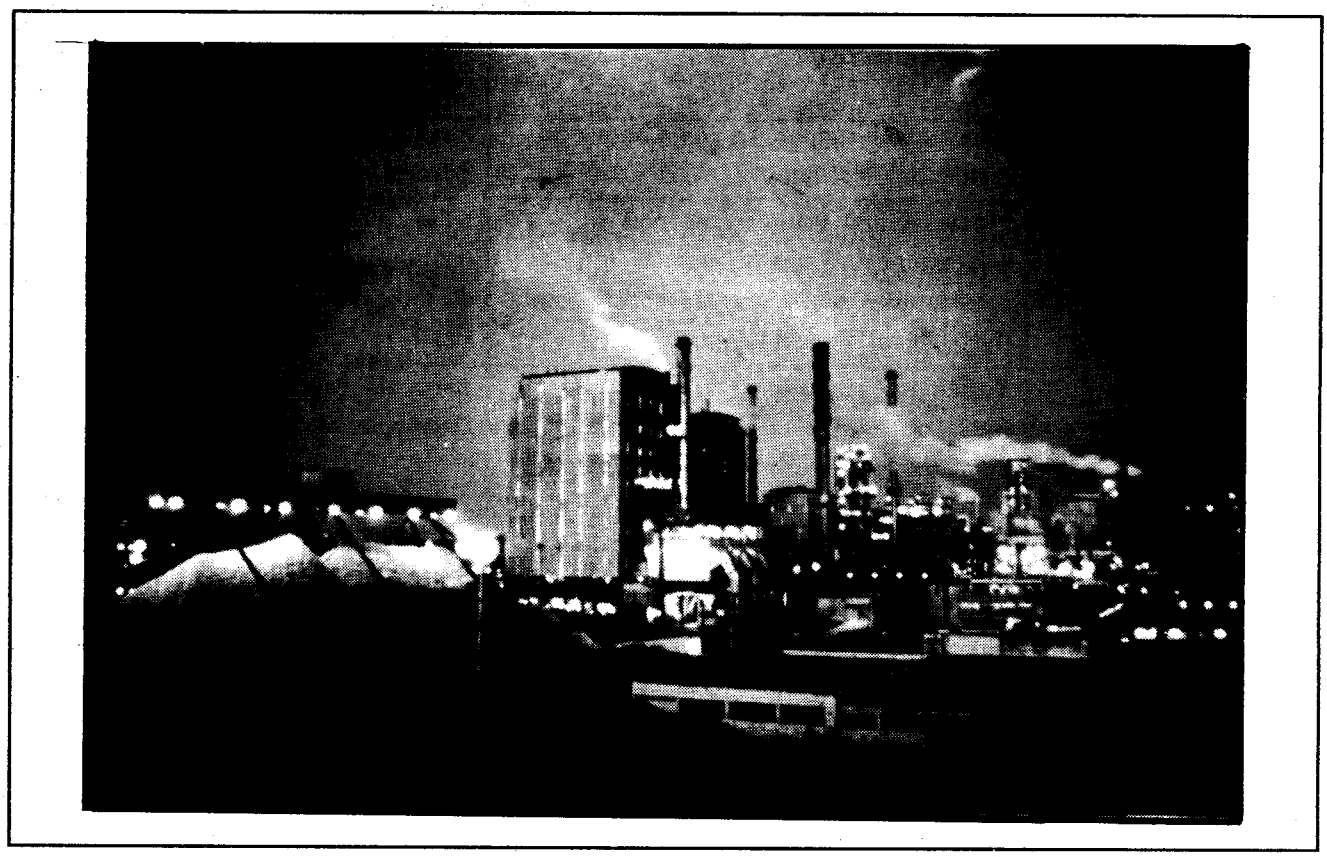
Aracruz has always taken an active role in supporting community initiatives that are consistent with the principles of social and environmental sustainability. Some of the projects currently supported by the Company, Most of them developed in cooperation with local, state and federal governments and non-governmental organizations, are listed below.

ENVIRONMENTAL PERFORMANCE

Licensing

Aracruz' operations are licensed by the States of Espirito Santo and Bahia. The following licenses were in effect during 1997:

Community projects supported by Aracruz in 1997			
Project	**Main Objective**	**Coordinator**	**Investment (US$thousand)**
Pitagoras School	Educational support to the Conqueiral residential district	Pitagoras Educational System	2,212.6
Indigenous Communities	Financial and technical support to agriculture and health projects in communities of Indian descendants in the state of Espirito Santo	NISI (inter-institutional Nucleus of Indigenous Health)	186.2
Barra do Riacho	Social and educational assistance to the Barra do Riacho community, with emphasis on environmental education and non-predatory fishing techniques	Barra do Riacho Development Group	69.0
Crer com as Maos (Faith through Action)	Support to underprivileged children, through programs that cover training and education, counseling and recreation	SECRI (Christian Voluntary Service)	35.7
Araca	Assistance to homeless youth, through a program that aims to educate and train them for local jobs	Araca Cultural and Youth Care Center	23.1
Tamar	Support for ecological projects aimed at protecting the reproductive cycle of five threatened species of sea turtles on the coast of Espirito Santo and Bahia	Pro-Tamar Foundation	42.1
Formar	Training and qualification of 600 elementary school teachers who work in 6 municipalities of the Company's operating regions.	RIED (interdisciplinary Education Network)	108.5
Microcredit Project in the state of Espirito Santo	Support to microbusinesses development by providing access to credit lines as well as technical and administrative training	CEAPE-ES (Center of Support to Small Businesses - ES)	45.8
Citizens against Drugs	A project designed to increase awareness and provide drug prevention assistance in Bairro do Coqueiral	Human Resources Department, Aracruz Cellulose	146.0
Forest Extension	Forest rehabilitation in small and medium Farms in Espirito Santo	Espirito Santo State Agricultural Agency	144.9
Donations	Financial support to education, environmental protection, social development and health promotion projects	Various	726.7
Total			**3,740.6**



MILLVIEW - Aracruz Cellulose S.A. BRAZIL

ENVIRONMENTAL LICENSES/1997		
STATE	**TYPE/NO. OF LICENSE**	**OPERATION**
Espirito Santo	IL 065/95	Modernization Program
	OL 035/96	Plantations and Mill
	OL 086/96	Partners-in-Timber Program
	IL 027/96	Expansion of Portocel
Bahia	OL CEPRAM 1238/96	Plantations
	Tecflor's Installation	Tecflor

IL- Implementation License

OL- Operating License

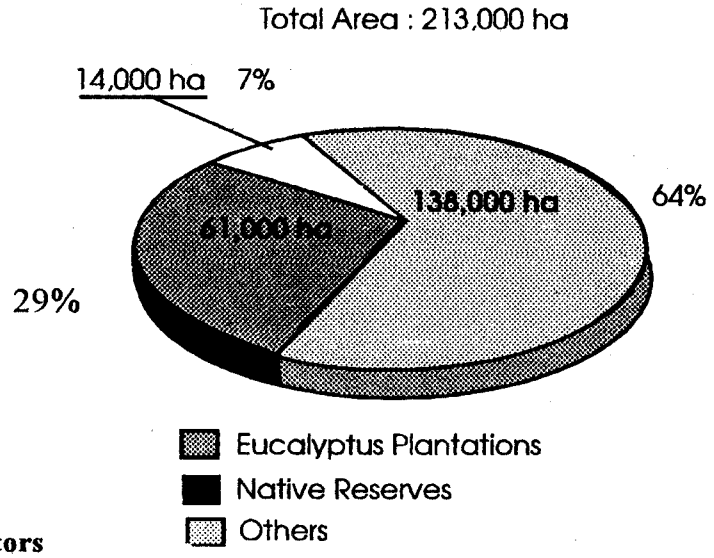
SUSTAINABLE FOREST MANAGEMENT

Aracruz' Landholdings

The Company's eucalyptus plantations occupy 83.8 thousand hectares in Espirito Santo and 54.2 thousand hectares in Bahia, corresponding to 1.8% e 0.1% of the states' territories, respectively.

The watershed Project

Close monitoring of a 286-hectare closed site throughout a full 7-year eucalyptus cycle is yielding valuable scientific data on the interaction between native forest reserves and Aracruz' plantations. This helps to ensure continuous improvement of the Company's forest management and to minimize



Forestry Indicators

Partners-in-Timber Program	No. of municipalities covered: 55 municipalities in the state of Espirito Santo: 43 Municipalities in the state of Minas Gerais: 12 No. of contracts awarded: 2, 192 Total area (ha): 19,654 Average area per contract (ha): 8.97
Production, Planting and donation of eucalyptus seedlings	No. of seedlings produced (1997): 14.7 million No. of seedling planted (1986-1997): 12 million Minimum planting of eucalyptus trees/year on Company land: 10 million restoration program in 50% of owned plantations annually No. of seedlings donated (1997): 605, 568 No. of seedling donated (1986-1997): 49 million No. of municipalities benefiting from donations: 71 in Espirito Santo No. of farmers benefited: 16,700
Riparian Buffer Zone	Total area restored in 1997 (ha): 875 Total area restored since project implementation (ha): 2,500
Biodiversity indentified to date on Aracruz' land	Fauna (*)

	Families	Species	Endangered
Mammals	24	65	10
Birds	56	448	18
Reptiles	16	54	1
Amphibians	6	47	-
Insects	168	2,509 (*)	(**)

(*) Through to December 1997. (**) Not analyzed

Flora

Over 460 tree species per hectare have been identified in the tablelands, and approximately 150 tree species per hectare were found in the eucalyptus understory vegetation.

Production and donation of native tree seedlings from the Atlantic Forest and associated ecosystems	The Shannon-Wiener (H') diversity level rated above 5 in the Company's native reserves, which is equivalent to that encountered in dense Atlantic rain forests. No. of seedlings produced (1997): 361,000 No. of species covered: 73 No. of seedlings produced (1991-1997): 4.6 million No. of species covered: 250 Seedlings donated in 1997 (government restoration and preservation programs): 195,000 No. of seedlings donated from 1991-1997 (government restoration and preservation programs): 2.1 million

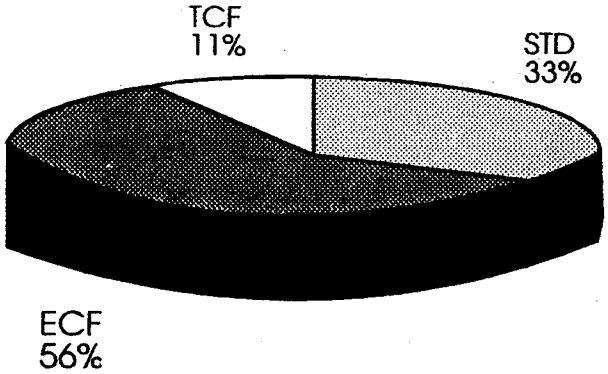
potential environmental impact. Initiated in 1993, the project studies the complete hydrological cycle, water quality; soil fertility' nutrient cycles' populational and biological dynamics of the avifauna; entomofauna; natural regeneration and local flora growth patterns; and weather conditions and their influence on forest growth. The project is being developed by an internal team in partnership with renowned national and international institutions.

ENVIRONMENTAL CONTROL AT THE MILL

Indicators

The environmental performance of Aracruz' industrial operations in 1997 can be measured by the following indicators:

Production (bleached pulp)



Raw Materials, water and energy consumption

Wood - 4.20 m^3s/adt

Chlorine - 6.81 kg/adt

Water - 62.1 m^3/adt

Energy (1997):

Electrical

	Annual consumption (Mwh/adt)	%
In-house generation	861,056	74
Outsourced	306,183	26
Total	1,167,239	100

FUEL

	Consumption (GJ/Month)	%
Renewable	29,267,154	90
Non-renewable	3,221,852	10
Total	32,489,006	100

Renewable fuels comprise black liquor (72.0%), biomass (17.6%), hydrogen, non-condensable gases and methanol, Non-renewable fuels are oil and natural gas.

❑ Aracruz' air emission levels are within limits established by Operating License 035/96 and have been substantially reduced along the years.

❑ In order to improve the monitoring of odor levels near the mill, the Company set up an Odor Perception Network, made up of 55 individuals who live in 12 locating within a radius of 70 kilometers of the mill. In 1997, 24 complaints were received from the network.

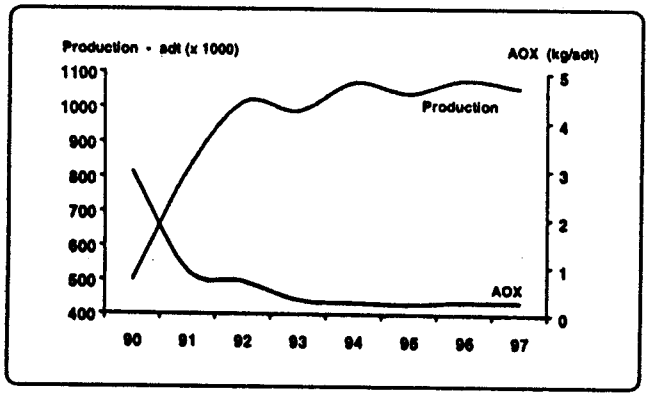
❑ Espirito Santo's environmental legislation is as stringent and comprehensive as other similar legislations worldwide.

AIR EMISSIONS (average rates 1994-1997)

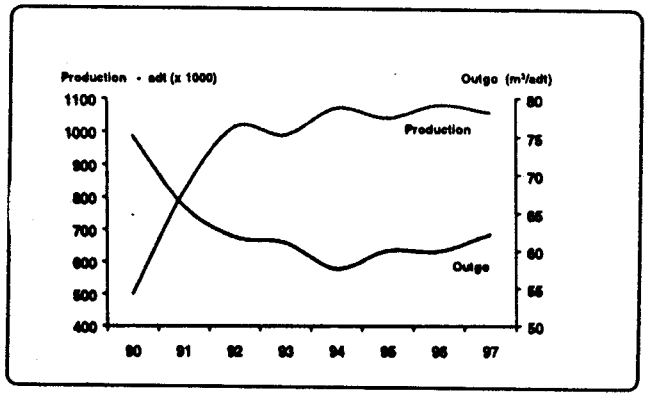
Parameters/Sources	1994	1995	1996	1997	Maximum level OL 035/96 (*)
1) Particulates (mg/Nm³)					
Recovery Boiler A	489	520	617	96	100
Recovery Boiler B	85	96	96	97	100
Auxiliary Boiler A	91	70	85	94	100
Auxiliary Boiler B	111	84	98	97	100
Dissolving Tank A	158	187	198	98	100
Dissolving Tank B	81	89	96	97	100
Kilns	157	50	80	56	100
2) Total Reduced Sulfur Compounds (TRS - ppm)					
Recovery Boiler A	0.1	0.2	0.2	0.2	2
Recovery Boiler B	0.4	0.4	0.4	0.3	2
Kilns	2.7	2.7	2.1	3.6	6
3) SO_2 (ppm)					
Recovery Boiler A	44.9	38.2	24.4	27.5	100
Recovery Boiler B	16.5	26.4	7.0	11.2	100

(*) Maximum level established by Operating License valid for 1996/1997

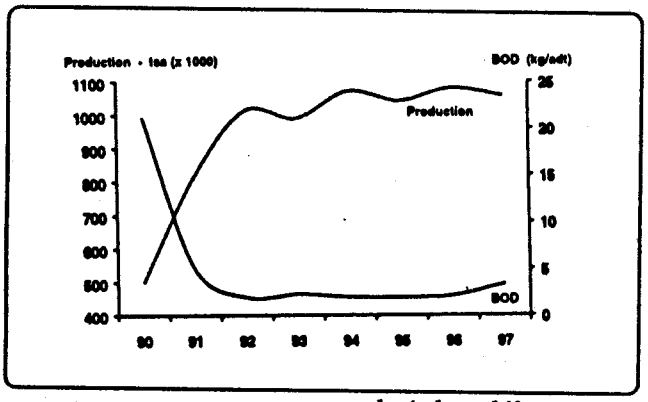
Production x Efluent AOX



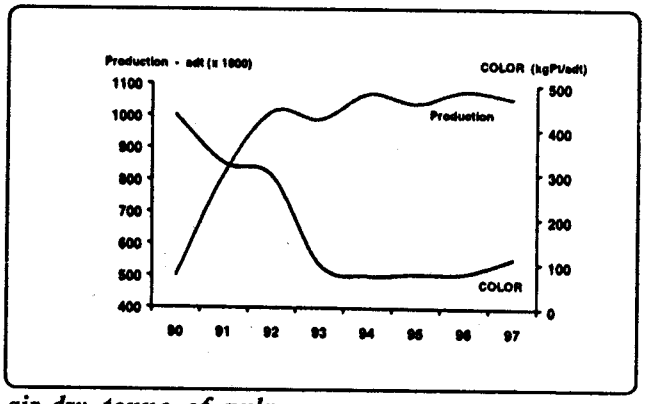
Production x Efluent Outgo



Production x Efluent BOD



Production x Efluent Color



kg/adt - kilograms per air-dry tonne of pulp
kg/Pt/adt - kilograms of platinum per air-dry tonne of pulp

EFLUENTS

❑ Impressive improvements have been registered since 1990, such as reductions in the levels of: 91% for Adsorbable Halogens Compounds (AOX), 84% for Biochemical Oxygen Demand (BOD) and 74% for efluent color (COLOR).

❑ Aracruz' effluent levels are significantly below limits established by the Operating License issued by the State of Espirito Santo Environmental Agency (SEAMA) and are in accordance with the most stringent international regulations.

❑ The increases registered in 1997 were due to the shutdowns related to the Modernization Program implementation.

RESIDUES

Production:

Dregs and grits from the process	17.7 kg.adt
Cold ash	1.0 kg/adt
Hot ash	14.5 kg/adt
Administrative waste	0.9kg.adt
Wood Bark	4.8 kg./adt
Sand	5.2 kg/adt

Destination:

Solid waste landfill A - Wood Bark

Solid waste Landfill B - Dregs, grits, ashes, sand and administrative waste

Soil chemistry correction and fertilization - Ash (8-10 t/year)

Recycling:

❑ 12% of administrative waste was recycled in 1997, resulting in the production of 12,000 notebooks.

THE PULP MILL MODERNIZATION PROGRAM

Aside from expanding the nominal production capacity by 20% to 1,240,000 tonnes/year, one of the main outcomes of the pulp mill modernization was the enhanced environmental performance of Aracruz' industrial complex. The increase in production capacity will not require any additional water consumption or purchase of extra electrical power; pulp production units A and B were equipped with new environmental control systems, and existing ones were modified and improved. Four new state-of-the-art electrostatic precipitators began operation in September 1997, to ensure that the levels of particulate emissions are comparable to those found in the world's most modern pulp mills. New technologies introduced in the bleaching process will allow the mill to increase its production capacity of ECF (Elemental Chlorine-Free) and TCF (Totally Chlorine-Free) pulp. The watertable around the mill will be better protected by the construction of a new solid waste disposal landfill utilizing a state-of-the-art-technology monitoring system. Improvements made in the treatment system will allow for reduction in discharge levels of organic and inorganic effluents.

HEALTH AND SAFETY

All of the Company's activities are undertaken in a way that will promote a healthy and safe working environment, following an action plan based on accident prevention, systematic analysis of results and prompt correction of identified distortions.

INDICATORS

Year	Frequency Rate (*)	Severity Rate (**)
1996	4.48	55
1997	3.96	43

(*) Frequency Rate - the number of work-related accidents, with or without injury, per million of manhours of risk exposure.

(**) Severity Rate - amount of time (days lost plus days discounted) per million of man - hours of risk exposure.

PERFORMANCE IMPROVEMENT

New management and operational programs aimed at improving performance were introduced in 1997, including:

Management Programs:

Annual auditing on health, safety and environment in all of the Company's sectors.

Identification and correction of distortions through a computerized system, to be operational in 1998;

An "Emergency Control Plan" is under implementation scheduled to be fully operational in 1998.

Technical Programs

Implemented: Fugitive Emissions Control Plan, Hearing Conservation Plan, Contractor Safety Plan, Lockout and Tagout, Environmental Risk Prevention Plan, Medical Services Plan, Preventive Analysis of Activities, Indusrtial Vehicles and Craning Equipment.

To be implemented: Emergency Control Plans (Forestry/ Industry), Respiratory Protection Plan, Revision of the Ionizing Radiation Plan.