

***INTER-AMERICAN DEVELOPMENT BANK***



***BRAZIL***

***DONA FRANCISCA HYDROPOWER PLANT***

***BR-0315***

***ENVIRONMENTAL AND SOCIAL IMPACT REPORT***

*May 2000*

Project Team: Leandro Alves (Team Leader), Roberto Vellutini (Group Chief), Rodrigo Levy, Robert Montgomery, Elizabeth Brito, MBV Consultores Associados (Environmental Consultant), John Renshaw (Social Consultant).

## TABLE OF CONTENTS

### ACRONYMS

<b>I. INTRODUCTION .....</b>	<b>5</b>
<b>II. PROJECT DESCRIPTION.....</b>	<b>6</b>
A. <u>Site Location</u> .....	6
B. <u>Project Components and Facilities</u> .....	6
D. <u>Project Costs, Schedule, and Responsibilities</u> .....	7
E. <u>Project Alternatives</u> .....	7
<b>III. INSTITUTIONAL AND LEGAL FRAMEWORK.....</b>	<b>8</b>
A. <u>Institutional</u> .....	8
(a) Energy.....	8
(b) Environmental.....	8
(c) Health and Safety.....	9
B. <u>Legal</u> .....	9
(a) Energy.....	9
(c) Environment.....	10
(c) Health and Safety.....	11
C. <u>Compliance Status</u> .....	11
<b>IV. ENVIRONMENTAL AND SOCIAL CONDITIONS .....</b>	<b>12</b>
A. <u>Environmental</u> .....	13
B. <u>Social-Economic</u> .....	14
<b>V. ENVIRONMENTAL AND SOCIAL IMPACTS.....</b>	<b>16</b>
A. <u>Construction Impacts</u> .....	16
(a) Environmental.....	16
(b) Socioeconomic.....	17
B. <u>Operation Impacts</u> .....	18
(a) Environmental.....	18
(b) Socioeconomic.....	19
C. <u>Positive Impacts/benefits</u> .....	19
<b>VI. ENVIRONMENTAL AND SOCIAL MITIGATION AND MONITORING .....</b>	<b>20</b>
A. <u>Mitigation Measures</u> .....	20
(a) Construction phase.....	20
(b) Operation phase .....	24
B. <u>Monitoring Programs</u> .....	25
C. <u>Cost, Schedule, and Responsibilities</u> .....	26
D. <u>Health and Safety</u> .....	26
E. <u>Environmental Management System</u> .....	27
<b>VII. PUBLIC CONSULTATION.....</b>	<b>27</b>
<b>VIII. RECOMMENDATIONS.....</b>	<b>28</b>

**TABLES**

- Table 4-1. Size of Holdings in Project Directly Affected Area
- Table 5-1. Project Affected Area and Properties by Municipality
- Table 5-2. Directly Affected Properties
- Table 5-3. Families Eligible for Resettlement
- Table 6-1. Potential Collective Resettlement Sites
- Table 6-2. ESMP (PBA) Program Responsibility, Schedule, and Cost
- Table 7-1. List of Meetings and Public Consultation

**FIGURES**

- Figure 2-1. Dona Francisca Site Location

**ANNEXES**

- Annex 1. Summary of Select Potentially Applicable Project Environmental Legislation
- Annex 2. Status of Sites of the Archaeological Rescue Program
- Annex 3. Summary of Expropriation and Resettlement Plan

## ACRONYMS

ADI	Area of Direct Influence ( <i>Área de Influência Direta</i> )
AII	Area of Indirect Influence ( <i>Área de Influência Indireta</i> )
ANEEL	Regulatory Agency for the Energy Sector ( <i>Agência Nacional de Energia Elétrica</i> )
CEE	<i>Companhia Estadual de Energia Elétrica</i>
CELESC	<i>Centrais Elétricas de Santa Catarina</i>
COMASE	Environmental Committee for the Electric Sector ( <i>Comitê de Meio Ambiente do Setor Elétrico</i> )
CONAMA	National Environmental Council ( <i>Conselho Nacional do Meio Ambiente</i> )
COPEL	<i>Companhia Paranaense de Energia</i>
DFESA	<i>Dona Francisca Energética S.A.</i>
DNAEE	National Department of Water and Energy ( <i>Departamento Nacional de Águas e Energia Elétrica</i> )
DNPM	National Department of Mineral Production ( <i>Departamento Nacional de Produção Mineral</i> )
DRTs	State-based offices of the Ministry of Labor ( <i>Delegacias Regionais do Trabalho</i> )
EIA	Environmental Impact Assessment ( <i>Avaliação de Impacto Ambiental</i> )
ELETRORBRAS	Centrais Elétricas Brasileiras S.A.
ESMP	Environmental and Social Management Plan ( <i>Projeto Básico Ambiental – PBA</i> )
FATEC	<i>Fundação de Apoio a Tecnologia e Ciência</i>
FEPAM	State Foundation for Environmental Protection ( <i>Fundação Estadual de Proteção Ambiental</i> )
HPP	Hydropower Plant ( <i>Planta hidrelétrica</i> )
IBGE	Brazilian Institute of Geography and Statistics ( <i>Instituto Brasileiro de Geografia e Estatística</i> )
IBAMA	Brazilian Institute for Environment and Renewable Resources ( <i>Instituto Brasileiro de Meio Ambiente e Recursos Naturais Renováveis</i> )
IPHAN	Institute for National Historic and Artistic Heritage ( <i>Instituto do Patrimônio Histórico e Artístico Nacional</i> )
IPP	Independent Power Producer
MT	Ministry of Labor ( <i>Ministério do Trabalho</i> )
PNMA	National Environmental Policy ( <i>Política Nacional do Meio Ambiente</i> )
PUCRS	Catholic University of Rio Grande do Sul ( <i>Pontifícia Universidade Católica do Rio Grande do Sul</i> )
RCC	Rolled Compacted Concrete
RIMA	Environmental Impact Assessment Report ( <i>Relatório de Impacto Ambiental</i> )
SFCIEPS	<i>Santa Felicidade Comercio, Importação e Exportação de Produtos Siderúrgicos Ltda.</i>
UBEA	Brazilian Union for Teaching and Assistance ( <i>União Brasileira de Ensino e Assistência</i> )
UFRGS	Federal University of Rio Grande do Sul ( <i>Universidade Federal do Rio Grande do Sul</i> )
UFSM	Federal University of Santa Maria ( <i>Universidade Federal de Santa Maria</i> ).

## I. INTRODUCTION

- 1.1 In August 1998 a 35-year concession ("Concession") to develop the 125 MW Dona Francisca hydroelectric power plant ("Dona Francisca" or "Project"), located on the *Jacuí River* in the *State of Rio Grande do Sul* in the southern Brazil, was granted to the Consortium formed by the state owned electrical utility Companhia Estadual de Energia Elétrica ("CEEE") of the State of Rio Grande do Sul (10 percent) and the Consortium Dona Francisca Energética, S.A. ("DFESA") (90 percent). The consortium DFESA is comprised of the following companies: (a) Electrical Utility Companies: Centrais Elétricas de Santa Catarina ("CELESC"), from the State of Santa Catarina; Companhia Paranaense de Energia ("COPEL"), from the State of Paraná; (b) Independent Power Producers ("IPP"): Desenvix; Inepar Energia S.A.; and (c) Self-Producer: Santa Felicidade Comércio, Importação e Exportação de Produtos Siderúrgicos Ltda. ("SFCIEPS"). The Dona Francisca Project is considered a priority project for the Southern region in the Brazil National Ten-Year Energy Expansion Plan 1998/2007, which foresees that the installed capacity of the country should go from 59.3 GW to 95.7 GW.
- 1.2 The original Concession rights for the development of this project were granted in 1979 to CEEE by DNAEE (National Department of Water and Electricity). CEEE initiated preliminary construction activities commenced in the early 1980s but construction was halted due to lack of funds. In early 1996, the Concession was re-offered under a public bidding process. However, the regulatory framework in force in Brazil at that time had not defined the rules for the participation of the auto-producers and Independent Power producers (IPPs) in the electricity sector. Therefore, only public utilities could participate in bidding processes of hydro power plants. In September 1996, the enactment of Decree 2.003 introduced provisions to allow other players to participate in the bidding process and the operations of the Brazilian power sector. Currently self-producers and IPPs (who can either consume the energy produced, or sell it to public utilities or industrial users) are eligible.
- 1.3 A Consortium Agreement between CEEE and the Partner Group – GIDF was signed on March 13, 1997 and an addendum was signed on February 16, 1998. According to this Agreement, CEEE agrees to comply with several obligations, such as the payment of the costs of the technical management activities during the implementation phase. In proportion to its participation in the consortium, CEEE has to absorb the costs of operation and maintenance of the Dona Francisca HPP, and all the costs of the transmission lines and the electric substation. Furthermore, the Consortium Agreement defines the rights and obligations of the parties regarding the development and operation of the power plant.
- 1.4 According to the Consortium Agreement, the Partner Group - GIDF is responsible for the implementation of the project and is planning to invest approximately US\$ 90.5<sup>1</sup> million (from which US\$ 66.4 million for the Engineering Procurement Construction –EPC) through a Special Purpose Company ("SPC"), Dona Francisca Energética S.A. ("DFESA").
- 1.5 The Consortium Dona Francisca ("Consortium") has requested that the Inter American Development Bank ("IDB") provide a portion of the financing for the Dona Francisca Project. The total project cost is estimated at US\$100.1 million, with the Engineering Procurement Construction ("EPC") contract representing 86 percent of total project cost (US\$86 million). The proposed financial plan proposed is: equity of US\$ 36.5 million, IDB A-Loan of US\$ 10.3 million, IDB B-Loan of US\$ 21.6 million, BNDES loan of US\$ 19.6 million, and Bradesco (a private Brazilian Bank) of US\$ 12.2 million.

---

<sup>1</sup> R\$ 167.5 million converted to US\$ by the exchange rate of US\$1.00 = R\$ 1.85.

## II. PROJECT DESCRIPTION

### A. Site Location

- 2.1 The Dona Francisca Project is located on the Jacuí River, at the border of the Municipalities of Agudo and Nova Palma, in the State of Rio Grande do Sul, in the southern region of Brazil (see Figure 2-1). The Jacuí River currently has four other operational hydroelectric power plants (Ernestina, Passo Real, Jacuí and Itaúba), all of which are located upstream of Dona Francisca and were constructed over twenty years ago. The Dona Francisca dam is located approximately 40 km downstream of Itaúba HPP. The total area of the Jacuí River watershed is 76,000 km<sup>2</sup>, and the incremental area between Itaúba HPP and Dona Francisca HPP is 3,375 km<sup>2</sup>. Due to the existence of the other hydroelectric power plants upstream in the Jacuí river, an integrated operation is expected to benefit the control and efficiency of Dona Francisca HPP.
- 2.2 The reservoir operational levels will be 94.5 meters above sea level (masl) (maximum level) and 91.0 masl (minimum level) (i.e., a normal variation 3.5 m), with an extreme maximum of 100.5 masl. The surface area of the reservoir will be approximately 19 km<sup>2</sup>, with 2.06 km<sup>2</sup> belonging to the present riverbed and the remaining 16.89 km<sup>2</sup> corresponding to the land to be flooded. The reservoir will have a perimeter of 135 km and an active storage of 355 x 10<sup>6</sup> m<sup>3</sup>. The filling of the reservoir is expected to last 28 days.

### B. Project Components and Facilities

- 2.3 The Project involves the construction and the operation of a 125 MW installed capacity hydroelectric power plant and ancillary facilities on the *Jacuí River*. The firm average capacity of the plant will be 80 MW and the guaranteed energy is expected to be 700 GWh per year. The main project component will be the roller compacted concrete (“RCC”) dam of 610 meters in length and 51 meters in height. The power house will contain two Francis Turbines 62.5 MW capacity each. There will be a cofferdam, two penstocks, two transformers, a 800 m long connection line, one substation (located 0.4 km to the southwest of the dam), and 2,500 m 230-kV transmission line to connect to the existing integrated transmission system (230 kV Itaúba to Santa Maria line). There will be four sluiceways used for the river diversion (see below) and one spillway in the body of the dam (elevation 94.5 masl). The spillway is designed for a discharge of 10,600 m<sup>3</sup>/s (equivalent to 10,000 year event). The energy from the spillway is dissipated by means of a stilling basin. The water intake for the turbines is at elevation 79.15 masl and is a conventional concrete gravity structure. Trash-racks will be located immediately upstream of the intake opening. The water intake will be controlled by two wheel gates. Most of the support facilities (e.g., minor access roads, offices, temporary housing, storage and work areas) are all existing, in that they were built by CEEE during the initial construction phase.
- 2.4 The estimated quantities of materials associated with construction are: common excavation (947,000 m<sup>3</sup>), rock excavation (basalt)(442,500 m<sup>3</sup>), rock excavation (sandstone)(241,000 m<sup>3</sup>), quarry (basalt)(169,000 m<sup>3</sup>), embankment (cofferdams and substation)(742,000 m<sup>3</sup>), roller compacted concrete (400,900 m<sup>3</sup>), cement (87,050 ton), structural steel (4,850 ton), and conventional concrete (152,540 m<sup>3</sup>).
- 2.5 The diversion of the Jacuí River for the construction of the Project was planned for two phases. The first phase, which is already concluded, consisted of a diversion channel in the left bank of 70 m width. The channel is designed for a discharge of 4,458 m<sup>3</sup>/s (equivalent to a 25 year event). During the second phase, the diversion will be accomplished through four 5.50 m x 11.00 m sluiceways and two 8.00 m x 9.60 m superior openings.

D. Project Costs, Schedule, and Responsibilities

- 2.6 The estimated total cost for the Dona Francisca Project is US\$100.1 million, with the Engineering Procurement Construction (“EPC”) contract representing 86 percent of total project cost (US\$86 million).
- 2.7 The planned Project implementation time schedule is:

Start of construction	August 1998
First phase of the river diversion	February 1999
Filling of the reservoir	October 2000
Commercial operation of the first unit	February 2001
Commercial operation of the second unit	May 2001
Completion of construction works	November 2001
Construction of the transmission line	February 1999 to June 2000

- 2.8 For the development of Dona Francisca HPP, the Consortium has divided responsibilities as follows:

- CEEE is responsible for obtaining environmental licenses and permits, for the expropriation of lands, and compensation and resettlement of the affected population. However, CEEE has subsequently delegated the implementation of resettlement to the State of Rio Grande do Sul Ministry of Agriculture and DFESA has contracted ICODES Sociedade Civil and various universities to implement various environmental and social mitigation measures and monitoring programs. CEEE was responsible for the preparation of the Project Environmental Impact Assessment (EIA) and the Project Environmental and Social Management Plan (*Projeto Básico Ambiental or PBA*). CEEE is also responsible for Operation and Maintenance.
- The Consortium Ivaí Engenharia de Obras/Torno, formed by a Brazilian and an Italian civil construction company, respectively, is responsible for the execution of civil construction.
- Inepar Indústria e Construção S.A., a Brazilian power equipment supplier, will supply, assemble and operate the equipment.
- Engineering will be provided by Engevix Engenharia S/C, a Brazilian company specialized in infrastructure projects in the power and oil sectors.
- COPEL will provide Owner’s Engineering to DFESA.

E. Project Alternatives

- 2.9 The evaluation of the environmental feasibility of Dona Francisca was performed as part of the annual update of the Ten-year Expansion Plan 1998/2007 prepared by the *Grupo Coordenador de Planejamento do Sistema (GCPS)*. Dona Francisca is included in the Plan as a priority project for the Southern region of Brazil. The Ten-year Expansion Plan is updated annually and consolidates all necessary investments in power plants and transmission lines to guarantee the supply of electricity, the physical and economic viability of their implementation and an evaluation of their social and environmental impacts.
- 2.10 The development of the Dona Francisca facility was originally explored by CEEE who evaluated nine project alternatives, from which four were considered to be feasible alternatives. Of the four feasible alternatives, the alternative selected was the earth dam and trench fill revetment with 495 m of length and maximum height of 53 m. The intake works were to be located at the left embankment and the sluiceways on the right embankment, with 6 sluice gates measuring 5 m x 10 m under the dam. This project alternative, completed in

1980, was revised by Engevix in 1997, and resulted in the following main changes: (a) new dam axis relocated 150 meters upstream from the original location; (b) use of RCC technology; (c) dam with an ungated spillway; and (d) use of 2 x 62.5 MW Francis Turbines instead of the Kaplan Turbines.

- 2.11 This revised project is more advantageous, in terms of both the environment and technical. The main environmental advantages are: (a) the geological characteristics of the right bank are better and the axis location is more adapted to the geologic conditions; (b) less concrete will be required; (c) excavation volumes for the spillway will be reduced; and (d) there is reduced hydraulic impact on the soils (“arenito”) of the downstream foundation. The Project economy and construction logistic were also improved by: (a) the new turbines are cheaper than the original ones; (b) construction time will be reduced, therefore a reduction in Project cost; and (c) general optimizations in the Project electro-mechanical components also reduced costs.

### III. INSTITUTIONAL AND LEGAL FRAMEWORK

#### A. Institutional

##### (a) Energy

- 3.1 The National Electrical Energy Agency (ANEEL), was instituted and regulated by Federal Laws 8.897/95 and 9.427/96 and its regulations, as the regulatory body responsible for implementing the federal government policies and procedures related to the potential for hydroelectric exploration and energy production, as well as for issuing the appropriate concessions, permits and other forms of authorization. Two additional organizations are involved in the operation of the sector, GCPS and the National Electric System Operator (ONSE), a private institution integrated by entities granted with concessions or authorizations as well as customers. Together they are responsible for the sector’s operations planning and programming, and the activities of coordination and control of the generation and transmission system. Other entities involved are Coordinating Group for Interconnected Operation (GCOI) and National System’s Operation Center (CNOS), regarding the sector’s operations planning and programming, and the activities of coordination and control of the generation and transmission system.
- 3.2 The Coordinating Committee of the Environmental Operations of the Power Sector (“*Comite de Meio Ambiente do Setor Elétrico - COMASE*”), comprised of Eletrobrás and its regional concessionaires, established the environmental and social policies for the electric power sector based on the following guidelines: social and environmental feasibility of the project, environmental protection and socioeconomic development of the project area of influence, and public consultation and participation.
- 3.3 Within the state of Rio Grande do Sul, CEEE who is a partner in the Consortium for the Dona Francisca Project, is a state governmental entity in the energy sector.

##### (b) Environmental

- 3.4 The Ministry of the Environment, Water Resources and the Amazon Region (MMA) is responsible for the coordination of the National Environmental Policy (“*Política Nacional de Meio Ambiente*”) at the federal level. The National Environment Council (CONAMA) is a consulting and deliberating body responsible for defining general environmental regulations and basic criteria and guidelines to implement the Policy, such as environmental and emission standards for ambient quality and pollutants, respectively, and also the general requirements



for environmental licensing and for the environmental impact assessment process. The Brazilian Institute for Environment and Renewable Resources (IBAMA) is the federal agency responsible for executing and enforcing the environmental regulations and standards, at the federal jurisdiction, and to issue the environmental permit in the cases defined by law.

- 3.5 In terms of the Dona Francisca Project, the environmental responsibility for the enforcement of environmental legislation, including the principal licenses, is primarily with the State of Rio Grande do Sul environmental agency: the *Fundação Estadual de Proteção Ambiental (FEPAM)*. IBAMA is only responsible for the authorizations required related to reservoir clearing (e.g., tree cutting), flora and fauna rescue, and cave protection. Archeological and historical resources are the responsibility of IPHAN (National Institute for Historic Heritage - Instituto do Patrimônio Histórico e Artístico Nacional).

(c) Health and Safety

- 3.6 The responsibility for developing and enforcing the health and safety regulations is assigned to the Ministry of Labor (MT) and its Regional State-based Offices (DRTs).

B. Legal

(a) Energy

- 3.7 The regulation of the public provision of electricity is mainly centered in articles 175 and 121 of the Federal Constitution which establish that the following are federal responsibilities: services and works of electric energy and exploration of hydroelectric potential of the water resources (together with the States where the hydroelectric resources are found), and rendering of public services, either directly or under regime of concession or permit, always by means of public bidding. The reform of the Brazilian power sector began in 1995 with the privatization of government-owned electricity utilities and with Constitutional amendments allowing private investment in the electricity sector. In 1996, the GOB undertook regulatory reform by setting rules of a new and competitive electricity market. The new market model opened generation and trading businesses to competition, while transmission and distribution continued as regulated activities.
- 3.8 Financial compensation (royalties) for the use of hydrological resources in the generation of electricity are regulated by Federal Laws 7.990/89 and 8.001/90, Federal Decrees 01/91 and 774/93, and Ordinance DNAEE 304/93. Compensatory payments are due to Federal government, States, and Municipalities where the areas to be flooded by hydroelectric reservoirs are located. The value of financial compensation is determined on a monthly basis, taking into account the amount of electric power effectively generated by the hydroelectric power plant. ANEEL is responsible for calculating the value of the financial compensation, based on information provided by the operator.
- 3.9 The expropriation process is regulated by the Federal Decree-Law 3.365/41 and Federal Law 2.786/56. This legislation constitutes the legal basis for the acquisition of private properties for public good/use. Article 5 (item XXIV) of the Federal Constitution defines the concept of fair payment. The expropriation process is to occur in two stages. In the declaration stage, ANEEL publishes a resolution determining that the area to be expropriated is of public utility. In the expropriation stage, the concessionaire is allowed to acquire and compensate the affected properties in the areas to be expropriated.
- 3.10 Other relevant pieces of legislation that regulate the provision of electricity are: Federal Law 8.987/95, which establishes the regime of concession and permit for public services, as established by article 175 of the Federal Constitution; Federal Decree 1.717/95, which establishes procedures for concessions of public services related to electric energy; Federal

Decree 2.003/96, which regulates the electric energy production by independent producers; and Law 9.648, which included amendments to all the above legislation, as part of the government's reform to introduce greater competition and transparency in the generation of electricity.

(c) Environment

- 3.11 As granted by the 1988 Federal Constitution, environmental legislation and regulations in Brazil are enacted at the federal, state and municipal levels. The federal agency establishes general requirements of broad applicability, while specific standards of enforcement are left to the state agency, either by regulation or by administrative orders. The states and municipalities may also issue standards of equal or more stringent requirements than the federal ones. In addition, the Brazilian Technical Standards Association (ABNT) issues technical norms and standards dealing with specific environmental matters. The content of these standards is in general considered as best management practice; however, they can also be considered legal requirements when recommended by any piece of legislation.

*Federal*

- 3.12 The most relevant piece of environmental legislation is Federal Law 6.938/81, which created the National Environmental Policy (Política Nacional do Meio Ambiente – PNMA). It established the basis for environmental protection in Brazil, by putting in place the appropriate institutional framework and defining the main instruments for environmental management. This policy and its regulations made provisions for the creation of the Brazilian Institute of Environment (“Instituto Brasileiro de Meio Ambiente, Recursos Naturais Renováveis e Amazonia Legal – IBAMA”), the National System of Environment (“Sistema Nacional de Meio Ambiente – SISNAMA”), and the National Council of Environment (“Conselho Nacional de Meio Ambiente – CONAMA”), as well as the establishment of the environmental permit system and the environmental impact assessment system (EIA system).
- 3.13 The Brazilian environmental permitting system requires that three licenses (permits) be obtained by all potentially pollutant activities: Preliminary License (Licença Prévia or “LP”), Installation License (Licença de Instalação or “LI”), and Operating License (Licença de Operação or “LO”). For projects listed in CONAMA 001/86 (includes HPPs with nominal capacity above 10 MW), an Environmental Impact Assessment (EIA) is required. The CONAMA Resolution 001/86 defines the basic content of the EIA and establishes the public participation requirements. CONAMA Resolution 09/87 regulates the public hearing process associated with the EIA process. The LP is granted based upon governmental approval of the project EIA and the RIMA (“Relatório de Impacto Ambiental”, which is a summary of the EIA). The LI is granted based upon governmental approval of a project-specific Environmental and Social Management Plan ESMP (“Projeto Básico Ambiental” or “PBA”) and represents the governmental authorization to start the construction of the proposed project. The LI also establishes specific requirements regarding the mitigation and monitoring of environmental and social impacts. The LO must be obtained prior to project operation.
- 3.14 The specific environmental licensing process for HPPs is regulated by CONAMA Resolution 006/87. The LP must be requested at the beginning of the feasibility study of the HPP and the granting depends on the approval of the EIA study and the RIMA. The governmental approval of the PBA is required for the issuance of the LI. The LO must be issued prior to the closing of the dam (i.e., beginning of reservoir filling/flooding), and is based upon verification of compliance with the environmental requirements established in the LI, in particular the implementation of the PBA.

- 3.15 CONAMA Resolution 002/96 determines that projects with significant environmental impact should establish an environmental conservation area/unit, and that a minimum of 0.5% of the total project cost be spent exclusively for the acquisition of the necessary areas. Complementary funds (e.g., when areas cost less than the established percentage) can be used in infrastructure and monitoring activities within the area, at the discretion of the state environmental regulatory agency.
- 3.16 Federal Laws 8.171/91 and 8.987/95 establish that electric utilities are obliged to recover the environmental conditions in the affected area. These laws also address requirements for forest clearing and other disinfecting activities within the reservoir area, as well as institutional arrangements with environmental agencies to promote pollution control in the reservoir watersheds, and monitoring and control of activities in the reservoir and protected areas. Federal Decree 95.733/88 establishes that large and medium scale projects, funded totally or partially by federal funds, must include in the project budget a minimum of 1% of this budget, to prevent or correct the project negative impacts.
- 3.17 Other federal legislation that may relate to the Project includes (see Annex 1 for brief summary): (a) waste management; (b) water management, including water quality standards, and standards for wastewater and effluent discharges; (c) fauna and flora and forest management, including requirements for deforestation and clearing of reservoirs before filling and the minimum width of protected forests around reservoirs; (d) exploitation of mineral resources, including extraction of stones, clay, gravel and sand and other materials for construction works; (e) noise, including maximum limits for noise in industrial, commercial or leisure areas; (f) protection of historic and archeological sites and patrimony; (g) handling and transportation of explosives; and (h) the expropriation process required to acquire and compensate the affected properties in the areas to be expropriated for a public project or a project that is of public interest.

#### (c) Health and Safety

- 3.18 Health and safety regulations in Brazil are mainly established by the Ministry of Labor, at the federal level, through a set of laws, decrees and Regulatory Norms (NR's). However, complementary health and safety and industrial hygiene requirements are established through Technical Rules and Standards issued by the ABNT.

#### C. Compliance Status

- 3.19 Dona Francisca HPP was already under construction at the time that the Brazilian regulatory requirements regarding the EIA systems were issued. After the publication of the CONAMA Resolution 001/86, the Project Environmental Impact Assessment (EIA) and the RIMA ("Relatório de Impacto Ambiental"), was prepared and completed in 1989. FEPAM approved the EIA and issued the LI<sup>2</sup> in 1991 with conditions regarding the presentation of a set of programs to ensure appropriate mitigation of Project-related impacts. In 1992, a Project Environmental and Social Management Plan (ESMP) (*Projeto Básico Ambiental or PBA*)<sup>3</sup> was developed (see Section VI for details). FEPAM has subsequently renewed the LI on a yearly basis. The current LI is valid until June 2000. Other key permits/authorizations include: (a) ANEEL issued Resolution No.11 on January 21, 1999 that declares the land required for the development of the Dona Francisca Project to be of public utility and authorizes the expropriation process to be implemented; (b) the Department of Natural and Renewable Resources of Rio Grande do Sul (DRNR) issued in February 2000 the License for cleaning the area to be flooded; and (c) the report on the updated archeological rescue research study

<sup>2</sup> FEPAM issued the LI without an LP due to the stage of development of the project by the time it initiated the permitting process.

<sup>3</sup> Originally there were 18 programs, currently consolidated in 15 programs.

and the applicable forms for the final registration and rescue permit were submitted to in September 1999 and approved by IPHAN, as well as the authorization for the relocation of the historic “stone house”.

- 3.20 Since the early stages of the project, the population has been consulted and informed about the Project (see Section VII for details). Public consultation about the Project with the affected population was initiated in the late 1980s during the development of the Project EIA. Specifically, a Commission of Affected People (*Comissão dos Atingidos*), that comprised representatives of the affected landowners and representatives from the affected municipalities, was established in 1989 in order to discuss the EIA. On September 28, 1990 the Commission signed a formal agreement with CEEE which outlined the main points to be addressed in the resettlement plan. This was followed by a further agreement, signed on 12 July 1991 that addressed specific concerns about collective resettlement and valuation procedures. Further public meetings were held after the Concession contract was awarded to the Consortium to explain and discuss social, economical and environmental impacts, the associated mitigation measures, including several monitoring programs. The Consortium made available in all affected municipalities and also for the affected population copies of the Project EIA, RIMA, and PBA.
- 3.21 The original agreements between CEEE and the Commission of Affected People were ratified in 1997 by DFESA when the Dona Francisca Concession was awarded. In January 1999, Resolution 11 of the Federal Electricity Regulator, ANEEL (*Agência Nacional de Energia Elétrica*) declared the project to be in the public interest, in accordance with Law 3365 of 1941. Based upon these agreements and as part of the PBA, the Project Consortium has established an Expropriation and Resettlement Program (ERP)(i.e., Resettlement Plan). The main goal of the ERP is to provide the affected families, either property owners or landless workers, improved living conditions or adequate compensation (see Section VI for details). The census and socioeconomic survey to define the directly affected families was performed in 1997. In August 1999 an agreement was established to define the specific expropriation and resettlement responsibilities among DFESA, CEEE and the Government of Rio Grande do Sul. During 1999 the *Movimento dos Atingidos por Barragens* (MAB), a national NGO that claims to represent people affected by hydropower projects, organized an alternative commission comprising two representatives from each of the affected localities. This commission has now effectively taken over representation of the affected population, and the original commission is no longer active. In addition during 1999, a modified and expanded ERP was developed based upon IDB policy, guidelines and input. On January 25, 2000, the main points from the ERP were included in a new agreement drawn up between the commission of affected people, CEEE and Rio Grande do Sul Ministry of Agriculture.

3.22

#### IV. ENVIRONMENTAL AND SOCIAL CONDITIONS

- 4.1 The Dona Francisca Project is located on the Jacuí River, at the border of the Municipalities of Agudo and Nova Palma, in the State of Rio Grande do Sul, in the southern region of Brazil (see Figure 2-1). The Project area of direct and indirect influence includes, respectively, portions and all of six municipalities: Agudo, Ibarama, Estrela Velha, and Arroio do Tigre, in the left margin, and Nova Palma and Pinhal Grande, in the right margin. The Jacuí valley is characterized by steep slopes, with a small area of alluvial floodplain (*varzea*) extending for about five kilometers upstream from the dam site to the confluence of the Rio Jacuizinho.
- 4.2 The Project directly affected area includes the reservoir area, some properties immediately adjacent to the reservoir that will lose road access, and the area used for the civil works, quarries and construction site. The area for the transmission line will not need to be acquired; the owner will be compensated for the right of way. The reservoir area is defined as all the

land situated below 100.2 masl, a level that corresponds to the estimated maximum flood level in 10,000 years. This would cover a total area of 1,895 ha, of which 1,689 ha are new land that will be flooded and 206 ha that correspond to the present bed of the Jacuí and Jacuizinho rivers.

A. Environmental

- 4.3 Climate: The local climate is characterized by average temperatures between – 3°C and 18°C during the coldest month (e.g., July) and above 22°C during the hottest month (e.g., January). The annual average temperature is 19.2°C. Precipitation is well distributed during the year with total annual precipitation above 1,200 mm. The predominant wind direction is from the south during the whole year, except in the months of May and June when winds are from the North. The annual average wind speed is 2.2 m/s.
- 4.4 Water Resources: The hydrographic basin of the Jacuí River is one of the most important in the State of Rio Grande do Sul. The Jacuí River originates about 10 km east of the city of Passo Fundo, at an approximate altitude of 730 masl. The maximum recorded daily flow for the Jacuí River was of 4,362 m<sup>3</sup>/s in July 1983, and the minimum daily flow recorded is 2.7 m<sup>3</sup>/s in April 1978. The Jacuí River currently has four other operational hydroelectric power plants (Ernestina, Passo Real, Jacuí and Itaúba), all of which are located upstream of Dona Francisca. The Dona Francisca dam is located approximately 40 km downstream of Itaúba HPP. The total area of the Jacuí River watershed is 76,000 km<sup>2</sup>, and the incremental area between Itaúba HPP and Dona Francisca HPP is 3,375 km<sup>2</sup>. The main tributary is the Jacuizinho River, located downstream the Itaúba dam, with a drainage area of 1,950 km<sup>2</sup>. Based upon the presence of the Jacuizinho River, historical flow data indicates that the average monthly flow near Dona Francisca of 302 m<sup>3</sup>/s has not been affected by the construction of the upstream dams upstream. Historical flow data from the area of Dona Francisca have ranged from 2.6m<sup>3</sup>/s to 1,265m<sup>3</sup>/s.
- 4.5 Despite the agricultural activities in the drainage area, which have resulted in increased concentrations of nutrients (nitrogen and phosphorus), iron, manganese, aluminum and suspended solids; the water quality still complies with the Brazilian standards for Class II waters<sup>4</sup>.
- 4.6 There is some use of the Jacuí River in the area of Dona Francisca for irrigation and domestic water supply for six nearby cities. The agricultural use (primarily rice) downstream from the dam site is estimated at approximately 5.1m<sup>3</sup>/s in the months of November to April.
- 4.7 Groundwater: A groundwater program implemented as part of the Project PBA (ESMP) has observed fairly stable groundwater levels and that precipitation has not had significant effects on groundwater levels.
- 4.8 Geology and Geomorphology: The river basin where the Dona Francisca HPP is situated has variations in altitude from 55 masl, corresponding to the river's water level, up to 550 masl in the basin edges. Regional characteristics in the geomorphology suggest the existence of extensive natural erosion in the past. However, presently monitoring has indicated low levels of sediment deposition, probably due to the sediment deposition in upstream reservoirs. Geological evidences indicate that the occurrence of semi-precious stones in the area of the reservoir is very improbable. The main geological characteristics of the site are: Aluvionar sediments (quaternary Age); Serra Geral Basalt formation (Jurassic/Cretaceous Age); Botucatu Sandstone formation (Jurassic Age); and Sandstone and siltstones clayey (Triassic Age).

---

<sup>4</sup> According to CONAMA Resolution 020/86, the water of the Jacuí River basin in area is classified as "Class II: adequate for domestic supply after conventional treatment, protection of aquatic life, recreation, and irrigation.

- 4.9 Seismic: The seismic activity in the construction area is considered weak and homogeneous. Of 15 tremors that occurred from 1811 to 1977, ten were instrumentally registered by seismological stations in the Project area of interest; however none with the epicenter registered in an area within a radius of 322 km around Dona Francisca HPP. In terms of induced seismic due to HPPs in Brazil, there are nine cases of seismic activities during or following the filling of reservoirs: Volta Grande, Porto Colômbia, Capivara, Cajuru, Salto Santiago, Capivari-Cachoeira, Paraibuna-Paraitinga, Itaúba and Passo Real.
- 4.10 Soils: Soils in the Project area are defined as primarily: (a) Júlio de Castilhos, which are soils classified as *podzólico vermelho amarelo*, characterized by a clayey texture, red-color and good drainage ability with an average depth of approximately 150 cm; (b) Oasis, which are soils classified as *laterítico bruno avermelhado distrófico*, characterized by a humid and clayey in texture, brownish-red color, high silt content and moderate drainage ability; (c) Vacacaí, which are soils classified as *planosol* (hydromorphic soils), characterized by a grayish color, average texture, and poor drainage ability; or (d) Ciriaco-Charrua, which are soils classified as *brunizem avermelhado*, characterized by shallow and with a clayey texture, found in strong and undulated relief with a basaltic substratum.
- 4.11 Vegetation: The area's landscape is highly irregular, formed by a deep and relatively narrow valley, which enables the preservation of the vegetation in the uplands due to difficult access. In the area to be flooded, approximately 60 percent is used for farming activities (mainly tobacco, corn, and beans), approximately 30 percent is natural vegetation (consisting of primarily five vegetation communities, *capoeirinha*, *capoeira*, *capoeirão*, *mata secundária e mata ribeirinha*), and approximately 10 percent is used for pasture (cattle, horses, etc.). There are no rare or endangered species under special protection. The forest vegetation has been significantly impacted in the more accessible areas due to use of wood as fuel. In the Jacuí River, aquatic vegetation is relatively scarce due to the relatively frequent changes in river level and speed.
- 4.12 Fauna: Environmental studies in the Project area indicate a large relatively number of species: 51 fish species, 18 amphibians, 15 reptiles, 176 birds, and 39 mammals. Among the invertebrates: 15 insect orders (including some diseases carrying, such as mosquitoes of the genus *Anopheles* and *Aedes*, responsible for the transmission of malaria and dengue) and more than 12 mollusks species (including "*Lymaea columella*" which is a potential vector of fasciolose). None of the species found in the affected area are considered to be rare, endangered, or of economic importance.

#### B. Social-Economic

- 4.13 The Project reservoir will affect six municipalities: Agudo, Nova Palma, Estrela Velha, Pinhal Grande, Ibarama and Arroio do Tigre. The total area to be flooded (16.9 km<sup>2</sup>) is distributed as follows: Nova Palma (2.68 km<sup>2</sup>); Estrela Velha (1.89 km<sup>2</sup>); Pinhal Grande (3.53 km<sup>2</sup>); Agudo (1.21 km<sup>2</sup>); Ibarama (7.01 km<sup>2</sup>); and Arroio do Tigre (0.56 km<sup>2</sup>).
- 4.14 Population and economic activities: The total population in the Project area of indirect influence is approximately 80,000 people, predominantly located in the rural areas at an average demographic density of 15 inhabitant/km<sup>2</sup>. The region is occupied by small and medium-sized, and a few large, rural estates whose owners or tenants are dedicated to agriculture or cattle raising, both for subsistence and commercial purposes.
- 4.15 Characteristics of the Affected Population. Most of the families in the directly affected area of the reservoir are small-holder farmers of German and Italian origin, whose ancestors settled in Rio Grande do Sul in the latter part of the Nineteenth and early Twentieth centuries. Some of the affected families speak German, and identify themselves as German-Brazilians; this sense

of a distinct identity seems to be particularly strong among families belonging to the Lutheran church.

- 4.16 The farmers rely on tobacco and to a lesser extent on beans as their principal cash crops. Most families plant a variety of subsistence crops, principally corn, manioc, sugarcane, potatoes and vegetables, and use the corn and manioc, and some sugarcane, to feed pigs, chickens and cattle. The average size of the holdings is in the region of twenty hectares, although the areas cultivated are much smaller, typically between three and five hectares (see Table 4-1). There are a significant number of small properties under 5 hectares, a large number in the 5-20 hectare range, few large properties over 50 hectares and none over 100 hectares. At the time of the 1997 census, 28 percent of the total area cultivated was planted with corn, 22 percent with tobacco, 20 percent with beans and 20 percent with vegetables. Some rice and sugarcane is planted in the fertile *várzea* soils of the floodplain, and a few farmers cultivated small areas of soy, wheat and oats.
- 4.17 According to the survey of the affected households carried out by ICODES, tobacco provides 76 percent of household income; this compares with 11 percent derived from beans, 3 percent from corn, and a further 10 percent from all other sources combined. At present two varieties of tobacco are produced: Virginia, the traditional crop, and Burley, which is air-dried in open barns. The tobacco is sown in seed beds in June-July, and is planted out in August-September. It is harvested between November and February. The average area planted is around two hectares. Away from the floodplain (*várzea*), most of the area is steep and rocky, and is unsuitable for mechanized agriculture. The ICODES survey shows that 89 percent of families use oxen for preparing the soil, 7 percent prepare the soil by hand, and only 4 percent use tractors. Beans (*feijão*) are the other major cash crop in the region, and are planted in rotation with tobacco. The disadvantage of this crop is the absence of a guaranteed market, and the relatively lower prices in comparison with tobacco. Corn is essentially a subsistence crop. There is no guaranteed market, and most farmers lack the storage facilities that would allow them to keep the corn any length of time. A few farmers grow small areas of sugarcane, which is made into molasses and raw sugar for domestic consumption, or sold to produce rum (*cachaça*). Most families also keep some livestock (e.g., census showed an average holding of four oxen, four milk cows, six calves, eleven pigs and over sixty hens).
- 4.18 There is very little economic activity in the affected area other than agriculture. This is partly due to the expectation that the area would eventually be flooded. Some households derive part of their income from labor performed outside the affected area and/or from State and other pensions. In some extended households it is common practice for adult sons, and occasionally sons-in-law, to take temporary employment in the nearby towns, while their parents work on the farm. The construction industry provides the main source of temporary employment. Forestry provides a supplementary income for a few farmers. Most of the steeper slopes have a natural forest cover, but are not exploited due to lack of access and the difficulty of obtaining licenses to cut and transport the timber. In fact, the most important commercial forest product is firewood, mainly eucalyptus, which is grown in small plantations, and is used to fire the tobacco kilns. There is no commercial fishery in the Jacuí or Jacuizinho, although there is some sport or subsistence fishing. Some of the inhabitants of the affected area claim that the fishery has declined dramatically since the Itaúba dam was completed.
- 4.19 Indigenous populations and vulnerable people: There are no identifiable indigenous populations or other obviously vulnerable "ethnic groups" in the Project area. There are, however, pockets of poverty, such as the households that live on the *Morro dos Macacos*, who are not of German origin. In addition, there are other vulnerable families, who clearly would not be able to participate effectively in the resettlement program, and who would probably be unable to make any repayments. These include elderly couples, the chronically

sick, the physically and/or mentally handicapped, and some families of single mothers with many children.

- 4.20 Infrastructure: Infrastructure in the Project area is fairly limited and not well developed.
- 4.21 Archeological and cultural heritage: The archeological study of the Project area, initiated in 1981 by the *Instituto Anchieta de Pesquisas*, has been recently updated as part of the Archeological Heritage Rescue Program in the Project PBA. Currently, there are 38 sites being studied, some of which have been damaged either due to the intensive use of the land over time or as a consequence of the current construction site activities. Annex 2 presents a brief description of the sites being investigated.
- 4.22 Construction Site Work Camp: The construction site work camp was originally built by CEEE in the early 1980s when Project construction was first initiated. Subsequently, DFESA has made some improvements. Presently, there are approximately 1,400 people at the site. There are approximately 280 houses and an additional 13 lodging-type houses. The daily consumption of potable water is approximately 160,000 liters, which is obtained from the Jacuí River and treated at an onsite water treatment plant. Other facilities include store, a club, a school, a hotel, bus line station, and security station. On-site medical assistance is provided by the IVAÍ/TORNO Consortium.

## V. ENVIRONMENTAL AND SOCIAL IMPACTS

- 5.1 The principal environmental and social impacts associated with the construction of Dona Francisca Project are those typical of large-scale hydroelectric works. These include the following principal impacts which are mainly temporary and mitigable: soil erosion; dust and air contamination from vehicle traffic and cement plant; noise emissions from construction and blasting activities; wastes and spills from petroleum products and other chemicals; waste rock disposal; sewage disposal and storm water runoff; temporary changes in river flows due to diversions and hence impacts on aquatic flora and fauna; and social issues associated with construction camps, such as increased local traffic, increased demand on local infrastructure and services (including social services), worker accidents, cultural conflicts and possible increased demand on local social infrastructure. Other impacts are permanent, though mitigable, mainly those related to the filling of the reservoir, such as loss of land use, involuntary resettlements, changes in flora and fauna ecosystems, loss of archeological sites, and loss of infrastructure (e.g., roads, etc.).

### A. Construction Impacts

#### (a) Environmental

- 5.2 Loss/Change of land use: The Dona Francisca Project will directly impact 1,698 ha, of which the vast majority will be flooded and a small portion will be limited use land immediately surrounding the reservoir (see Table 5-1 for distribution of affected land by municipality). This is based on the reservoir area defined as all the land situated below 100.2 masl (corresponds to the estimated maximum flood level in 10,000 years) while the normal reservoir operating levels will vary between 91 and 94.5 masl. Of the affected land, approximately 60 percent is typically used for farming activities, approximately 30 is natural vegetation, and approximately 10 percent is used for pasture. Much of the affected area is steeply sloping. Overall, only 17 percent of the total affected area has been classified as “flat land” (*terra plana*), with slopes of less than 5 degrees. Of the remainder 34 percent is classified as “relatively steep” (*meia encosta*), with slopes of between 5 and 20 degrees, and 49 percent as “very steep” (*encosta*), with slopes of 20 degrees or over. There are fertile areas of *varzea* in the area between the dam and the confluence of the Jacuí and Jacuizinho rivers,



and the valley bottoms of the smaller tributaries, such as the *Lajeado do Gringo* and the *Lajeado da Gringa*. In the upper reaches of the Jacuí, above the confluence with the Jacuizinho, there are small river terraces, but most of the flat areas are situated outside the valley on the plateau.

- 5.3 Soil loss and erosion: Soil removal and clearing of vegetation will result in loss of soil and vegetation, both in the construction and borrowing areas and raw material extraction. Construction at the Project site may result in increased soil erosion due to superficial soil removal, exploitation of borrowing areas, opening of access roads and others factors. In addition, some areas will have the soil exposed during vegetation clearing (deforestation) which may enhance soil erosion and small scale slope failures.
- 5.4 Contamination from dust, air emissions and noise: Construction site activities (such as excavation, soil removal, blasting, rock crushing, vehicle traffic on non-paved roads, cement silos and concrete preparation vehicle movement, etc.) will result in temporary increases in noise, dust, and air emissions.
- 5.5 Water Impacts: Construction site activities (such as vehicle cleaning and maintenance, worker housing and support facilities, etc.) will result in temporary increases in wastewater (sewage, storm water runoff).
- 5.6 Waste Disposal: Various types of construction debris (e.g., waste rock, etc.), non-hazardous wastes (paper, food wastes, etc.), and limited amounts of hazardous wastes (e.g., waste oil, filters, medical wastes, etc.) will be generated and must be disposed.
- 5.7 Flora and fauna: The reservoir clearing and filling will result in the loss of some flora and fauna. They may also be some habitat fragmentation and/or changes to flora and fauna in the reservoir edge areas. Some species of fauna may temporarily or permanently change their locations/patterns.
- 5.8 Risk of accidents: The heavy construction activities result in a potential for worker accidents. In addition, an access route between Nova Palma and Arroio da Sétima goes through the construction site area. There is a potential risk of accidents to the public as well as delays due to blasting and heavy vehicle movement.

(b) Socioeconomic

- 5.12 Expropriation and resettlement: According to the 1997 census and the cadastral studies, there are 510 properties in the reservoir area and 484 affected families. Of the estimated 510 properties, 409 have land situated at or below 100.2 masl, while 101 are affected by loss of access<sup>5</sup>. Some of the properties on the upper Jacuí and Jacuizinho rivers will only be very slightly affected, even at 100,2 masl. The breakdown of the affected areas (properties) by municipality is shown in Table 5-1. Some landowners do not reside in the area, and many own more than one plot. Sixteen private landowners own more than three plots each, and one landowner owns six separate plots in the reservoir area. According to resettlement plan, 418 properties (82 percent of the total) had legally documented purchase and sale agreements. 64 properties (13 percent) had some documentation of possession (*posse*) or usufruct rights (*usucapião*), 13 (3 percent) had no documentation, and 7 had been inherited without legal documentation. The other eight properties include a variety of private sharing or usufruct arrangements.

---

<sup>5</sup> Another 8 properties have since been included in the total affected by loss of access. This gives a total of 518 affected properties (109 by loss of access).

- 5.13 Of the 484 affected families identified in the 1997 census, 402 live in the area of the reservoir and 82 are non-residents but own land in the reservoir area (see Table 5-2). Most of the families in the reservoir area are small-holder farmers of German and Italian origin (see Section IV for more complete description of affected family characteristics). Of the 402 families that live in the affected area, only 246 (61 percent) are classified as property owners or legal occupants, while 156 (39 percent) are classified as non-owners. These figures do not coincide exactly with the figures for the families that are eligible for resettlement, which include 92 “tenants” (covering a variety of sharecropping and tenancy arrangements) and 92 families that are related to the landowner, usually the sons or sons-in-law (see Table 5-3).
- 5.14 Loss of community infrastructure: The community infrastructure that will be directly affected includes three schools (small rural schools for children in grades one to three), two churches and four cemeteries.
- 5.15 Pressure on local infrastructure and social services: Approximately 1,200 direct jobs will be created during the construction of the Project. A large percentage of the construction workers are housed in on-site housing, which were constructed in the early 1980s were CEEE originally initiated construction. The presence of these workers may put some additional pressure on local availability of housing, social services (education, health, public safety, transportation) and infrastructure.
- 5.16 Total or partial destruction of archaeological sites: During the filling of the reservoir, archaeological sites located in the directly affected area will be impacted. There have been 38 sites identified and are being studied, although none appear to be of extreme significance.
- 5.17 Increased public health concerns: During the filling of the reservoir, due to the migration of several species, an increase of incidents and accidents involving attacks of snakes and scorpions may occur.
- 5.18 Unemployment: At the end of construction, social and economic impacts may occur from the increase in local unemployment.

## B. Operation Impacts

### (a) Environmental

- 5.19 Changes in Water Quality: The reservoir will result in changes to the hydraulic and quality characteristics of the Jacuí River in the area to be flooded, especially in the downstream areas near the dam. However, given the relatively short residence time (approximately 30 to 45 days), some portions of the reservoir will maintain some riverine characteristics. Water quality is anticipated to be moderate and dependent significantly upon the water quality of the Jacuizinho River. Changes in the water quality may also arise from the intensification of the reservoir’s use for recreation and from increased sewage discharge and agricultural run-off. In addition, reservoir releases may affect the downstream river conditions, including hydraulics, water quality and biological resources. If there are changes in downstream water quality (or quantity), there may be an impact on downstream uses (e.g., irrigation, water supply).
- 5.20 Changes in Aquatic Fauna: The change from a riverine environment to a reservoir environment, especially in the downstream areas near the dam, may result in changes in aquatic fauna species, diversity, and patterns.
- 5.21 Erosion of Reservoir Margins: Reservoir water level changes/oscillations of up to 3.5 m within a short period may cause localized soil erosion and/or slope failures, and thus increase

in suspended solids in the reservoir. This impact may be increased, if areas along the reservoir's margin are used more intensively.

- 5.22 Change in Groundwater: The filling of the reservoir will likely cause changes in the groundwater levels. Once the reservoir and groundwater become stabilized, the groundwater level at the reservoir margin should coincide with the elevation of the reservoir water surface. In addition, there may be some localized change in groundwater quality.
- 5.23 Increase in Aquatic Flora: The creation of the reservoir may result in increased habitats and growth of aquatic macrophytes and algae.
- 5.24 Increase in population of disease carrying vectors: The creation of the reservoir may result in increased habitats for insect larvae, and in particular diseases carrying vectors, such as mosquitoes of the genus *Anopheles* and *Aedes*, responsible for the transmission of malaria and dengue.
- 5.25 Changes in the Landscape: There will also be a loss of some areas of landscape value, such as Pedra da Lua. In addition, there will be a visual change from riverine to reservoir environment.
- 5.26 Potential Change in Seismicity: The creation of the reservoir may induce minor localized seismic activities.
- 5.27 Potential Change in Micro-Climate: The relative humidity in the air tends to increase due to the evaporation of reservoir water to the atmosphere, and thus, there may be minor micro-climate changes (e.g., increased fog) especially in the areas nearest to the reservoir. In addition, there may be slightly increased winds due to the large surface area of the reservoir.

(b) Socioeconomic

- 5.28 Risks to Public Health: The presence of the reservoir may result in increased disease carrying vectors and thus increased risks to public health (e.g., malaria and dengue).
- 5.29 Change in land use: With the presence of the reservoir, there may be a change and increase in intensity of the land use around the lake; for example, due to recreational use (and possibly migration) local population from neighboring towns (Agudo, Dona Francisca, Sobradinho, Faxinal do Soturno, Nova Palma, Santa Maria, Cachoeira do Sul, among others). Lack of proper land use and management for the areas surrounding the reservoir may result in inappropriate and/or intensive land use, damage of riparian vegetation, and risk of fires.

C. Positive Impacts/benefits

- 5.30 The main positive impacts of the Project are the economic and social benefits to the region. The Project will provide much of the energy demand increase in the next five years, thus supporting the economic and social regional development. In the short term, during the construction phase, the Project provides new job opportunities, both direct and indirect
- 5.31 During construction, the municipalities of Agudo and Nova Palma, where the dam is sited, will receive ISS (*Imposto Sobre Serviços*) - a tax on services, equivalent to 3 percent of the labor costs of the civil works and electro-mechanical contracts (30 percent of the contract value). This should represent over R\$ 700,000 for each municipality. In addition the affected municipalities will receive royalties (*Compensação Financeira*), paid in accordance with the area directly affected by the project. The royalties are collected by ANEEL, and are equivalent to 6 percent of the value of the energy generated. It is estimated that they should represent around R\$820,000 per year, 45 percent of which will be distributed among the

affected municipalities, with the remainder going to the State (45 percent), ANEEL (8 percent) and the Secretariat for Science and Technology (2 percent). Some of the affected municipalities, including Pinhal Grande, already receive a significant part of their income in royalties from Itaúba.

## **VI. ENVIRONMENTAL AND SOCIAL MITIGATION AND MONITORING**

6.1 The environmental, social, and health and safety management for the Dona Francisca Project is based upon the following plans/procedures:

- Project Environmental and Social Management Plan (ESMP or PBA), which presents the environmental and social mitigation measures and monitoring programs (see Sections 6.A and 6.B for description);
- Project Expropriation and Resettlement Plan, which presents the proposed requirements, options and procedures for Project-related expropriation and resettlement of affected families and properties (see Section 6.A for details); and
- Project specific environmental, health and safety procedures developed by the EPC contractor to deal with the environmental, health and safety impacts and risks associated with the HPP construction activities (see parts of Section 6.A, and Sections 6.D and 6.E).

6.2 The responsibilities and costs associated with the environmental and social mitigation and monitoring measures are presented in Section 6.C. Section 6.E presents a summary of the proposed environmental, health and safety management systems proposed for the project.

### **A. Mitigation Measures**

#### **(a) Construction phase**

##### *Environmental*

6.2 Environmental Management Program for the Construction Site: As part of the EPC, a Construction Site Environmental Management Program has been implemented to control the potential impacts from the construction activities, including control of dust and air emissions, control of potential sources of water contamination, control of erosion and sedimentation, protection of natural resources, and appropriate management and disposal of wastes.

6.3 Degraded Areas Recovery Program: The Program is designed to mitigate impacts due to the construction phase, especially in the construction site and surrounding area. It includes the clean-up of area, recovery of the landscape and re-establishment of natural conditions, and installation of soil erosion controls. The program encompasses preventive measures (guidelines and environmental criteria to minimize the alterations in the natural environment during construction works) as well as corrective measures (to rehabilitate the altered areas according to their reintegration in the regional landscape, and to recover the native flora as to provide habitats to the wild fauna). CONFRAM is currently preparing the reclamation projects of portions of the construction site and neighboring areas. An additional area will be treated with hydro seeding. The cost is part of the EPC. The Program will continue until approximately January 2002.

6.4 Cleaning of Accumulation Basin Program: The Program is designed to promote the removal of all materials that could deteriorate the water quality of the reservoir, and includes: (a) removal of significant portions of the existing vegetation in the areas to be flooded immediately prior to the reservoir flooding; (b) demolition, disinfecting and cleaning of residential buildings and various facilities (septic tanks, warehouses, nurseries, pigpens,

- poultry yards, barns, etc.); and (c) the relocation, disinfecting and cleaning of cemeteries and scattered tombs. The Program comprises the pre-definition of the areas to be deforested and the evaluation of the existent volume, through forest inventory (by sampling) and the definition of modes for the deforestation. The disinfecting of septic tanks and elimination of the garbage should be done with the fundamental participation of the rural producers, properly guided by specialists in public health and monitored by CEEE. Currently DFESA is receiving proposals from companies that are interested in participating in the cleaning program. The tree cutting permit was issued by DRNR in February 2000. The operational details of the program activities are currently being discussed among CEEE, COPEL, DFESA and DRNR representatives. The estimated cost of this Program is R\$ 500,000 and should be completed by the end of September 2000 (filling is scheduled to begin in October 2000).
- 6.5 Ichthyc Fauna Monitoring Program: This program is designed to monitor the impacts on the aquatic fauna during river diversion of the river, before and after the filling of the reservoir, and during Project operation. Another principal objective is to rescue the fish during river diversion and reservoir flooding. This program is developed by *União Brasileira de Ensino e Assistência da Pontifícia Universidade Católica do Rio Grande do Sul - UBEA/PUCRS*, through its Science and Technology Museum and will be implemented in coordination with FEPAM and the fishermen associations in the area. The Program started in April 1998 and seven fields events have been completed, including capture (sampling) of a total of 1,274 fishes and 65 species. The estimated cost of the Program is R\$ 156,000 and will continue until December 2003.
  - 6.6 Fishery Station Improvement Program: This program is designed to develop and maintain species that shall be used in the re-population during the reservoir operation. This Program is developed by CEEE, by maintaining and expanding the Ernestina Fishery Station. The program intends to develop reproduction activities using native species of the basin of the Jacuí river, especially those that may be threatened in the regional area and/or those capable of assuming an important economical and ecological role in the reservoir. The estimated cost is R\$ 135,000 and the Program will last until December 2006.
  - 6.7 Forest Nursery Implementation Program: The Program is designed to compensate the loss of vegetation in the flooded area by providing seedlings to the recovery of degraded areas, recovery of the vegetation along the reservoir edge, and implementation of the conservation unit. The Program will be responsible for planning and administrating the production of seedlings, collection of seeds and implementation of forestry procedures. The Program will focus mainly on native species in order to provide the appropriate habitat for the fauna that is rescued or displaced (terrestrial and aerial). The seedlings will be produced in Salto Jacuí's nursery, which already possesses an adequate structure to develop this activity. The Program started in January 1999 under the responsibility of CEEE. The re-vegetation will be performed from April 2000 to November 2004. The total estimated cost of this program is R\$ 8,000.
  - 6.8 Aquatic Vegetation Control Program: The program is designed to mitigate possible overgrowing of macrophytes after the flooding of the reservoir, in order to reduce the eutrophication process, preserve the safety conditions of the dam, prevent habitats for disease-carrying vectors, and ensure navigation, fishing and other recreational activities in the reservoir. The Program has identified the likely types of aquatic vegetation in the area and a plan to remove them has already been established. Routine inspections to avoid the proliferation of water hyacinths will be implemented. This program is developed by *UBEA/PUCRS*, through its Science and Technology Museum at an estimated cost of R\$ 51,248. It started in April 1998 and will continue until April 2006.
  - 6.9 Wild Fauna Rescue and Monitoring Program: The Project is designed to rescue and monitor the fauna during the filling of the reservoir. The program was structured in four main phases:

before the filling, during the clearing of the reservoir area, during the filling and during the operation of the reservoir. First phase initiated in 1998, with baseline studies to complete the EIA. The study of the endemic and threatened species was enhanced, including aspects of its ecology to subsidize the handling techniques and conservation of such species and their habitats. Besides the inventory of species, the initial studies on the local terrestrial fauna included the relationship between the fauna and the flora, as to identify areas where vegetation could be enhanced thus serving as a potential rescue area for the animals. The Program started in April 1999 and has conducted several field campaigns, and has identified 18 species of amphibians, 18 species of reptiles, 195 species of birds, and 31 species of mammals. The rescue project was presented to FEPAM in March 2000 and is currently waiting for the Agency's approval. The program is also coordinating with the Environmental Education program to raise community awareness regarding conservation and protection of fauna and flora. It has also contributed to the identification of priority areas for the implementation of the Conservation Unit, taking into consideration the potential to attract the fauna during their displacement. The Program is under the responsibility of *FATEC/UFSM* and will be carried out until the end of 2005.

- 6.10 Conservation Unit Implementation Program: The objective of this program is to comply with CONAMA Resolution 02/96 that requires the implementation of a Conservation Unit as a compensation measure. The Program started in April 1998, by updating studies regarding the potential areas and appraising the selected areas. On January 2000, CEEE submitted to FEPAM a proposal for implementing a Conservation Unit in an area of 1,670 hectares along the Jacui River in the Municipalities of Agudo and Ibarama. The Program is developed by *FATEC/UFSM* at an estimated cost that represents 0.5 percent of the total project cost (i.e., approximately R\$ 79,200) and should be completed by April 2006.

#### *Social*

- 6.11 Archaeological Heritage Rescue Program: The Program is designed to mitigate the impact on archaeological sites, by implementing actions to rescue the materials that will disappear with the flooding of the reservoir. The objectives of the Program are to characterize, rescue, analyze and study archaeological sites existent in the reservoir area. For the development of the program, the National Program of Archaeological Researches (*PRONAPA*) is using a specific methodology, developed in Brazil, under the orientation of the Institute of the National Historical and Architectural Patrimony (*IPHAN*). The methodology comprises field searches, demarcation and registration of the located sites, archaeological excavations, registration and laboratory activities, among other activities. The Program is being developed by *FATEC/UFSM* and is presently nearly 85 percent complete. Currently 38 archeological sites were identified, among which 7 have the potential to be explored, 27 have no potential and 4 were destroyed. All the archeological material collected is being stored at *FATEC/UFSM* facilities. In March 2000, *FATEC/UFSM* submitted to IPHAN the second report and is waiting for approval. The estimated cost of the Program is R\$ 186,898 and should be completed until June 2000.
- 6.12 Environmental Education Program: This Program is developed by *UBEA/PUCRS*, through its Science and Technology Museum. It is designed to help establish the basic sanitation conditions in the area, and control potential sources of water contamination and vectors of human diseases. It also aims at developing environmental awareness regarding basic environmental management principles. The Program will also support the implementation of all the other programs in the ESMP, by supporting the establishments of the institutional partnerships and agreements required. Four campaigns have been implemented to date, involving universities, government agencies, municipal governments, and students. Other activities include the preparation of a movie to be shown on TV, and lectures to specific target audiences. Currently 670 teachers and students, 70 construction workers, 40 local residents and 7 municipal secretaries have attended the lectures. Other activities will include social,

cultural and sport activities; interaction with the community associations, cooperatives and churches, as well as with the NGOs and municipalities; interviews for local radios (Agudo, Sobradinho, 14 de Julho and Itapoã radio stations), folders and posters. The total cost of the Program is estimated at R\$ 214,000. It started in April 1998 and will continue until April 2003.

- 6.13 Expropriation and Resettlement Program: An Expropriation and Resettlement Plan has been developed, in conjunction among the various parties involved (including affected population), based upon (a) the various agreements that have been reached among the parties involved (see Section III.C for details), (b) the IDB Policy on Involuntary Resettlement (OP-710, August 1998), and (c) input from IDB during its environmental and social due-diligence of the Project. The plan was ratified by the parties in January 2000.
- 6.14 The principal aspects of the plan are the following (see Annex 3 for more complete summary of the plan):
- Eligibility: Families that own more than 50 hectares are only eligible for compensation or resettlement, while families with 50 hectares or less, landless families, tenants, sharecroppers are eligible for the resettlement program<sup>6</sup>. The 1997 census survey of affected families serves as the cut-off date, although additional extra-censal families that may have been missed are being included provided they can provide proof that they were resident at the time of the census.
  - Compensation: Includes payment for land, housing, other structures (such as barns and tobacco kilns), other improvements (such as fencing), perennial crops and timber, and standing crops.
  - Resettlement: Options include: (a) individual resettlement in large areas (*reassentamento em grandes áreas*), and is a collective resettlement option for groups of 15 or more households, in areas of at least 480 hectares; (b) individual resettlement (*reassentamento individual*), an option for individuals and groups of 2-14 households; and (c) resettlement in the areas that remain above the level of the reservoir (*áreas remanescentes*).
  - Transport Costs: all families will receive a fixed amount to cover transportation costs to new location.
  - Assistance: Assistance will be provided for land titling, property searches, technical assistance in new location, and maintenance payments (for vulnerable populations).
  - Social Communication: a social communication program is being implemented to inform the affected population about compensation procedures and resettlement options.
  - Monitoring: monitoring during resettlement process and after completion (see Section VI.B for more details).
  - Responsibilities: These are divided among various entities (refer to Annex 3 for details).
- 6.15 The following presents a summary status (as of April 2000) of the expropriation and resettlement:
- In terms of compensation, all evaluations have been completed, 283 properties have been acquired, accounting for 55 percent of the total, a further 87 (17 percent) have been re-

---

<sup>6</sup> The 50 hectares refers to the household's total holdings, including properties outside the affected area. "Ownership" includes full title, legally recognized occupancy rights (*posse*), usufruct rights derived from continued use (*usucapião*), rights derived through inheritance, and so on. "Tenancy" includes arrangements as usufruct, sharecropping, and sharing agreements. "Landless families" include the close relatives of landowners, such as sons or sons-in-law, who were identified as independent producers, who live and work in the area, and were 21 and/or married at the time the move takes place. Any children over 18, married or not, will have the right to a separate plot in a collective resettlement if their parents opt for collective resettlement.

evaluated and are awaiting payment, and 132 (26 percent) are being negotiated or are ready for negotiation, 16 properties have been assessed but have yet to be valued. It appears that all compensation should be completed by the end of June.

- In terms of resettlement, the State Ministry of Agriculture (SAA) has acquired four sites, with two others (Capão Grande and Capão de Cipó), in process of acquisition (see Table 6-1) and should be completed by June 2000. SAA and the *Comissão dos Atingidos* have organized the groups that will be resettled in the four sites already acquired. If further land is needed SAA has the option of using areas that have been acquired for the State government agrarian reform programs. SAA is preparing a plan to move the families that have chosen collective resettlement to the resettlement sites as soon as possible. The initiative responds to the families' desire to prepare for planting next season's crops. The proposal is to establish provisional settlements, using materials from the affected families' old houses or from unoccupied housing at the construction site. Bids have been invited for dismantling the houses and rebuilding them at the temporary site.
- There has been little progress in individual resettlement and resettlement in remaining areas and this represents the area where significant more work and efforts must be performed and implemented. Based upon an April 2000 site visit by the IDB, a series of specific actions have been identified, and agreed upon, to be implemented over the next few months to correct the situation.
- In November 1999, MAB presented CEEE with a list of people who had not been included in the 1997 census. Subsequently ICODES carried out a house to house survey of the people who may be eligible for the resettlement program, enumerating 207 additional people. This would bring the potential number of non-landowning families and individuals eligible for resettlement up to 420. So far 50 extra-censal families or individuals have been accepted for the resettlement program, on the basis of documentary evidence such as tax receipts, school registration or witness statements, and 45 have been rejected. The remaining cases are still being reviewed.

#### (b) Operation phase

##### *Environmental*

- 6.16 Reservoir Edge/Belt Protection Program: The Program is designed to ensure long-term vegetation stability in the area immediately surrounding the reservoir. The main objectives of the Program are: (a) to prevent siltation in the reservoir, by ensuring adequate level of vegetation cover along the reservoir margins; (b) to provide potential sources of alternative income to the bordering proprietors; (c) to create feeding and refuge conditions/habitat for fauna; (d) to contribute to the maintenance of good reservoir water quality; and (e) to contribute for the reduction of the costs of maintenance of the power equipment. It comprises the implementation of a protection belt along the reservoir margins, with species that tolerate high humidity and fluctuations of water level. The criteria for selection of the species for forestation will consider rare or threatened species, hygrophylous species (in the areas subject to periodic flooding), and wild fruitful species to contribute to the sustainability of the terrestrial fauna. This program foresees 610 ha of forestation and 120 ha of vegetation thickening. It will be developed by CEEE and foresees partnerships with several entities, which have not yet been defined. The estimated cost of the Program is R\$ 180,000 to be implemented from April 1999 to April 2002.
- 6.17 Some ESMP (PBA) programs aimed at mitigating the impacts of the construction phase (i.e., those listed in Section VI.A) will also address the impacts of the operation phase. For example, the Fishery Station Program, Aquatic Vegetation Control Program, Conservation Unit Program, and Environmental Education Program.

##### *Social*



- 6.18 Control of Disease-carrying Vectors: This program is designed to control and monitor possible diseases or accidents associated with the reservoir and to contribute for the disclosure of information regarding accidents with animals and potential risks of dissemination of human diseases. The program is structured in three sub-programs: poisonous animals, mollusks and mosquitoes and black flies. All three follow the same methodological approach: research of existent data, contacts with the relevant institutions in the area, monitoring of the disease-carrying vectors, identification and monitoring of potential areas of disease, and dissemination of information and education. This Program is being developed by *FATEC/UFSM*. To date no critical infestation of mollusks and other vectors has been observed. Accidents with poisonous animals have not been reported as well. The National Health Foundation is permanently updated in the results of this program, which will continue until December 2005, at a total cost of R\$ 72,000.
- 6.19 Some of the construction phase social mitigation programs will also deal with operational impacts, such as the Environmental Education Program and the Health and Safety Program (see Section VI.D).

B. Monitoring Programs

- 6.20 Climatic Conditions Monitoring Program: This Program is designed to evaluate possible climatic changes after the flooding of the reservoir and comprises routine meteorological observations of the local and regional climate. Other objectives of the program are to register the climatic events (before and after the filling of the reservoir) and to enhance the knowledge about the climatic conditions in the area of influence to subsidize the environmental planning and administration of the reservoir. An automatic station was installed in March 1999 to obtain data in the influence area of the Project and will be used to detect eventual changes in some parameters after the formation of the reservoir. The following parameters will be monitored: atmospheric pressure; air temperature; winds direction and speed; relative humidity of the air; temperature of the soil; solar radiation; and precipitation. *FATEC/UFSM* is responsible for the implementation of this Program, which has a total estimated cost of R\$ 50,000. The program started in 1998 and will continue until April 2005.
- 6.21 Surface and Groundwater Quality Monitoring Program: This program is designed to evaluate changes in the physical, chemical and biological parameters of the reservoir, the Jacui River and its tributaries, and groundwater in the immediate area of reservoir influence. The Program is developed by the *Federal University Federal of Rio Grande do Sul*. The Program comprises two sub-programs: surface water and groundwater. Surface water quality will be studied in three periods: the 34 months during the construction phase, the 2 months for reservoir filling phase, and 24 months into operation phase during reservoir stabilization. Sampling will occur every three months at six stations for various water quality parameters, microbiologic and biological parameters, and sediment samples. The groundwater sub-program will include samplings from 4 ground water wells every three months before and after the filling of the reservoir for water level and various water quality parameters. The Program estimated cost is R\$ 421,000 and will be carried out until April 2008.
- 6.22 Seismic Monitoring Program: This Program is designed to monitor tectonic stability conditions, at a regional level. The estimated cost is R\$ 100,000 and the duration of the Program is estimated to continue until June 2005.
- 6.23 Resettlement Monitoring Program: The main objective of this program is to follow-up the adaptation of the resettled families in their new locations. It will be implemented with the use of questionnaires, visual observations and interviews with the affected families. Information will be collected regarding housing conditions, economic activities, social and cultural activities, education and health.. A database will be created using the social and economical

census accomplished in 1997 as a baseline and will be compared with the results of the new questionnaires, observations and interviews. The application of the questionnaires will comply with the following schedule: one year after the resettlement, two years after the resettlement and two years after the application of the 2nd questionnaire. The cost and responsibilities are included in the Expropriation and Resettlement Program.

- 6.24 Other monitoring will be performed associated with other ESMP (PBA) programs already previous discussed, including Aquatic Fauna Rescue and Monitoring Program, Aquatic Vegetation Control Program, and Fauna Rescue and Monitoring Program, Disease-Carrying Vectors Program, and Archeological Rescue Program.

C. Cost, Schedule, and Responsibilities

- 6.25 The cost, schedule, and responsibilities for the ESMP (PBA) environmental and social mitigation measures and monitoring programs are described associated with each program description (see Sections VI.A and VI.B), and are also summarized in Table 6-1. The measures and programs under the responsibility of the EPC companies (e.g., environmental control at construction site, health and safety at construction site, etc.) are included as part of the overall EPC contract and are thus the costs are not presented individually/separately. Additional information regarding environmental management and supervision is provided in Section VI.E.

D. Health and Safety

- 6.26 The contract signed between DFESA and the EPC Contractor (CONFRAN) establishes the occupational health and safety guidelines for the contractors' activities. The IVAÍ/TORNO Consortium and the other contractors (as members of CONFRAN) are responsible for ensuring that the applicable regulations and DFESA's policies relating to occupational health and safety of the construction activities are met. The contract establishes the policy, general procedures and responsibilities to be followed by contractors to comply with the pertinent Brazilian Safety and Health laws and regulations.
- 6.27 IVAÍ/TORNO Consortium has implemented actions and procedures to comply with applicable health and safety Brazilian legal and contractual requirements. This includes: (a) identification of potential construction health and safety hazards; (b) identification and implementation (use) of the necessary procedures and equipment which are technically appropriate to deal with the health and safety hazards; (c) definition of responsibilities and authorities related to the implementation; (d) definition of specific supervision methods; (e) definition of health and safety training that will be provided to all workers. In addition, the emergency response procedures and equipment have been defined.
- 6.28 The IVAÍ/TORNO Consortium established a specific unit to manage the safety and occupational health aspects of the construction of Dona Francisca HPP. The unit has one safety engineer, four safety technicians, one medical doctor, two nursers and administrative staff.
- 6.29 COPEL has initiated a periodic Safety Inspection Program performed by an experienced safety technician to verify the safety conditions of the construction and to propose recommendations to improve or eliminate unsafe conditions.
- 6.30 DFESA will develop and implement for the Project operational phase both an Occupational Health and Safety Plan and a Contingency Plan.

E. Environmental Management System

- 6.31 The environmental management of the Dona Francisca HPP construction activities is the direct responsibility of the EPC companies to ensure that the applicable requirements are adequately implemented. COPEL is responsible for the technical supervision of the contractor's activities on behalf of DFESA.
- 6.32 The environmental management of the ESMP (PBA) programs (described in Sections VI.A and VI.B) is the responsibility of CEEE. These activities are monitored by DFESA and COPEL by a full-time environmental specialist located at the Project site.

## VII. PUBLIC CONSULTATION

- 7.1 The Sponsors have conducted a broad public consultation process for the implementation of the Project. Copies of the EIA study and Summary Report (*RIMA*), the ESMP (*PBA*), the Environmental Schedule and Plan, the Environmental Permit, the Agreement with the EPC were made available by DFESA to the affected communities by means of several meeting and public consultations. Public meetings were held since June 1997 in order to explain and discuss with the community the social, economical and environmental impacts of the project, the mitigation measures and the monitoring programs that would be implemented. In February 2000 alone, a total of 17 lectures were performed to an audience of approximately 500 participants. Several meetings were also held at schools (with teachers, children and their parents and other interested people), as part of the Environmental Education Program and of the Control of Vectors and Hosts of Human Diseases Program. Table 7-1 lists some of the meetings and public consultation activities held with representatives of public institutions, universities, NGOs and the affected population.
- 7.2 Specific consultation and social communication actions have been implemented focused on the expropriation and resettlement of directly affected population. The first public consultations took place in 1989 during the preparation of the EIA. This led to the establishment of a commission of representatives from the affected municipalities (*Comissão dos Atingidos*), which included affected landowners (resident and non-resident) and representatives of the municipal authorities to discuss the agreement with CEEE that would establish the basis for the resettlement plan. In September 1990, CEEE and the Commission drew up the formal agreement that provides the basis for resettlement. This was followed by a further agreement, signed in July 1991, covering additional points. These included the right to choose between individual and collective resettlement, acceptance of the principles underlying the valuation procedures (for land, housing and other improvements), and the rights of landowners whose property would be indirectly affected through loss of access. The agreement was ratified in 1997 when DFESA was awarded the concession, and remains the basis of the resettlement program.
- 7.3 In June/July 1999 representatives of MAB (*Movimento dos Atingidos por Barragens*) - a national movement that claims to represent the interests of people affected by hydropower projects, began organizing a series of meetings in the project area. The principal aim of these meetings was to encourage those households eligible for resettlement to consider the option of collective resettlement. This commission is now effectively representing the affected population and on 25 January 2000 signed a new agreement with CEEE, which was ratified by SAA and the Governor of Rio Grande do Sul, ratifying the principles for the Expropriation and Resettlement Plan which had been developed based upon the existing agreements and IDB policy, guidelines and input.
- 7.4 As part of the ERP, a specific expanded social communication program is being developed to addresses the immediate need to inform the affected population about compensation

procedures and resettlement options. The social communication program will be an on-going, interactive process, that allows CEEE, SAA, DFESA and the contractors, to respond effectively to issues as they arise. The first activity of the communication team will be to inform the affected population and other interested parties, such as the municipal authorities, about every aspect of the resettlement plan. This will be done through local meetings, local radio programs, bulletins, posters, and so on. One of the most sensitive issues that the communication program will have to address is the choice between resettlement alternatives.

- 7.5 In addition, as part of the PBA, additional public consultation will be performed associated with individual programs, such as the Environmental Education Program and Archaeological Rescue Program. In addition, data and results from various monitoring programs will be made available to the public.

## VIII. RECOMMENDATIONS

- 8.1 The Bank (IDB) will require as part of the Loan Agreement that the DFESA and the parties involved in the Project shall, at all times during the life of the Loan Agreement, comply with each of the following:
- (a) All applicable environmental, health and safety Brazilian regulatory requirements;
  - (b) All requirements associated with any environmental, health and safety related permits, authorizations, or licenses that apply to the Project or the Company;
  - (c) All environmental, health and safety requirements of the Project contracts, and any subsequent modifications;
  - (d) All mitigation and monitoring programs and actions of the Project's Environmental and Social Management Plan - ESMP (*Projeto Básico Ambiental – PBA*), for both the construction and the operation phase;
  - (e) All actions and requirements of the Project's Expropriation and Resettlement Plan;
  - (f) All actions and requirements of the Project's Health and Safety Plan;
  - (g) Implement ongoing information disclosure and consultation activities related to environmental, social, and health and safety aspects of the project, and, particularly, related to the indemnification and resettlement plan.
  - (h) Implement an environmental, health and safety management system that is consistent with ISO 14001 during the operational phase of the Project.
  - (i) Ensure that all companies contracted for construction or operation activities comply with the applicable environmental and social requirements of the loan agreement;
  - (j) Consult with the Bank before implementing any action not covered by the Project environmental, social, or health and safety plan, which will have a material environmental or social impact; and
  - (k) Notify the Bank of any and all noncompliance with any environmental requirement of the loan agreement and any significant environmental, social, or health and safety accident, impact, event or environmental claim.
- 8.2 Prior to the presentation of the Project to the Bank Board of Executive Directors, the Company must submit the final version Project Resettlement Plan, in form and content acceptable to the IDB, in compliance with the IDB Policy on Involuntary Resettlement (OP-710, August 1998).
- 8.3 Prior to the date of Financial Closure, the Company must submit evidence of compliance with the environmental permitting requirements (Installation License) for the installation of the campsite, for the exploration of quarries and other construction materials, and for the clearing of the vegetation at the campsite.
- 8.4 Prior to each disbursement, the following conditions shall be fulfilled:

- (a) The Company shall certify compliance with all environmental and social requirements in the loan agreement and, as applicable, provide a description of any significant environmental, social, or health and safety accident, impact, event, claim, liability, material complaint, or unforeseen environmental, health or safety impact or risk.
- (b) The IDB shall have received from the independent environmental consultant a satisfactory report on the compliance and status of the implementation of the ESMP.
- (c) The IDB shall have received from the independent social consultant a satisfactory report on the compliance and status of the implementation of the Expropriation and Resettlement Plan

8.4 As a condition for the Technical Completion of the Project the Company shall:

- (a) Submit, in form and substance satisfactory to IDB, a Final Report prepared by an Independent Consultant certifying that the ESMP (in particular the Environmental and Social Mitigation and Monitoring measures for the construction phase) was fully and adequately implemented.
- (b) Submit, in form and substance satisfactory to IDB, a Final Report prepared by an Independent Consultant certifying that the Resettlement Plan was fully and adequately implemented.
- (c) Submit, in form and substance satisfactory to IDB, a final Environmental and Social Management Plan for the Project's operational phase.
- (d) Submit, in form and substance satisfactory to IDB, the Contingency Plan (e.g., SPCC, Emergency) for the Project's operational phase.
- (e) Submit, in form and substance satisfactory to IDB, the Health and Safety Plan for the Project's operational phase.

8.5 During the life of the Loan Agreement, the Company must prepare and submit an Environmental and Social Compliance Report, in form, content and frequency acceptable to IDB.

8.6 The Bank will monitor the project's environmental, social, and health and safety aspects via internal Bank supervision actions (e.g., site visits, review of documentation, etc.) and will contract an external independent environmental and social consultant to perform more detailed supervision/monitoring actions during project construction and initial operation. In addition, the Bank will have the right, as part of the Loan Agreement, to contract for the performance of an independent environmental, health, and safety audit, if needed.

**TABLE 4-1. SIZE OF HOLDINGS IN PROJECT DIRECTLY AFFECTED AREA**

<b>Size in Hectares</b>	<b>Number of Holdings (Percentage)</b>
0 – 5	117 (23percent)
5 – 20	268 (52percent)
20 – 50	117 (23percent)
50 – 100	8 (2percent)
<b>Total</b>	<b>510 (100percent)</b>

**TABLE 5-1. PROJECT AFFECTED AREA (IN HECTARES) AND PROPERTIES BY MUNICIPALITY**

<b>Municipality</b>	<b>Area Directly Affected (percent of total area affected)</b>	<b>Remaining Areas to be Acquired</b>	<b>Total Area</b>	<b>Total Properties</b>
<b>Left Bank:</b>				
Agudo	121.05 (7percent)	176.86	297.91	15
Ibarama	701.33 (42percent)	1990.01	2691.34	189
Estrela Velha	189.50 (11percent)	1371.42	1560.92	60
Arroio do Tigre	56.33 (3percent)	454.78	511.11	90
<b>Right Bank:</b>				
Nova Palma	268.49 (16percent)	621.92	890.41	67
Pinhal Grande	353.17 (21percent)	949.24	1302.41	89
<b>Total</b>	<b>1689.87 (100percent)</b>	<b>5564.23</b>	<b>7254.10</b>	<b>510</b>

**TABLE 5-2. DIRECTLY AFFECTED POPULATION**

Location	Municipalities	Number of Families (Individuals)			Total
		Landowners		Resident-Non Landowners	
		Resident	Non-Resident		
Left bank	Agudo	13 (46)	5 (5)	8 (29)	26 (80)
	Ibarama	88 (351)	33 (33)	49 (197)	170 (581)
	Estrela Velha	38 (149)	11 (11)	23 (75)	72 (235)
	Arroio do Tigre	22 (99)	2 (2)	16 (55)	40 (156)
Right bank	Nova Palma	39 (137)	10 (10)	24 (112)	73 (259)
	Pinhal Grande	46 (178)	21 (21)	36 (117)	103
Total		246 (960)	82 (82)	156 (585)	484 (1627)

**TABLE 5-3. FAMILIES ELIGIBLE FOR RESETTLEMENT**

Municipality		Status of Family			Total
	Son or Son-in-Law	Owner of < 20 hectares	Tenant		
Right Bank:					
Nova Palma	24	26	12		62
Pinhal Grande	10	26	26		62
Left Bank:					
Agudo	5	5	4		14
Ibarama	34	56	25		115
Arroio do Tigre	6	16	9		31
Estrela Velha	12	13	16		41
Total	91 (28percent)	142 (44percent)	92 (28percent)		325

**Table 6-1. Potential Collective Resettlement Sites**

<b>Site/Municipality</b>	<b>Area (Hectares)</b>	<b>Estimated No. Families</b>
Joia I	760	32
Iara Fogliatto/Joia II	974	40
São Dimas/Tupanciretã	679	28
Cotriel	422	21
Capão Grande/Salto Jacuí	1,050	52
Capão de Cipó	1,832	80



**Table 6-2. ESMP (PBA) Program Responsibility, Schedule, and Cost**

Program	Responsibility	Schedule/Year										
		98	99	00	01	02	03	04	05	06	07	08
Climatic Conditions Monitoring	FATEC/UFMS											
Surface Waters Monitoring	FAURGS/UFRGS											
Groundwater Monitoring	FAURGS/UFRGS											
Conservation Unit Implementation	FATEC/UFMS											
Aquatic Vegetation Control	PUCRS											
Ichthyc Fauna Monitoring	PUCRS											
Disease-carrying Vector Control												
Prevention of Accidents with Poisonous Animals	FATEC/UFMS											
Prevention of Diseases Caused by Mollusks	FATEC/UFMS											
Prevention of Diseases Caused by Mosquitoes and Black Flies	FATEC/UFMS											
Archaeological Heritage Rescue	FATEC/UFMS											
Environmental Education	PUCRS											
Seismic Monitoring	Not yet contracted											
Fishery Station Improvement	CEEE											
Forest Nursery Implementation	CEEE											
Reservoir Belt Protection	CEEE											
Degraded Areas Recovery	CEEE/DFESA											
Cleaning of Accumulation Basin	DFESA											
Wild Fauna Rescue and Monitoring	FATEC/UFMS											

CEEE – Companhia Estadual de Energia Elétrica (Electric Energy Company of the State of Rio Grande do Sul)

DFESA – Dona Francisca Energética S.A.

FATEC/UFMS – Foundation for Support of the Federal University of Santa Maria

UFRGS – Federal University of Rio Grande do Sul

PUCRS – Catholic University of the State of Rio Grande do Sul

**Table 6-2. ESMP (PBA) Program Responsibility, Schedule, and Cost**

Program	Responsibility	Cost (R\$ 1000)
Climatic Conditions Monitoring	FATEC/UFSM	50.00
Surface Waters Monitoring	FAURGS/UFRGS	192.00
Groundwater Monitoring	FAURGS/UFRGS	229.00
Conservation Unit Implementation	FATEC/UFSM	79.00
Aquatic Vegetation Control	PUCRS	51.00
Ichthyic Fauna Monitoring	PUCRS	155.00
Disease-carrying vectors Control	FATEC/UFSM	16.00
Prevention of Accidents with Poisonous Animals	FATEC/UFSM	28.00
Prevention of Diseases Caused by Mollusks	FATEC/UFSM	28.00
Prevention of Diseases Caused by Mosquitoes and Black Flies	FATEC/UFSM	186.00
Archaeological Heritage Rescue	FATEC/UFSM	186.00
Environmental Education	PUCRS	214.00
Seismic Monitoring	Not yet contracted	100.00**
Fishery Station Improvement	CEEE	135.00**
Forest Nursery Implementation	CEEE	8.00**
Reservoir Belt Protection	CEEE	180.00**
Degraded Areas Recovery	CEEE/DFESA	135.00**
Cleaning of Accumulation Basin	DFESA	500.00**
Wild Fauna Monitoring and Rescue	FATEC/UFSM	199.00
<b>TOTAL</b>		<b>2,485.00</b>

\*\* Estimated cost

CEEE – Companhia Estadual de Energia Elétrica - Electric - Energy Company of the State of Rio Grande do Sul

DFESA- Dona Francisca Energetica S.A.

FATEC/UFSM – Foundation for Support of the Federal University of Santa Maria

UFRGS – Federal University of Rio Grande do Sul

PUCRS – Catholic University of the State of Rio Grande do Sul

**TABLE 7-1. LIST OF MEETINGS AND PUBLIC CONSULTATIONS**

**A - Physical and Biological Aspects**

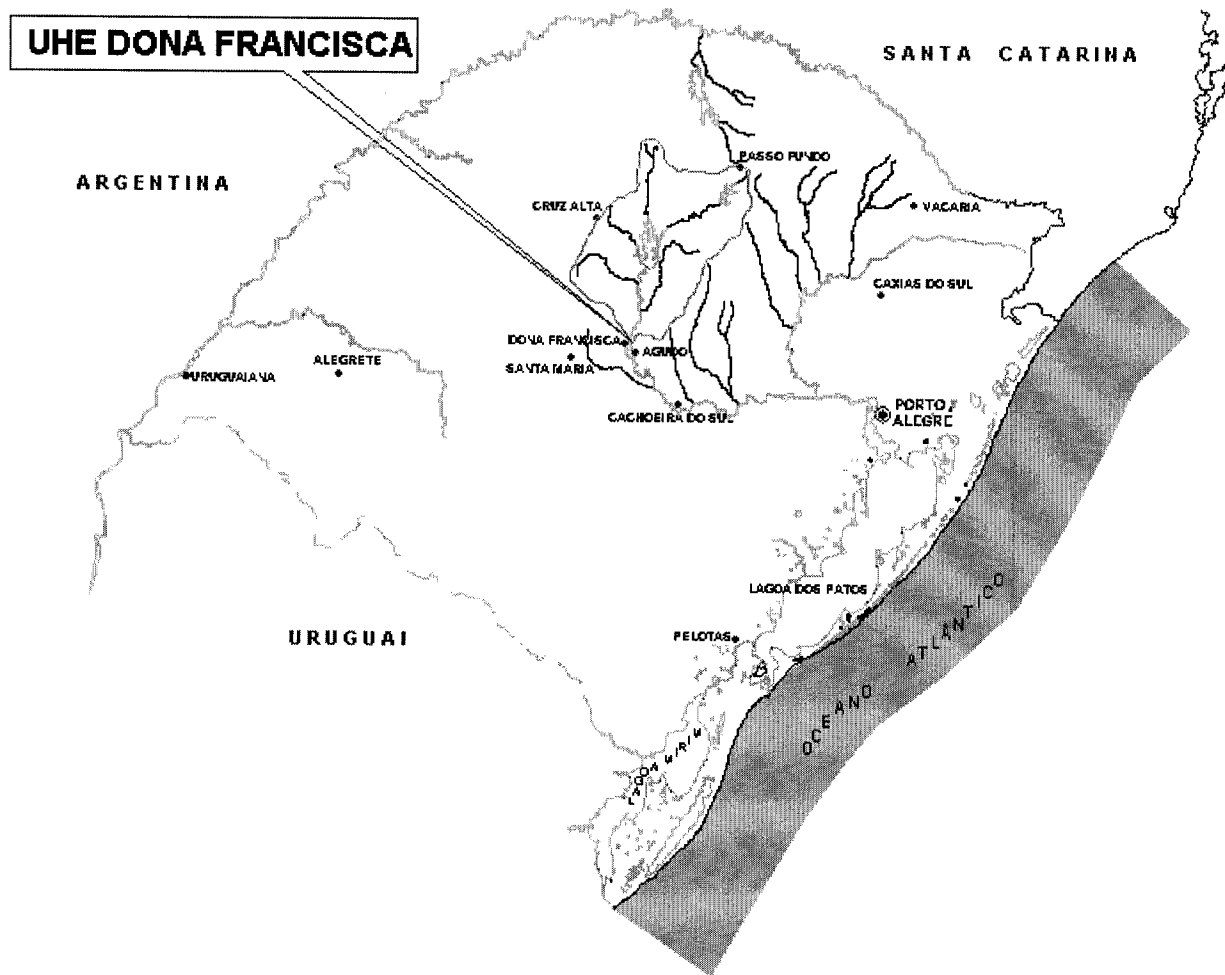
Event	Date	Participants	Objective	Results
1 <sup>st</sup> Workshop	June 28, 1997	CEEE, COPEL, Universities, Environmental Organizations, Private Corporations	Introduce the PBA to the local and scientific community, and to private corporations	Detailed proposals for implementing the environmental programs.
2 <sup>nd</sup> Workshop	April 28, 1998	CEEE, COPEL, Universities, Environmental Organizations, Private Corporations	Present the work plan for having the environmental programs developed by the universities	Consulting agreements for the commencement and monitoring of the programs.
3 <sup>rd</sup> Workshop	June 23, 1999	CEEE, COPEL, Universities, Environmental Organizations, Private Corporations	Each university presented the status of each environmental program	Updating information and provide the integration among the different programs

**B - Socioeconomic Aspects**

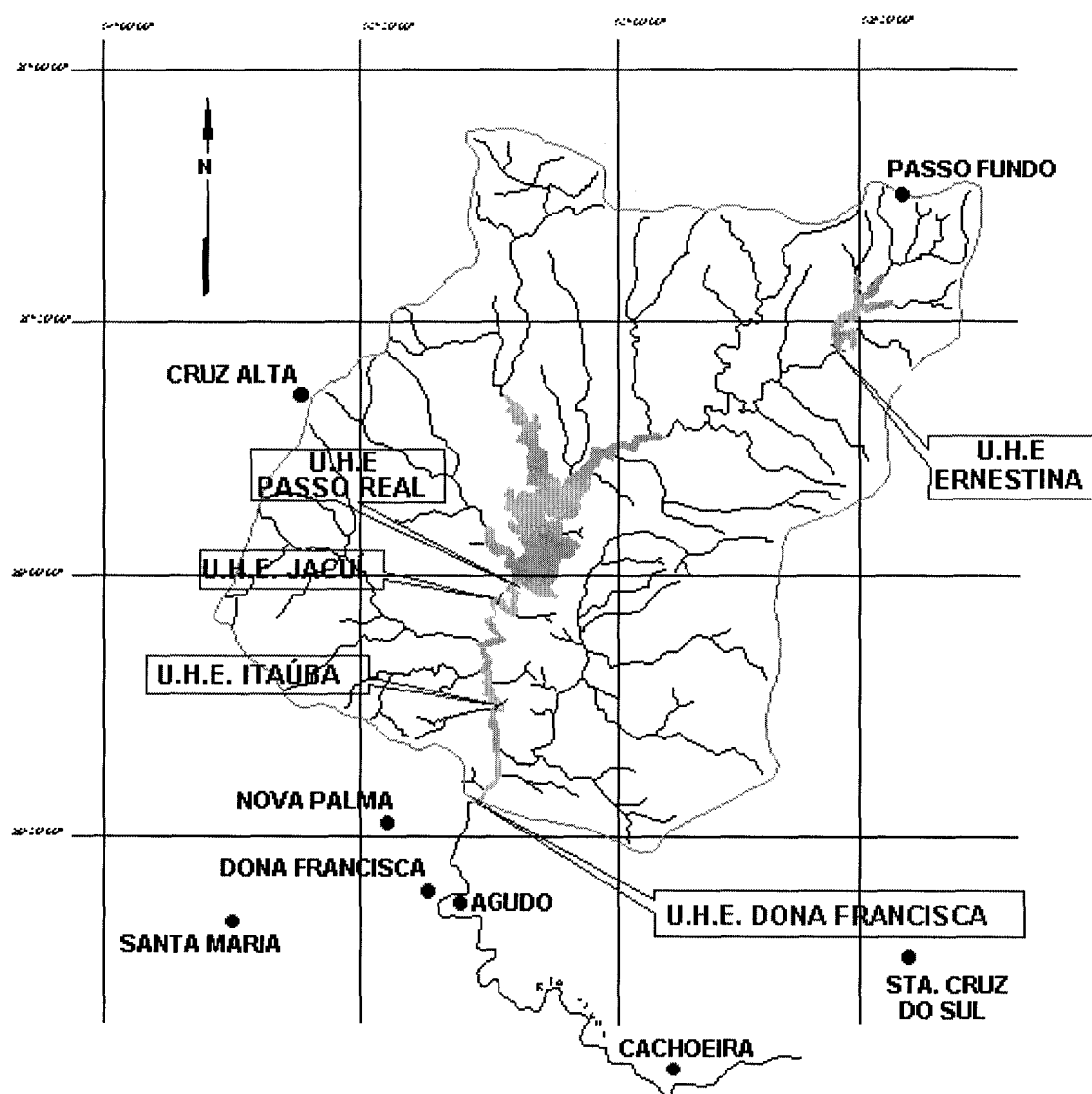
Event	Date	Participants	Objective	Results
Beginning of the public participation.	1989		Create the "Affected Population Commission" ("APC")	
Meeting	Sept 28, 90	APC & CEEE	Discuss the ERP Agreement	Definition of the Agreement between APC and CEEE with the support of the State of Rio Grande do Sul.
Meeting	July 12, 91	APC & CEEE	Updating of the 1990 Agreement.	Updating of the 1990 Agreement.
Meeting	May 12, 97	APC & CEEE	Updating the schedule of the ERP program.	ERP updated Schedule.
Socioeconomic Census	Aug. 1997	COPEL & ICODES	Formulate the census questionnaire.	Creation of a databank to appoint the individuals who will be included in the ERP.
Meeting	Sep 17, 97	APC & CEEE	Provide a list to APC and CEEE with the names of the people affected by the Dona Francisca HPP.	Negotiation with the families in the ERP
Meeting	Sep 30, 97	APC & CEEE	Provide minutes of the updated Agreement.	Guaranteed continuation of the ERP and consentation all of the terms and conditions of the Agreement signed by the involved parties
Meeting	Oct 22, 97	APC & CEEE	Present and discuss the value of the land to be	The price of the land to be paid for ERP and the

Meeting	Nov 12, 97	CEEE, COPEL, ICODES, Aerosul, & APC	awarded in the ERP and provide an updated list of the ERP beneficiaries Present the final list with the ERP beneficiaries, and the ERP prices	list of the ERP beneficiaries were agreed upon
Meeting	Dec 28, 98	APC & CEEE	Inform the values of the properties to be first compensated	APC approved the final ERP list of beneficiaries, with a detailed description of the price of each property, based on its productivity Approval of the proposed pricing and of the continuity of the ERP.

**FIGURE 2-1. DONA FRANCISCA SITE LOCATION**



**FIGURE 2-1. DONA FRANCISCA SITE LOCATION**



## SUMMARY OF SELECT POTENTIALLY APPLICABLE PROJECT ENVIRONMENTAL LEGISLATION

Waste Management: several CONAMA Resolutions deal with waste management and regulate requirements for a complete waste inventory (including storage, transportation and final disposal methods), submittal of inventory forms to the state environmental agency, classification of used lubricant oil as hazardous waste, and procedures for its storage, treatment and disposal. The ABNT has also issued a number of standards that relate to waste management, such as waste classification and characterization. There are also standards addressing the final disposal of wastes. Criteria for design, construction and operation of a hazardous waste (Class 1) landfill are defined under NBR's 8418 and 10157. The option of disposal through incineration is becoming more widely available and performance criteria for hazardous waste incinerators are established under NBR 11175 (former NB 1265). CONAMA Resolution 006/88 requires the submission of an inventory of any PCB (Polychlorinated Biphenils) and/or PCB-containing materials to the state environmental regulatory agency. Federal legislation also establishes procedures for handling, storage and transportation of PCB or PCB-containing materials (and reference ABNT NBR 8371 for technical aspects).

Water Management: the most important piece of legislation is CONAMA Resolution 20/86, which establishes standards for quality of superficial water bodies and requirements and limits for wastewater and/or effluent discharges. Most recently, Federal Law 9.433/97 establishes the Water Resources National Policy and creates the National System of Water Resources Management. Ordinance 36/90, by the Ministry of Health, establishes standards for drinking water use.

Fauna and Flora and Forest Management: the most relevant legislation, at the federal level, is Federal Law 4.771/65 (Forestry Code), which defines as permanent preservation areas forests and other forms of natural vegetation along the rivers and around lakes and other natural or artificial reservoirs. It sets provisions to authorize the clearing of these forests if previously authorized or when absolutely necessary for the implementation of public interest projects. Procedures to manage native forests and requirements to cutting and transporting forest resources are defined at the state level. Further regulation at the federal level defined the minimum width of "ciliary belts" – in the case of artificial reservoirs and rivers wider than 50 meter "ciliary belts" should have a minimum width of 100 meters. CONAMA Resolution 04/85 also requires the establishment of a permanent preservation area of 100 meter around the reservoir of a HPP.

Federal Law 3.824/60, establishes the requirements for deforestation and clearing of the areas to be flooded.

Mineral resources: under the Brazilian Mining Code, established by Federal Law 227/67, the extraction of stones and slate (quarry) (Class II mineral resources) to serve as raw material for the construction of dams require an specific authorization from the local administration authority and from the National Department of Mineral Production (DNPM). CONAMA Resolution 010/90 determines that the quarry to serve at class II mineral resources is subject to the environmental permitting procedures.

Environmental education: Federal Law 9.795, of April 27, 1999, creates the National Policy for Environmental Education.

Noise: CONAMA Resolution 001/90 establishes criteria for noise emissions from any industrial, commercial, social or leisure activities. It also addresses the contents of NBR 10151 as the suitable noise evaluation method and NBR 10152 as the applicable noise levels for areas of different use (residential, commercial, and industrial).

Historic and Archeological Heritage: the main regulation addressing the issues related to the protection of the historic, artistic, aesthetic, cultural and archeological heritage/patrimony is Federal Law 3924/61 that determines that any site in which positive vestiges of occupation by paleoamerindians or of

temporary settlements of the ceramic period, is defined as historic or archeological monuments. The legislation also establishes the general requirements for the excavation procedures.

Health and Safety: health and safety regulations in Brazil are mainly established by the Ministry of Labor, at the federal level. The federal legislation establishes the set of general requirements and details the federal health and safety requirements through Regulatory Norms (NR's). However, complementary health and safety and industrial hygiene requirements are established through Technical Rules and Standards issued by the ABNT. As for the transportation, handling and temporary storage of explosives for mineral extraction purposes Federal Decree 2998/99 requires that a specific authorization ("Certificado de Registro") be granted by the Ministry of Army for each activity. Technical requirements for the storage facilities are also established by the Decree.

Expropriation: The expropriation process, regulated by the Law-Decree No. 3.365, of June 21, 1941, occurs in two stages. In the declaratory stage, ANEEL, the organization responsible for the regulation of the electricity concessionaires, publishes a Resolution determining the area to be expropriated for public utility. In the expropriation stage, the concessionaire is allowed to acquire and compensate the affected properties in the areas to be expropriated.

Environmental crimes: recent Federal Law 9.605/98, regulated by Federal Decree 3,179/99 establishes punishments for environmental crimes, which include among other, environmental damages provoked by human actions.



**ANNEX 2**  
**STATUS OF THE SITES OF THE ARCHAEOLOGICAL RESCUE PROGRAM**

Site #	Owner	Code #	Lot	Bank	Register #	Municipality	Status of the Archaeological Site		
							Exploration Year	Material sent to CEPA-UNISC	Archaeological evaluation
1	Wilmuth Röpke	01	77	Left	RS-JC:56/57	Ibarama	2000	Flints, ceramics and lithium based materials	Being explored; potential
2	Albino Granzel	02	89	Left	RS-JC:66	Ibarama	2000	N/A**	Will be explored in Jan./Feb./Mar./2000
3	Ivania Granzel	03	91	Left	RS-JC:61	Ibarama	1991 - 1999	-	Already explored; without potential
4	Albino Granzel	04	93	Left	RS-JC:62 e 92	Ibarama	1999	Flints, ceramics and lithium based materials	Already explored; without potential
5	Luiz D. Ferreira	05	147 - 147A	Left	RS-MJ:102	Ibarama	1991 - 1999	-	Already explored; without potential
6	Lincoln Steuernagenal	06	58	Right	RS-MJ:53	Nova Palma	1973 and 1999	Prehistoric rock drawings (petroglyphs)	Already explored; impossible to be removed
7	Alcides Drescher	07	24	Right	RS-JC:64	Nova Palma	1999	Flints	Already explored; without potential
8	Ernesto Serafin	09	209-A	Laj. Gringa	RS-JC:134	Ibarama	1999	-	Already explored; without potential
9	Norlei Dias	10	205-A	Laj. Gringa	RS-JC:129	Ibarama	1991 - 1999	Flints	Already explored; without potential
10	Claudio Puntel	11	183	Laj. Gringa	RS-JC:124	Ibarama	1999	Flints	Already explored; without potential
11	Nidolfo Kitell	12	185	Laj. Gringa	RS-JC:128	Ibarama	1999	Flints	Already explored; without potential
12	Ernesto Serafin	13	209	Left	RS-JC:58	Ibarama	N/A*	N/A**	Will not be explored
13	Albino Puntel	14	243	Left	RS-JC:157	Ibarama	1999	Tomb	Already explored; without potential
14	Escola 21 de	15	265	Jacuzinh	RS-JC:142	Ibarama	1999	-	Already explored; without potential

	abril				o					potential
15	Arlindo Ebert	16	267-267A	Jacuzinh o	RS-JC:143	Ibarama	1999	Lithium-based materials	Already explored; potential	without
16	Arnaldo Hall	17	121	Left	RS-JC:106	Ibarama	1991-1999	Ceramic pieces	Already explored; potential	without
17	Arnaldo Hall	18	121	Left	RS-JC:106	Ibarama	1991-1999	Ceramic pieces	Already explored; potential	without
18	Edi Mundt	20	25	Left	RS-JC:159	Agudo	1999	5000 Flints paleo indigenous site	Being explored; potential	good
19	Norma Klein	21	23	Left	RS-JC:160	Agudo	1999	Stone axes; ceramic flints “boleadeiras” (strong cord with stones attached to its ends for roping cattle and horses)	Already explored; potential	without
20	Edison Halberstadt e Nilson Becker	25	83/85	Left	RS- JC:55	Ibarama	N/A*	N/A**	With potential; it is not priority	
21	Ivo Menegassi	26	109,109 A	Left	RS-JC:81	Ibarama	1999	304 flints	Being explored; potential	good
22	Deobaldo B. Ulrich	27	139/130 A, B, C	Left	RS-JC:70	Ibarama	1999	Lithium-based materials, flints	Already explored; potential	without
23	Elemar Mundt e outros	28	137	Left	RS-JC:68	Ibarama	1991 and 1999	Flints	Already explored; potential	without

\* Site code number according to the Archaeological Rescue Program

\*\* N/A: Not Applicable

Site #	Owner	Code #	Lot	Bank	Register #	Municipality	Status of the Archaeological Site		
							Exploration Year	Material sent to CEPA-UNISC	Archaeological evaluation
24	Aristides Ferreira	29	149	Left	RS-JC:79	Ibarama	1991 - 1999	Lithium-based material, ceramic, pottery, bone, shell, glass, metal and charcoal	Already explored; good potential
25	Leander Hall	30	151	Left	RS-JC:94	Ibarama	1991 and 1999	Ceramics, pieces	Already explored; without potential
26	Elisio Giacomelli	31	153	Left	RS-JC:63	Ibarama	1991 and 1999	Flints	Already explored; without potential
27	Edvino Mundt "A"	32	27	Left	RS-JC:158	Agudo	1999/2000	442 flints, ceramics and lithium-based materials indigenous site	Being explored; good potential
28	Edvino Mundt "B"	00	27	Left	RS-JC:162	Agudo	N/A	N/A	Already explored; without potential
29	Verno Maske	00	52,52-A	Right	RS-JC:60	Nova Palma	1991 - 1999	Flints	Already explored; without potential
30	Euclides Leal	00	219	Left	RS-JC:77	Ibarama	1991 and 1999	Flints	Already explored; without potential
31	Romildo Petterman A	00	36	Right	RS-JC:163	Nova Palma	1999	Flints, painted ceramics	Already explored; without potential
32	Romildo Petterman B	00	36	Right	RS-JC:164	Nova Palma	1999	Flints	Being explored; good potential
33	Adelar Konrad	00	62	Right	RS-JC:165	Pinhal Grande	1999	Pebble, flints, lithium-based materials	Already explored; without potential
34	Pedro O. Stüeler	00	76	Right	RS-JC:166	P. Grande	1999	Flints	Already explored; without potential
35	Albertina A. Jacques	00	68	Right	RS-JC:75	P. Grande	1999	Flints	Already explored; without potential
36	Alfredo Dresch	00	construc	Right	RS-JC-107	Nova Palma	N/A*	N/A**	Destroyed

	A			tion site								
37	Alfredo B	Dresch	00			Right	RS-JC-108	Nova Palma	N/A*	N/A**		Destroyed
38	Alfredo C	Dresch	00	bridge		Left	RS-JC-161	Nova Palma	N/A*	N/A**		Destroyed

\* Site code number according to the Archaeological Rescue Program

\*\* N/A: Not Applicable

## SUMMARY OF THE EXPROPRIATION AND RESETTLEMENT PLAN

## 1. DEFINITIONS

**Compensation and Resettlement.** The resettlement plan is intended to give priority to the most vulnerable sectors of the affected population. In principle, those families that own more than 20 hectares are only liable for compensation, while families with 50 hectares or less, landless families and tenants, sharecroppers and other occupants are eligible for the resettlement program.

- The 50 hectares refers to the household's total holdings, including properties outside the affected area. Property owners can participate in the collective resettlement program if he or she agrees to exchange the affected property for 17 hectares of cultivable land offered at the resettlement site, and agrees to reside there permanently.
- "Ownership" includes full title, legally recognized occupancy rights (*posse*), usufruct rights derived from continued use (*usucapião*), rights derived through inheritance, and so on. As part of the process of acquisition, CEEE and DFESA are jointly responsible for legalizing the titles, and will fully compensate the owner for the affected land and improvements.
- "Tenancy" includes arrangements as usufruct, sharecropping, and sharing agreements.
- "Landless families" include the close relatives of landowners, such as sons or sons-in-law, who were identified as independent producers, who live and work in the area, and were 21 and/or married at the time the move takes place. Any children over 18, married or not, will have the right to a separate plot in a collective resettlement if their parents opt for collective resettlement, if not, they can be included in the State's agrarian reform program.

**Cut-Off Dates.** The 1997 census is used as the cut-off date for eligibility for the resettlement program. However, a further census of additional families was carried out in November 1999.

**The Household.** A married couple is defined on the basis of at least two years co-residence (without the requirement for a formal marriage certificate – although this is one of the documents required when the household has to negotiate compensation). The concept of the household is widely defined, and also considers "an individual who resides and produces independently of the family from which he/she originated" as a separate household. This definition allows most adult sons, and married daughters and their husbands to be considered as separate households for the purposes of the resettlement program.

## 2. INSTITUTIONAL STRUCTURE

In the original contract CEEE was legally responsible for resettlement and environmental mitigation, with DFESA providing R\$ 6 million towards the costs. This agreement has since been modified to ensure that sufficient funds are available for resettlement, and to take into account the priorities of the present State Government of Rio Grande do Sul, which took office in March 1999. Under the agreement signed on 6 August 1999, the responsibilities of DFESA, CEEE and the Government of Rio Grande do Sul are defined as follows (see also Table 1)

- DFESA and CEEE will each put up the equivalent of R\$ 6 million, at its November 1996 value, to cover the cost of compensation. This is in addition to funds already committed by DFESA for the environmental monitoring studies, and to compensation paid during the first part of Phase I expropriations. Once all compensation has been paid, any remaining funds will be used for resettlement. CEEE will continue to be responsible for negotiation and payment of compensation.

- DFESA will pay for the environmental programs, with the exception of the fisheries research station, the forestry nursery, and the organization and management of the 100 meter conservation zone (*faixa ciliar*) along the edge of the reservoir. DFESA will also pay for the construction of the substation.
- The compensation used to cover part of the costs of settling those families eligible for the resettlement program will be reintegrated into the compensation account. In practice, this means that those families whose nominal compensation is less than the cost of their resettlement will not receive payment other than an advance of up to R\$ 3,000 to cover maintenance. The full cost of the resettlement will be paid from the resettlement account managed by CEEE.
- The Government of Rio Grande do Sul/CEEE will pay the costs of the resettlement program, with CEEE and the Agriculture Secretariat (*SAA Secretaria de Agricultura e do Abastecimento*) taking responsibility for its implementation.

Before this agreement was signed DFESA had contracted ICODES Sociedad Civil Ltda. (*Instituto de Cooperação de Desenvolvimento Econômico, Social e Cultural*) to support CEEE in implementing the resettlement. The activities of ICODES have included the valuation of the affected properties, review and updating of titles to the affected properties, and management of a database of suitable properties for resettlement. ICODES will continue these activities, and will participate in the social communication program. The cadastral studies, aerial surveys, and the surveying and demarcation of the reservoir area were contracted to Aerosul, and were completed in 1998. DFESA has contracted COPEL to monitor the progress of the resettlement and environmental programs, and to provide technical support wherever necessary. DFESA has a full-time consultant on site to monitor and supervise the progress of the compensation and resettlement programs.

### 3. COMPENSATION

The compensation program involves expropriation and negotiation with the affected families. In legal terms, the acquisition of the areas that are directly affected by the reservoir – that is, land below 100.2 masl, is subject to expropriation. Resolution 11 of the Federal Electricity Regulator, ANEEL (*Agência Nacional de Energia Elétrica*) emitted in January 1999, declares the project to be in the public interest, in accordance with Law 3365 of 1941. In addition, the conservation area (*faixa ciliar*) - defined as land within 100 meters of the 94,5 masl operating level - is also subject to expropriation. The remaining areas are subject to negotiation, and the affected households have the option of either selling or retaining these areas. The valuation and negotiation procedures are the same for both areas, but separate legal documents have to be prepared.

Compensation is due to all affected households, regardless of whether or not they are eligible for the resettlement program. If the household is eligible and accepts the option of resettlement, the compensation is put toward the cost of the replacement land and housing. In this case the affected household will only receive payment if the total value of the land, housing and improvements is greater than the cost of the replacement land and housing. In some cases, however, part of the compensation can be used to pay for housing and other improvements, and up to R\$ 3,000 can be used to cover the family's maintenance costs. Any family that is eligible for resettlement and does not want to participate in the resettlement program has to formally notify CEEE. The family can then be compensated, on the same terms and conditions as those families with properties of 20 hectares or over.

The latest agreement between CEEE/SAA and MAB/*Comissão dos Atingidos* provides for a direct exchange of land-for-land. Under this proposal, the families that opt for collective resettlement will be able to exchange their land for an equivalent area in a collective resettlement, up to a maximum of 17 hectares, regardless of the category of the land that is affected. A smallholder with 6 hectares, for instance, would receive 17 hectares of cultivable land in the collective resettlement scheme, but would only have to make payments for the outstanding 11 hectares. Owners of 17 or more hectares would not have to make any repayments, but would not be entitled to more than 17 hectares in the resettlement scheme.

Compensation is paid for the following items: i) land, ii) housing, iii) other structures, such as barns and tobacco kilns, iv) other improvements, such as fencing, v) perennial crops and timber, and vi) standing crops. Each item is valued independently, using detailed tables to assess the values of each. The value of the directly affected assets, located below 100.2 masl, is calculated separately from the value of those that are indirectly affected.

**Compensation for Land.** The value of the land is calculated as *terra nua*; that is independently of any crops, outbuildings, housing and other improvements that are sited on the land. Under the 1991 agreement, the Commission accepted the classification of land into three categories: flat land with slopes of less than 5 degrees (*terra plana*), relatively steep land of between 5 and 20 degrees (*meia encosta*), and very steep land of over 20 degrees (*encosta*). The categories do not take any other factors into account, such as soil quality or ease of access, but are taken to represent the prices of the best land within each category.<sup>7</sup> The valuation of each category is based on a detailed evaluation of current land prices in the region, which is updated every six months. The evaluation, in accordance with Brazilian norm NBR 8799, adjusts the prices paid in the region to give an estimated cost for Class 1 *terra nua*, from which the values of land in Class 2 and 3 can be derived. Where there are minor discrepancies between the area inscribed in the land registry and the area actually occupied, compensation is paid for whichever is the larger.

**Compensation for Housing, Farm Buildings, Improvements and Crops.** The valuation of housing, outbuildings, other improvements and crops is worked out from standardized tables prepared by ICODES. The tables are based on the costs of labor, agricultural inputs, construction materials, hire of machinery, seedlings and standing timber, and offer an assessment that is relatively self-explanatory. The valuation of housing, for example, considers the floor area, foundations, structure, materials, roofing, plumbing, electricity, and so on, each aspect being assessed for depreciation in accordance with its age and condition. The same system is applied to outbuildings and tobacco kilns. All fruit trees and timber are enumerated, and assessed on the basis of age and size.

**Transport Costs.** All the affected families will be paid R\$300 to cover the cost of transporting their possessions to a new location (R\$150 if the move is within the reservoir area). The affected household has the right to take any items or materials that they want. This facilitates clearance of the reservoir area, and some households have taken virtually all the construction materials from their houses and barns.

**Compensation Procedures.** The valuation of the properties is the responsibility of ICODES. The first step has been to review the information from Aerosul's photo-interpretation and cadaster study. This was based on the information in the INCRA land registry, held in the Municipal Government offices (*prefeituras*), which was cross referenced with aerial surveys to provide detailed maps of each property. The maps distinguish the directly affected and indirectly affected areas (below and above 100.2 masl), and offer a detailed description of each plot, showing the categories of land (areas classified as flat, steep or very steep) and land use.

This information has to be reviewed, first by the legal team, as the information from the land registry is often out of date. In many cases, inheritances, occupancy (*posse*) and usufruct rights (*usucapião*) have not been legalized, in others sale and purchase agreements or other arrangements have not been recorded. DFESA and CEEE are jointly responsible for the cost of updating and legalizing the titles to the affected properties, and this should involve no cost for the affected households.

The valuation has been carried out by field teams from ICODES, who are accompanied by the owners of the affected properties. The houses and outbuildings are measured and photographed, and the information is recorded on a standardized form, that is input into a database that can be updated to provide a valuation in accordance with the most recent surveys of land, housing, and other prices.

**Negotiation.** CEEE and ICODES are now carrying out negotiations in the municipalities closest to the homes of the affected people, allowing all the family to participate, and offering the representatives of CEEE the opportunity to review any assets that may have been missed or improperly assessed. If the

<sup>7</sup> The original proposal recognized eight categories of land. Categories I and II were reclassified as *terra plana*, Categories III, IV and V as *meia encosta* and Categories VI, VII and VIII as *encosta*.

affected families accepted the valuation, they signed an agreement (*termo de acordo*) with CEEE, thus initiating the transfer of their assets. If they rejected the valuation, but accepted that their assets have been correctly registered, the negotiation would be postponed pending a decision by the courts.

**Transfer of Title.** When CEEE and the affected party have signed the agreement, it is the responsibility of ICODES to ensure that there are no limitations that could affect the owner's right to transfer the property, such as mortgages, unpaid taxes, and so on. DFESA and CEEE are responsible for the legal costs of verification, but outstanding payments are the owner's responsibility. The legal procedures to regularize possession (*posse*), usufruct rights (*usucapião*) and inheritance are exceptions, however, and will be paid by DFESA and CEEE. The owner will be informed of any outstanding payments that are due, and if he/she is unable to pay, CEEE and ICODES will try to find an acceptable solution.

Once the owner's title is deemed to be in order, the transfer deeds are prepared, with DFESA and CEEE taking responsibility for all the relevant documentation, and covering the costs. The owners who will not participate in the resettlement program should then be paid within 30 days. The payments made before March 1999, when the compensation program was halted for lack of funds, appear to have been made promptly. The families that have been compensated have the right to stay on their land until 180 days before the reservoir is due to be flooded, in accordance under the 1990 and 2000 agreements.

**Payment to Municipalities.** The resettlement plan states that CEEE will pay compensation for all community, church and municipal buildings that are affected. In addition, the municipalities will receive income from taxes and royalties. The municipalities of Agudo and Nova Palma, where the dam is sited, will receive ISS (*Imposto Sobre Serviços*) - a tax on services, equivalent to 3 percent of the labor costs of the civil works and electro-mechanical contracts (30 percent of the contract value). This should represent over R\$ 700,000 for each municipality.

In addition the affected municipalities will receive royalties (*Compensação Financeira*), paid in accordance with the area directly affected by the project. The royalties are collected by ANEEL, and are equivalent to 6 percent of the value of the energy generated. It is estimated that they should represent around R\$820,000 per year, 45 percent of which will be distributed among the affected municipalities, with the remainder going to the State (45 percent), ANEEL (8 percent) and the Secretariat for Science and Technology (2 percent). Some of the affected municipalities, including Pinhal Grande, already receive a significant part of their income in royalties from Itaúba.

#### 4. RESETTLEMENT PROGRAM

The resettlement plan agreed between CEEE and SAA in October 1999 and ratified in the January 2000 agreement describes two resettlement options. The terms used to describe the options are intended to counter the affected population's prejudice against collective resettlement. The first is described as "individual resettlement in large areas" (*reassentamento em grandes áreas*), and is a collective resettlement option for groups of 15 or more households, in areas of at least 480 hectares. The second is "individual resettlement" (*reassentamento individual*), an option for individuals and groups of 2-14 households.

The definition of the minimum number of families that would be needed for collective resettlement is, however, described as being flexible, and can be modified if necessary. This would be the case if a group, for instance, from a particular locality, or perhaps a particular church, could identify a suitable area for collective resettlement. The January 2000 agreement notes that groups of 10-14 families would be considered on a case-by-base basis (Clause 9).

**Reorganization of "Remaining Areas".** Another alternative described in the resettlement plan is the reorganization of the areas that remain above the level of the reservoir. This excludes the 100 meter wide conservation area (*faixa ciliar*) around the margin of the reservoir, even where it is situated above 100,2 masl. The intention is to reassign the remaining areas that will be acquired by DFESA and CEEE, and that are indirectly affected and remain accessible. First priority will be given to families eligible for resettlement, and second to the neighbors who wish to remain in the area. The families that choose this option will have to repay the cost of the land (*terra nua*) – if the cost is greater than their compensation.



They are also eligible for loans of up to R\$ 5,000 for the construction of new housing, and R\$ 3,000 for installation of electricity and drinking water.

The advantages of reorganizing the remaining areas are, firstly, that it would reduce the overall requirement for land. Secondly, it reduces the overall cost of the compensation and resettlement programs. Finally, it offers more continuity and an easier transition for the families that remain in the area.

**Collective Resettlement.** Under this option, groups of 15 or more households would be formed on a voluntary basis, the resettlement sites being divided into individual family plots of at least 17 hectares, the exact size being determined by the size of the family's labor force. The affected families would have the option of locating their houses within their plots, or in a nucleated village.

SAA is responsible for identifying potential sites, and for helping the groups select the sites most suited to their needs. ICODES can also provide technical support, drawing on a database of land for sale. Available sites will first be offered to the families situated nearest the dam, and then to groups from further upstream. The sites should be within 300 kilometers of the project, preferably in the affected municipalities, must be suitable for the proposed productive activities, and must have full legal title.

Groups of 15 or more families will be provided with basic community infrastructure comprising a church of 150M<sup>2</sup>, a community center of 200M<sup>2</sup> and a school building of 300M<sup>2</sup>. Each house in the collective resettlements will be provided with a potable water supply, electricity, and access roads. CEEE will be responsible for operation and maintenance of the water supply for the first year, and the municipalities would take over afterwards. The beneficiaries will be responsible for their electricity bills from the moment they receive their first maintenance payments. Each family will be eligible for a house of 72M<sup>2</sup> with a tiled roof, plumbing and electrical installation, or for payment of R\$ 8,500 to cover the cost of housing. They will also be eligible for a barn, garage, animal pens and chicken coops, of a total value of up to R\$ 6,000, and sufficient seedlings for a hectare of fruit trees, timber or firewood.<sup>8</sup>

CEEE will pay all the expenses related to the transfer, sub-division and registration of the resettlement site, as well as all the costs involved in moving to the new site. The collective resettlements should receive four years technical and organizational support from a team of social workers and agronomists from ICODES and the Agrarian Reform Department of SAA (DRA – *Departamento de Reforma Agrária*), and agricultural extension from the State extension agency, EMATER. It is envisaged that at least some of the collective resettlements will attempt to diversify their production, reducing their dependence on tobacco and moving into areas such as dairy production.

The beneficiaries of collective resettlement will be eligible for loans for productive activities, including equipment and infrastructure. One line of credit will be offered by the National Development Bank, BNDES (*Banco Nacional de Desenvolvimento Econômico e Social*) through the State Development Bank BANRISUL (*Banco do Estado do Rio Grande do Sul*). These loans, of up to R\$ 15,000, have to be repaid in eight years, with two years grace, at a fixed annual rate of 6 percent. Another potential line of credit is the Federal Government program, *Planta Brasil*, that can be used for productive infrastructure, equipment and animals. This facility offers loans of up to R\$ 7,500, including R\$ 3,000 interest free. The loans have to be repaid in seven years, with three years grace. *Planta Brasil* can also provide short-term loans of up to R\$ 1,500 a year to cover the production and labor costs of crops, such as soy, beans, maize and tobacco.

**Maintenance Payments.** The beneficiaries who receive less than R\$ 15,000 in compensation for their assets will be paid a monthly maintenance for nine months. This will be the equivalent of 1.5 minimum salaries for a family of three, and 2 minimum salaries for a family of more than three.

**Repayment.** The program of "Resettlement in Large Areas" will be financed the State Land Fund, FUNTERRA, with funds from BNDES, channeled through BANRISUL. Beneficiaries of the collective

---

<sup>8</sup> The figures are taken from the agreement signed by CEEE/SAA and MAB/*Comissão dos Atingidos* on 25 January 2000.

resettlement program will repay the cost of resettlement over 16 years, with 4 years grace, at the equivalent value of 100 bags of corn (ie. a total of 1,600 bags of corn).

**Individual Resettlement.** The “individual resettlement” is an option that is only available to property owners or occupants, and includes groups of 2-14 families as well as resettlement by individual households. The only advantage for groups of 2-14 people is that if they form an association they will be eligible for loans from FUNTERRA for housing, electricity and water. Individual households will have to choose a plot with housing, outbuildings and other infrastructure in place, although they will be allowed to use some of their compensation to improve infrastructure, or to install water and electricity. The plots must be around 20 hectares (only 15 percent variation is allowed), and must have a valid title. SAA will carry out a technical evaluation to ensure that the plot is of adequate quality, and that the price is fair.

ICODES maintains a database of land that is being offered for sale in the region, and can help the affected families identify a suitable plot. They can arrange visits, and accompany the affected families. Once the family has found a suitable plot, the vendor is asked to sign a contract, agreeing to sell the land to CEEE, and a further contract is drawn up between CEEE and the beneficiary. Once the sale and purchase documents have been finalized, the land is transferred to the beneficiary, who agrees to move there within a month. All the legal costs are paid by CEEE. CEEE will also pay transport costs of R\$300 for moving the family to a new location outside the affected area, and R\$150 for moving the family to one of the remaining areas.

ICODES will carry out a detailed study of the productive potential of each resettlement site, and will prepare a management plan, taking into account the characteristics of the property, the capacity of the affected family, and the local and regional markets. The aim is to produce a plan that can offer maximum returns from a reasonably low level of investment. The plans cover the production of annual and perennial crops, livestock and forestry, as well as activities intended to add value to the basic agricultural production. The first plans that were prepared included a detailed financial analysis of the proposed activities for a period of 12 years, and crop budgets for the principal cash and subsistence crops. EMATER will provide agricultural extension during the first six months, and will draw up formal agreements with relevant municipal and state agencies to ensure that extension will be continued.

**Repayment.** Beneficiaries will have to repay the cost of individual resettlement in 12 years, with 2 years grace, and without paying interest charges. It appears that repayment has to cover the total cost of the land, buildings and other assets, less any compensation due to the beneficiary. The plan states that repayments will be set at a level equivalent to 40 percent of the family’s disposable income.

## **5. SOCIAL AND ENVIRONMENTAL IMPACT OF THE RESETTLEMENT PROGRAM**

The resettlement program is unlikely to have any significant impact on service provision in the resettlement areas. New infrastructure will be provided for collective resettlements of more than 15 families. It should also be noted that all children from rural areas, from Year Four, are taken by bus to schools in the municipal centers. There will some reallocation of children between municipal centers, but the numbers are likely to be relatively small in terms of overall school rolls. The municipalities have not identified any schools, health posts or other infrastructure outside the affected area that would become non-viable as a result of the movement of population away from the affected area.

## **6. SOCIAL COMMUNICATION**

DFESA and SAA have agreed on the outline of a new and more formal social communication program that addresses the immediate need to better inform the affected population about compensation procedures and resettlement options. The social communication program will be an on-going, iterative process, that allows CEEE, SAA, DFESA and the contractors, to respond effectively to issues as they arise. SAA will provide three staff to work on the social communication team, and DFESA has agreed to extend the contract with ICODES to include additional staff for the social communication program.

The first activity of the communication team will be to inform the affected population and other interested parties, such as the municipal authorities, about every aspect of the resettlement plan. This should be done through local meetings, local radio programs, bulletins, posters, and so on. One of the most sensitive issues that the communication program will have to address is the choice between resettlement alternatives. This needs to be presented impartially, offering full information about the different options, and facilitating the process of decision making within families and neighborhoods. The communication program will be responsible for liaison between the affected families, the project, and other parties, including contractors, local government, and the tobacco companies. It will also provide information about issues such as the authorizations for the clearance of timber, and facilitate negotiations with outside interests, such as the tobacco buying companies.

## 7. COSTS

**Compensation.** According to the 1997 census, there are 402 families living in the affected area (246 resident landowners and 156 resident non-owners). If their houses, outbuildings and all other improvements are estimated at R\$ 20,000, this would give a figure for the compensation excluding land of around R\$ 8 million, and a total cost of around R\$ 16 million for the entire compensation program. In fact, this figure is likely to be a significant over-estimate, and the R\$ 12 million allocated for compensation (R\$ 6 million from DFESA and R\$ 6 million from CEEE) should be sufficient to cover all compensation costs. This is due to: i) the R\$ 12 million is at 1996 value and estimated that inflation since then has been well over 10 percent, giving a total in year 2000 reais of at least R\$ 13,200,000; ii) some families are expected to remain on the land that is not directly affected; iii) smallholders that opt for resettlement (142 families are eligible) will only be compensated if they have an amount outstanding after the cost of the resettlement program has been covered and the groups that form associations of 2-14 families will, however, have the option of using part of their compensation for housing and infrastructure; iv) tenants that opt for resettlement (92 families are eligible) are unlikely to have any compensation outstanding once the cost of resettlement has been covered; and v) the value of the indirectly affected areas used for resettlement will be reintegrated into the compensation account.

**Resettlement.** The resettlement plan simply states that the CEEE/Government of Rio Grande do Sul will provide R\$ 12 million for resettlement. Some idea of the order of magnitude can be calculated by assuming that if all the 325 families accept resettlement, and the cost is equivalent to the maximum mentioned in earlier documents (R\$ 40,000) the total would reach R\$ 13 million. It is reasonable to assume that the real figure, excluding all technical assistance, administrative and other costs (such as transport), is likely to be slightly more, perhaps in the order of R\$ 15 million.

## 8. MONITORING AND EVALUATION

**Internal Monitoring.** There are two areas where internal monitoring will be important are: i) monitoring the progress of the compensation, resettlement and other social programs, and ii) monitoring the situation of the families that have been compensated and/or resettled.

In the first case, monitoring will be vital in the months prior to filling the reservoir to ensure that DFESA and CEEE know whether the compensation and resettlement programs are being implemented according to the procedures and schedules laid down in the resettlement plan. DFESA has contracted to COPEL to monitor the resettlement and environmental programs, and a consultant has recently been assigned to monitor the resettlement program on site. A monthly report will be prepared, summarizing the progress of the compensation, resettlement and other programs, and identifying any bottlenecks. The report will be presented to the Coordinating Committee (*Comitê de Gestão*), and copied to the relevant authorities in State Government (Secretaries of Energy and Agriculture) and to the Bank.

In the second case, DFESA, CEEE and SAA will need to monitor the progress of all the families that are displaced, including those that only receive compensation, and those that are resettled, either individually or in "large areas". It has been agreed that EMATER will be responsible for monitoring the affected families, using baseline data provided by ICODES and SAA. EMATER will undertake an annual survey of the affected households in the four years from 2000 to 2004. This should show whether the aim of

improving production levels and income is being met. Particular attention will be given to the most vulnerable families that are resettled.

**TABLE 1. SUMMARY OF INSTITUTIONAL RESPONSIBILITIES**

**DFESA**

- Finance for compensation (R\$ 6 million at 1996 value)
- Payment of contract with Aerosul (completed) and ICODES
- Monitoring/Support for Resettlement plan (contract with COPEL)
- Reporting to IDB
- Clearance of the reservoir area
- Payment of other compensation (cemeteries)

**CEEE**

- Financing, negotiation and payment of compensation (R\$ 6 million)
- Negotiation and payment of land for resettlement (individual and “large areas”)
- Payment of legal costs for resettled families
- (with SAA) Payment of transport costs and maintenance for resettled families
- Payment of other compensation and expenses (municipal infrastructure)
- (with SAA) Implementation of collective resettlements, including management and payment of contracts for access roads, water and electricity supply, housing, and community buildings
- (with SAA) Titling of plots on resettlement sites once they have been paid off

**SAA**

- Identification of “large areas” for collective resettlement
- Surveying (with ICODES), demarcation, soil survey, soil preparation in collective resettlement areas
- Technical assistance for collective resettlement
- (With CEEE) Implementation of collective resettlements, including management and payment of contracts for access roads, water and electricity supply, housing, outbuildings, and community buildings, supervision
- (with CEEE) Payment of transport costs and maintenance
- (with CEEE) Titling of plots on resettlement sites once they have been paid off
- Coordination with State and Federal agricultural programs

**ICODES**

- Valuation of affected land and assets
- Review and regularization of legal status of affected land
- Identification of land for individual and collective (with SAA) resettlement
- Valuation, legal review and regularization of land for resettlement
- Preparation of production plans, social and technical assistance
- Survey of areas for resettlement (with SAA)
- Communication program (with SAA)
- Provision of baseline survey for EMATER monitoring?

**Aerosul**

- Cadastral study and Geo-referencing (completed 1998)
- Surveying and demarcation of the maximum reservoir level (completed 1998)

**FUNTERRA**

- Finance for the Resettlement Program, using funds from BNDES, channeled through BANRISUL

**EMATER**

- Agricultural extension in collective resettlements
- Monitoring of all displaced families