

INTER-AMERICAN DEVELOPMENT BANK



REGIONAL

***Interconnection Argentina - Brazil
(RG-0054)***

***ENVIRONMENTAL AND SOCIAL IMPACT REPORT
(ESIR)***

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LIST OF ACRONYMS

ABB	Asea Brown Boveri
ABNT	Brazilian Association of Technical Standards
ADI	Area of Direct Influence
AII	Area of Indirect Influence
ANEEL	National Electricity Energy Agency
BED	Basic Environmental Design
CEDI	Ecumenical Center for Documentation and Information
CEEE	Companhia Estadual de Energia Elétrica
CELESC	Centrais Elétricas de Santa Catarina
CEMSA	Comercializadora de Energía del Mercosur S.A
CIEN	Companhia de Interconexão Energética
CIPA	Internal Commission for Accident Prevention
CONAMA	National Environmental Council
CONSERSA	Archeological Services Consultant (Argentina)
CORSAN	Companhia Riograndense de Saneamento
COTESA	Consultant Services (Brazil)
CTEE	Technical Committee of Energy Studies
CTM	Compañía de Transmisión del Mercosur S.A
DAA	Direct Affected Area
DAC	Civil Aviation Department
DNPM	National Department of Mineral Production
DNSST	Operational Health and Safety National Department
EIA	Environmental Impact Assessment
EIS	Environmental Impacts Study
EIR	Environmental Impact Report
ELETROSUL	Electric Company of South Brazil
ENRE	Ente Nacional Regulador de la Electricidad
EPC	Construction Agreement
EPI	Individual Protection Equipment
FUNAI	Indigenous National Foundation
GCPS	Electric Systems Planning Group
IBAMA	Brazilian Institute for Environmental and Renewable Natural Resources
IPHAN	National Institute for Archeological and Historic Heritage
LP	Previous Permit
LI	Installation Permit
LO	Operation Permit
MME	Ministry of Mines and Energy
PAC	Environmental Plan for Construction
PBA	Basic Environmental Plan
PGA	Environmental Management Plan (for Construction)
RS	Rio Grande do Sul
SC	Santa Catarina
SGA	Environmental Management System
TESA	Transportadora de Energia S.A.
TL	Transmission Line

I. INTRODUCTION

- 1.1 The effort to integrate the electricity systems of Argentina and Brazil was formally initiated with the signing of a protocol on energy integration in April 1996. Demonstrating the high political priority of this initiative, a joint declaration (Rio de Janeiro, 1997) and a memorandum of understanding on electricity integration (August 1997) were subsequently agreed between the governments of the two countries. The electric interconnection between Argentina and Brazil is part of the scenarios studies for the period 1999-2008 by the *Comite Tecnico de Estudos Energeticos – CTEE (Technical Committee on Energy Studies) of the Grupo Coordinador de Planejamento dos Sistemas Eletricos - GCPS (Electricity Systems Planning Group)* of Eletrobras, which led the Brazilian Government to the decision to import 2000 MW of energy from Argentina.
- 1.2 Brazil is currently facing a severe power shortage, expected to further intensify in the next 2-3 years if programmed capacity additions (hydro and thermal) do not come into operation within this period, which is becoming increasingly uncertain in the light of the delay in developing a Government-supported priority thermal generation program. In this context, the proposed electricity interconnection acquires more relevance, as demonstrated by the decision of the Government to declare it an “emergency” project.
- 1.3 Implementing the integration strategy, an international bidding process to award a contract to supply Brazil, on a firm basis, with 1,000 MW of Argentinean electricity was initiated by the end of 1997 and concluded by mid-1998 with the execution of a 20-year Power Purchase Agreement with Gerasul (a public utility at the time) and Furnas. This resulted in the construction of the Brazil-Argentina Interconnection System 1 (“Interconnection I”), composed of the Rincón - Garabi – Itá I Transmission Line (Rincón – Garabi – Itá I), the Rincón Substation, the Garabi Conversion Station and the Itá Substation (Interconnection I). The Interconnection I commenced operations in June 2000.
- 1.4 The remaining 1000 MW of the electric energy interconnection between Argentina and Brazil is to be through the Brazil-Argentina Electric Interconnection System II (“Interconnection II”), which is the Project under consideration for financing by the Inter-American Development Bank. The Interconnection II is composed of the Rincón - Garabi – Itá II Transmission Line, Rincón Substation, the Garabi Conversion Station and the Itá Substation (Interconnection II) and will be parallel to the Rincón – Garabi – Itá I TL.
- 1.5 In Brazil, the Project Company for Interconnection II, as well as Interconnection I, is CIEN (*Companhia de Interconexão Energética*). CIEN has authorization from the *Agência Nacional de Energia Elétrica* (National Electricity Agency) to construct and operate Interconnections I and II. In Argentina, the Project Company for Interconnection I is CTM (*Compañía de Transmisión del Mercosur S.A.*) and for Interconnection II is TESA (*Transportadora de Energia S.A.*) both project companies are 100% owned by CIEN. The construction contract to build the entire Interconnection II system was signed between CIEN and TESA with ABB, as the main EPC contractor.

II. PROJECT DESCRIPTION

A. Site Location

- 2.1 The project entails the construction of a second 1,000 MW 500 kV electricity interconnection line between Argentina and Brazil. Interconnection II is a linear system, which leaves the Rincón Santa Maria Substation in the province of Corrientes in Argentina, crosses the Uruguay River close to Garabi and enters Brazilian territory in the north eastern region of Rio Grande do Sul state, passing through the Garabi Frequency Conversion Station in Garruchos, until it reaches the Itá Substation in the state of Santa Catarina (Figure 2.1).

- 2.2 In the Argentinean territory, the Interconnection II crosses the province of Corrientes. On the Brazilian side, the transmission line (TL) covers 355 km, crossing 28 municipalities, of which 27 are in Rio Grande do Sul State and one (Itá) in Santa Catarina State. The Interconnection II system covers 129 km in the Argentinean territory and 361 km in the Brazilian territory. The total length of the system (Brazil and Argentina) is 490 km with a width in the right of way (ROW) of 65 meters in Brazilian section and 100 meters in Argentine section .

B. Project Components

- 2.3 The project consists of the main components described below:
- 2.4 Transmission Line (TL): With a total length of 490 km and a right-of-way (ROW) of 65 meters wide in Brazil and 100 meters in Argentina, the Argentina-Brazil Interconnection II transmission line was designed in a simple circuit. The support structures consist of approximately 1000 (one thousand) metal towers, with a height of between 25.5 and 40.5 m, 70% of which are guyed and the others self-supporting, all with cathode protection. The conductor cables will be made of aluminum with a steel core, with a diameter of 24.85mm and 4 conductors per phase. The lightning conductor cables will be made of steel with a width of 3/8" EHS and OPGM with a width still to be determined. The insulators will be multipart shell glass insulators, with a rupture charge of 12,000 kgf. The fittings will be made of galvanized steel or aluminum, with a minimum rupture charge of 12,000 kgf.
- 2.5 The TL is subdivided into two sections: (i) between the Rincón Substation (Argentina) and the Garabi Conversion Station (Brazil), at 500 KV, along a 135 km route, of which 129 km is in Argentina and 6 km is in Brazil, and (ii) between the Garabi Conversion Plant and the Itá Substation, with a length of 355 km, at 525 KV.
- 2.6 Substations and Conversion Station: The project involves the expansion of two Substations and the duplication of one Conversion Station, which are: (i) Rincón Santa Maria Substation (50Hz), where the line begins; (ii) the Conversion Station of Garabi (50-60 Hz) located, in Garruchos (RS, Brazil); and (iii) the Itá Substation (60 Hz), where the line ends, in Itá (Brazil). In all three cases, the construction activities will be carried out within the existing properties.
- 2.7 Rincón Santa Maria Substation: The existing substation is installed in an area of 90,000 m². It is owned and operated by Litsa-Yacilec. The substation has three 500 kV transmission lines that enters it. The expansion will be made within the existing substation property, in an area where the drainage systems are already installed. The expansion activities will involve the construction of new porches, the extension of the main busbars and the expansion of the control equipment.
- 2.8 Garabi Conversion Station: The duplication of the Garabi Frequency (50 Hz to 60 Hz) Conversion Station will interconnect the Brazilian electricity grid (60 Hz) with that of Argentina (50 Hz), and is specified to work with energy transfer in both directions. The construction will take place within the property of the existing station, whose total area is around 400,000 m². The Conversion Station is owned and operated by CIEN. The Phase I existing station occupies half of this area and the new one (Phase II) will occupy the remaining 200.000 m². The workers camp will be installed in an area located in an area adjacent to the existing station.
- 2.9 Itá Substation: The Itá Substation is an existing substation owned and operated by ELETROSUL. The drainage and sewage systems are currently installed and working. It occupies an area of approximately 120,000 m². The expansion of the substation will occupy an area of approximately 9,000m², within the existing substation. This substation belongs to ELETROSUL– *Centrais Elétricas do Sul do Brasil* and is connected to the Eletrosul grid, at a voltage of 525 kV, 60 Hz.
- 2.10 The construction of the Interconnection II involves the following activities: topographic survey and profiling, land planning, opening of access routes, setting out the service corridor and the tower site enclosures, establishment of the cable laying sites, and laying of pilot cables and conductors.

- 2.11 At the substations, the main activity required is the adapting of one additional transmission line bay (line entrance and integration to the rest of the substation). At the Itá Substation, the activities are limited to installation of new equipment: two circuit breaker (SF6 - 500 V, 60 Hz), three reactors (500 kV, 60 Hz), ten switches (550 kV), twelve current transformers, three transformers, six Exlim lightning-arresters and expansion of the equipment protection system, the control panels and the communication system.
- 2.12 At the Conversion Station, the duplication activities will involve topographic survey, profiling and land planning, construction and expansion of existing workers accommodations, canteen and other workers supporting buildings, expansion of existing control room and duplication of existing equipment. The new equipment that will be installed is high-voltage disconnect switches, transformers, modular valves, filters, thrusts, reactors and capacitors.
- 2.13 The expansion of the activities of Rincon de Santa Maria Substation will be carried out within the property of the existing facilities and will involve the following activities: construction of new bay, extension of 500 kV busbars, extension of control equipment and installation of new communication systems.

C. The Project Company

- 2.14 CIEN - Companhia de Interconexão Energética is a company specially formed to operate the electrical interconnection project (in both phases II and I). CIEN's capital is distributed between ENDESA INTERNACIONAL S/A (54.99%) and COMPAÑÍA ELÉCTRICA CONOSUR S/A (44.99%), a subsidiary of EMPRESA NACIONAL DE ELECTRICIDAD S/A. COMPAÑÍA ELÉCTRICA CONO SUR is the largest power generation and transmission company in Chile, where it owns and operates 23 plants, representing around 43.5% of the installed capacity in December 1999. ENDESA INTERNACIONAL S/A is 100% controlled by ENDESA S/A, the largest electricity company in Spain. In Argentina, TESA – Transportadora de Energia S.A. is the operator of the transmission line. TESA is 100% owned by CIEN. ABB is the main EPC contractor for the entire Interconnection II system (Argentina and Brazil).

D. Costs, Schedule and Workforce:

- 2.15 The total cost of the project is US\$ 280 million and construction started in March 2001. The estimated date for the end of construction of the section in Brazil is April 2002, and the end of construction of the section in Argentina is estimated for January 2002. The start of commercial operations for the project is planned for May 2002. The crossing of the Uruguay River near the Garabi Conversion Station is planned to start in April 2001 and be completed in January 2002.
- 2.16 In total, the Project is expected to generate an average of 1000 direct jobs during the construction phase, of which approximately 700 on the Brazilian side and 360 on the Argentinean side (approximately 200 at peak). During the operational phase, however, the workforce is not expected to exceed 100 employees in both sides, including the transmission line and substations.

E. Analysis of Alternatives

- 2.17 The energy interconnection between Argentina and Brazil is one of the alternatives considered by the *Comitê Técnico de Estudos Energéticos - CTEE* (Technical Committee of Energy Studies) of *Grupo Coordenador de Planejamento dos Sistemas Elétricos - GCPS* (Electricity Systems Planning Group) of Eletrobrás to mitigate the energy shortage that Brazil is currently facing. The study led to the Brazilian Government decision to import 2000 MW of energy from Argentina, in two phases of 1000 MW each (Interconnections I and II, both to be constructed parallel one to another). The entire project (both phases) was studied as a sole project and involved the definition of an interconnection corridor approximately 10km wide. The alternative of keeping Interconnection II within the same route as the Interconnection I aimed at minimizing impacts and avoiding crossing conservation and protected areas and high density population nucleus. The studies of alternatives included that of not carrying out the project, which is required under environmental legislation in Brazil.

- 2.18 Within the interconnection corridor, the selection of the route for both TLs covered a number of alternatives, considering many different environmental and social aspects, such as the effects on flora and fauna, the fragmentation or alteration of habitats, access to protected areas, risks to aviation, impacts on communities and on historical, cultural and archaeological heritage. In the Argentinean section, the route of Interconnection II is parallel to three other existing TLs, including Interconnection I. During the studies for Interconnection II, a study of routing alternatives was carried out as to minimizing visual impacts, interference with cultural heritage, fragmentation of ecosystems, interruption of drainage, interference with populations, interference with aviation and to avoid conservation units. The study assessed three alternatives for the lower section (from the Rincón Substation until Estero del Iberá), and two alternatives for the middle section (Estero del Iberá until Arroyo del Susto) and for the upper section (from this point until Arroyo Garabi).

III. INSTITUTIONAL AND LEGAL ASPECTS

A. Institutional

(a) Energy

- 3.1 Brazil: The main entity involved in the licensing process for the project is *Agência Nacional de Energia Elétrica* (National Agency for Electric Energy) - ANEEL, which is connected to the *Ministério de Minas e Energia* (Ministry of Mines and Energy) – MME, responsible for approving the engineering project, issuing the authorization to import and sell firm capacity and associated energy, and issuing the *Declaração de Utilidade Pública* (Public Utility Declaration).
- 3.2 Argentina: The main regulatory body for the sector is the *Ente Nacional Regulador de la Electricidad* – ENRE, while policy setting is the responsibility of the *Secretaria de Energia* (Department of Energy). ENRE is responsible for issuing the *Certificado de Conveniencia y Necesidad Pública* after reviewing and approving the studies presented (including an EIA) and after a public hearing has taken place.

(b) Environment

- 3.3 Brazil: The *Instituto Brasileiro do Meio Ambiente e dos Recursos Naturais Renováveis* (IBAMA) is the main institution involved in the environmental licensing process for the Interconnection II. IBAMA is responsible for managing the whole licensing process, since it is a project with international and inter-state scope. It is also responsible for issuing environmental permits, after the other state environmental agencies and any other agency involved have been heard, be they federal, state or municipal.
- 3.4 The *Fundação Nacional do Índio* (FUNAI) and the *Instituto do Patrimônio Histórico e Artístico Nacional* (IPHAN) also participate in the licensing process, through consultation with IBAMA. Additionally, the *Ministério de Minas e Energia* participates in the licensing process, through its *Departamento Nacional de Produção Mineral* (National Department of Mineral Production) – DNPM, with the responsibility for blocking mining activities in the project's administrative right of way, after an official request to this effect.
- 3.5 Argentina: The main environmental entity is the Department of the Environment and Sustainable Development of the Environmental and Social Development Ministry, whose main purpose is to set out regulations, standards and policies for environmental protection, environmental contamination, auditing and human settlements. The Department is also responsible for the development of environmental studies of the country and environmental certification of companies. The environmental licensing process is taken care of by the sector Departments of Mines and Energy, Mining and Transportation.

(c) Health and Safety

- 3.6 In both Brazil and Argentina, issues relating to occupational health and safety are the responsibility of the respective Health and Labor Ministries.

B. Legal

(a) Energy

- 3.7 Brazil: The main legal documents relating to the project concerning the electricity sector are the Resolutions passed by ANEEL, the regulatory agency for the electricity sector in Brazil. Of particular importance are: the Resolution authorizing the importation and sale of firm capacity and associated energy, the Resolution which declares the public utility and the project's right of way, and the Resolution approving the Basic Design.
- 3.8 Argentina: Law 15.336/90 governs the generation, transmission and distribution of electricity, with it being of federal responsibility to regulate any activity connected to the sale of electricity with a foreign nation. Resolution 21/97 of the Department of Energy sets out the procedures for the concession of the transportation of electricity through an international interconnection.

(b) Environment

- 3.9 Brazil: There are a number of laws, decrees, and resolutions, declarations and authorizations that regulate the implementation of different aspects of the project at a federal level in terms of the environment.
- 3.10 Environmental licensing: The Brazilian licensing system involves the issuance of the following permits for projects within the electricity sector: Preliminary (or Previous) Permit (LP) in the preliminary phase of the planning of the activity, containing the basic requirements to be met in site selection, installation and operation phases, observing the municipal, state or federal plans for land use; Installation Permit (LI) authorizing the start of construction, according to the specifications contained in the approved Basic Environmental Design (BED); and the Operating Permit (LO) authorizing, after the required inspections, the start of operation of the activity.
- 3.11 Environmental Impact Assessment (EIA): With regard to the EIA: (a) CONAMA Resolution 001/86, which establishes the obligation of an Environmental Impact Study (EIS) and its respective Environmental Impact Report (*Relatorio de Impacto Ambiental - RIMA*) for the environmental licensing of transmission lines above 230 KV; (b) CONAMA Resolution 237/97 defines the responsibilities of IBAMA in the environmental licensing of projects that involve other countries, and regulates the environmental permit process; (c) CONAMA Resolution 006/87 establishes the requirements for the licensing of projects within the electricity sector; and (d) CONAMA Resolution 02/96 establishes the obligation on the part of the contractor to implant *Unidade(s) de Conservação de Domínio Público e Uso Indireto* (Conservation Units of Public Domain and Indirect Use), with investments no less than 0.5% of the total project cost, as a prerequisite for the licensing of large scale works that require suppression of vegetation areas.
- 3.12 Environmental Control and Protection: *Flora*: With regard to the protection of flora: *Código Florestal* (Forest Code) (Law 4771/65) and Regulation 37, of April 3, 1992, issued by IBAMA, which publishes the Official List of Brazilian Flora Species Under Threat of Extinction; *Noise*: Relating to noise are CONAMA Resolutions 001/90, which adopt the noise levels in the NBR-10151, of the Brazilian Association of Technical Standards (*ABNT*) (Table 3.1). *Waste*: Interministerial Ruling 019/981, SEMA/STC/CRS Normative Resolution 001/83, CONAMA Resolutions # 06/88, 9/93 and # 05/93 which regulate the sale and use of PCBs, rules of handling, storage and safety of these products; it regulates and sets fines for the discharge of lubricating oils; it regulates the management of solid waste by the generators; *Appropriation and Compensation*: the passage of the transmission line through private property, since it is of public interest, is subject to the Federal Decree-Law 3.365, of 21/06/41, which regulates appropriation for public use. In addition, this process is regulated by Law 8987 of 13.02.95, which covers the concession regime and permission for rendering public services, and Law 9427, which creates ANEEL; *Archaeological Heritage*: Ruling 07/88 regulates requests for authorization to IPHAN for the realization of archaeological research; *Public Participation*: CONAMA Resolution 001/86 and Law 237/97 regulate the requirement of a public hearing

(obligatory for projects with an EIA) and the availability of the EIA report for public consultation. *Indigenous peoples*: The rights of indigenous peoples are established in the Federal Constitution (Chapter 8, articles 231 and 232). Paragraph 3 requires that a special authorization be obtained from the Congress in order to develop mining activities or hydroelectric power generation within indigenous land. Moreover, the Constitution requires consultation with the affected indigenous people prior to decision-making regarding the project construction. These articles are on hold for regulation by Law. There are no specific requirements for the transmission lines. However, in practice, the same requirements regarding conservation units have been adopted. Conama Resolution 13/1990 establishes that the projects should not be constructed within an area of 10 km around the conservation unit (buffer zone). Based on this requirement, FUNAI is contacted and issues a specific report to IBAMA regarding the interference of one specific project on the neighboring indigenous populations.

- 3.13 Argentina: Law 24.065/92 regulated by Decree 1398/92 requires that contractors obtain the *Certificado de Conveniencia y Necesidad Pública*, also considering the possibility of holding Public Hearings. Among the other conditions, this Law sets out the need for explicit authorization for the exportation of energy. Resolutions 15/92 and 77/98 of the Department of Energy regulate the Manual for the Environmental Management of Electricity Transmission Systems. The Environmental Impact Study (EIS) and the Environmental Management Plan (EMS) are mandatory, as set out in Resolution 1725/98, also issued by the Department of Energy. The Environmental Impact Study (EIA)¹ must be presented to and reviewed by ENRE prior to the public hearing. Once the Certificate is granted, the Environmental Management Plan for the Construction and Operation must be presented before the start of construction works. ENRE Resolution 0032/94 of May 9, 1994, sets out a Minimum Contents Guide for the Environmental Management Plan, including guidelines for the management of waste, an emergency prevention plan, a monitoring plan, definition of responsibility, and the emission of reports to be submitted to ENRE.
- 3.14 Environmental Control and Protection: The procedures to be adopted to assess and mitigate impacts relating to the soil, vegetation, visual impacts, cultural heritage, the quality of waters and health and safety are described in Resolution 0546/99. *Noise*: The Resolution from the Department of Energy # 77 of 12 March 1998 covers noise, adopting limits for noise levels for the high tension conductors and for the substations (Table 3.1); *Public Participation*: Public participation is regulated through ENRE Resolution 027/93 of September 7, 1993, which defines the procedures to be adopted for the audiences to be held; *Electromagnetic Fields*: The procedures for measuring electromagnetic fields are presented in ENRE Resolution 1724/98 and Resolution 77/98 of the Department of Energy, including specific procedures and limits for electrical and magnetic fields.(Table 3.2).
- 3.15 In the Corrientes province, apart from Laws 4.731/93, 5260/98 and 5067/97, there are other important laws, such as 4.736, which defines the activities that may be undertaken in Provincial Parks and Nature Reserves, and creates the Iberá Provincial Park. Law 3.979 (which sets out regulations to prevent environmental contamination), 5.067/97 (which regulates the Environmental Impact Evaluation) and 5.260/98 (which deals with Anthropological and Palaeontological Heritage) are not yet regulated.

(c) Health and safety

- 3.16 In Brazil, the two legal texts of greatest relevance to the project are Law 6.514/77, which alters the Chapter of the Consolidation of Labor Laws relating to Safety and Medicine at Work, and Ruling 3.214/78, which approves the Regulatory Procedures (RPs) of Law 6.514/77. Among the RPs of importance to the project are RP/4, which establishes the Specialized Services in Safety Engineering and in Occupational Medicine (*Serviços Especializados em Engenharia de Segurança e em Medicina do Trabalho* - SESMET); RP/5, altered by Ruling 33/83 and later by Ruling 1.351/94, which regulates the objectives and attributes of the Internal Commission for

¹ The EIA must comply with the content established in the Environmental Management Manual of the Department of Energy. Resolution ENRE 0546 of April 28 1999 complements these contents, detailing and presenting the responsibilities of the contractor and of the constructor for each activity to be undertaken.

Accident Prevention (*Comissão Interna de Prevenção de Acidentes – CIPAs*); RP/6, defined by Ruling 06/83, 26/94, 06/92 and 03/92, which establishes the requirement for Individual Protection Equipment (*Equipamentos de Proteção Individual – EPIs*); RP/7, which establishes the Medical Control Program for Occupation Health (*Programa de Controle Médico de Saúde Ocupacional – PCMSO*); and RP/9, which defines the Prevention of Environmental Risks, considering physical, chemical and biological risks to the health and integrity of the environment, workers and the natural resources.

- 3.17 In compliance with Brazilian legislation, the Project has undertaken a Risk Analysis, as part of which a Risk Map was prepared (Ruling 5 of August 17, 1992 of the DNSST – *Departamento Nacional de Saúde e Segurança do Trabalhador*) for the operation of substations. Similar requirements do not exist in Argentina, although there is a legal requirement for training of substation operators on risk prevention, safety and emergency response.

(d) Others

- 3.18 Bidding documents: The bidding document (*Edital de Licitação*) for the Interconnection System II address the Project as a whole (both sides – Argentina and Brazil) and includes the Environmental Plan for Construction (*Plano Ambiental para Construção - PAC*) for the entire project and must be complied with by the Contractor. The bidding documents require that the general guidelines be further developed into Technical Specifications. The PAC contains various procedures related to the main construction activities, such as for land planning, opening of access routes, establishment of the ROW, setting of foundations, storage of materials, land restoration and revegetation, implementation of the construction site and workers accommodations, reutilization of wood, and erosion control.

- 3.19 Construction Agreement between CIEN/TESA with ABB: This agreement establishes the responsibilities of the Owner (CIEN/TESA) and the Contractor (ABB) for the entire project (Argentina and Brazil). Regarding environmental aspects, the contract establishes that:

- (a) The Contractor shall comply, and shall cause its employees and suppliers to comply with all Project documents, legal requirements and prudent utility practices;
- (b) The Contractor shall implement, at its expense, all safety and work procedures mandated by the environmental permitting in either Argentina or Brazil, provided that any requirements necessitating technical changes that result from such environmental permitting shall be at Owner's expense (other than requirements or technical changes to bring the work in compliance with general Legal Requirements)
- (c) The Owner will pay for the additional length of the system built to avoid any archeological discoveries or pre-existing hazardous waste discoveries at the agreed unit prices for the Project;
- (d) The Contractor shall not start construction works until the area has been cleared by the archaeological team;
- (e) In the event of an archaeological discovery, the Contractor shall suspend any construction works until the area is cleared by the archaeological team; and
- (f) The Contractor shall be responsible for the performance of a review of the environmental Technical Specifications for the Project, and the performance of all system load studies and all other studies required by the Technical Specifications (other than the environmental impact study).

- 3.20 Operative Agreement for the operations of the Substations: The Itá substation has been in operation since 1984 and is owned and maintained by ELETROSUL. According to the Operative Agreement between CIEN-FURNAS-GERASUL and ELETROSUL the operation is responsibility of the substation owner. CIEN has also hired ABB to perform the supervision of the equipment maintenance. The situation is quite the same for the Rincón substation. Rincón substation is in operation since 1993 and is owned by Yacilec-Litsa and operated by Yacilec. The operator is responsible for all activities performed within the area of the

substation. The Contract Agreement between CIEN/TESA and Yacilec is automatically renewed every two years. During construction, the responsibility for the substation continues to be of the owners. CIEN and ABB are responsible for all activities.

C. Project Status and Compliance

- 3.21 All tower location have already been inspected, surveyed and cleared as part of the archeological survey and rescue study, which is also concluded and a final report is expected for mid June. The Project Environmental Management Plan for Construction (*Plano Ambiental para Construção - PAC*) is complete, with the preparation of the Technical Specifications for construction, as required in the bidding documents. The Social Communication Plan, the Environmental Management Plan, and the implementation of the procedures of the Technical Specifications are in progress.
- 3.22 Brazil: All required environmental permits have been obtained from all institutions associated with the project, including IBAMA (Preliminary and installation permits, clearing of vegetation), IPHAN (Archaeology), FEPAM - Environmental State Agency of the State of Rio Grande do Sul (clearing of vegetation), FATMA Environmental State Agency of the State of Santa Catarina) and FUNAI (indigenous people).
- 3.23 On October 5, 1998, the Environmental Impact Assessment Study (EIA) and its respective Environmental Impact Report (*Relatório de Impacto Ambiental - RIMA*) for the Interconnection Project (both Interconnection I and II) was presented to IBAMA and subsequently publicly disclosed in November 19, 1998. Both the LP and LI for Interconnection I were issued subsequently and construction started in 1999.
- 3.24 On April 5, 2000 the Preliminary Permit (LP 064/2000) for Interconnection II was issued, and subsequently, on May 31 and June 21, 2000, the Authorizations for the Clearing of Vegetation (necessary for the topographical survey and the demarcation of the ROW) were obtained from both the *Departamento de Recursos Naturais Renováveis* of the *Secretaria de Meio Ambiente* of Rio Grande do Sul - DRRP/SEMA/RS (Authorization 06/00, DRRP/DPLC) and from IBAMA (Authorization 08/2000 IBAMA), respectively.
- 3.25 On September 28, 2000, IBAMA issued the Installation Permit for Interconnection II (LI 106/2000). According to Brazilian legislation, no Public Hearing was held given that no interest parties have requested it following the public disclosure of the EIA (since 19 November 1998).
- 3.26 On October 18, 2000, IBAMA issued Authorization # 55/2000 for the Archaeological Survey and Rescue Project (*Projeto de Salvamento Arqueológico*) in compliance with legal requirements from SPHAN. The proposal for the archaeological survey was developed by archaeologists from the *Universidade de Santa Maria*, hired by CIEN, and was submitted to FEPAM, IBAMA, and to IPHAN. This survey is still in progress. Five archeological sites have currently been identified and 100 km of work areas have been released, including all the towers location. In Argentina, the archeological studies are being developed by a consultancy company, CONSERSA – *Consultores de Servicios S.A.*, which was also responsible for the EIA.
- 3.27 On November 17, 2000, IBAMA issued Authorization # 22/2000, for the clearing of vegetation (28.70 ha as total clearing and 126.76 ha as selective cutting). On December 2000, ANEEL issued Resolution 481 with the Public Utility Declaration (*Declaração de Utilidade Pública*)
- 3.28 Argentina: In 28 February 2001 ENRE issued the *Certificado de Conveniencia y Necesidad Pública* (the only environmental permit required in Argentina) upon analysis and approval of the EIA and EMP submitted by the company. The EIA was disclosed on January 2, 2001 and the permit was issued after a Public Hearing was held in Buenos Aires, on January 31, 2001, in

compliance with Argentinean legislation (See section VII – Public Consultation for more information).

IV. ENVIRONMENTAL AND SOCIAL CONDITIONS

- 4.1 The two EIAs (one in Brazil and one in Argentina) addressed the environmental and social conditions in the entire territory likely to be directly or indirectly affected by the Project during construction and operation phases. All the municipalities crossed by the transmission line (TL) and associated works were included in the Area of Indirect Influence (AII). A 10 km wide corridor along the axis of the TL throughout its entire extension (490 km) was defined as the Area of Direct Influence (ADI), where the alternative location study (routing) of the Interconnections I and II systems was performed. For Interconnection II, specifically, an immediately affected area (IAA) was defined encompassing the areas immediately affected by the construction works, comprising the right of way (ROW) of 65 meters wide in Brazil and 100 meters in Argentina, the areas of the Garabi Conversion Plant in Garruchos (RS), the Itá Substation, in Itá (SC) and the Rincón de Santa María Substation, in Argentina, for which detailed impact studies were performed. The following paragraphs present an overview of the environmental and social aspects in the areas of direct and indirect influence, whereas Section V summarizes the environmental and social impacts, with emphasis on the impacts in the immediately affected area (ROW, substations, and workcamps).

A. Environmental Aspects

- 4.2 Geomorphology and Soils: In Brazil, the Interconnection II crosses the Planalto region from the southwest to the northeast, passing through Missões, Planalto Médio and Alto Uruguay subdivisions. Missões is situated to the west, between 100 and 400 meters of altitude, where a slightly undulating landscape prevails. In the Planalto Médio, the flattest part of the plateau lies between 400 and 800 meters of altitude, whereas in the northern part, the landscape tends to be strongly undulating. Alto Uruguay, to the extreme north of the Planalto, occupies areas that are strongly undulating and mountainous, dissected by the Uruguay River and its tributaries, between 200 and 500 meters of altitude.
- 4.3 In general, the soils in the direct and indirect area of influence of Interconnection II are acidic, susceptible to erosion, with low natural fertility and poor in available phosphorus. In small sections, there is soil with medium fertility (as the relief becomes less rugged), with scarcity of phosphorus and high levels of aluminum. Currently, most of the region is utilized for agriculture and livestock rearing, and there are scattered clusters of woodland. The main crops are wheat, soy, corn, manioc, and there is also pasture land. There can also be found plantations of Paraguay Tea (*erva-mate*) and pine forests. There are many areas of natural grasslands and some scattered natural vegetation strongly affected by selective deforestation. The intensity of the erosive processes observed are considered strong, due to the removal of the vegetation covering at the heads and along the borders of drainage.
- 4.4 In Argentina, in the initial section the Interconnection II crosses a sandy plain combined with gullies caused by old river beds, and then the Iberá depression. The existing soils are known as Alfisols, Entisols, Histosols and Mollisols. In the mid-section, the TL continues along the Iberá depression and the Aguapey plains, with the same soil types as in the previous section. In the final section, between the national highway # 14 and the Uruguay River, there are hills, undulating plains and red clayey soils, which belong to the Ultisols and Alfisols orders.
- 4.5 Land use: The Area of Direct Influence is mainly used for agriculture, with small agricultural properties in the Alto Uruguay section (specifically from Itá to the Várzea river), medium-sized properties (up to approximately 500 hectares) with mechanized agriculture (particularly soy, corn and wheat, which are alternated seasonally) up to Santo Ângelo. From Santo Ângelo to the Argentina border, there is a collection of medium-sized, large and small properties, alternating cattle and sheep farming and agriculture. In the whole region, there is evidence of strong integration between agriculture and industry, mainly for poultry, swine and tobacco, with

national-scale cooperatives and slaughterhouses. In Argentina, the ADI area is mainly used for forestation and cattle breeding.

- 4.6 Water Resources: In Brazil, the main bodies of water crossed by the route of the Interconnection II, from Garruchos to Itá, are the Uruguay River (close to Garruchos/RS, and again close to Itá/SC), the Piratini River, Ijuí River, Guarita River, Várzea River, and Passo Fundo River. In Argentina, the Corrientes Province crossed by the Interconnection II is flooded 20% of the year. Of the rivers, the main ones are the Aguapey and Uruguay, with many streams, such as the Garabi, Del Susto, Cañadon del Medio, Pedregoso, Morrador and Divisa, all of which are tributaries of the Uruguay River. Nevertheless, none of them, with the exception of the Uruguay river is affected by the Project.
- 4.7 Climate: In Brazil, there are no great variations between the climatic parameters of the sub-regions. Though the average annual temperature is around 19°C, it can drop to -3°C, with the occurrence of frosts. In Argentina, the region's climate is subtropical without a dry season. The area is affected mainly by the circulation of two masses of air, one coming from the North, from the South Atlantic Anticyclone, which is hot and humid, and the other, which is cold and dry, from the South Pacific Anticyclone. The rains are abundant during almost the whole year, with annual rainfall of around 1,600 mm, which comes from the South West to the North East. Annual evaporation is of around 1,100 mm. Temperatures are high, with little annual variation, with mild winters and hot summers. The annual average is 21.5°C. Winds from the East, South East and South predominate, with average speeds varying between 14 and 19 km/h. Sporadic tornadoes might occur in the south region of Brazil, with wind speed of 33,5 m/s (120,6 km/h) and cyclones wind speed of 55,5 m/s (200,0 km/h).
- 4.8 Flora: In Brazil, the areas crossed by the Interconnection II were originally occupied by great formations of native vegetation, such as the Deciduous Seasonal Forest (*Mata do Alto Uruguay*), Ombrophilous Forest (*Mata com Araucária*) and Grassland Formations. Currently, these formations are highly degraded, with a predominance of annual monocultures of soy, corn and beans. The remaining vegetation formations are characterized by an upper stratum dominated by *Araucaria angustifolia*, with a subwood where there are species such as the winters bark drimys (*Drynis brasiliensis*), Paraguay Tea (*Ilex paraguayensis*), holly (*Ilex dumosa*), bitterwood (*Myrcia bombyciensis*) and pepper tree (*Schinus* sp.), among others. Close to the municipality of Garruchos until the Serra do Pirapó, there are large areas of native grassland with extensive animal farming, intermixed with areas of annual crops. The forest covering is limited to areas along water bodies (*matas ciliares*). Such areas, though small in size, are of great ecological value, given their role as refuges for fauna and as the genetic corridor of the region, where few species predominate.
- 4.9 In Argentina, the project area has flora elements of *Paranaense* (*Distrito de los Campos*) and chaco vegetation (*Distrito Oriental*) phytogeographic provinces. The predominant vegetation is in the *Planicie del Rincón de Santa Maria*, which is hydromorphic sedimentary, hydromorphic with poor drainage, lagoons, sand banks and esteros del Iberá, a large area of sedimentation, made up of different geomorphologic elements, such as lakes, streams, emerging and flooded sand banks. There is also vegetation characteristic of the *Planicie* subnormal west from Aguapey, of a sedimentary origin, with gentle hills, without a drainage system spread by the river beds; in the alluvial zone of the Aguapey River, which corresponds to the alluvial plains of the Aguapey River and its tributaries, including streams and marshes, where there are flooded river-side woods with two or three tree strata; and the alluvial zones of the Uruguay River, where there predominate woods and wetlands, meadows of *Axonopus compressus* and *Rhyncospora* spp, hygrophilous flooded woods. Artificial woods of *Eucaliptus* spp and *Pinus* spp, rice plantations in the low areas, close to the rivers and streams, etc.
- 4.10 Fauna: In Brazil, given the level of degradation and fragmentation of the ecosystems in the area of influence, fauna is not diverse, nor dense. Significant density and diversity is only found in the forest remnants, like in the riverside forests. In these areas, the presence of opossums, howling monkey, different carnivores and many rodents was observed. As for birds, the studies carried out in the EIA indicated the presence of 159 species occurring in the Nonoai region, none of endangered species. No bird migratory routes were observed within the region of the Interconnection II project. There are only some daily migrations of isolated individuals. Of the

reptiles and amphibians present in the Araucária Forest of the Planalto Oriental and in the Alto Uruguay region, there are many species of snake. As for river fauna, of the 74 species found in the Project's area of direct influence the more frequent are: Amazon lungfish, *grumatã*, *biru*, different minnow, plain bonito, *dentado*, *piracanjuba*, different catfish, *pati*, *pintado*, different types of mailed catfish, and different species of *barrigudinhos*.

- 4.11 In Argentinean territory, Interconnection II crosses a region with a diversity of environments and habitats. The predominant fauna in the area of studies is related to the water environments, like the flood plains, estuaries, marshlands and savannas. The bird life is particularly rich, with the greatest specific diversity in the marshlands and savannas. Amphibians and reptiles are in equal abundance. This abundance and diversity has been affected by the introduction of cattle and the creation of grazing land, which have competed to move away the autochthonous herbivore species, like the pampas deer (*Ozotoceros bezoarticus*), considered a “natural monument” in the Corrientes province. This species has reduced its distribution radius considerably, currently being limited to small, scattered nuclei, which make it an animal under the threat of extinction. The majority of the areas that are crossed by the transmission line are strongly modified. The land affected by the project is occupied with cattle raising, where no significant fauna exists, and where other three transmission lines are already installed. The pampas deer, one of the representatives of the region has not been observed in the area crossed by the transmission line. Poaching and hunting for sport and the illegal trade in wildlife, both of live animals and of derived products, also threaten their existence and that of other species under threat of extinction, listed in Decree # 1555/92, like the otter (*Lutra platensis*).
- 4.12 Protected Areas and Conservation Units: The Project affects two small protected areas reserved for permanent preservation (*Áreas de Preservação Permanente*), one in Brazil and one in Argentina), specifically riparian vegetation and riverside forests.
- 4.13 In the Brazilian section, no Conservation Unit will be affected. In the final section in the Argentinean side the TL passes through the edge of the *Reserva Provincial Natural del Iberá*, in a zone privately owned and known as the “false” Iberá, given that it is intensively degraded and used for farming and reforestation activities. Also in this area there are other three existing TLs installed. The total affected area in the “false” Iberá is of 104 ha, whereas the total area of the Estero del Iberá is 1,300,000 ha.

B. Socioeconomic Aspects

- 4.14 Population: In Brazil, the Interconnection II will cross the territory of 28 municipalities, 27 of which are in Rio Grande do Sul and one in Santa Catarina. Santo Ângelo and São Luiz Gonzaga are the main polarized centers in the region, with a high level of urbanization. Most of the other municipalities have larger rural than urban population, as shown in Table 4.1 (Brazil). The route of the line is totally situated, in both countries, in the rural areas of the municipalities. In Argentina, the region's population is concentrated in the urban centers. The zone to the south of Santo Tomé, with its animal farming and large properties, has low-density population. In the last three decades, population growth in Gobernador Virasoro is due to the development of primary and secondary activities (agro-industrial). The town of Ituzaingó has seen the greatest population growth, due to the construction of Yaciretá. Table 4.2 (Argentina) presents the data referring to the population in the project's area of influence in Argentina. The highest demographic concentration in the project's area of influence is the town of Ituizangó, which is the town closest to the TL route and also closest to the Rincón de Santa Maria Substation (approximately 5 km).
- 4.15 Economic aspects: In Brazil, agriculture and livestock is the economic base of most of the municipalities in the region. This sector is also responsible for the highest number of jobs, mostly family labor. The structure of the land predominating in the region is of small properties of up to 20 (twenty) hectares, in which are grown short-cycle (temporary) crops, and natural grazing land. The tertiary sector (Trade and Services) represents another important component in the internal income of the municipalities in the region, mainly those where population is more concentrated in the urban areas. A scattering of small towns with a distance of around 30 km between them are polarized by the towns of Ijuí, Passo Fundo and Santo Ângelo.

- 4.16 The area of influence can be divided into three main sections: (a) from Itá until the Várzea river, Alto Uruguay section, where there are small agricultural properties; (b) from the Várzea river to the town of Santo Ângelo, with mid-sized properties (up to around 500 hectares) with mechanized production, notably of soy, corn and wheat (alternated seasonally); and (c) from Santo Ângelo to the Argentine border, a mixture of mid-sized, large and small properties, alternating cattle and sheep farming and agriculture. There is agro-industrial integration for poultry, pig and tobacco farming in the whole region, mainly thanks to the national-scale cooperatives and slaughterhouses. In Argentina, the project area is occupied by primary and agro-industrial activities, which are the basis for the local economy. In the corridor between Santo Tom   and Posadas the main crops are Paraguay tea (*erva mate*) and tea. In the Corrientes province, through which most of the TL will pass, agriculture is limited to the use of 10% of the territory, due to the existence of flooded and inappropriate land conditions. The same is true in the areas bordering the Paraguay and Paran   rivers. Close to the Uruguay river, there are forests and rice paddies. Animal farming occupies around 80% of the Corrientes province, with predominance of the zebu or humped cattle and of *criollo* cattle. Since the creation of the Mercosur, the province is an area through which merchandise travels, leaving Santo Tom  .
- 4.17 Infrastructure and services: In Brazil, the public service of water supply is offered only in the municipal centers and districts close to the urban perimeter, and is run by the *Companhia Riograndense de Saneamento* - CORSAN. In the rural areas, hand-dug wells are used for water supply. The public system for the collection of sewage only exists in the Santo Ângelo municipality. In most of the municipalities, there are poorly made individual systems. The collection and disposal of refuse is efficient only in the largest urban centers. In the other municipalities, refuse is deposited in the open air, without any kind of treatment. The Companhia Estadual de Energia El  trica do Rio Grande do Sul provides the supply of electricity in the region - CEEE and the *Centrais El  tricas de Santa Catarina* - CELESC, in Rio Grande do Sul and Santa Catarina, respectively, concentrating on residential and rural use. In Argentina the municipality provides the collection and disposal of refuse services. In Virassoros the water supply and collection of sewage are offered by a local cooperative. In Ituzain   part of the municipality is served by *Direcci  n Provincial de Agua y Saneamento* and part by a cooperative.
- 4.18 Education: In Brazil, the education system in the municipal area under study is not substandard, though it does not have a good enough infrastructure, as in most of the country. Most of the school places on offer are from the public sector schools (municipal and state). The pupils, mainly in pre-school, receive help from the local councils through diverse programs, as well as receiving their basic education. Chiefs of these programs are the school lunch, schoolbooks, and free transport and donated uniform. These measures seek to raise the literacy level of the population, particularly in the rural zone, as well as curbing school evasion. In Argentina, the education system is mainly provided by the public sector. Ituzain   and Virassoros have several primary and secondary schools. There are also some private kindergartens. The rural area has also primary rural schools. Near Virassoro, at National Highway n   14 there is a rural agronomic school of the Del Salvador University.
- 4.19 Health: In Brazil, the network that integrates the health service in the municipalities is composed of hospitals and mobile units. The population of the rural zone receives medical treatment through the mobile units spread around the communities, where basic treatment is given (first aid), with patients being transferred, whenever necessary, to another hospital unit in the municipality in an urban area or in another center with greater resources. In Argentina, according to TESA representatives the health system in the project area is provided by the public sector. Ituzain   and Virassoros have municipal hospitals and some small private clinics.
- 4.20 Road network and transportation: In Brazil, the region of the Project is between important highways, which guarantee access to any part of the country, mainly the great urban centers. These highways work as important local connections, helping interstate traffic through the other surfaced roads, railroads, ports and airports. During the implementation phase, these transport systems shall be used as back up for the transportation of machinery, equipment, raw materials and employees. The region also has railroad branch lines that connect the towns of Santa Rosa, Giru  , Santo Ângelo and Catu  pe with the other towns and cities in the State of Rio Grande do Sul, basically for the transportation of freight. The International Airport in Porto Alegre is the main air transport reference for the region's municipalities. Some municipalities within the Area of Indirect

Influence, such as Nonoai, Palmeira das Missões, Santo Ângelo and São Luiz Gonzaga have their own domestic airports. Water transport in the State of Rio Grande do Sul is operated through Rio Grande, Porto Alegre and Pelotas ports, with the importation and exportation of merchandise. In Argentina, the region has a number of different national and private highways, the railroad Ferrocarril Metrovias and a non-operative airport in Ituzaingó.

- 4.21 Historical and Archaeological Heritage: In Brazil, the region was occupied by indigenous and pre-historic populations, mainly on the banks of the rivers, like the Uruguay, the Ijuí and their respective tributaries. However, according to the study carried out, the historical heritage and archaeological sites identified in the region are located outside the Area of Direct Influence. However, within the Area of Indirect Influence, many archaeological sites were identified and registered, most of indigenous occupation. CIEN hired the University of Santa Maria; from the State of Rio Grande do Sul, to continue to develop the studies prior to construction. The plan for the surveys was previously approved by IPHAN. In Argentina, the region is part of a large Paraguayan, Argentinean and Brazilian area in which there were the Jesuit Missions which, since 1550, had a strong influence on the indigenous Tupi-Guarani and karaivé-guarani communities. There are many ruins, remains of the joint presence of the Jesuits and indigenous peoples in the region, much of which is now covered by woodland. There are many points of cultural interest in the areas crossed by the TL, such as the *San Juan Bautista* church (1904) and the M.I. Lagraña Historical Museum (1874) in Ituzaingó. The Interconnection I route was developed avoiding the impacts on San Alonso ruins and the Caa Caraó “emplazamiento”. The same procedure was adopted for Interconnection II. For both projects, TESA hired a senior specialist to perform the studies and the surveys, which are still in progress. Until now, no archeological sites have been discovered.
- 4.22 Indigenous Communities: There are no demarcated nor assigned indigenous territory in the Project’s direct area of influence. In the Brazilian TL area, CIEN contacted FUNAI to perform an inspection before the Installation Permit was obtained. On 13 August 2000, FUNAI presented the inspection report to IBAMA stating the non-existence of any direct interference of the Interconnection II with the indigenous lands, nor, to their best knowledge, of any claim for indigenous territory in the Project’s indirect area of influence. The closest area, (approximately 4 km from the TL itself) is the Nonoai Area, which is a State Park and, since 1998 is also an Indigenous Area, with the formal demarcation process in progress. Currently, both the State Park and the Indigenous Area are one sole entity, where natural resources are particularly well preserved. In Argentina, the TL route does not cross or passes near any indigenous land.

V. ENVIRONMENTAL AND SOCIAL IMPACTS

- 5.1 The impacts from transmission lines (TLs) and associated infrastructures are more relevant during the construction phase and more intense within the area of immediate influence of the TL and substations, mainly in the right-of-way (ROW). Due to a careful environmental and social planning of the route selection and incorporation of environmental standards into project engineering, the majority and most relevant impacts of the Interconnection II project were avoided. Of particular relevance are the site selection and design (type and height) of the towers placement, and the engineering design to comply with noise and electromagnetic national and international standards. Typical construction impacts of large infrastructure works will be mitigable by standard environmentally sound construction practices and environmental, health and safety management procedures.

A. Construction phase

(a) Environmental Impacts

- 5.2 Impacts on vegetation: One of the Project’s principal impacts is related to removal of vegetation in the ROW, given that there will be no need to open new access roads (the area is well served with existing roads and farm accesses). Therefore, on both sides (Brazil and Argentina) the impacts on vegetation were minimized by careful routing selection during the planning stage. Only two small natural protected areas on riverside locations could not be avoided (one in Brazil

- and one in Argentina), for which appropriate mitigation measures were designed and will be implemented (see Section VI. A for details).
- 5.3 According to the forestry survey carried out in Brazil (October 2000) along the full extent of the TL, approximately 155 hectares of forest will be affected, of which 29 hectares with total removal (mainly for installation of towers) and the remaining 126 ha where only selective removal of trees will be done (along the ROW)². In Argentina the transmission line crosses areas used for livestock and forestation projects, without significant native vegetation. This is true also for the area of the Estero del Iberá crossed by the TL along approximately 16 km of extension and 65 m width (approximately 104 ha of a total area of 1,300,000 ha). This zone, known as the “false” Iberá, is located on the edge of the park and occupied nowadays by extensive livestock farms and reforestation and by three other transmission lines (500 kV).
 - 5.4 Deforestation will not be required for the installation of the campsite, given that it will be installed in areas previously utilized by Interconnection I, adjacent to the Garabi Conversion Station.
 - 5.5 Impacts on fauna: In relation to fauna, although changes may occur in behavioral patterns, an increase in hunting is not expected, given the existing low fauna density and land use in the area. Furthermore, the fact that meat will be provided on-site (on the worker’s campsite), combined with the availability of other meat sources contributes to reduce the probability of impacts upon local wildlife.
 - 5.6 Impacts on Protected Areas and Conservation Units: No Conservation Unit will be affected on the Brazilian side. In the case of the Argentinean side, impacts will be limited to approximately 104 ha of the 1,300,000 ha of the *Reserve Estero del Iberá*, albeit in privately owned areas currently used for livestock and cattle raising and where three other transmission lines are already installed. Two small areas of riparian vegetation will be affected, one in Argentina and one in Brazil, where only removal of selected trees will be necessary.
 - 5.7 Erosion and Siltation: Erosion and siltation are generated mainly from soil exposure after deforestation, particularly at the towers locations. In this particular project, such impacts are likely to be minimal, given the topography, that the majority of the towers will be installed far from the river margins, and that a revegetation program will be implemented.
 - 5.8 Impacts at Substations and Garabi Conversion Station: The principal impacts expected for the expansion of the Itá and Rincón Substation and the Garabi Conversion Station are mainly localized impacts from the construction activities that will be carried out within the existing areas, all of which will be addressed by the environmental, social, health and safety management plans for the construction phase.
 - 5.9 One critical point of the project is the crossing of the Uruguay River, which will be made in two points. One will be located near Itá substation and does not have critical aspects related to its construction, given that the river forms a canyon, where the width is only 240 meters, with small flow variations. The other one will be located near the Garabi Conversion Station. This crossing has 2,550-meter length with six towers and special foundations. The greatest span will have 800 meters. There will be no towers in the river flow. All towers will be placed distant approximately 100 meters from border of the river in both sides. The towers’ foundations are designed to handle a hydraulic tension of the maximum flood of the Uruguay River, to allow for continuous operation of the transmission line even in the event of flooding.
 - 5.10 Impacts from waste generation: Different types of wastes will be produced during the construction of the transmission line and substations expansion, such as oil filters, used oil, batteries, fiberglass, ambulatory wastes, used tires, construction debris, vegetation wastes, papers, paint boxes, bottles and office wastes. In the Garabi Conversion Station the wastes produced during the installation and operation of Interconnection I were directed to the landfill in the nearby Garruchos. The wastes produced at the expansion phase (Interconnection II) will

² In Brazil, the Environmental Guidelines from Eletrobras for the installation of LTs requires that the height of towers and lines be increased to avoid total removal of vegetation in the ROW (only removal of selected trees is allowed).

be also disposed at the same landfill.

(b) Socioeconomic Impacts

- 5.11 Impacts of access roads, construction works and workers camp: Given the sufficiency of the existing road network in the Project's direct and indirect area of influence no new access roads will be required. There will be one single worker camp for the entire project. The worker camp will be located approximately 5 km from Garruchos, in an area adjacent to the Garabi Conversion Station, where no residential areas exist in the immediate vicinity. Remodeling and expansion of the previous worker accommodations and facilities used for the Interconnection I are currently underway. For the Interconnection II, given that most of the supporting infrastructure required was installed for the Interconnection I, the impacts of the campsite and workers camp tend to be of lesser magnitude. The increase of population (new workers) is estimated to be of 200 people at the peak of construction, which can be of relative significance in Garruchos, a small city with only 3,000 inhabitants. Nevertheless, Garruchos has been previously affected during the construction of Interconnection I and has been gradually adjusting to the new scenario, where the Garabi Conversion Station plays a major role. Main impacts will be increased truck traffic on the existing small-unpaved road between the area and Garruchos, increased demand on Garruchos's health and education infrastructures, and particularly, increased demand on the existing waste dumpsite, generating secondary environmental impacts. Therefore, social conflicts are not expected to be significant, given the experience with Interconnection I and the fact that the majority of the workers will be recruited in the region.
- 5.12 Impacts on land use of affected properties: Experience with the implementation of Interconnection I showed that the vast majority of the affected landowners were able to invest the compensation obtained in improvements to their properties and production, given that no significant restrictions are imposed on the short-cycle (temporary) crops and on the rearing of livestock. Restrictions are mainly imposed on buildings, trees higher than 2.5 meters (in general) and on aerial irrigation within the ROW. Therefore, given the type of activities and agriculture in the area of influence of Interconnection II, it is not expected that the Project will affect economic activities negatively in the region.
- 5.13 Impact upon historical, cultural and archeological assets: Due to the careful site selection and routing studies performed at the planning stage, the Project is successful in avoiding any interference with archeological sites in the region (such as the ruins of Estancia San Alonso, amongst others). The archeological survey and inventory undertaken during the Environmental Impact Study phase identified that all archaeological sites within the region are located outside the areas directly affected by the Project (on both the Brazilian and Argentinean sides). Any unforeseen interference with sites not identified in the above study should be treated in the manner described in the specific Work Program. (See section VI for details).
- 5.14 Impact upon Indigenous Communities: According to the last National Indian Census in Argentina (dated 1968) there are no indigenous communities within the Project's area of influence. In the Brazilian side, according to FUNAI and IBAMA, the project will not interfere with any of the indigenous communities in the region. The nearest indigenous community is located more than 4 kilometers from the TL.

(c) Health and Safety Impacts

- 5.15 Health and safety impacts during construction are related to incidents and accidents to which workers are permanently exposed, such as different types of injuries, falls, and electrocution, among others, for which the appropriate preventive and corrective measures are specified in the Health and Safety plan developed by ABB for the construction phase. (See section VI for details).

B. Operation Phase

(a) Environmental Impacts

- 5.16 Clearing of Vegetation: During the Interconnection II operation it will be necessary to remove vegetation for preventive and/or corrective maintenance. The resulting impacts, of reduced magnitude, will be similar to those experienced during the construction phase and will solely involve the maintenance of safety distances between the TL and the top of the trees (given that only selective removal of trees is done in Brazil) and, if required, the opening of new emergency maintenance access roads. Nevertheless, given the type of prevailing agriculture (soy, tobacco, and wheat) in the region, this impact will be of small magnitude.
- 5.17 Interference with birds: Impacts of transmission lines on birds are due to collision impacts and electrocution. Both are related to the habits and the morphology of the birds (migratory birds are at major risk, in particular wetland/marshland birds). Therefore, there will be no significant impact on birds in the Brazilian territory, given that there are no wetlands and short-cycle (temporary) agriculture predominates. However, in Argentina, where there are several wetlands, this impact is likely to occur and mitigation measures (signaling) have therefore been planned (Interconnection II will use the same signaling devices utilized for Interconnection I - see Section VI). This impact is normally reduced over time during the operation phase, as the structure is integrated into the landscape and the birds become adapted to its presence. For Interconnection II, in particular, this impact is likely to be reduced given the presence of three other existing TL in the same corridor, which all have bird signaling devices.
- 5.18 Wastes: The principal wastes generated during the operation phase are related to maintenance of corridor service and comprise mainly vegetation residues. In the substation and conversion station wastes are produced by office activities, such as papers and by replacement of non-operational/defective equipment. At Garabi Conversion Station other wastes will be generated from servicing of equipment, such as oil and other lubricants. Therefore, given the limited number of operational staff and equipment in the substations (for Interconnection II), only a small amount of wastes will be generated. In Garabi Conversion Station, wastes will include also mineral oils from transformers maintenance in small quantities that are stored within the existing facilities.
- 5.19 PCBs: There are no concerns regarding the use of oils containing PCBs–Polychlorinated Biphenyls. In both Argentina and Brazil the use of PCBs in high voltage substation equipment is precluded since 1981. The equipment within the substations of Itá, Rincón and the frequency conversion station were installed after that date. The Brazilian Portaria Interministerial 19 issued January 29, 1981 regulates the use of PCB (ascarel) in Brazil. Argentina is also signataire of the Basileia Convention (March 3, 1989) and existing legislation regulates the use of PCB (Decree 806/97).

(b) Socioeconomic Impacts

- 5.20 Visual pollution: Inevitably, the Project towers and cables will have a negative visual impact upon the typically rural region landscape. Nevertheless, the TL routing avoids populated areas, tourist and environmentally sensitive areas. On the Argentinean side, the Project will have only an incremental visual impact, given that it will integrate a transmission line corridor where other three lines already exist. The visual impacts in Argentina will be perceived mainly from Federal Highways 12, 14 and 120 and Provincial Highway 41, which is located in a flat region within the Iberá Provincial Reserve limits.
- 5.21 Generation of Electric and Magnetic Fields and the Corona Effect: Transmission lines and substations generate electric and magnetic fields that cause electromagnetic interference in radio and television receivers (the Corona Effect). Interference of high voltage lines, operating at 520 and 525 kV (such as Interconnection II) can be felt within a radius of 100 meters or more. There is an agreement in the scientific community to adopt an upper limit of 250 mG for the electromagnetic fields produced by 500 kV transmission lines in the corridor service border (World International Organization Criteria # 137/93 – Electromagnetic fields, International Standard). Results of the monitoring of Interconnection I show that the values are below the established standards (Table 5.1). Monitoring of Interconnection I reflects the results of the cumulative effects of the three existing TLs in the same corridor. Cumulative effects of the fourth line are still to be identified from monitoring of Interconnection II.

However, the transmission line corridor avoids populated areas and residences within a radius of 100 meters from any of the TLs.

- 5.22 Noise: The electromagnetic field effect generated by the transmission line produces audible noise in the line conductors and hardware. In the substations and conversion station the power transformers and reactors also produce noise. Nevertheless, according to Project design (and confirmed by monitoring of Interconnection I) the results (41 db) are below all standards (World Bank, Argentina and Brazil). Moreover, there are no populated areas situated within a radius of 1km from these substations and at less than 500 meters from any given point in the TL (Refer to Table 3.1 for noise standards).
- 5.23 Aviation Risks: In Brazil, at the project's planning stage various airfields on private properties were identified within the project's direct area of influence. The Civil Aviation Department of Brazil (DAC) conducted a survey to check on the operation permits of these airfields. Subsequently, when selecting the TL routing all interference with legally registered established airfields was avoided. Non-registered airfields were adverted by DAC and subsequently re-located and regularized by their owners. On the Argentinean side, the route does not cross or runs close any airfield, with the exception of the Ituzaingó Flying Club, which is no longer operational.

(c) Occupational Health and Safety Risks

- 5.24 The principal occupational health and safety risks during operation are related to incidents and accidents due to the permanent exposure of workers to risks during routine maintenance activities, such as falls, electrocution, and various types of injuries. The appropriate measures to avoid and mitigate such impacts will be developed as part of the Health and Safety Plan for the operational phase, which will benefit from the previous experience of CIEN (the operator) with Interconnection I.

C. Positive Impacts/Benefits

- 5.25 During the construction phase, the Project's principal direct benefits will be increased job opportunities throughout the area of influence, a region suffering from significant unemployment; secondarily, the increase in capital available to the region's landowners, currently undercapitalized (from compensation payments) can also have a significant impact in the region's economy. In Argentina, in particular, according to information obtained at the Public Hearing held in Buenos Aires, the expected benefits are mainly improvements on the local/regional roads and transportation infrastructures, and access of the Argentinean electric sector to a larger market (thus creating conditions and *exciting* the market towards new investments and business development).
- 5.26 During the operational phase, and at a national level, the main benefits derive from the increased energy availability to supply the demand in the Brazilian interconnected system, which is currently exposed to exceptionally high-energy deficit rate risks. At the regional level, the increased supply is expected to boost the regional economy, particularly throughout the State of Rio Grande do Sul, leading to a greater dynamism within the state's stagnating industrial, commercial and service sectors.

VI. ENVIRONMENTAL, SOCIAL AND HEALTH & SAFETY MANAGEMENT

- 6.1 The environmental, social, and health and safety management system during construction and operation of the Project is somewhat complex and various components were required and have been developed in different documents (e.g. bidding documents, etc.) by different project parties.
- 6.2 The bidding documents included requirements for bidders to comply with the *Environmental Plan for Construction (Plano Ambiental para Construção - PAC)*, which contains guidelines and procedures regarding several construction activities, which should be further developed by

the bidders into detailed operational Technical Specifications for Construction. Such guidelines included specific recommendations for each of the project-related activities, such as: (a) topographic studies, (b) earthmoving, (c) access routes, (d) opening and clearing of ROW, (e) foundations, (f) assembly of structures, and (g) installation of conductor cables, lightning conductors and accessories.

- 6.3 Complementary, a Basic Environmental Plan (*Plano Básico Ambiental - PBA*) for both the construction and the operational phases was prepared for the Brazilian portion of the TL, as part of the environmental requirements for the Installation License. The *PBA* includes several socioenvironmental programs that will be implemented during construction and operation of the transmission line, such as: (a) Historical and Archeological Protection Program; (b) Environmental Compensation Program (to comply with CONAMA Resolution 002/96); (c) Forest Compensation and Environmental Education Programs (to comply with RS State legislation regarding Obligatory Forest Replacement); (d) Social Communication Program; and (e) Fauna Monitoring Program. On the Argentinean side, although a *PBA* was not prepared, the specific mitigation measures that were included in the Environmental Impact Assessment (EIA) study were based on the same guidelines of the *PAC*.
- 6.4 Subsequently, all the environmental and social requirements included in the above mentioned documents were included in the *Environmental Section of the Construction Contract* between CIEN and ABB (EPC Contractor), which includes Health and Safety requirements as well. This section requires ABB to prepare an Environmental Management Plan for Construction (*Plan de Gestión Ambiental - PGA*). The *PGA* consolidates all the environmental aspects of the *PAC*, *EIA*, and *Environmental Section of the Construction Contract*, as well as the specific requirements of the environmental permits and authorizations, in Brazil and Argentina.
- 6.5 Subsequently, the programs, mitigation measures and guidelines presented in the *PGA* are to be incorporated into the Technical Specifications developed by CIEN/TESA that will constitute the ABB Service Instructions. Such Technical Specifications are being gradually developed by CIEN/TESA with the assistance of a specialized environmental consultancy firm (according to the Project construction schedule and schedule CIEN/TESA's issuance of the Service Instructions to ABB, in the following sequence: construction activities, line operation and maintenance, Conservation Unit's implementation and forest replacement). Technical Specifications for topographic works, opening of service routes (including earthmoving, access routes and opening and clearing of ROW with removal of vegetation), foundation activities and assembly of structures have already been developed.
- 6.6 The following sections summarize the environmental and social mitigation measures and monitoring programs that are included in the above mentioned documents.

A. Mitigation Measures

(a) Construction Phase

(i) Environmental

- 6.7 The *PAC* (Environmental Plan for Construction of the bidding document) and the *Environmental Section of the Construction Contract* (all detailed at the level of Technical Specifications) contains the following principal mitigation measures, among others:
- 6.8 Mitigation of Impacts on Vegetation: (a) Minimization of vegetation clearing through selective cutting; (b) delimitation of the minimum areas required for each activity, thus reducing deforestation to a minimum; (c) incentives to re-route the transmission line during the implementation phase if any new interference with forested areas is identified; (d) primary use of existing access routes, thus avoiding opening of new routes; and (e) re-vegetation of affected areas immediately upon conclusion of construction activities.
- 6.9 Mitigation of Erosion and Siltation: (a) Protection of existing drainage systems and watercourses, their reduction or interruption being prohibited; (b) immediate recovery of

- excavated areas and areas used for cable rigging yards, etc; (c) segregation of vegetation residues in specific areas for recycling during the degraded areas restoration phase, avoiding riverbanks, steep slopes and preservation areas; (d) avoid the formation of steep slopes and unstable soil conditions; and (e) minimization of erosive procedures and protection of embankments by installing sediment containment basins when working on river banks. However, erosion and siltation were mainly avoided by the reduction in deforestation and the selection of suitable sites for the installation of towers and substations.
- 6.10 Mitigation of air emissions: (a) Prohibition of burning wastes and vegetation residues; and (b) installation of water sprinklers or water-trunks in work areas, when required.
 - 6.11 Mitigation of soil and water contamination: (a) Guidelines for the treatment of removed vegetation residues; (b) waste management specifications; (c) guideline for the selection of waste disposal areas; and (d) prohibition of herbicide use.
 - 6.12 Mitigation of impacts on Protected Areas and Conservation Units: The same mitigation measures to address impacts on vegetation are applicable to protected areas. With regards to Conservation Units, in Brazil there are no impacts on Conservation Units. Nevertheless, the project will comply with CONAMA Resolution 02/96, which establishes the obligation to the Project proponent to implement one or more Conservation Units (*Unidades de Conservação de Domínio Público e Uso Indireto*) with investments no less than 0.5% of the total project cost (Environmental Compensation Program of the *PBA*). CIEN is currently in the process of defining with IBAMA where the investment should be located. In Argentina, in order to minimize impacts on the edge area of the Estero del Iberá, construction works will make use of trucks specially adapted to work in wetlands and flooded areas.
 - 6.13 Prevention of impacts from natural disasters: To prevent impacts of tornadoes and strong winds on the Project, the towers were designed taking into consideration the historical analyses on the occurrence of tornadoes and strong winds, and applying the experience gained from Interconnection I.
 - 6.14 Mitigation of Archaeological Impacts: Archaeological surveys and recovery programs were implemented in both Brazil and Argentina. Moreover, the Technical Specifications for foundations include specific requirements for written clearance from CIEN/TESA regarding the archaeological survey and recovery program before initiating construction works in any given point of the TL.
 - 6.15 Mitigation of Impacts on Fauna: Although no increase in hunting is expected as a result of the Interconnection II Project, the Social Communication Program incorporates one component addressed to workers in the campsite and immediate neighbors in the directly affected area, as to raise awareness regarding fauna protection.
 - 6.16 In addition, the following mitigation measures have been specifically developed for particular situations in Brazil and Argentina

Brazil

- 6.17 Mitigation of Impacts upon Vegetation: The *PBA* includes a Forest Compensation / Relocation Program to comply with the requirements of the Rio Grande do Sul state legislation. This Program involves replacement stocks of approximately 273,155 seedlings, given the rate of 15 seedlings for each individual removed and the additional replacement of 10 seedlings for each meter of wastes derived from the removal of individuals with *DAP (Diámetro Altura do Peito)* between 8,0 cm and 15 cm. Additionally, the Social Communication Plan will address landowners directly affected, with a view to mitigating any possible increase in the practice of burning and deforestation to extend cultivated land.

Argentina

- 6.18 Mitigation of Impacts on Birds: In Argentina, where impacts on wetland birds were identified, signaling will be installed (as it is also installed on the other existing parallels transmission lines). Two bird surveys will be performed to verify the relative abundance, migratory routes and sensible areas in order to define exact placement of the signalizers. These surveys shall be completed before the cable laying activity. In Brazil, given that no significant impacts were anticipated, no mitigation measures were designed.

(ii) Social

- 6.19 Mitigation of Impacts from Construction Sites and Workers Accommodations: In order to reduce the potential for conflict caused by work sites and worker's accommodation facilities, the hiring of local labor will be prioritized. The Environmental Section of the Construction Contract requires that ABB implement a campsite environmental control program, which includes adequate waste management program, adequate signaling of safety areas, air quality program, noise control program and others. Complementary, the Bank will make specific recommendations (See Section VIII).
- 6.20 Mitigation of Impacts on Affected Population: Affected landowners will be fairly compensated for any restriction imposed upon the use of their land due to implementation of the "administrative right-of-way" (partial restriction on use), according to transparent criteria which consider the specific characteristics of each property, the assets affected, and the continuing economic viability of the activity currently performed in the property. All non-owners (regardless of their status) will be compensated for the improvements of properties (houses, crops, warehouses, etc.). Through the Social Communication Plan the transparency of the process will be guaranteed and direct access to the Company will be granted to all affected people.
- 6.21 Mitigation of Historical and Archeological Impacts: Although no impacts upon historical or archeological assets are expected from the Project's implementation, an Historical and Archeological Protection Program is currently under implementation, requiring clearance from the archeological survey team before construction works can start at any given site. In the event of the discovery of any unforeseen archeological site, activities will be suspended and immediate notice will be forwarded to IPHAN (National Institute of History and Archeology), in Brazil and to ENRE, in Argentina.
- 6.22 Mitigation of Impacts upon Indigenous Communities: No impacts on indigenous communities within the project's immediate area of influence are anticipated.

(iii) Health and Safety

- 6.23 The risk of accidents during the Project's construction phase will be mitigated by the implementation of the Contractor's (ABB) Health and Safety Plan. The plan covers construction of transmission lines and substations, and includes: (a) a Health and Safety Policy; (b) the description of specialized Engineering, Safety and Occupational Health Services (*Serviços de Engenharia de Saúde e Medicina do Trabalho – SESMT*); (c) an Internal Commission for Accidents Prevention (*Comissao Interna de Prevencao de Acidentes - CIPA*); (d) a detailed description of personal protective devices (*Equipamentos de Protecao Individual - EPI*); (e) the Working Environment Medical Conditions Program (*Programa de Controle Medico do Ambiente de Trabalho - PCMAT*); (f) the Occupational Health and Safety Plan (*Plano de Saúde e Segurança Ocupacional - PSSO*) for the construction phase; (g) daily indoctrination procedures (*Diálogos Diários sobre Segurança - DDS*); and (h) specific training and refreshers for safety personnel and CIPA members. This plan also includes preventive measures, such as suitable signaling of roadways and the provision of advance information to the local population regarding traffic alterations along access routes, amongst others.(iv) Contingency and Emergency

- 6.24 There is no Contingency and Emergency Plan for the construction of the transmission line, therefore the Bank will make specific recommendations (See Section VIII).

(b) Operation Phase

- 6.25 Detailed procedures for the operation and maintenance phases will be developed at a later stage of the Project's implementation (prior to the energization of the line). To develop the Operation and Maintenance Program for the Interconnection II, CIEN hired COTESA, the same company that was responsible for Interconnection I.

(i) Environmental and social

- 6.26 The principal mitigation measures for the operational phase of Interconnection II address the main environmental (removal of the vegetation for maintenance of the TL ROW, birds signaling, and waste disposal) and social (electromagnetic fields and noise) impacts at the operation phase, as summarized below.
- 6.27 Mitigation of Vegetation Clearing: Clearing of vegetation will be reduced to the minimum necessary to address periodic maintenance requirements, so as to ensure minimum safety distances. Removal of trees will be done selectively and without the use of chemical products likely to affect soil quality or the water table.
- 6.28 Mitigation of Impacts on Birds: The bird protection devices (signalizers) will be placed according to the results of the birds' survey and the experience of the three existing TLs in the same corridor. The devices have a spiral form and are made of PVC. The length is variable (20 to 40 cm) according to the cable line diameter. The average distance between the signalizers is 10 meters. The signalizers are placed in order to make the cables visible for the birds and avoid bird collision near the wetlands.
- 6.29 Mitigation of Impacts from Waste Disposal: Specific procedures for management of maintenance wastes from the transmission line will be included in the Operation and Maintenance Program to be developed by CIEN for the operation phase. Nevertheless, treatment and final disposal of the wastes generated in substations are the responsibility of the substation operator (ELETROSUL), not CIEN's, except for the Garabi Conversion Station, which is owned and operated by CIEN. ELETROSUL complies with the Brazilian environmental regulations and is monitored and inspected by FEPAM.
- 6.30 Electric and Magnetic Fields: In order to avoid such impacts, the line was installed at a minimum distance of 500 meters from any existing community. In addition, the Social Communication Program includes specific information on electrical discharges and the possible electromagnetic interference that these might cause.
- 6.31 Noise: To avoid noise impacts in the neighboring areas, the Project was designed to comply with the legal standards in Brazil and Argentina, as well as the World Bank standards. Results from monitoring of the similar project, Interconnection I, show that these limits have not been exceeded, thus no additional mitigation measure is anticipated for Interconnection II. Nevertheless, should the results of the noise monitoring of Interconnection II indicate the need CIEN would implement additional mitigation measures.

(ii) Health and Safety

- 6.32 Both the two substations and the Conversion Station of Garabi are already in operation (of Interconnection I) and therefore implement Health and Safety programs, which include, amongst other measures, mandatory training of all personnel to reduce risks of accident. The Health and Safety Plan for the operation phase of the transmission line will be included in the Operation and Maintenance Program to be developed prior to the energization of the line.

(iii) Contingency and Emergency

- 6.33 Only the Garabi Conversion Station presents a Contingency and Emergency Plan. The Plan was designed to mitigate the main risks that have been identified (potential fire events and oil

spills or leakage from transformers). It contains specific fire fighting procedures and correspondent maps (with the location of assembling points and fire fighting equipment). The Bank will require specific Contingency and Emergency Plans for the substations and transmission line (See Section VIII).

B. Monitoring Programs

(a) Construction Phase

- 6.34 Erosion and siltation: Periodic visual monitoring will take place, both during construction and operation, at selected areas more likely to be impacted by erosion and siltation, along the corridor of the TL, with particular emphasis on towers located on steeper slopes and along river crossings.
- 6.35 Fauna: A fauna monitoring program, including birds monitoring, and consisting of three periodic surveys will be developed during the construction phase. The first one at the beginning of construction, the second one during spring and the last one at the end of construction. The methods will vary according to the species to be monitored (transects, identification of tracks and footprints and direct observations). Although this program is a specific requirement of the Brazilian environmental permit, it will be implemented along the entire project.

(b) Operation Phase

- 6.36 Electromagnetic Fields: The level of interference generated by the equipment and accessories utilized on the Interconnection II will be monitored by Field Magnetic Measurement Equipment (frequency range of 5 Hz to 30 kHz), similarly to the program in operation for the Interconnection I. The electric fields will be measured in the middle of the corridor service (*Centro da Linha – CL*) and in six selected points along the line, at different distances from the line, ranging from 7 meters to 100 meters, on a perpendicular axis.
- 6.37 Noise: The most critical areas are the substations. However, given that none is located in the vicinity of residential areas, the need for a noise-monitoring program was not initially identified. Nevertheless, a limited noise monitoring program will be implemented.

C. Environmental, Health and Safety Management (EHSM)

- 6.38 CIEN has developed and is implementing an Environmental Management System – EMS (*Sistema de Gestão Ambiental - SGA*) for both the construction and operational phases. The System includes an administrative structure responsible for the project's environmental management, the environmental management procedures (in particular Technical Specifications that CIEN is gradually developing (according to the project stages, in the following sequence: execution of construction activities, line operation and maintenance, Conservation Unit's implementation and forest replacement), the documentation system (such as the reports to be generated and the information flow), periodic audit and supervision systems and the financial and operational resources necessary for the EMS implementation. The training activities, however, are presented as part of the Social Communication Program. According to CIEN, this EMS was developed based on the experience with the implementation of the EMS for the Interconnection I.
- 6.39 During the construction phase, similar system will be implemented by ABB (the Construction Contractor)
- 6.40 In Brazil, Biodinamica, the environmental consulting firm that assists CIEN, performs CIEN's environmental supervision for the construction phase. Biodinamica's supervision structure includes:
- (a) One Environmental Supervisor;
 - (b) One Environmental Coordinator;

- (c) Two Construction Inspectors, responsible for the monitoring of construction activities and to provide the Environmental Supervisor with progress reports on the implementation of the proposed environmental mitigation measures, and the occurrence of any non-compliance and environmental risk identified.
- 6.41 Given the particularities related to the Brazilian environmental permit system, the environmental supervision structure will be responsible for: (a) ensuring compliance with all environmental requirements of the environmental permits; (b) ensuring consistency of the social-environmental actions associated with the construction process, preventing environmental losses or damage likely to delay the system's operation; and (c) contributing to build a positive image of the project.
- 6.42 Other than this executive structure, the CIEN's EMS relies in a coordinating structure, consisting of the Technical Director of CIEN as the Environmental Coordinator, and the Environmental Manager of CIEN as the General Coordinator.
- 6.43 Similarly, in Argentina, Consersa, an environmental consulting firm, which will implement a similar structure, will perform TESA's environmental supervision for the construction phase.
- 6.44 ABB, the Construction Contractor, will create its own environmental, health and safety unit, which will be responsible for the supervision and inspection of the environmental and health and safety plans. A minimum of two senior professionals for environmental, and health and safety coordination will be hired. The environmental unit will also be responsible for the environmental, health and safety training activities.

VII. PUBLIC CONSULTATION

- 7.1 In Brazil, the request for the Preliminary (Previous) Permit (LP) and the disclosure of the EIA was published in the Official Gazette and in two large-circulation newspapers in the States of Rio Grande do Sul and Santa Catarina, on November 19 and 20, 1998. However, there was no request for a Public Hearing for neither the Interconnection I or the Interconnection II projects. Nevertheless, CIEN and its contractors voluntarily developed a Social Communication Plan to ensure public disclosure and consultation throughout the entire project in both stages (construction and operation) (See below for details).
- 7.2 In Argentina, the EIA was disclosed for the first time in January 2, 2001. Subsequently, the EIA was disclosed in January 15, 2001. The announcement of the Public Hearing was held by ENRE in Buenos Aires on January 31, 2001 (as part of the requirements for granting the *Certificado de Necesidad y Conveniencia*). The announcement of the Public Hearing (January 4, 2001) stated the objectives, time, date and venue of the hearing. The notice also included information on the availability of materials, the deadline for submission by interested parties of their views and demands and details of the person responsible for representing User's Rights. Out of a total of more than twenty public interventions, only one was related to environmental matters, in particular to the Environmental Management Plan. The main public concerns, however, were related to end-user energy price increases, to which ENRE informed that the issue was under the responsibility of the State Secretariat of Energy.
- 7.3 The Social Communication Plan has been developed since the early planning stages of the project, and is intended to address all the requirements during project planning, construction and operating phases, with particular emphasis on the landowners directly affected by the project. The Plan includes information disclosure on different media, with special focus on radio communication, which is particularly important in the rural areas. The information disclosed includes; (a) information on the Company's contact numbers and the project's impacts, benefits and status; and (b) environmental education campaigns. It also includes direct communication between the affected people and the Company, via a telephone numbers of regional technical representatives who can be contacted at any time. This contact can be both individual and direct, or collectively, via community representatives (Summary description of the Social Communication Plan is provided in Annex 1).

VIII. RECOMMENDATIONS

8.1 The Bank (IDB) will require as part of the Loan Agreement that the Company (CIEN/TESA) and all portions of 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 Argentinean and Brazilian regulatory requirements, in particular: (i) all the conditions established in the environmental permits issued by IBAMA (Brazil) and ENRE (Argentina); (ii) all environmental, health and safety requirements of the Project contracts, and any subsequent modifications; and (iii) all requirements associated with any environmental, health and safety related permits, authorizations, or licenses that apply to the Project or the Project Company.
- (b) All aspects and components of the various Project environmental, health and safety documents.
- (c) Ambient noise standards of the World Bank General Environmental Guidelines (World Bank Pollution Prevention and Abatement Handbook, 1998).
- (d) Applicable aspects of the International Finance Corporation General Health and Safety Guideline (1998).
- (e) Consult with IDB before approving or implementing any and all substantive changes to the Project or its timetable which could potentially have negative environmental, social, or health and safety effects.
- (f) Send written notice 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.
- (g) Ensure that all companies contracted for construction or operation activities comply with the applicable environmental and social requirements of the loan agreement.
- (h) Implement ongoing information disclosure and consultation activities related to environmental, social, and health and safety aspects of the project.
- (i) Implement an environmental, health and safety management system that is consistent with the main principles of ISO 14001 and BS 8800 (for environment and health and safety, respectively), for the construction and the operation phases.

8.2 Prior to the date of Financial Closure, the Company must:

- (a) Present ABB's Final Environmental, Health and Safety Management Plan (ESHSM) for Construction, for Argentina and Brazil, in form and substance acceptable to the IDB, including without limitation, the organizational structure responsible for the implementation of the ESHSM, the assigned personnel and budget as well as the schedule of implementation, with the relevant milestones, in particular for the development of the detailed operational Construction Procedures developed by ABB to comply with the Technical Specifications issued by CIEN. The ESHSM must include the mitigation measures and monitoring programs as specified in the *Environmental Section of the Construction Contract*, and including without limitation: (i) the Worker's Code of Conduct, which must address, among other aspects, unexpected encounters with indigenous people, sanitary and health practices regarding endemic and sexually transmissible diseases, and guidance to reduce the potential for conflict and ensure peaceful coexistence with the local population; (ii) the specific and detailed operational Construction Procedures

developed by ABB to comply with the Technical Specifications issued by CIEN to ABB as part of the Service Instructions; such procedures must include, without limitation, specific procedures for crossing the Uruguay River in the critical point near the border line with Argentina and for working in the *Estero del Iberá* and other wetlands in Argentina; (iii) training and indoctrination programs for construction workers; (iv) the Contingency and Emergency Plans for construction of the substations and transmission line; and (v) the Health and Safety Plan for the construction phase.

- (b) Present CIEN/TESA Social Communication Plan, in form and substance acceptable to the IDB.

- 8.3 Prior to First Disbursement of the Loan, the Company shall present the CIEN/TESA organizational structure responsible for the supervision of the implementation of ABB's ESHSMP of the construction phase, in Argentina and Brazil, including the assigned personnel and budget, the reporting format, as well as the schedule of implementation, with the relevant milestones, in particular for the development of the environmental Technical Specifications.
- 8.4 Prior to the initiation of operations and Technical Completion, the Company shall fulfill the following conditions:
 - (a) Present, in form and substance acceptable to the IDB, the Company's (CIEN/TESA) Environmental, Social, and Health and Safety Management Plan (ESHSM) for the operational phase of the Interconnection II, in Argentina and Brazil, consistent with the main principles of ISO 14001 for environmental aspects and BS8800 for health and safety, including without limitation, the correspondent policies, reporting procedures and requirements, detailed environmental procedures for the Project's operation and maintenance (substations, conversion station and transmission line), documentation processes, performance indicators, responsibilities, training programs, information disclosure procedures, and an internal and external audits and inspections program. The ESHSMS must include the schedule, costs and assigned responsible personnel for its implementation.
 - (b) Present, in form and substance acceptable to the IDB, the Contingency and Emergency Plan for the operational phase of the Project maintenance (substations, conversion station and transmission line), in form and substance acceptable to the IDB.
- 8.5 Prior to each disbursement, the Company must certify compliance with all environmental, social, and health and safety requirements in the loan agreement.
- 8.6 During the life of the Loan Agreement, the Company must prepare and submit an Environmental and Social Compliance Report, in form, content and frequency as determined by the IDB.
- 8.7 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 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.

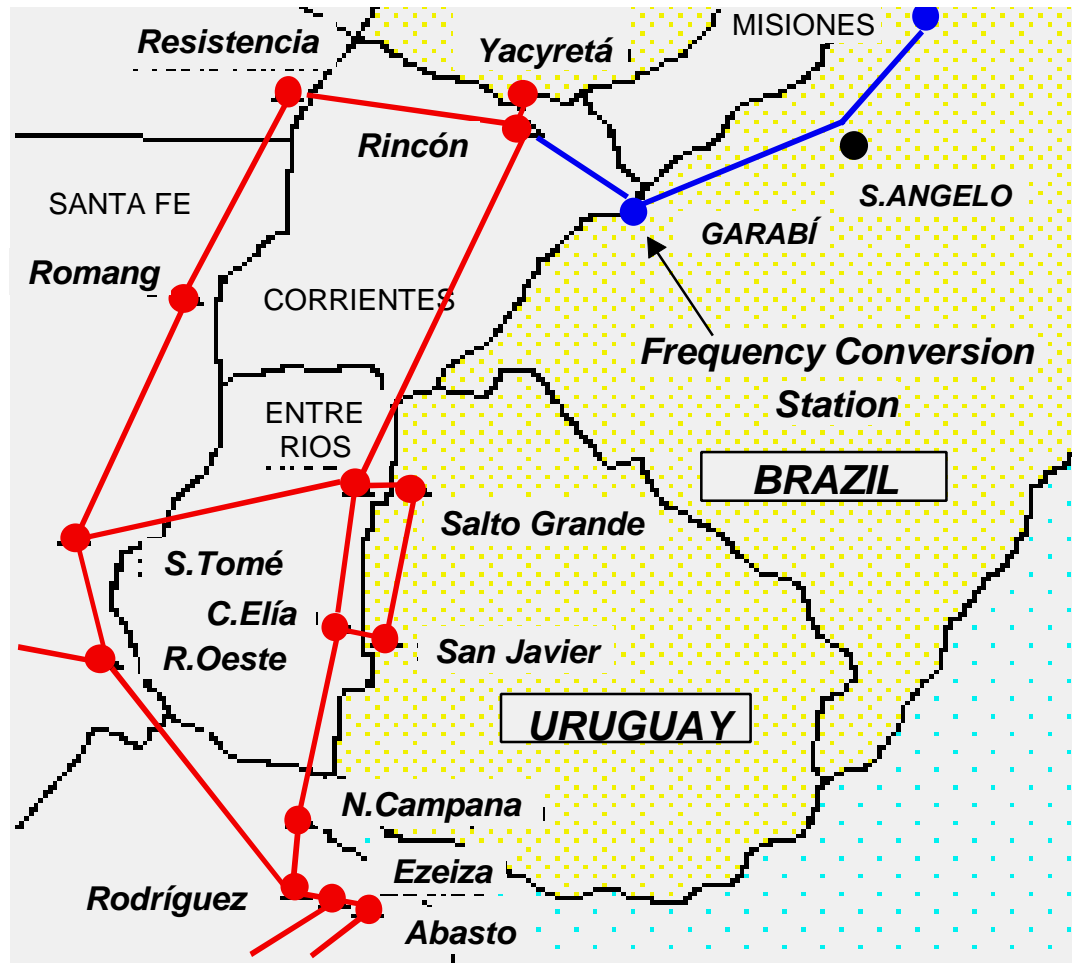


TABLE 3.1 NOISE LIMITS

Receiver	Day From 07:00 to 22:00 h			Night From 22:00 to 07:00 h		
	World Bank (a)	Argentina (b)	Brazil (c)	World Bank (a)	Argentina (b)	Brazil (c)
Residential, institutional, educational	55	54	55	45	54	50
Industrial, commercial	70	54	60	70	54	60

- (a) World Bank, "Pollution Prevention and Abatement Handbook – Part III". General Environmental Guidelines. The guidelines establish that noise abatement measures should achieve either the levels given in the Table or a maximum increase in the background level of 3 decibels (measures on the A scale) [dB(A)]. Measurements are to be taken at noise receptors located outside the project property boundary.
- (b) Argentina; Environmental Department Resolution 77/98.
- (c) Brazil: NBR 10.151 – Brazilian National Norm issued by ABNT – Brazilian Association of Technical Standards. States of Rio Grande do Sul and Santa Catarina do not have specific noise emission standards. According to the Rio Grande do Sul legislation (State Law 11.520/2000) and FATMA (environmental control agency of Santa Catarina) guidelines, projects must follow the limits established by ABNT.

TABLE 3.2 ELETRIC AND MAGNETIC FIELDS LIMITS

	Upper Limit Transmission Line	Upper Limit Substation
Electric Fields	3 kV/m (1)	3 kV/m (2)
Magnetic field	250 mG (1)	250 mG (2)

Department of Energy Resolution # 77/98 (Argentina)

- Note: (1) At the border of the service corridor
(2) Measured at 1 meter from ground level

TABLE 4.1 TOTAL, URBAN AND RURAL POPULATION – 1996 (Brazilian Side)

Municipalities (1)	Population		
	Total	Urban	Rural
Garruchos	3,395	873	2,522
Santo Antônio das Missões	13,201	6,161	7,040
São Nicolau	6,542	3,823	2,719
Dezesseis de Novembro	3,553	541	3,012
São Luiz Gonzaga	40,233	33,079	7,154
Cerro Largo	12,958	9,056	3,902
Guarani das Missões	11,076	5,075	6,001
Sete de Setembro (2)	-	-	-
Santo Ângelo	75,511	65,037	10,474
Giruí	25,377	14,266	11,111
Catuípe	10,636	6,235	4,401
Chiapetá	4,245	2,509	1,736
Santo Augusto	15,137	11,501	3,636
Coronel Bicaco	8,778	4,107	4,671
Palmeira das Missões	38,933	30,153	8,780
Dois Irmãos das Missões	2,811	861	1,950
Boa Vista das Missões	2,089	556	1,533
Jaboticaba	4,732	1,347	3,385
Novo Tiradentes	2,689	333	2,356
Liberato Salzano	7,371	1,311	6,060
Trindade do Sul	6,251	1,916	4,335
Gramado dos Loureiros	2,552	286	2,266
Nonoai	12,666	7,876	4,790
Faxinalzinho	3,086	684	2,402
Erval Grande	5,915	1,879	4,036

Itatiba do Sul	6,000	1,607	4,393
Barra do Rio Azul	2,511	306	2,205
Itá	8,548	2,212	6,336

Source: IBGE-Population Census-1996.

Notes: (1) Municipalities between Garabi Substation outlet and Itá Substation.

° (2) Sete de Setembro was still a district within the Guarani das Missões municipality in 1996.

TABLE 4.2 - TOTAL POPULATION – 1991 (Argentinean Side)

Location	Population Growth (%)		Current Population (hab)
	1970-80	1980-91	
Apóstoles	73.5	40.2	15,881
Concepción de La Sierra	12.8	44.3	3,999
Candelaria	70.5	58.8	6,280
Santo Tomé	29.8	20.3	17,263
Virasoro	99.7	92.6	16,562
Ituzaingó	257.6	95.6	16,995
Posadas	44.8	46.5	210,755

TABLE 5.1 MONITORING OF MAGNETIC FIELD - SURVEY POINTS AND RESULTS

Units are in mG

Location		Distances from the center of the line (CL)										
1	CL	7.5 m	15 m	25 m	35 m	45 m	55 m	65 m	75 m	-	-	-
	126.10	119.60	94.50	44.35	14.80	13.60	18.10	17.85	19.85	-	-	-
2	CL	5,75 m	11,5 m	16,5 m	21,5 m	26,5 m	31,5 m	36,5 m	41,5 m	46,5 m	50 m	-
	176.65	169.0	97.65	23.8	15.54	26.15	26.25	23.85	20.15	16.98	15.65	-
3	CL	7.5 m	15 m	20 m	25 m	30 m	35 m	40 m	45 m	50 m	55 m	60 m
	116.95	108.85	78.20	50.45	28.20	13.09	10.92	12.52	12.78	12.89	11.11	10.15
4	CL	10.25 m	20.5 m	25.5 m	30.5 m	25.5 m	40.5 m	45.4 m	50.5 m	55.5 m	60.5 m	-
	131.15	129.65	88,0	54.85	23.50	16.00	23.40	30.70	31.55	30.80	27.90	-
5	CL	7 m	14 m	19 m	24 m	29 m	34 m	39 m	44 m	49 m	54 m	-
	122.70	116.50	73.20	30.90	10.83	16.45	20.75	21.05	20.90	16.58	15.05	-
6	CL	6.25 m	12.5 m	17.5 m	22.5 m	27.5 m	32.5 m	37.5 m	42.5 m	47.5 m	50 m	-
	141.55	124.90	65.15	24.60	21.49	33.00	33.40	27.20	23.35	19.81	18.80	-

Location	Description
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1	Yaciretá Hydroelectric Plant – between towers 4 and 5
2	Crossing National Highway 12 – between towers 17 and 18
3	Crossing National Highway 12 – between towers 32 and 33
4	Crossing National Highway 120 – between towers 86 and 87
5	Crossing National Highway 14 – between towers 176 and 177
6	Near the Provincial Scholl 303 – between towers 253 and 254
CL	Centro da Linha (Center of the Line)

Annex 1

SOCIAL COMMUNICATION PROGRAM

olidate an efficient communications structure, capable of responding rapidly to community demands throughout the project's implementation;
positive image of the undertaking in the region and keep society 100% informed of the Project's status.

those municipalities crossed by the Transmission Line
NGOs, Trade Unions, Associations, etc)
onal Public Authorities (City Hall, Municipal Secretaries and Chamber of Representatives)
neighboring populations

s	Timeframe	Current Situation	Comments
ate and Publicize Communications Channels			
with landowners and is	Prior to, and during the initial months of construction	First phase concluded. There are some negotiations with landowners that are still in progress	
channel of dialogue – unication Unit (UMC) e for visits and the municipal	During construction	In progress	
ications governing the ving priority to the ocal labor	Prior to construction	Concluded	
ker's Code of Conduct	Prior to construction	In progress	
er's support program s and leisure activities	Prior to construction	In progress	
erships and agreements private entities for the the activities planned	During construction	In progress	

Consolidation of co-existence initiatives			
Graphic identity of Social Impact materials	Prior to, and during the initial months of construction	In progress	
Materials to be utilized	Prior to, and during the initial months of construction	In progress	
Informative material	Prior to, and during the initial months of construction	In progress	
Telephone number was put out any doubt	Prior to, and during the initial months of construction	In progress	
Material in local	Prior to, and during the initial months of construction	In progress	
Educational material and of an educational zone children	Prior to, and during the initial months of construction	In progress	
Informative material	Throughout the 30 days prior to the start of construction, and throughout the project's construction.	In progress	
In local radio stations: - São Luiz Gonzaga - Nonoai - Santo Ângelo - Chapecó	Throughout the 30 days prior to the start of construction, and throughout the project's construction.	In progress	
Permanent and continuous communication through periodic meetings parties involved.	Throughout construction	In progress	
Opinion polls	3 months after construction begins – up to 30 days prior to the start of operation	Not yet started	
Attention on the project's reach and demobilization	30 days prior to the start of operation and 60 days after that date.	Not yet started	
S			

It will be achieved through the Environmental Management System and the issue of periodic progress reports.

responsibility: CIEN/TESA and Biodinâmica

developed and utilized:

or publication by main newspapers and broadcast by radio stations
stickers
material for teachers at schools within the area of direct influence
roadcast by the radio stations
roducing the project, containing images of the region and its historic, ethnic and archeological features.

on the issue of new	March, 2001		
ts			

l be achieved through the Environmental Management System

nsibility: CIEN, Biodinâmica, UNESP/SP