LIST OF ABBREVIATIONS

ABNT	*Associação Brasileira de Normas Técnicas* (Brazilian Association of Technical Norms)
ANEEL	*Agência Nacional de Energia Elétrica* (National Agency for Electric Power)
APA	Environmental Protection Area
BR	Abbreviature of Brazil, when followed by numbers used to designate federal roads – BR 101
CE	Abbreviature of Ceará State, when followed by numbers designates state roads - CE 422
CFN	*Companhia Ferroviária do Nordeste* (Northeast Railroad Company)
CGTF	*Central Geradora Termoelétrica de Fortaleza S.A.* (Fortaleza Thermoelectric Generation Plant)
CHESF	*Companhia Hidrelétrica do São Francisco* (São Francisco Hydroelectric Company)
CIPP	*Complexo Industrial e Portuário do Pecém* (Pecém's Industrial and Port Complex)
COEMA	*Conselho Estadual de Meio Ambiente do Estado do Ceará* (Ceará State Environmental Council) comprising: IBAMA, NGOs, Universities, Government Bureaus, Professional Councils, Town Halls, Trade Unions, Associations and Federations
CAGECE	*Companhia de Água e Esgoto do Ceára* (Ceará Water and Sewerage Company)
COGERH	*Companhia de Gerenciamento de Recursos Hídricos do Estado do Ceará* (Ceará State Water Resources Management Company)
CONAMA	*Conselho Nacional de Meio Ambiente* (National Environmental Council)
EE	Ecological Station
EIA	Environmental Impact Study
ENDESA FORTALEZA	Endesa Fortaleza thermoeletric plant
ETE	Effluents Treatment Station
GASFOR	Fortaleza Gas Pipeline
GLP	Oil Liquefied Gas
IPHAN	*Instituto do Patrimônio Histórico e Artístico Nacional* (National Institute for Historical and Artistic Heritage)
LT	Transmission Line
LI	Installation License
MC	Compensatory Measures
MW	Megawatt
NR	Regulatory Norm of the Ministry of Employment
PETROBRAS	*Companhia de Petróleo Brasileiro S.A.* (Brazilian Oil Company)
RENOR	*Refinaria do Nordeste* (Northeast Refinery)
RIMA	Environmental Impact Report
SECI	Industrial City Substation
SEMACE	*Superintendência Estadual de Meio Ambiente do Ceará* (State Environmental Department)
SOMA	*Secretaria da Ouvidoria Geral e Meio Ambiente* (General Magistracy and Environment Secretary)

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1 INTRODUCTION

The aim of the present document is to introduce to the International Finance Corporation - IFC, a division of the World Bank Group, as well as some preliminary information on building and operating of Endesa Fortaleza thermoelectric plant. This plant is property of Central Geradora Termelétrica Fortaleza S.A., which belongs to the Group ENDESA, owns the plant.

Endesa Fortaleza thermoelectric plant is being built in the city of Caucaia (km 02 of state road CE422), located in the southern area of the Pecém's Industrial and Port Complex – CIPP.

This Complex is situated in the towns of Caucaia and São Gonçalo do Amarante in the State of Ceará – Brazil (figures 1 and 2).

Figure 1 Location of Endesa Fortaleza thermoelectric plant

Endesa Fortaleza thermoelectric plant will employ natural gas as fuel, achieving 307,6 MW of power. Its main goals are to profitably supply energy to an expanding market, whilst reducing the vulnerability of State of Ceará to shortage of electric energy.

This power plant will bring several advantages:

- An increase in the stability of the energy-generating system.
- A continuous supply of electric energy to local industries.
- Supply of electric energy to distributors in Ceará at competitive rates.
- Implementation of an alternative source of non-polluting diversified and economic energy.
- Investments on infrastructure for the generation of electric energy in Brazil.
- Increased competition for cost in local industries.
- More job opportunities in the metropolitan region of Fortaleza.
- Improvement of social economical conditions due to a direct investment of R$550 million on local economy.

The Environmental Council of Ceará, in a session held on December 13th 2001, approved the plant's environmental studies that had been carried out, and considered the project to be in accordance with federal and state legislation.

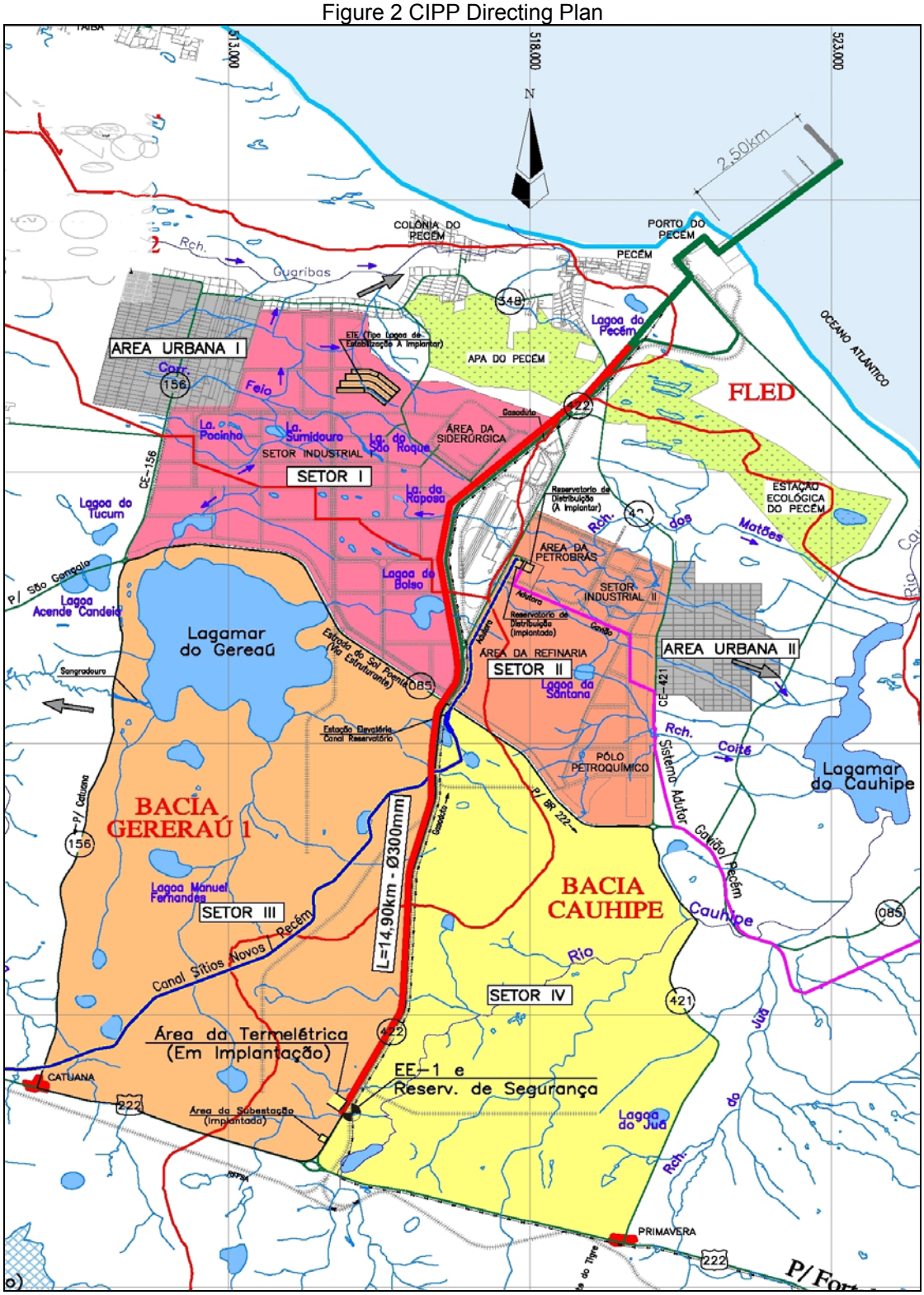
Endesa Fortaleza thermoelectric plant received installation permit number 020/02-NUCAM (Environmental Control Center) from the *SEMACE - Superintendência Estadual de Meio Ambiente* (State Environmental Department), a division of *SOMA - Secretaria da Ouvidoria Geral e Meio Ambiente*, in January 2002.

1.1 PECÉM'S INDUSTRIAL AND PORT COMPLEX – GOVERNOR MÁRIO COVAS

Endesa Fortaleza thermoelectric plant is located within approximately 50 km from Fortaleza, in the city of Caucaia, which lies inside the Pecém's Industrial and Port Complex – CIPP (Figure 2). It also spreads out over the towns of Caucaia and São Gonçalo do Amarante (Figure 3). This complex has a total area of approximately 320 km^2.

The industrial zone is almost entirely a property of the State of Ceará, which is a factor that eliminates problems related to land disputes or eminent domain.

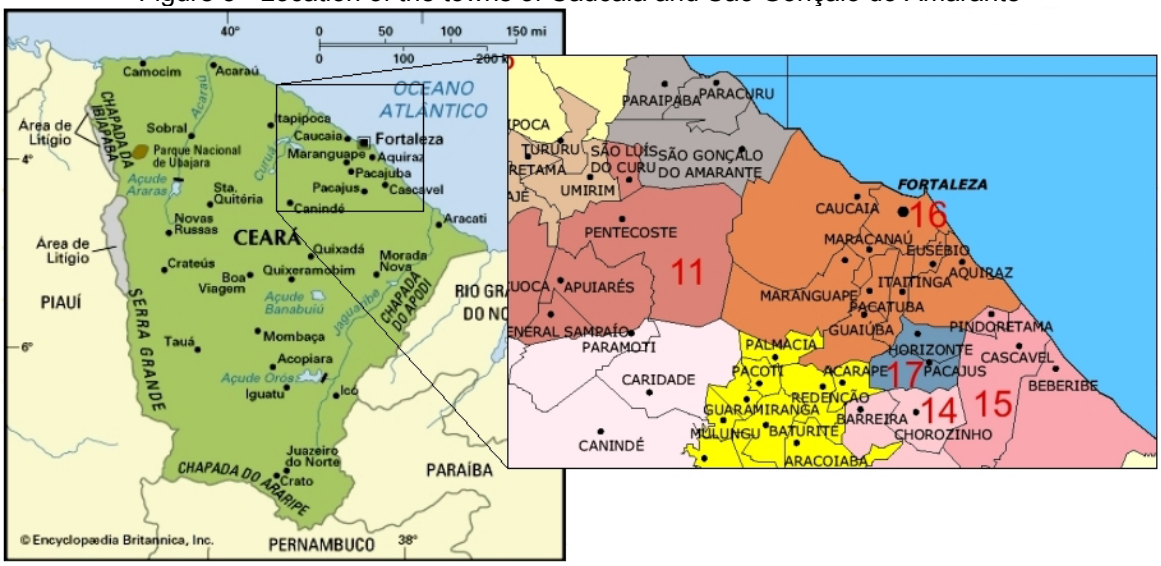
Figure 2 CIPP Directing Plan



At CIPP, there are also an environmental protection area and an ecological station, which are natural sites protected as per federal laws No. 6.902 (1981), 6.938 (1981) and 9.985 (2.000).

These areas have been created with the purpose of creating a border between CIPP and the coastal region, also avoiding human presence in the area.

Figure 3 - Location of the towns of Caucaia and São Gonçalo do Amarante



The main feature at CIPP is the Port, whose operations have initiated in November 2001. Aside from that, the complex has been designed to host following anchor industries:

- Electric energy generation plant. The CIPP project was the first large self-powered thermoelectric plant in the northeast of Brazil. In an early stage, Petrobrás will supply natural gas through the recently built Guamaré-Pecém Gas Pipeline (GASFOR). The project includes the implementation of a Natural Gas Reinforcement Unit during the next stage, which will allow, by means of importing of liquid natural gas, the demand of the State of Ceará, as well as the remainder of the northeast region.

- *Companhia Siderúrgica do Ceará* (Ceará's Steel Mill), to be built on a 300-ha site, will deliver hot and cold laminated steel sheets, as well as coated sheets, at a yearly rate of 1,5 million tons of sheet steel.

- *Refinaria do Nordeste – RENOR* (Northeast Oil Refinery), to be built in a 500-ha site, is located within approximately 6 km from the Pecém Port Terminal. In its early stage, the refinery will have an output capacity of 110.000 raw oil barrels a day. It will also produce GLP, kerosene, diesel fuel, gasoline and fuel oils, amongst other products. In a second stage, capacity will be raised to 200.000 barrels a day.

- Fuel pools. The demand for safety of the population, as well as environmental protection and the proper handling of urban soil in the area of Mucuripe, in Fortaleza, has motivated the government to encourage the relocation of all storage sites of oil and its byproducts to Pecém's Industrial and Port Complex. These projects are under development by Petrobrás and other Distributors.

In 2001, Brazilian Senate named the complex as Pecém's Industrial and Port Complex Governor Mário Covas.

1.2 ACCESS ROADS

The following roadways are the main access to Pecém's Industrial and Port Complex and to Fortaleza Thermoelectric Plant:

1.2.1 Main roadways

BR-222: Federal roadway, it is the main road leading to Pecém's Port premises. It interconnects Fortaleza, the capital of the State, to the northern region of the state as well as to the states of Piauí and Maranhão.

BR-116: Most important federal roadway in the state, it links the Fortaleza to the southern states in Brazil. From the terminal premises, it will be possible to access this roadway through a road junction *("Anel Viário")*, which is also used as a point of connection between CIPP Mário Covas and the industrial districts of Maracanaú, Horizonte, Pacatuba, Eusébio, etc.

CE-422: State roadway known as *"Via Portuária"*. It is 20.5 km long and 12 m wide. It connects BR-222 road to the Pecém's Port premises. This road, along with

BR-222, is the main roadway for the traffic of loaded trucks inbound to or outbound from terminal premises.

1.2.2 Secondary roadways

CE-085: State roadway known as *"Estruturante."* This is a road designed for light vehicles going to the beaches along the west coast of Ceará, avoiding thus loaded trucks to share a road with light vehicles.

CE-421: Light-traffic state roadway that makes a junction with CE–085 at a neighborhood named Coité, giving access to the district of Pecém and to BR-222.

These two secondary roadways are not interconnected with CE-422, which is a road for the heavy traffic of loaded trucks from the terminal.

In addition to roadway access, a railway has been built connecting with the northeast railway system. It is run by *Companhia Ferroviária do Nordeste - CFN* (Northeast Railway Company – CFN).

1.3 AREA SELECTION

The initial selection of the area was carried out according to principles of:

- Convenience - in terms of implementing this thermoelectric plant in the CIPP area.
- Proximity to consumer markets, represented by CIPP itself and by the Metropolitan Region of Fortaleza, which is one of the largest and fastest-growing regions of the northeast region in Brazil.
- Availability of water supply, in enough proportions so as to meet the requirements of the thermoelectric plant – taking advantage of CIPP's preexistent structure.
- The route of Guamaré-Pecém gas pipeline, as well as the location of CIPP's City-Gate.

- The use of a transmission line to distribute the energy generated by Interconnecting System, which will be connected to CHESF's Substation on 230 kV.
- Areas identified as being able of nesting such a thermoelectric plant, indicated Area 1 – Dunas and Area 2 – Cauípe. Alternative 1 is situated on the retroportuary area, and the other one is situated near CHESF's SE where future industrial installations of CIPP will take place.

Second stage included a preliminary environmental impact assessment of:

- Air Quality/Human Environment
- Risk Factor/Preservation Areas
- Landscape/ Human Aspect
- Flora and Fauna
- Technical-Economic Aspects
- Access
- Proximity to City-Gate
- Proximity to Power Transmission System

Due to similarities between the two alternatives, aspects related to water and soil have not been considered.

After rating previously mentioned criteria, the area next to CE 422 (figure 1), close to CHESF's Cauípe substation, was chosen.

1.4 TECHNOLOGY SELECTION

For the generation of energy, a technology of combined cycle has been selected. It uses natural gas as fuel with steam generators that are powered by turbines' recycled heat (**CC**).

Selection has been accomplished by comparing the following technological alternatives:

- Electric power generated by steam produced through natural gas combustion (**GN**)
- Electric power generated by steam produced through coal combustion in fluidized bed (**FBC**)
- Electric power generated by steam produced by pulverized coal (**PC**)
- Electric power generated using the technology of combined cycles with integrated gasification (**IGCC**)

Each of the alternatives was examined and assessed according to the following criteria:

- Thermodynamic efficiency, or conversion rate from thermal energy to electric energy.
- Environmental cost related to water consumption, atmospheric emissions, generation of solid residues.
- Flexibility with regard to fuel used.
- Complexity and sequence of building stages.

Comparative results between alternative technologies are shown in Table 1.

Table 1 - Summary of comparison between alternative technologies for the Endesa Fortaleza thermoelectric plant

Items to be considered	GN	FBC	PC	CC	IGCC
Reliability/Availability	+	-	+	+	-
Thermodynamic Efficiency	-	-	-	+	-
Flexibility with regard to Fuel	-	+	+	-	+
Atmospheric Emissions	+	-	-	+	+
Water Consumption	+	-	-	+	+
Generation of Solid Residues	+	-	-	+	+
Unity Size/Module	+	+	-	+	-
Complexity	+	+	-	+	-
Building Stage (time)	+	+	-	+	-

As presented in Table 1, units using combined cycle technology are positive in practically all items.

Coal combustion-powered thermoelectric plants also displayed good results, based on comparative criteria, especially in terms of expenses with fuel. However, positive aspects are outnumbered by problems represented by low efficiency, larger quantities of atmospheric emissions, water consumption and larger quantity of solid residues.

In order for IGCC to compete with CC in terms of efficiency, the process of coal gasification will require a more developed steam system than the one that the combined cycle plants actually use. Apart from that, there are many uncertainties regarding future developments of such gasifiers. Until the efficiency of this type of installation is definitely proven on a running plant, doubts will remain regarding the development level and real applicability of this technology.

Both combined cycle (CC) and pulverized coal (PC) technologies have been considered to be fully developed.
Regarding coal combustion-powered thermoelectric plants using fluidized bed (FBC), market is still in expansion.
On the other hand, at the moment there are no large installations using combined cycles with integrated gasification technology (IGCC) to generate electric energy, either running or even in the process of being built.
As far as the alternatives evaluated insofar, no technology has been considered superior to combined cycle technology. Such plants require a period of construction and installation that is shorter than the majority of the alternative technologies, their thermodynamic efficiency is higher (same electrical power with less fuel burnt and thus, less CO_2 emission) and environmental impact is smaller.

1.4.1 Fuel

The advantages of natural gas are shown below, from an extract of "Natural Gas: the fuel of the new millennium", by ABREU, Percy L. and MARTINEZ, José (1999):

"...Many countries search to diversify their energy sources so that they will be less dependent on fewer suppliers but also to have the most adequate alternatives for each type of use available to them. Particularly in Brazil, where large quantities of oil are imported from far away, the possibility of being supplied by local distributors through gas pipelines would not only increase commercial trades with these neighbors but it would also lessen its dependency on distant countries for whom our exports are very modest..."

"...The use of natural gas as fuel, as opposed to all other types of fuel, is predominant, especially due to easy handling and the limited impact caused upon the environment by its combustion."

Because of its technical characteristics, natural gas allows a more efficient control of combustion process. By using gas turbines together with conventional electric turbo generators (fueled by gas or combined with any other fuels available) on a combined cycle, it is possible to achieve considerably higher energetic efficiency. These conditions make industries more efficient and competitive, two extremely important characteristics, in a world under a globalization process; at times could be decisive when attracting industries of state-of-the art technologies.

Natural gas yields extremely low levels of contaminants, which are eliminated in the country of origin. This makes its combustion cleaner when compared to the other types of fuel. The complete combustion of natural gas yields only water and CO2, contributing significantly to the quality improvement of the environment, especially in highly populated regions which incur on a heavier demand of energy.

Being a fossil fuel, natural gas does emit some CO2 and therefore is not completely neutral on the environment. However, the amount of CO2 released through energy generation is inferior to the one released by any other type of fossil fuel. It doesn't release particles or sulfur dioxide, so treatment for combustible gases is not necessary.

Natural gas is a very safe product to use. Due to its density, it doesn't accumulate at ground level.

Considering the average use of 4,3 thousand Nm3 of gas a day per megawatt, with an consumption factor of 70%, it will lead to a gas consumption from 30 to 36 million of Nm3 a day.

The advantages of using natural gas are summarized below:

- Energy source diversification.
- Local sources for import.
- Fast growing wide availability.
- Reduction of transportation (through roadways, railways and water).
- Improvement of energy throughput.
- Advantages in terms of environmental preservation and human safety.
- Extremely low presence of contaminants.
- Cleaner combustion.
- No emission of particles (ashes).
- Treatment for combustive gases is not required.
- Fast elimination of leaks (lighter than air).
- Less investments on storage and use of space.
- Reduced equipment corrosion and inferior maintenance cost.
- Minor cost associated to fuel handling;
- Reduced cost of building premises.
- Easily regulated combustion.
- Higher energy production.
- It allows for a greater flux variation.
- Payment after use.
- Cheaper insurance payments.
- Competitive cost when compared to other alternatives.

1.4.2 Fuel Supply

Aside from all those advantages, the company supplying fuel, *Petróleo Brasileiro S.A. – PETROBRAS*, has the capacity of delivering 800.000 m^3 of gas a day, through a pipeline that connects Guamaré – RN to Pecém – CE. It is 384km long.

According to PETROBRAS, there will be growing compression in Guamaré – RN starting in March of 2003. In August, the same will happen to the station at Aracatí

– CE. As a result, the available volume of gas will have an increase of 237,5%, reaching 1.900.000 m^3 a day.

In order to increase the gas supply to CIPP, studies for the construction of a new Guamaré – Pecém gas pipeline are under way. According to estimates, in 2004 this new gas pipeline will increase the region's gas supply to 3.200.000 m3 a day, which will meet the demands of thermoelectric plants, as well as of local gas users.

In February 2002, PETROBRAS approved investments in the amount of 1 billion dollars for compression increase, construction of the new gas pipeline and other similar projects.

The following information was taken from PETROBRAS' website. A schematic of the gas pipeline is shown, as well as the main characteristics of the northeast pipeline that connects Pilar – AL to Pecém – CE (Figure 4).

Figure 4 - Diagram of the Pilar – Pecém gas pipeline

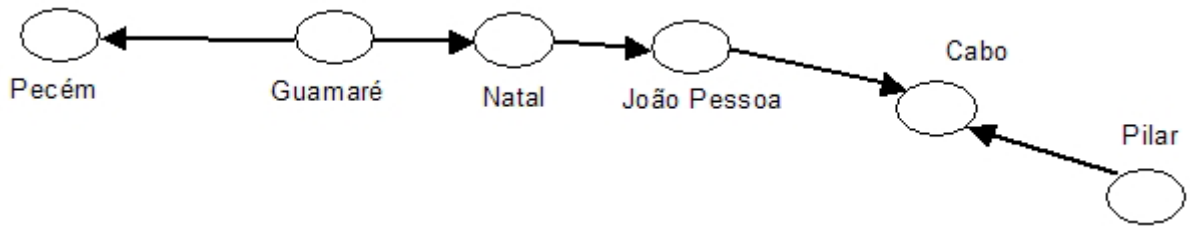


Table 2 – Main Characteristics of the Pilar – Pecém gas pipeline

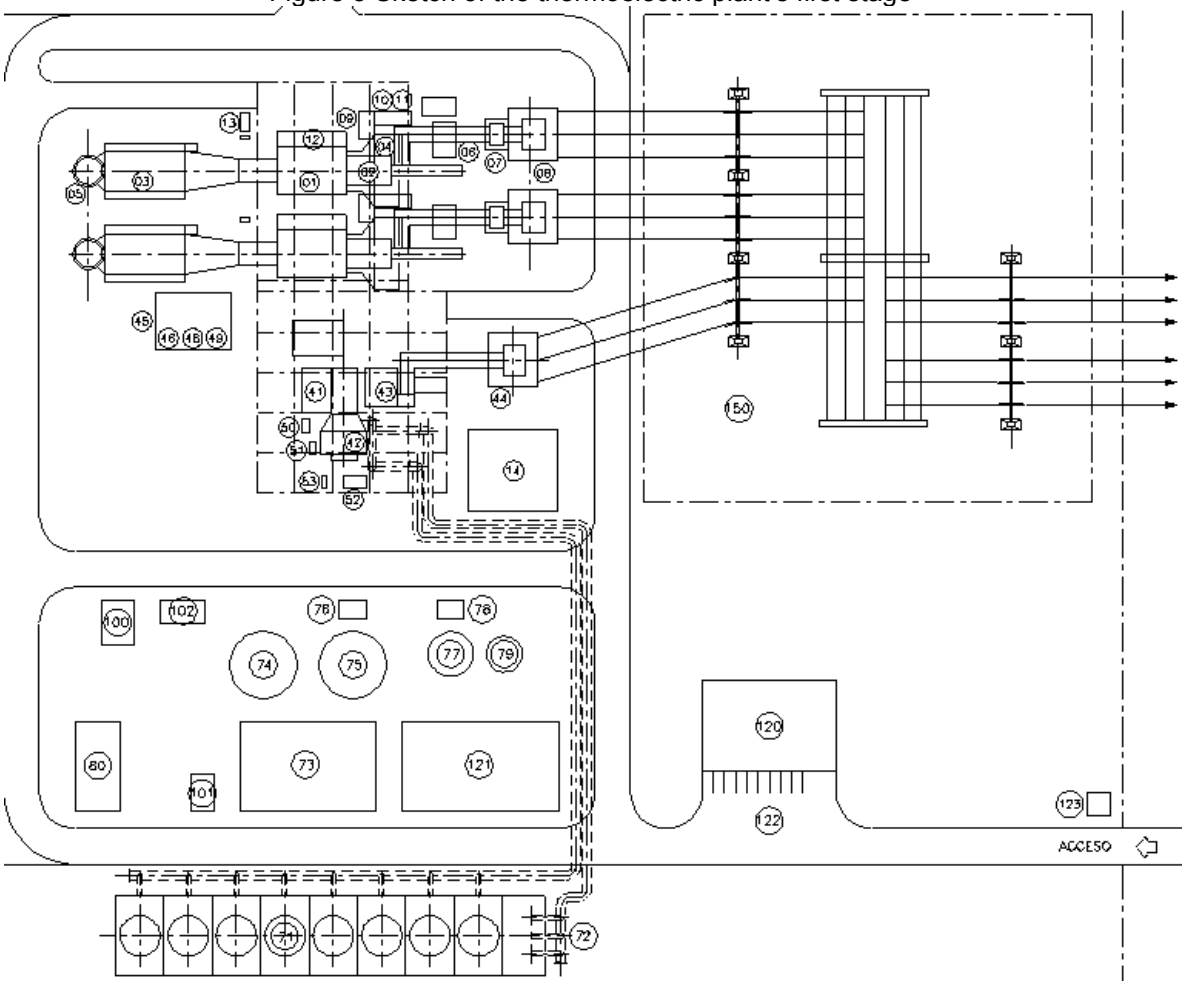
Pipelines Characteristics						
	Guamaré / Pecém	**Guamaré / Natal**	**Natal / João Pessoa**	**João Pessoa / Cabo**	**Pilar / Cabo**	
Rated Diameter (inches)	12/10	12	12	12	12	
Extension (km)	385	130	161	131	204	
Maximum Pressure (kgf/cm2)	100	70	70	70	100	
Guamaré's Reception Point (Guamaré-Cabo gas pipeline)						
Required Pressure (kgf/cm2)	68					
Guamaré's Reception Point (Guamaré-Pecém gas pipeline)						
Required Pressure (kgf/cm2)	68					
Required Pressure (kgf/cm2)	100					
Delivery Zone	**Natal**					
Area's Maximum Capacity (1000m3/day)	330					
Delivery Point	**km 119**	**km 140**				
Maximum Pressure (kgf/cm2)	30	30				
Maximum Pressure (kgf/cm2)	12	12				
Point's Maximum Capacity (1000m3/day)	30	300				
João Pessoa Delivery Zone						
Area's Maximum Capacity (1000m3/day)	240					
Delivery Point	**Km 291**					
Maximum Pressure (kgf/cm2)	30					
Minimum Pressure (kgf/cm2)	12					
Point's Maximum Capacity (1000m3/day)	240					
Pernambuco Delivery Zone						
Area's Maximum Capacity (1000m3/day)	1.273					
Delivery Point	**Ext. 5**	**Ext. 6**	**Ext. 7**	**Ext. 8**	**Ext. 9**	**Ext. 10 and 11**
Maximum Pressure (kgf/cm2)	30	30	30	30	30	30
Minimum Pressure (kgf/cm2)	12	12	12	12	12	12
Point's Maximum Capacity (1000m3/day)	64	124	178	255	52	600
Ceará Delivery Zone						
Area's Maximum Capacity (1000m3/day)	800					
Delivery Point	**Faz. Belém**	**Pacajús**	**Fortaleza**	**Pecém**		
Maximum Pressure (kgf/cm2)						
Minimum Pressure (kgf/cm2)						
Point's Maximum Capacity (1000m3/dia)	220	225	550	670		

2 PROJECT OVERVIEW

The first stage of the Endesa Fortaleza thermoelectric plant will consist of a Thermoelectric Plant with capacity of generating 310.7 MW of electric energy, a Substation and a 1,5 km long Transmission Line of 230 kV which will connect the Endesa Fortaleza thermoelectric plant Substation to the CHESF's Substation (figure 5).

The extent of the total area is 29 ha, 19 of which are used for the installation of the plant, the substation, and operational – administrative support.

Figure 5 Sketch of the thermoelectric plant's first stage



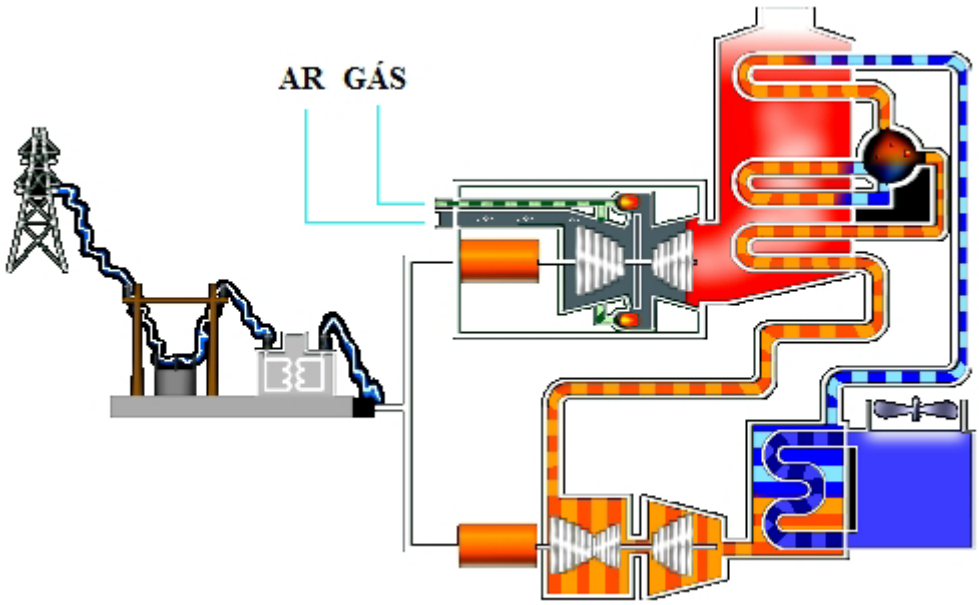
Main buildings and components

01 – Gas turbine
02 – TQ Generator
03 – Heat recovery boilers
04 – Air admission
05 – Chimney
06 – Circuit breaker
07 – Auxiliary service transformer
08 – Ancillary transformer
09 – Control room
10 – Starter skid
11 – Battery room
12 – Control valve room
13 – Gas skid
14 – Main control room and electric room
15 – Gas treatment station
41 – Steam turbine
42 – Condenser
43 – TV Generator
44 – TV Transformer
45 – Deaerator
46 – High pressure water pumps
48 – Chemical injection system
49 – Sampling system
50 – Condensate pumps
51 – Vacuum system condenser
52 – Heat exchanger – refrigeration auxiliary
53 – Auxiliary refrigeration system pumps
71 – Cooling towers
72 – Cooling water pumps
73 – Water treatment station
74 – Raw water tank
75 – Demineralized water tank
76 – Demineralized water pumps
77 – Firefighting water tanks
78 – Firefighting water pumps
79 – Drinkable water tank
80 – Equalization pool
100 – Compressor room
101 – Chemical laboratory
102 – Emergency diesel group
120 – Administration and cafeteria
121 – Workshop and Warehouse
122 – Parking
123 - Entrance

2.1 PROCESS SUMMARY

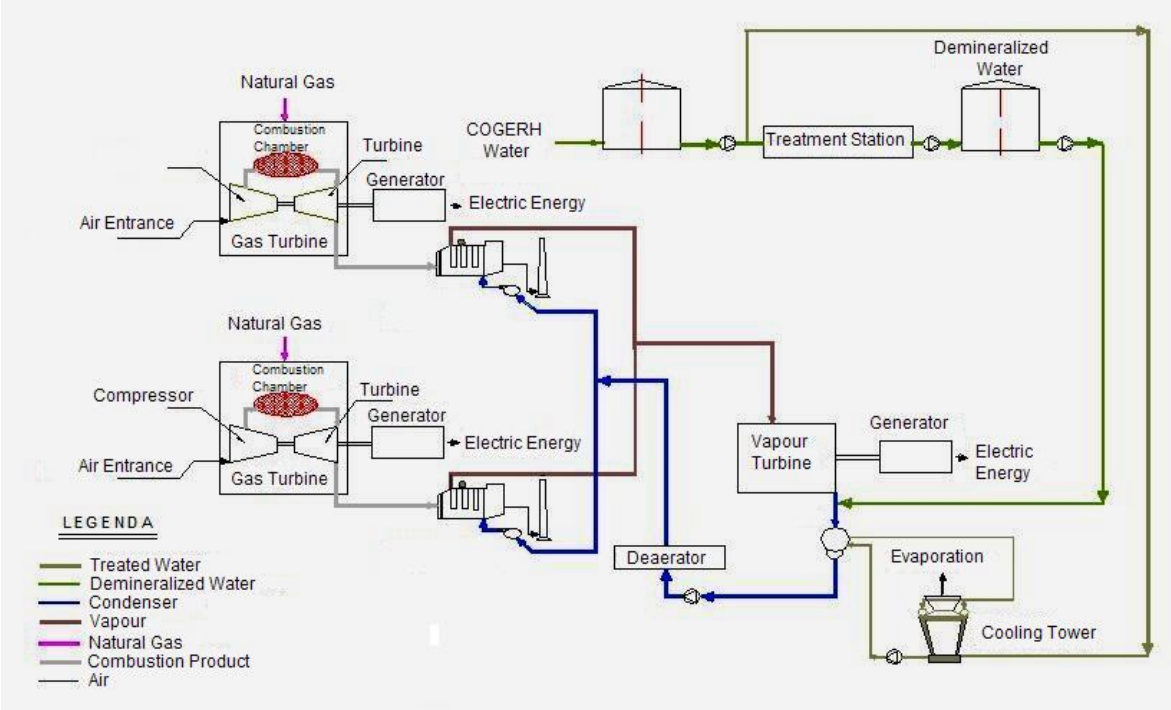
The process to be used is “combined cycles”, where gases heated by first turbine will in turn be used to heat water that will move another turbine (figure 6)

Figure 6 - Combined Cycle Technology Schematics



This system allows for maximum utilization of fuel, heat and steam. The diagram shown in Figure 7 illustrates the process.

Figure 7 - Endesa Fortaleza thermoelectric plant energy generation process diagram



3 ACQUISITION OF THE AREAS FOR THE INSTALLATION OF THE POWER PLANT AND SUBSTATION, AND THE RIGHT OF WAY OF THE TRANSMISSION LINE

As previously stated, after the selection of the area for the installation of the power plant, the grounds were purchased form their legal owners, through the buying and selling instruments recognized by the Brazilian legislation.

The processes of acquisition of the grounds were negotiated directly with the owners, like a situation of “willing buyer – willing seller”, without causing any pendency whatsoever.

Only one non-owner family who worked for the owner of the acquired area moved away to an area near the River Cauípe, where the conditions of the new dwelling are superior to those in the acquired area, due to the greater availability of water, essential for subsistence cultures and livestock breeding. This family still works for the former employer (in annex 1 its shown the assessment of the situation of this family).

Besides the area for the installation of the power plant, it was necessary to acquire the areas and right of way of the transmission lines. The Brazilian legislation and internal resolutions of ENDESA establish definite procedures for this process.

After the ascertainment of the necessity of the passing of transmission lines through private properties, the Brazilian Ministry of Mining and Power, through the *Agência Nacional de Energia Elétrica* (National Agency for Electric Power) – ANEEL, by means of a resolution, declares the area as public utility, determining also its recording in a public writ as a strip of perpetual servitude (Decree Law 3.365/41).

After this, the power generating company and the owner must reach an agreement as to the definition and payment due to nuisances and necessary changes for the implementation of the power line and its strip of servitude (necessary for the maintenance of the line), as well as the indemnity payment for the restrictions inflicted to the area by the transmission line, such as the interdiction of clearance of

ground by fire, sport fields, dams, parking lots, reforestation or vegetal species more than 3 meters high, and so on.

The criteria for the payment of indemnities used by ENDESA are:

- Risks and nuisances from the building, maintenance and inspection of the Transmission Line;
- Electromagnetic nuisances;
- Environmental effects;
- Form and percent of the servitude area in relation to the total area of the landed property;
- Level of restriction to which the landed property shall be subjected;
- Building restrictions in servitude area;
- Socio-economic viability of the remainder of the landed property;

In accordance with the above criteria, the values paid can range from 1 to 99% of the value of the affected grounds.
In addition to these, the following items are evaluated for the purpose of indemnities:

- The market value of the wood that shall be removed, 40% of this value being paid for the wood salable by the owner and 100% for the wood that cannot be sold by the owner.
- Damages to the agriculture, according to the productivity and average price of the product, ensuring at least the price stipulated by the federal government;

The concessionaire must also pay for the eventual removal of betterments out of the strip of servitude, considering the costs of labor and materials.

After the computation of the values and the documentary evaluation, the payment is done through a to-order check to the owner, of a bank in the region, after the signature of receipts, writs and other legal documents.

The document that declares the public utility and allows the beginning of the evaluation and indemnity process for the strip of servitude of the transmission line Endesa Fortaleza thermoelectric plant – Cauípe is the ANEEL Resolution No. 397, of July 30, 2002

For the installation of Endesa Fortaleza thermoelectric plant and the substation, 1(one) property was bought, including the right of way through 3 (three) properties.

The value negotiated for the acquisition of the property where the power plant and substation are being built was R$ 165,000.00 (U$ 45,600.00).

The process of negotiation began with the hiring of the ANÁLISE Company, which evaluated the possible impacts of the implementation and maintenance of the transmission line on the individual properties (in annex 2 its shown legal documents and assessment of compensation for the areas utilized to the implementation of the power line and its strip of servitude).

Based on the above criteria, basic prices were defined for the payment of indemnities to each owner; the values proposed and effectively paid after the negotiations shown in Table 3.

Table 3 Evaluation values and values paid to each owner

Owner	Area declared as strip of servitude (ha)	Evaluation value (R$)	Value paid (R$)	Value paid (U$)
José Roberto B. Ferreira	1,517.2	6,577.05	9,000.00	2,486.00
Mônica Beatriz P. Sampaio [1]	2,606.8	11,300.46		
MPX – TERMOCEARÁ Ltda.	0,6568	2,847.22	2,847.22 [2]	790,00

1 – Owner wants to sell the property and does not accept to negotiate an indemnity; situation sub judice.

2 – Negotiation in final stage; the owner accepted the values and in a few days an agreement will be signed.

4 ENVIRONMENTAL ASSESSMENT OF THE INSTALLATION AND OPERATION OF ENDESA FORTALEZA THERMOELECTRIC PLANT

4.1 APPLICABLE BRAZILIAN LEGISLATION

The process of environmental licensing was created by the Law No. 6.938 of 1981, which defined the national policy for the environment. One of the instruments created for the enforcing of the Policy is the environmental licensing.

In 1986, the National Environmental Council – CONAMA regulated and detailed the environmental licensing process, through the Resolution No. 001 of 1986, later modified by the Resolution No. 237 of 1998.

These legal charters define the kinds of licenses, the government levels through which the processes should go and the necessary studies for the attainment of each license.

They determine that the licensing of Endesa Fortaleza thermoelectric plant should be granted by the state environmental agency (SEMACE), the installation and operation licenses being a precondition.

The requested studies should list the possible impacts of the power plant on:

- Physical Environment
- Water
- Air
- Soils and Subsoils
- Biotic Environment
- Fauna
- Vegetation
- Socioeconomic Aspects

The studies should also define the measures for the elimination and/or minimization of the foreseen impacts, as well as the compensatory measures established by the Law No. 9.985, of 2000, regulated by the Decree No. 4.340 of 2002.

Besides complying with the requisites of the federal legislation, the licensing process of Endesa Fortaleza thermoelectric plant also complies with the state norms regulated by:

- Law No. 11.411 of 1987, which defines the policy of Ceará State for the environment.
- Ordinance No. 518 of 1994 which regulates the licensing system of activities using environmental resources within Ceará State.
- Ordinance No. 201 of 1996 which regulates the licensing of activities using environmental resources within the Ceará State.

Besides the legal documents concerning the licensing, all the stages of the project and operation of Endesa Fortaleza thermoelectric plant should respect standards of emissions, effluents, noise, and residues destination.

The main regulatory agency is CONAMA, related to the Ministry of Environment, Hydrous Resources and Legal Amazon; the main legal documents concerning standards and emissions are:

- CONAMA Resolutions: No. 313, Year:2002 - "Regulates the National Inventory of Solid Industrial Residues";
- CONAMA Resolutions: No. 307, Year:2002 - "Establishes guidelines, criteria and procedures for the management of civil construction residues".
- CONAMA Resolutions: No. 242, Year:1998 - "Establishes upper limits for the emission of pollutants".
- CONAMA Resolutions: No. 008, Year:1990 - "Regulates the standards of the air quality, established in PRONAR".
- CONAMA Resolutions: No. 003, Year:1990 - "Regulates the standards of the air quality, established in PRONAR" – Legislation date: 06/28/1990 - Publication in the DOU (Union Official Diary): 08/22/1990
- CONAMA Resolutions: No. 001, Year:1990 - "Regulates criteria and standards of noise emission of the industrial activities".

ABNT, *Associação Brasileira de Normas Técnicas* (Brazilian Association of Technical Norms) is another institution which studies and defines standards concerning residues, effluents and emissions. More than 100 Brazilian technical norms – NBR were launched about these subjects to the present moment.

It should be reminded that the ABNT is not a regulatory agency with legal force; in spite of its norms being produced by experts, only some of them are assumed by legal texts. Nevertheless, they are recognized and used as technical references.

4.2 HEALTH AND OCCUPATIONAL SAFETY LEGISLATION

The well being, health and safety of the people involved in the works and activities of Endesa Fortaleza thermoelectric plant , both in the implementation and operational stages, are regulated by the Brazilian work legislation and regulated by the Regulatory Norms – NRs of the Ministry of Employment.

The norms determine the evaluation of the working conditions, including risks, exposures, comfort and other situations to which all workers may be submitted in the working environment and activities, determining also the corrective and/or mitigation measures of the unsatisfying conditions according to the legislation or technical norms.

The main norms in effect refer to:

- **Occupation Health and Medical Control Program – NR 07**

According to the legislation, the Occupation Health and Medical Control Program (PPRA) aims at the preservation of the workers health and integrity, through the anticipation, recognition, evaluation and resulting control of the occurrence of environmental risks existing or that may come to existence in the working environment, considering the protection of the environment and natural resources.

The PPRA should include the physical, chemical and biological agents existing in the working environment, which, due to its nature, concentration or intensity and exposition time, may inflict damages to the worker's health.

Considering:

Physical agents as the various forms of energy to which the workers may be exposed, such as: noise, vibrations, abnormal pressures, extreme temperatures, ionizing radiations, as well as infrasound and ultrasound.

Chemical agents as substances, compounds or products which may penetrate the organism through the respiratory tract, in the forms of dust, smoke, mist, haze, gas or vapor, or which, due to the nature of the exposure activity, may have contact with or be absorbed by the organism through the skin or by ingestion.

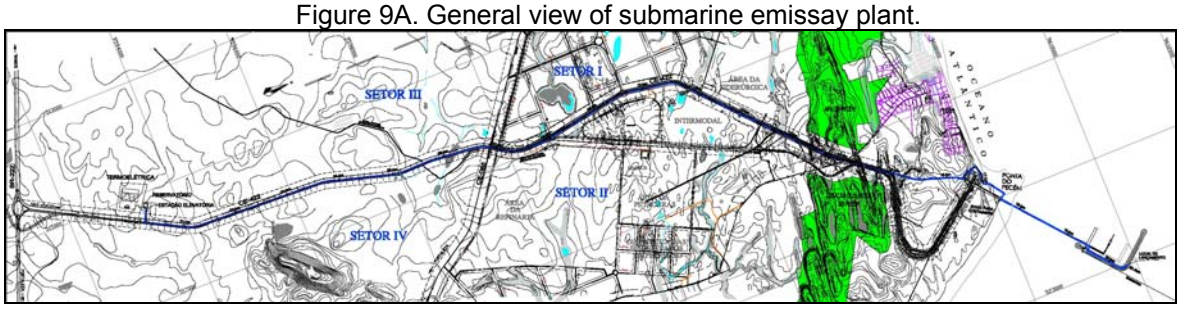
Biological agents as bacteria, fungus, parasites, protozoans, virus, among others.

- **Environmental Risk Prevention Program – NR 09**

The Environmental Risk Prevention Program (PCMSO) shall consider the issues affecting the individual and the collectivity of workers, favoring the clinical-epidemiological instruments in approaching the relation between their health and work. It shall be characterized by the prevention, monitoring and premature diagnosis of health hazards connected to the work, including of subclinical nature, as well as the confirmation of cases of illnesses related to work or irreversible damages to the workers' health. The PCMSO shall be planned and implemented based on the risks to the workers' health, especially those identified in the evaluations established in the other NRs.
Other regulations are the NR 05, which determines the mapping, in all facilities of the power plant/company, of areas of biological, chemical and physical risks, and which may also include the ergonomic risk, and the NR 06, which regulates the usages, kinds and dispositions of individual protection equipments.

Besides the environmental legislation and the legislation concerning the worker's health and safety, Endesa Fortaleza thermoelectric plant also complies with the legislation and norms concerning the electric sector.

Figure 9A. General view of submarine emissay plant.



5 EXPECTED IMPACTS

The negative impacts of the installation and operation of Endesa Fortaleza thermoelectric plant can be considered relatively mild compared to other works for the implementation of the power plant.

This is due to the size of the works, its characteristics, the localization (within a licensed industrial district) and the high degree of anthropomorphization of the intervention and direct influence areas.

Even the unit operation's adverse impacts shall be insignificant, as the fuel to be used, the chosen technology and the control programs in place shall assure the absence of environment relevant impacts.

On the other hand, great benefits shall result from the increase of electric power supply in CIPP and Ceará State, due not only to the increase itself, but also to the guaranty of power supply for the companies intending to set up in CIPP.

Following is a summary of the environmental components evaluated in the studies performed and, in case of negative impacts, the related corrective measures.

The information was separately grouped for the stages of implementation and operation, as the impacts and measures have different characteristics in each stage.

5.1 INSTALLATION STAGE

5.1.1 Air Quality

The studies determined that the current air quality in the area where Endesa Fortaleza thermoelectric plant will be installed complies with national and international standards. The main polluting sources identified were the motor vehicles, which transit through the local roads and the clearing of ground by fire, common in the region.

During the implementation stage, the pollutant materials consist basically of:

- Gases produced by combustion engines, which use diesel and gasoline as fuels;
- Particulate material.
- Vapors of paint and solvents, smokes and metallic dust, in smaller proportions.

During this stage of the power plant implementation, the main contribution will be the generation of dust and particles, due to the movement of machines and heavy equipment in the building site and climatic and soil conditions.

- Action: Earthwork and civil construction work.
- Aspect: Generation of particles and gas emissions
- Impact: Local air quality change.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Insignificant to small	Temporary	Reversible

5.1.2 Noise and Vibrations

During the elaboration stage of the preliminary environmental studies, the levels of equivalent noise (LAeq) were monitored and the L90 was statistically computed, both in dB (A). The levels monitored (LAeq) and computed (L90) (table 4).

The criterion level adopted was the background noise, L90 (statistical) because the monitored noises varied during the monitoring, and sources were observed concerning the vehicles movement on the access road to the port of Pecém.

Table 4. Levels of environmental noise, equivalent (Leq) and L90 in dB (A)

Shift	Point 1	
	LAeq	L90
Morning	46.0	37.0
Afternoon	52.0	42.0
Night	50.0	44.0

The noise sources observed during the monitoring were restricted to the action of the wind on the vegetation and the low vehicles movement on the access road to the port

of Pecém. The temperature ranged between 20°C and 29°C, with mean winds during the monitoring; the monitoring equipment had a windscreen.

No agents were observed with the potential to generate noise that would increase or change the verified levels. The area designated for the implementation of the power plant, as well as its surroundings, is mainly void of human, industrial, building or assembly activities with generation of stationary or impulsive noise, with no expectation of significant changes on the monitored noises here presented.

According to the literature on the implementation of similar power plants, the main generating sources present the following noise levels, as shown in Table 5.

Table 5. Noise levels in civil construction and assembly works at a distance of 15 m.

Equipment	Noise level dB (A)
Truck	67.4
Dump truck	54.7
Concrete scraper	57.2
Concrete scraper/washing	62.5
Münck truck	63.0
Van	60.9
Diesel van	56.6
Trailer with container	64.0
Air brake trailer	64.2
Mechanical shovel	62.5
Backhoe	64.1
Disk saw	58.0
Concrete vibrator	58.2

Source: MRS Estudos Ambientais Ltda. 1998.

Based on the above noise sources, we can assert that they will be surpassed by those generated during the works, in a magnitude greater than or equal to 3 dB (A), within a radius of 240 meters from the boundaries of the implementation ground, considering the possible wind action. This estimate is based on the attenuation of the noise level propagated outdoors resulting from the distance (logarithmic decrease curve/attenuation of 6 dB (A) at each doubling of the distance). We assume the performance of the works on an indiscriminate basis in the implementation area, without considering the noises emitted on the nearby access roads.

For similar works, it is assumed that the population can suffer various kinds of disturbances within a radius of 240 meters (table 6).

Table 6. Estimated community response to the noise during the implementation stage, according to distance/nbr 10,151/87/logarithm decrease curve applied (Note: non-populated area)

Distance from the boundaries of the ground	ΔDB (A)(*)	Estimated community potential response	
		Category	Description
Up to 15 m	30.4	Very high	Vigorous community action
From 15 m to 30 meters	24.4	Very high	Vigorous community action
From 30 m to 60 meters	18.4	High	Community action
From 60 m to 120 meters	12.4	Moderate	General complaints
From 120 m to 240 meters	6.4	Low	Sporadic complaints
From 240 m to 480 meters	0.4	None	No reaction observed

(*)ΔdB (A): Value in dB (A) by which the source sound level surpasses the environmental noise.

As there are no groupings or communities within a radius of 240 meters, the noise generation impacts can be considered negligible.

- Action: Earthwork and civil construction works.
- Aspect: Noise levels increase in the area
- Impact: Local disturbance.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Small to medium	Temporary	Reversible

5.1.3 Geology, Geomorphology and Soils

The major impact concerning the geology, geomorphology and soils during the implementation stage of the power plant refers to the earthwork, which results in the landscape levelling and vegetal suppression. This impact, however, might be milder on the power plant area, due to the absence of declivities considered median or high, which would require major interventions in soil removal or earthwork to reach the ground project height (25.5 meters).

- Action: Earthwork.
- Aspect: Transformation of rural area in industrial.
- Impact: Local characteristics change, vegetation suppression and landscape change.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Small to medium	Permanent	Irreversible

- Action: Earthwork.
- Aspect: Rubble generation.
- Impact: Degradation of rubble deposit areas

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Small to medium	Permanent	Reversible

The areas for parts and vehicles painting and washing can contaminate the soil at isolated spots. Due to the low volume of this kind of activity, the impact can also be considered small.

- Action: Parts and equipment maintenance, painting and washing.
- Aspect: Generation of greasy and chemical effluents.
- Impact: Soil contamination and/or degradation.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Small to medium	Temporary	Reversible

5.1.4 Water Resources

The water for the various stages of the power plant will not come from the region's water table. All the water to be consumed shall be supplied by the *Companhia de Gestão de Recursos Hídricos do Estado do Ceará* (Ceará State Water Resources Management Company) – COGERH.

The water will come from the *Sítios Novos* Reservoir, operated by COGERH, which belongs to the hydraulic complex constructed on the Anil River basin expressly to supply CIPP with water.

The crude water to CIPP is supplied by the Main Aqueduct of Sítios Novos/Pecém, with a maximum outflow of 2m³/s. This aqueduct has an extension of 23,29 km, including the siphons and road-crossing works.

The superficial water resources availability of CIPP and the region as a whole is related to the accumulation capacity of the following dams: Sítios Novos, Cauípe and Anil (to be constructed), of which the main characteristics are listed in Table 7.

Table 7. Maximum Alert Volumes Adopted, Regulated Outflows and Emergency Demands

Reservoirs	Maximum volumes (hm^3)	Guaranty 95%				Guaranty 99%			
		Qreg (m^3/s)	Alert volume		Emergency demand	Qreg (m^3/s)	Alert volume		Emergency demand
			(hm^3)	(% Max V)			(hm^3)	(% V Max)	
Anil	15	0.195	4.16	27.00	0.098	0.185	2.84	18.91	0.093
Cauípe	12.19	0.182	3.71	30.43	0.091	0.169	2.29	18.92	0.084
Sítios Novos	123.20	1.028	34.82	28.26	0.514	0.937	19.62	15.93	0.468

Note. Sítios Novos and Cauípe dams are already functioning and the Anil dam is in the implementation stage.

Besides these resources, studies are being conducted for the construction of one more dam, called Ceará dam, on the basin of the river with this name.

The water supply complex presents also an operational control reservoir channel of 15.600m³, supplying a water station responsible for the lowering of the crude water to a compensation and distribution reservoir of 40,000m³ (step 1) and 50,000m³ (step 2).

The monthly average consumption concerning only the human consumption during the installation stage of Endesa Fortaleza thermoelectric plant was 1.105 m3. Based on the water resources availability, it can be assumed this value has only a small to medium impact, according to some seasonal factors, as the periods of rains or droughts.

- Action: Endesa Fortaleza thermoelectric plant implementation civil construction works.
- Aspect: Water consumption for human use and the implementation of Endesa Fortaleza thermoelectric plant .
- Impact: Reduction of the regional water resources availability.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Regional	Small to medium	Temporary	Reversible

The impacts on the local water resources during the implementation stage of Endesa Fortaleza thermoelectric plant shall be restricted to possible for the removal of earth,

resulting from the civil construction works and earthwork, greasy and chemical residues from machines, equipments and construction processes, as well as domestic effluents produced in changing rooms, restrooms, kitchen and cafeteria of the building site.

- Action: Endesa Fortaleza thermoelectric plant implementation earthwork and civil construction works.
- Aspect: Solid and liquid materials removal to the natural drainages and local water tables.
- Impact: Degradation and/or contamination of local water tables.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Small to medium	Temporary	Reversible

5.1.5 Solid Residues

During the implementation stage of Endesa Fortaleza thermoelectric plant , the generated solid residues include domestic residues from the restrooms, kitchen and cafeteria of the building site, construction rubble, classified as class 3 residues according to NBR 10004/87. It occasionally also included materials contaminated by paints, oils and greases from the cleaning, maintenance and supply of machines and equipments, rated as class 1 residues by the above NBR.

- Action: Endesa Fortaleza thermoelectric plant implementation civil construction works.
- Aspect: Domestic and industrial solid residues generation.
- Impact: Degradation and/or contamination of soils and subsoil.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Small to medium	Temporary	Reversible

5.1.6 Marine Environment

According to the studies, the air emissions, liquid effluents and solid residues generated during the construction stage of the power plant will not reach or affect the marine environment.

5.1.7 Biotic Environment

In the intervention area (where the works will be performed) and in the power plant direct influence area, the carnauba tree remains an outstanding element, due to the exploratory use of its leaves for the extraction of carnauba wax, with large industrial usage.

In the region can be found a few arboreal and shrubby species, typical of the secondary successional stage, such as the quince tree (Croton sonderianus), typical of the interior Shrubby Caatinga (Secondary), which invades the altered areas, as in the studied case, where this species dominates the vegetal community. Other species present are *Jurema Branca* (Piptadenia stipulacea) and the *Jiquiri* (Mimosa arenosa), also typical of the Caatinga.

Due to the degradation of the vegetation and local soils, the fauna is limited to small animals, no legally protected species or species that should be preserved having been identified.

Due to the region change level, including its transformation in an industrial district, the installation of Endesa Fortaleza thermoelectric plant in an area limited to 17.05 ha does not imply any increase on the degradation level, as the area belongs to an industrial district which is already changing the local landscape from rural to industrial.

- Action: Endesa Fortaleza thermoelectric plant implementation civil construction works.
- Aspect: Suppression of degraded vegetal formations.
- Impact: Landscape change, vegetal species elimination and fauna disturbance.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Small	Permanent	Irreversible

5.1.8 Protected Natural Areas

There are 6 Protected Natural Areas in the influence area of Endesa Fortaleza thermoelectric plant :

1 – Ceará Botanical Park

- Legal Charter: Decree No. 24,216 of 09/09/96
- Area (ha): 190
- Region/ Municipality: Fortaleza/Caucaia
- Ecosystem: Coastal Vegetation Complex

2 - Environmental Protection Area of Lagamar do Cauípe

- Legal Charter: Decree No. 24,957 of 06/05/98
- Area (ha): 1,884.46
- Region/ Municipality: Caucaia
- Ecosystem: Lacustrine/Coastal Vegetation Complex

3 - Environmental Protection Area of Pecém

- Legal Charter: Decree No. 24,957 of 06/05/98
- Area (ha): 122.76
- Region/ Municipality: S. Gonçalo do Amarante
- Ecosystem: Lacustrine/Coastal Vegetation Complex

4 - Environmental Protection Area of the Ceará River Estuary

- Legal Charter: Decree No. 25,413 of 03/29/99
- Area (ha): 2,744.89
- Region/ Municipality: Caucaia
- Ecosystem: Mangrove swamp

5 – Pecém Ecological Station

- Legal Charter: State Decree No. 25,708 of 12/17/99
- Area (ha): 800
- Region/ Municipality: Caucaia and São Gonçalo do Amarante
- Ecosystem: Dunes

6 – Pecém Botanical Garden

- Legal Charter: Law No. 13,089 of 12/09/00

- Area (ha): 19,405
- Region/ Municipality: São Gonçalo do Amarante
- Ecosystem: Lacustrine/Coastal Vegetation Complex

Nevertheless, the power plant implementation works and activities shall not impact these units or the nearer units, the APA of Pecém and the EE of Pecém.

5.1.9 Anthropomorphic Environment

As already stated, the power plant area is being installed in an industrial district, significantly changing the regional trend. Changes in the social and economical structure of Caucaia and São Gonçalo do Amarante municipalities are expected at medium term.

The most affected urban cluster is the community of Pecém District, next to the port, as the implementation of the CIPP is changing the habits and way of life of people who originally found their profession and livelihood in the fishing. According to the Environmental Impact Study of Endesa Fortaleza thermoelectric plant , the population is in a transition stage to economic activities linked to CIPP. This change will also lead to the transformation of the regional/local landscape from rural to industrial.

On the other hand, the CIPP implementation allowed a fast life quality and urban structure change, especially in the District of Pecém, with the implementation of services and utilities absent until the middle 1990's, as sanitation, piped water, urban cleaning and others.

Thus, the implementation of the Thermoelectric Plant shall be another investment, which can help the development of the local and regional economy.

- Action: Endesa Fortaleza thermoelectric plant implementation civil construction works.
- Aspect: Investments provided to site and region.
- Impact: Local/regional economy increase.

Type	Nature	Extension	Magnitude	Duration	Characteristic

Positive	Direct and indirect	Local to regional	Medium to big	Permanent	Irreversible

In the intervention area of Endesa Fortaleza thermoelectric plant installation works, there are no communities or urban cluster, the population being limited to 30 people living in isolated houses, which cannot be considered a human cluster.

According to the studies carried out, no Indian groups or areas were identified that could be impacted by the implementation of Endesa Fortaleza thermoelectric plant or induce legal procedures against the power plant.

- Action: Endesa Fortaleza thermoelectric plant implementation civil construction works.
- Aspect: Area acquisition.
- Impact: Dwellers removal.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Insignificant	Permanent	Irreversible

As already stated, the regional infrastructure was designed to receive the impact of the industries installation. Therefore, the road system, water and power supply, and other utilities are in condition to receive not only Endesa Fortaleza thermoelectric plant but also other industries simultaneous.

- Action: Endesa Fortaleza thermoelectric plant implementation civil construction works.
- Aspect: Pressure increase on local and regional infrastructure.
- Impact: Traffic problems and greater water and power resources consumption.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local to regional	Insignificant to small	Temporary	Reversible

The installation of Endesa Fortaleza thermoelectric plant will lead to an increase on the offer of temporary jobs, not only for the municipalities of Caucaia and São Gonçalo do Amarante, but for Greater Fortaleza too, as the monthly workers average shall be 500. Currently the number of workers ranges from 950 to 1,000, 50% coming from the district of Pecém (which represents 6% of this locality total population), and the remainder from various localities of Greater Fortaleza.

Another positive aspect is the location of the power plant, in the vicinity of several cities and towns, especially of Greater Fortaleza, allowing for local/regional-scattered labor. Therefore, Caucaia will not be used as a dormitory-city for commuter workers, which could bring trouble and jeopardize sanitation, health, transport and other structures.

Currently São Gonçalo do Amarante has a population of 35,534 inhabitants, 22,049 living in the urban areas. Caucaia is the second most populated municipality in Ceará, surpassed only by Fortaleza. Currently it has a population of 250,246 inhabitants. It is the greatest municipality of Greater Fortaleza in extension, with a mainly urban population.

Both municipalities have a not much evolved economy. Caucaia is considered a dormitory-municipality, as the majority of its employed population works in Fortaleza.

The studies show that they expect that their economies may evolve with the development of the CIPP. Thus, in a general way, all power plants directed to the CIPP are viewed as positive by the majority of the population.

Due to this local/regional economic stagnation, the job offer during the installation stage is very positive, especially for manual labor activities, admittedly the most critical activities for the obtainment of jobs.

- Action: Endesa Fortaleza thermoelectric plant implementation civil construction works.
- Aspect: Labor hiring with diverse specialization levels.
- Impact: Increase in the population job level.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Positive	Direct	Local to regional	Regionally small Locally from medium to big	Temporary	Reversible

5.1.10 Archeology and Paleontology

No traces of archeological or paleontological sites were identified in the power plant intervention area. This statement is confirmed by data from the Institute for Historical and Cultural Heritage.

5.1.11 Associated Infrastructure

The operation of Endesa Fortaleza thermoelectric plant will require the construction of a small gas pipeline. The gas supplying company, PETROBRAS, shall be responsible for the works.

This company has a tradition in this kind of works and satisfies some basic principles for this kind of works:

- The layout is determined with the aid of aerophotogrammetric and field surveys so as to minimize the environmental impacts;
- The project, construction and operation of the pipeline use the most advanced techniques applicable to this kind of power plant;
- For safety, the pipeline is installed at a depth that ranges from 0.60 to 1.50 m, and in the case of the crossing of rivers it is installed at the minimum depth of 1.50 m under the riverbed;
- In the crossing of roads and railways, the gas pipeline receives a special shielding so as to endure the constant circulation of trains and trucks;
- Its integrity is guaranteed by an external antirust shielding, consisting of a coating and cathodic protection;
- The operation is monitored on its whole, on a permanent and centralized basis;
- Safety valves are installed along the path to automatically block the gas way in case of leakage.

5.2 OPERATIONAL STAGE

5.2.1 Air quality

According to carried out studies, factors that might alter the quality of air during operational stage of the plant are those that result from fuel burning used to power turbines. However, as previously stated, the type of fuel selected is one of the least impacting options on the environment, since it presents low impurity rates, allowing an almost total burning with very low pollutant residue generation. The average composition of natural gas is shown on Table 8.

Table 8 - Composition of Natural Gas

Component	Percentage
CH4	83.7%
C2H6	11.0%
C3H4	0.84%
N2	1.51%
CO2	2.93%
H2S	20 mg/m3

Air emissions originating from Endesa Fortaleza thermoelectric plant operations will be permanent, in accordance to technology standards to be implemented, consisting of: inhaled particulate material (PM-10), sulfur dioxide (SO2), carbon monoxide (CO) and nitrogen oxides (NOx), originating from the burning of 66.600 Nm3/h of natural gas (on 100% capacity), distributed into two stationary gas turbines.

Air emissions considered in this study are based on the information provided by manufacturer–ALSTOM Turbine, ALSTOM GT11N2 model. This information is presented below for each turbine working at 100% load capacity:

- Inhalable Particulate Materials: 2 g/s, on combustible gases
- Sulfur Dioxide: 5 ppmvd (15% O2), on combustible gases
- Carbon Monoxide: 8 ppmvd (15% O2), on combustible gases
- Nitrogen Oxide: 25 ppmvd (15% O2), on combustible gases

- Each turbine will emit, at maximum capacity, 1,013,593 Nm3/h of gases with approximately, 12% O2 and 9,4% humidity.

- The transformation of gas outflow to a dry base and 15% of oxygen, will lead to 1.379.974 Nm3/h (15% dry O2).

Under these conditions, atmospheric emissions for each of Endesa Fortaleza thermoelectric plant turbine will follow the emission standards of Table 9.

Table 9 - Emissions and emission standards considered for the operation of each turbine.

POLLUTANT	EMISSION PER TURBINE (g/s)	EMISSION PER TURBINE TRANSFORMED TO A DRY BASE (mg/Nm3-@15%dryO2)
Particulate Material (PM-10)	2.00	5.22 *
Sulfur Dioxide (SO2)	5.48	14.29 *
Carbon Monoxide (CO)	3.83	10.00 *
Nitrogen Oxide (NOx)	19.68	51.34 *

(*) Values that were utilized in the dispersion model of the emissions.

Total maximum emissions resulting from operation of both turbines are presented on Table 10.

Table 10 - Total Maximum Emissions (g/s) from Endesa Fortaleza thermoelectric plant

POLLUTANT	TOTAL EMISSIONS (g/s)	TOTAL EMISSIONS TRANSFORMED TO A DRY BASE (mg/Nm3-@15%dryO2)
Particulate Material (PM-10)	4.0	5.22 *
Sulfur Dioxide (SO2)	10.96	14.29 *
Carbon Monoxide (CO)	7.66	10.00 *
Nitrogen Oxide (NOx)	39.36	51.34 *

(*) Values that were utilized in the dispersion model of the emissions.

These maximum emissions will be released through two 35-meter high smoke stacks.

The scenario for this study considered that both turbines would start their operations simultaneously, at 100% load capacity, emitting the pollutant quantities presented on Table 8.

Maximum impact concentrations resulting from the simulations are presented on Table 11.

Table 11. Maximum Impact Resulting from Endesa Fortaleza thermoelectric plant Emissions

Pollutant	Observation period	(I) Maximum increment ($\mu g/m^3$)	(II) Base line ($\mu g/m^3$)	(I)+(II) Maximum concentration ($\mu g/m^3$)	Brazilian's Air quality standards CONAMA Nº3/90 ($\mu g/m^3$)	World Bank's Air quality standards ($\mu g/m^3$)
PM-10	24 hours	0.90	46.0	**46.90**	150	150
	1 year	0.20	-	**-**	50	50
SO_2	24 hours	4.40	21.4	**25.80**	365	150
	1 year	0.54	-	**-**	80	80
CO	8 hours	7.00	-	**7.00**	10,000	-
	1 hour	21.6	-	**21.6**	40,000	-
NO_2	1 hour	111.0	97.0	**208.0**	320	-
	1 year	1.96	-	**1.96**	100	100

Studies and simulations determined that even working at full capacity, Endesa Fortaleza thermoelectric plant would not generate significant levels of atmospheric pollutant.

Authors of pollutant dispersion studies came to the following conclusions:

"Maximum impact originated by Endesa Fortaleza thermoelectric plant operations, at full capacity, will not cause side effects to the health of surrounding population (e.g. respiratory problems). There will be no side effects on the environment as well, since resulting air quality will meet required standards, which guarantees prevention from harmful impacts.

Therefore, regarding impact on air quality, there are no obstacles for the installation of Endesa Fortaleza thermoelectric plant , with the proposed technological control bases for the fuel that will be burned."

- Action: Endesa Fortaleza thermoelectric plant operation at 100% capacity.
- Aspect: Fuel burn and generation of emissions.
- Impact: Increase of air pollutant levels and reduction of air quality.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Regional and local	Insignificant	Permanent	Irreversible

5.2.2 Noise and Vibration

Noise generated during operation of the thermoelectric plant will originate predominantly from gas turbines and associated equipment. According to information gathered from the turbine manufacturer, highest noise level is generated close to the smoke stack, where fumes resulting from the burn of natural gas are expelled. The noise level is around 85 dB (A), measured 1 meter from the maximum generation point.

Since the plant consists of two gas turbines, the noise logarithm addition results in the emission of 88 dB(A), considered to be the noise source. The center of noise generation considered for its propagation estimate is the imaginary intersection between the smoke stacks' axis.

Regarding reduction of noise level propagated in open areas due to distance (logarithm declination curve / reduction of approximately 6 dB(A) for each distance fold), it is understood that there will be a concentric noise reduction.

The surrounding population notices the effects of those noise levels in a more or less intense way, depending on existent background noise (noise levels without the plant's operation). The louder background noise is, the less noticeable the noise source (power plant) will be, and vice-versa.

The estimated community response to the noise levels was established based on the information on background noise levels, according to NBR 10.151 (Table 12). It is important to emphasize that the procedure aims to only quantify the estimated exposed community, since the surrounding area is uninhabited.

Table 12 - Estimated community response to noise levels during the operational stage, according to distance/NBR 10.151/ logarithm decrease curve applied (Note: uninhabited area)

Distance from smoke stacks' axis (m)	Noise level (dB(A))	Point location and anticipated increase in noise level, as of operation ΔdB(A):increase in noise level based on noise generation at source	Estimated potential response from community according to. NBR 10.151/87	
			Category	Description
1	≅ 88	-x-	Very high	Vigorous community action
32	≅ 58	ΔdB(A) = 18,1 dB	High	Community action
64	≅ 52	ΔdB(A) = 12,1 dB	Moderate	**General** complaints
128	≅ 46	ΔdB(A) = 6,1 dB	Low	Sporadic Complaints

These noise levels indicate that, at a distance of approximately 512 meters from the maximum noise generation point, the increase of sound pressure over the level of measured criteria (background = 37 dB(A)) around 6,1 dB(A), which leads to a mild response from the community and sporadic complaints. Some noise alteration in this area can be the result of wind.

The population affected includes those eventually found in the surrounding areas, working for companies that might in the future occupy adjoining lands. The population affected is the one not directly connected to the power plant, working in the previously mentioned surrounding areas and the plant's working population.

- Action: Endesa Fortaleza thermoelectric plant operation at 100% capacity
- Aspect: Gas turbines activation
- Impact: Increase of noise levels.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Small	Permanent	Irreversible

5.2.3 Geology, Geomorphology and Soils

Endesa Fortaleza thermoelectric plant operational characteristics do not impose a threat to the local or regional geology and geomorphology. The possibilities of environmental impact are restricted to the manipulation of potentially dangerous

chemical products that may cause accidents that could contaminate the soil and generate various types of residue.

- Action: Operation and maintenance of Endesa Fortaleza thermoelectric plant .
- Aspect: Chemical leakage during manipulation or storage.
- Impact: Soil contamination.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Small to medium	Temporary	Reversible

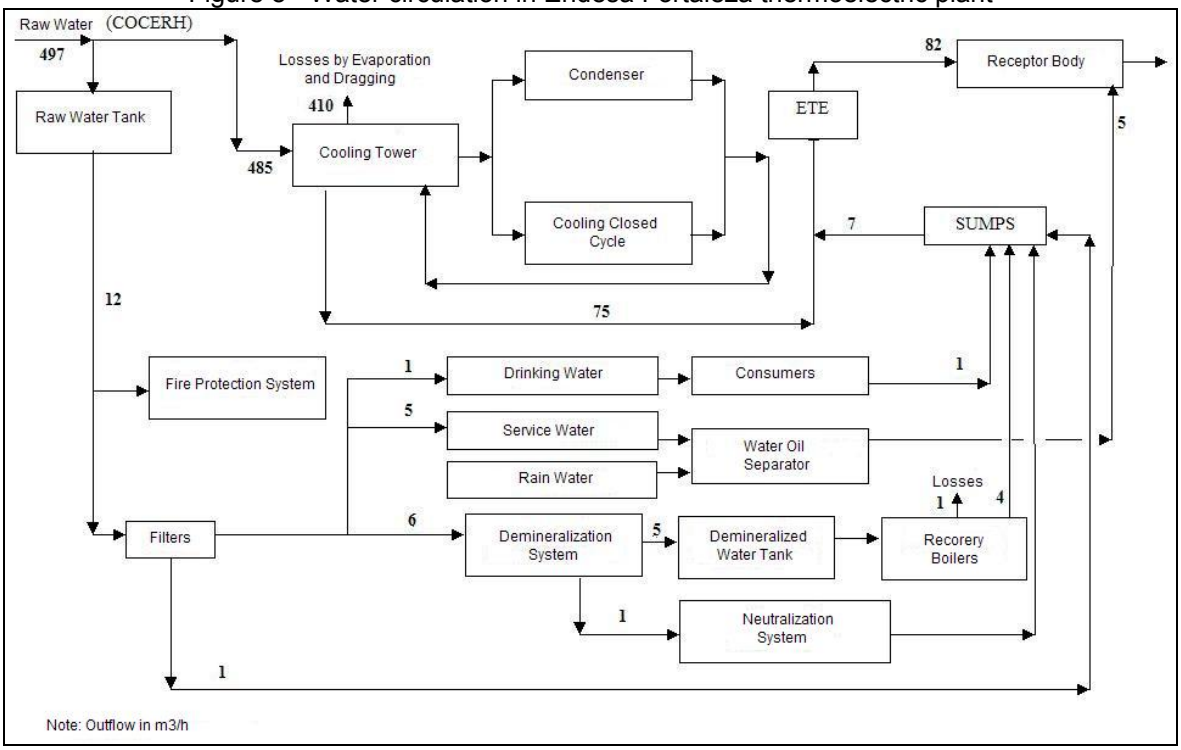
- Action: Operation and maintenance of Endesa Fortaleza thermoelectric plant .
- Aspect: Generation of residues.
- Impact: Soil contamination.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Small	Temporary	Reversible

5.2.4 Water Resources

One of Endesa Fortaleza thermoelectric plant basic elements is water, which is provided by COGERH, in a gross volume of 497m^3/h, derived from the water complex built to supply the CIPP. A diagram of water circulation in the plant is shown on Figure 8.

Figure 8 - Water circulation in Endesa Fortaleza thermoelectric plant



A summary of water consumption is shown on Table 13.

Table 13 - Summary of water consumption at Endesa Fortaleza thermoelectric plant

WATER CONSUMPTION		
Maximum demand of raw water to be processed	m^3/day	497 x 24
Process water for the cooling tower	m^3/day	485 x 24
Replacement boiler	m^3/day	5 x 24
Maximum demand of evaporated water from the cooling tower	m^3/day	410 x 24

As previously stated, the system projected by COGERH is capable of supplying water to CIPP, which will minimize the demand on local and regional water resources.

- Action: Endesa Fortaleza thermoelectric plant operation.
- Aspect: High water consumption.
- Impact: High demand of water resources.

Type	Nature	Extension	Magnitude	Duration	Characteristic

Negative	Direct	Regional	Small to medium	Permanent	Irreversible

Other impact factors resulting from the plant's operation are related to generation of effluents originating from the industrial zone and domestic waste.

The industrial effluents basic constitutions consist of:

Drainage effluents, washing of the industrial buildings and shops' floors as well as of other areas where oil might be stocked.

Effluents from the discharge of the recovering boiler, from the discharge of the cooling tower, and from the discharge of drinkable and demineralized water treatment stations.

The estimated industrial effluent volume is approximately 84 m^3/h (2016 m^3/day). The domestic estimated volume is 1m^3/day, considering 50 l/person/day.

Main products and substances which will form the liquid effluent and which might eventually cause soil contamination are described on Table 14.

Table 14 - Main substances and chemical products that will be used in the operation and maintenance of Endesa Fortaleza thermoelectric plant

Use	Product	Quantity (approx.)
General use	***Lubricating oil, Hydraulic oil, Grease, Paint, Solvents and cleaning products.***	Small amounts stored for a limited time
Demineralization system (anionic and cationic)	Hydrochloric Acid HCL 35% Sodium Hydroxide NaOH 48%	50 kg/day 30Kg/day
Drinking water system	Sodium hypochlorite NaClO 12%	0,6 kg/day
Cooling tower's water treatment system	Sulfuric Acid 98 % Crust formation inhibitor (ex.Nalco7307) Bio-dispersants (ex.Nalco 7348)	240 kg/day 24 kg/day 15 kg/day
Boiler's water treatment	Morpholine C4H9NO Hydrazine N2H4 80% Trisodium Phosfate Na3PO4 100% Disodium Phosfate Na2PO4 100%	4 kg/day 7 kg/day 3 kg/day 1 kg/day
Effluent treatment	Sulfuric Acid 98%	30 kg/day
Emergency generator and fire pump	Diesel Oil	Small amounts

The effluents will be pretreated at Endesa Fortaleza thermoelectric plant . They will later be sent for treatment by the Companhia de Água e Esgoto do Ceára **(**Ceará Water and Sewerage Company) – CAGECE.

This way, contamination of the water resources can only occur in case there is an accident in storage or manipulation of chemical products, oils and greases used in the plant's operation which might eventually reach the drainage system.

- Action: Endesa Fortaleza thermoelectric plant operation.
- Aspect: Accidents with chemical products' leaks.
- Impact: Contamination/degradation of water resources.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local and regional	Small to medium	Temporary	Reversible

CAGECE stabilish the standard effluents received from all industries of CIPP, including Endesa Fortaleza thermoelectric plant (table 15).

Table 15 CAGECE standards for industrial effluents of CIPP

Parâmetro	Valor Máximo Permissível
pH	6-10
Temperatura (°)	40
Materiais sed. (ml/l)	20
Óleos e Graxas (mg/l)	100,0
Cianeto (mg/l)	0,2
Sulfeto (mg/l)	1,0 mgs/l
Sulfato (mg/l)	1000
Zinco (mg/l)	5,0
Cromo Total (mg/l)	5,0
Cromo Hexavalente (mg/l)	0,5
Cobre (mg/l)	1,5
Cádmio (mg/l)	0,1
Ferro (mg/l)	15,0
Chumbo (mg/l)	1,5
Fluoreto (mg/l)	10,0
Fenol (mg/l)	5,0
DBO (mg/l)	1000
Coli Fecais (NMP org/100ml)	-

After being treated at the CAGECE's treatment station, they will be sent into the ocean through a submarine emissary (Figures 9A, 9B and 9C).

5.2.5 Solid Residues

During Endesa Fortaleza thermoelectric plant operational stage, the generation of solid residues will be restricted to domestic types, derived from the restrooms and cafeteria. Eventually they might come from paint, oils and grease contaminated materials, which are the result of cleaning, maintenance and supply of machinery and equipment. NBR 1004/87 classifies these residues as class 1 residues. Occasional accidents related to the manipulation of products listed on Table 14 might generate dangerous or potentially dangerous residues.

- Action: Endesa Fortaleza thermoelectric plant operation.
- Aspect: Generation of domestic and industrial solid residues.
- Impact: Degradation and/or contamination of soils, subsoils and water resources.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local and regional	Small to medium	Permanent	Reversible

5.2.6 Marine Environment

The operation of Endesa Fortaleza thermoelectric plant will not have a direct impact on the coastal region. Any possible impact will be indirect, since all effluents should receive a final treatment, after which they will be directed to CAGECE's submarine emissary, whose exit is 2,5km from the shore (Figures 9, 9A and 9B).

According to studies regarding the submarine emissary, the characteristics of local currents will allow its contents to quickly dissolve, not creating more problems for the local marine environment.

The emissary and the treatment of effluents are part of the CIPP's licensed processes. According to gathered information, all CIPP's activities have been regulated, including treatment licensing and operation of the emissary, which is the responsibility of CAGECE.

The standards of marine emissaries are determined by CONAMA 020/86 (annex 3).

Action: Endesa Fortaleza thermoelectric plant operation.

- Aspect: Generation of industrial and domestic effluents.
- Impact: Degradation and/or contamination of local shore.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Indirect	Regional	Small to medium	Temporary	Reversible

5.2.7 Biotic Environment

As previously stated, technology used, degradation level, and current use of soils do not indicate that local biotic environment will be put at risk by the operation of Endesa Fortaleza thermoelectric plant .

Eventually there might be some disturbance to the fauna by emissions and noise. In case accidents do occur which might contaminate drainage and water tables, there might be some impact on the local aquatic life.

- Action: Endesa Fortaleza thermoelectric plant operation.
- Aspect: Noise, emissions.
- Impact: Fauna disturbances and eventual damage to aquatic life.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Small	Permanent	Irreversible

- Action: Endesa Fortaleza thermoelectric plant operation.
- Aspect: Eventual accidents involving chemical products.
- Impact: Damage to aquatic life

Type	Nature	Extension	Magnitude	Duration	Characteristic
Negative	Direct	Local	Small	Temporary	Reversible

5.2.8 Protected Natural Areas

There are no indications that operation of Endesa Fortaleza thermoelectric plant might affect existent protected natural areas, even the closest ones.

5.2.9 Anthropomorphic Environment

The operation of Endesa Fortaleza thermoelectric plant would allow a larger energy supply for the CIPP and for the energy distribution system as a whole. This would make the increase in the number of industries possible, without risks of energy failure.

- Action: Endesa Fortaleza thermoelectric plant operation.
- Aspect: Increase in energy supply

- Impact: Increment of the local/regional economy.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Positive	Direct and indirect	Local to regional	Medium to large	Permanent	Irreversible

40 people, between administrative and operational personnel, are expected to be hired for the operation of Endesa Fortaleza thermoelectric plant . People will also be hired for support activities such as security services, transportation and cleaning services, amongst others. The estimate for these services is between 20 and 25 people.

- Action: Endesa Fortaleza thermoelectric plant operation.
- Aspect: Hiring different levels of specialized workmanship.
- Impact: Permanent job offer.

Type	Nature	Extension	Magnitude	Duration	Characteristic
Positive	Direct	Local to regional	Small	Permanent	Irreversible

6 IMPACT MITIGATION MEASURES AND ENVIRONMENTAL MONITORING

The measures for the reduction and/or elimination of the environmental impacts during the power plant installation stage are already in place.

For the operational stage, the mitigation, impact elimination and environmental monitoring measures are part of the Environmental Management Plan and should be consonant with the previous environmental studies and the performed risk analyses.

Table 16 presents a summary of the environmental programs and actions defined by EIA, relevant to environmental licenses and/or permissions.

Table 16. Summary of the environmental programs and actions defined for the installation and operation of Endesa Fortaleza thermoelectric plant

NO.	PROGRAMS AND ACTIONS	ORIGIN
1	Covering of works trucks	EIA
2	Soil humidification and protection	EIA
3	Landscape Project	EIA and LI
4	Industrial and sanitation effluents treatment system	EIA and LI
5	Liquid effluents release system	EIA and LI
6	Building site sanitation effluents treatment system	LI and MC
7	Chemicals leakage restraint system	EIA and LI
8	Gas emissions treatment system	EIA and LI
9	Gas emissions monitoring system	EIA and LI
10	Noise monitoring system	EIA and LI
11	Industrial effluents monitoring system	LI
12	Implementation of the Conservation Unit	EIA and MC
13	Emergency action plan	EIA and Risk Assessment
14	Access roads sign posting	LI
14	Solid residues management programs	EIA
15	Accidents prevention program	EIA
16	Public health monitoring program	EIA
17	Environmental education program	EIA
18	Employees enabling program	EIA
19	Public consultation program	IFC
20	Zoned deforestation plan	LI and Deforestation permission
21	Arborization project/Forestation of the transmission lines area	Renewal of the deforestation permission
22	Environmental control and monitoring plan of the transmission lines	Term of Reference No. 14/02
23	Survey of areas for the creation of Conservation Units	MC
24	Environmental diagnosis of the west coast emphasizing the estuary areas	MC
25	Monitoring and control in 6 Conservation Units	MC
26	Elaboration of management instruments for 3 APA´s	MC
27	Optimization of the SEMACE activities recording system	MC
29	Execution of an environmental education program for 5 UC´s	MC

Besides these programs, ENDESA is disbursing R$2,750,000.00 (U$760,000.00[1]) for the compliance of Law No. 9,985 of 2000, regulated by the Decree No. 4.340 of 2002, of which R$697,747.14 (U$192,748.00[1]) have already been disbursed.

6.1 MAIN IMPACTS CONTROL AND MONITORING MEASURES

6.1.1 Air Quality

Installation Stage

During dry periods, the soil shall be constantly humidified to reduce the particle emission due to the movement of machines and equipments.

Operational Stage

The project establishes mechanisms for the reducing of air emissions at the source.

Monitoring

The monitoring shall be continuous according to the emission standards set by the environmental license; a third-party company shall perform the system sampling, analysis and gauging.

6.1.2 Noise

Implementation Stage

The impacts of noises and vibrations during the implementation stage can be considered negligible, not affecting the external surrounding areas of the power plant. Therefore, no mitigating measures are necessary other than those referring to the occupation health.

Operational Stage

The major impact during the power plant operational stage is the noise generation. To minimize this problem, the project establishes reduction systems, as attenuators, deflectors and silencers.

In parallel, a buffer (damping) zone shall be created with the implementation of a barrier using appropriate tree species. This barrier, together with the noise reduction systems, shall contribute for the attenuation of the noise resulting from the power plant operation.

Monitoring

EIA recommends the following schedule for noise monitoring:

Implementation Stage

- Semiyearly evaluations

Operational Stage

- 1st year: assessments in the 1st month – 3rd month – 6th month – 12th month
- 2nd to 4th year: 1 semiyearly evaluation
- 4th year on: 1 annual evaluation

6.1.3 Water Resources

Implementation Stage

A domestic effluents treatment station has been installed for the control of the domestic effluents from the lodgings, restrooms and kitchen.

Operational and training measures have been adopted to reduce possible risks of chemicals and fuel leakages.

During this stage, an awareness program was initiated to rationalize water consumption in bathrooms, kitchen and back office. With this program, the per

person consumption dropped from 71.0 liters (June, 2002) to 35.6 (February, 2003), representing a reduction of almost 60%.

Operational Stage

To reduce the risks of contamination, mechanisms will be implemented to separate the drainage systems, avoiding the contamination of the rain water draining by effluents and drainages.

API separators shall be implemented and targeted to the pre-treatment for the control of contaminated effluents or drainages in risk of contamination.

The areas for chemicals storage shall be equipped with restraint systems restricting them to waterproofed areas, preventing from contamination of drainages, water tables and soils in case of leakages.

Monitoring

Monitoring shall follow the schedule below, according to Resolution CONAMA 20/86 and Ordinance SEMACE 97/96.

Installation Stage

- Quarterly

Operational stage:

- Until the 3rd month – monthly
- From the 3rd month to the 3rd year - quarterly
- From the 3rd to the 17th year - semiannually
- From the 17th year until 3 months before deactivation - quarterly

6.1.4 Solid Residues

Installation Stage

- Appropriate choice of rubble deposit areas
- Rubble use in sanitary landfills.
- Appropriate residues segregation and destination according to their risk class.

Operational Stage

- The guiding principles are: reduction at the source, appropriate segregation and destination of each residue according to their risk class. For residues that can be reused or recycled, alternatives shall be studied to enable these uses.

Monitoring

Internal audits and periodical assessments shall be conducted to check the progress of the programs for solid residues adequate destination at the companies and places used for the final disposal.

7 CONSULTATION AND PROJECT DISCLOSURE PROGRAMS FOR THE AFFECTED COMMUNITIES

A public consultation program has been created for the disclosure and consultation of the communities affected by the various stages of the power plant.

7.1 PREVIOUS DIVULGATION OF THE ENDESA FORTALEZA THERMOELECTRIC PLANT

With the objective of communicating the installation of a thermoelectric power plant at CIPP, as well as its technical characteristics, to society at large, a comprehensive information campaign was mounted by CGTF, involving all local newspapers and the national publication Gazeta Mercantil, in addition to TV and radio stations for the period between October 3 and November 17, 2001, as shown in Table 17.

Table 17. Publicity Campaign

Means of Communication	Number of insertions (*)	Period
TV Verdes Mares	15	10/13 to 11/15/2001
TV Cidade	20	
TV Jangadeiro	12	
Rede TV	13	
TV Diário	14	10/05 to 11/17/2001
Rádio 93 FM	36	
Rádio Verdinha	38	
Rádio Jangadeiro	65	
Rádio Interior	966	10/07 a 11/07/2001
Comunicadores	327	10/04 a 11/18/2001
Jornal Diário do Nordeste	2	10/05 a 10/25/2001
Jornal O Povo	1	10/14/2001
Jornal Gazeta Mercatnil	1	10/22/2001
Jornal o Estado	1	10/30/2001
Outdoors	15	10/13 a 11/09/2001
(*) Duration of each insertion (radio & television): 30 s.		

The protocol for conclusion of the EIA/RIMA and request for Authorization of Implementation, from SEMACE, were published in the O Povo and Diário do Nordeste daily newspapers on October 11th, 2001. The meeting of the State Environmental Council (COEMA) which approved granting of the Thermoelectric Plant's Authorization of Implementation took place on December 13th, 2001 and their decision was published in the Official State Diary on December 26th, 2001. On the basis of this authorization, SEMACE granted Authorization for Implementation No.

020/02/NUCAM, valid for 2 (two) years, published on January 14th 2002, in O Povo, Dário do Nordeste and Gazeta Mercantil daily newspapers.

After publication of the study in the state's official diary and in a regional newspaper, there were no requests, by any body or entity, for Hearings or Public Consultations. However, the announcement of the Environmental Impact was made, apart from publications, through the interviews given to the community and meetings with COEMA and intervening institutions.

The methodology used for the information gathering involved the statistical data in local city halls and in existing literature, referring to the direct and indirect influence. In technical visits information was obtained through interviews with technicians, inhabitants and photographs.

Sample data was gathered in the district of Pecém, on August 21 and 22, 2001, involving 61 people above the age of 18, on the degree of satisfaction of the local population, concerning the local infrastructure, work market and installation of the Port and the Thermoelectric Plant.

7.2 THE PUBLIC CONSULTATION PROGRAM

The meetings will be conducted in three stages in the districts and in one single stage in the municipalities' headquarters. The three stages in the districts aim at the presentation of the company information, acceptance of public criticism and disclosure of the company's input on criticism.

The disclosure of the project will employ local media resources and material produced by ENDESA (annex 4).

The program activities schedule is shown in Table 18, and the detailed project is attached.

Table 18. Schedule of the disclosure and affected communities consultation activities

Periods / Activities	2003					
	feb	mar	apr	may	jun	jul
Visits and questionnaires to the dwellers of isolated houses within a radius of 3 km of the power plant	stage 1	stage 2	stage 3			
Meeting in the district of Pecém (municipality of São Gonçalo do Amarante)	stage 1	stage 2	stage 3			
Meeting in the district of Catuana (municipality of Caucaia)		stage 1	stage 2	stage 3		
Meeting in the district of Primavera (municipality of Caucaia)		stage 1	stage 2	stage 3		
Meeting in the district of Sítios Novos (municipality of Caucaia)		stage 1	stage 2	stage 3		
Project disclosure in the city of Caucaia						
Project disclosure in the city of São Gonçalo do Amarante						
General evaluation of results						
Adjustment of the Environmental Management System						
Final Report						

Until 07.03.2003, the enterprise executed the following activities:

- 1st Consultation Meeting with the community of Pecém.
- 45 applied questionnaire with the properties isolated.

These activities are describe in the Public Consultation Program (annex 4).

8 HEALTH AND SAFETY

The fact of being installed in an industrial, under-populated district, reduces the risks of damages to third parties. Table 19 shows the distances of power plant boundaries to some vulnerable points.

Table 19. Distances from the plant to possible vulnerable sites

SITE	STRAIGHT DISTANCE (m)
Caucaia	23560
Fortaleza	33.040
Pecém	14.500
Rio Cauípe	939
Nearest construction	300
Highway CE 422	350

Note that the nearest urban cluster is the district of Pecém, 14.500 metres away.

The Thermoelectric Plants are power plants historically associated to no or few casualities, presenting efficient safety systems:

Possible accidents in similar power plants are mainly caused by operation or mechanical failures, corrosion, natural causes and third party actions.

A Preliminary Danger Analysis – APP has been conducted for the identification and assessment of the power plant operational risks. Based on the associated data, no situation of severity was identified associated to a strong chance of occurrence (table 20).

Table 20. Interaction Matrix: Severity x Chances of Occurrence

SE		A	B	C	D
VE	IV				1
RI	III			3	
TY	II		1	3	1
	I				

CRITICAL	0	MODERATE	5	NON-CRITICAL	4

Installation Stage

During the stage of construction and implementation of Endesa Fortaleza thermoelectric plant , the risks with greater chances of occurrence are restricted to those typical of major civil construction works and primarily related to occupation health and safety.

The risks with chances of affecting the environment or outside persons and areas are those related to the transportation of machines and equipments, heavy vehicles traffic, fuel transportation for the supply of machines and equipments in the building site and transportation of potentially dangerous products and substances, used in construction processes, such as paints, solvents, lubricants and gases, especially those inflammable. However the chances of occurrence are smaller.

For the reduction of risks, measures established in the legislation were taken and a program was created to monthly reward the employees who present the best safety improvement suggestions or preventively point out dangerous attitudes and situations.

Operational Stage

During the operational stage, the risks associated are those typical of facilities in which there is consumption of gas as fuel, related to chemicals storage locations and inherent to electric activities and installations.

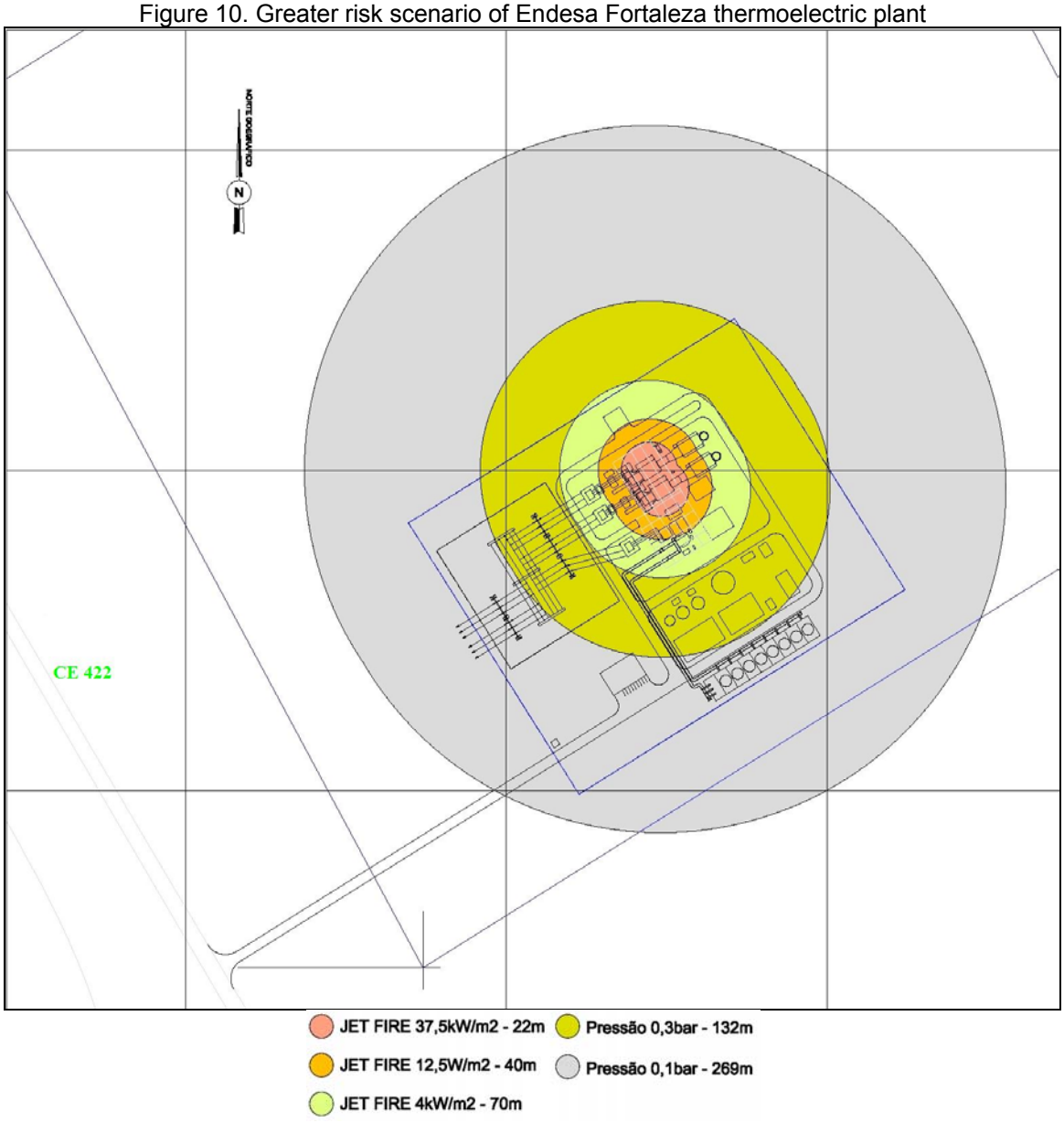
Note that there will be no gas tanks or deposits in the plant, which reduces the level and severity of accidents involving this product.

According to the vulnerability analysis, situations with greater consequences involve gas leakages followed by fire and/or explosion.

In these critical situations, the maximum radiuses are 22 meters and 132 meters for temperature (37.5Kw/m2 – 50% of lethality in 20s) and overpressure (0.3 bar –strong risks to structures and human life) respectively.

Due to location, low demographic density and highly anthropomorphized environment, the damages in this kind of accident shall be restricted to the facilities of Endesa Fortaleza thermoelectric plant . Figure 10 shows a simulation of vulnerability for the situations of greater risk.

Figure 10. Greater risk scenario of Endesa Fortaleza thermoelectric plant



Other risk scenarios involve the leakage of chemicals or other accidents with stocked chemicals (Table 21).

Table 21. List of oils and chemicals, daily consumption and recommendations

Product	Expected Consumption kg/month	Container	Special Recommendations
Hydrochloric Acid	1,500	600 liters PE container (metal cage)	Severe skin, eyes and respiratory tract irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, apron and safety glasses
Sulfuric Acid	50,000	Bulk	Severe skin, eyes and respiratory tract irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, apron and safety glasses
Neutralizing Amines	500	100 liters metallic container	Skin, eyes and respiratory tract irritant. Combustible. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, apron and safety glasses
Sodium Bisulfite	500	600 liters PE container (metal cage)	Mild skin and eyes irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, and safety glasses
Carbohydrazide	100	50 liters metallic container	Severe skin, eyes and respiratory tract irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, apron and safety glasses
Ferric Chloride	1,000	200 liters drum	Severe skin, eyes and respiratory tract irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, apron and safety glasses
Dispersant	100	100 liters metallic container	Mild skin and eyes irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, and safety glasses
Flocculant	200	50 liters metallic container	Mild skin and eyes irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, and safety glasses
Monosodium Phosphate	75	100 liters metallic container	Mild skin and eyes irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, and safety glasses
Trisodium Phosphate	175	100 liters metallic container	Mild skin and eyes irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, and safety glasses
Sodium Hydroxide	40,000	Bulk	Severe skin, eyes and respiratory tract irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, apron and safety glasses
Sodium Hypochlorite	10,000	Bulk	Skin, eyes and respiratory tract irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, apron and safety glasses
Rust Inhibitor	4,000	600 liters stainless container	Mild skin and eyes irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, and safety glasses
Soda Ash	10,000	25 kg bags	Mild skin and eyes irritant. Store sealed containers in a ventilated location. Wear mask, long-wrist gloves, and safety glasses

Besides these products, there will be smaller stocks and/or temporary storage of small amounts of lubricating oil, hydraulic oil, greases, paints, solvents and cleaning products.

Basically, the products used in Endesa Fortaleza thermoelectric plant processes present risk classes 3 (inflammable) and 8 (corrosive).

8.1 TRAINING PROGRAMS

The employees training shall be one of the key items in order to maximize the execution of the tasks and minimize the risks in both the installation and operational stages of the plant.

Installation Stage

For the installation stage, the companies and subcontractors are legally required to train all employees, these trainings being identified and included in the PPRAs for each company.

The legislation also requires that some tasks be executed by employees who received specific training in certified institutions, as the operation of heavy machines and cranes, welds and cuttings using flammable gases, etc.

Operational Stage

For the operation of Endesa Fortaleza thermoelectric plant , ENDESA designed a training program to be provided by a third party institution. All employees to be hired for the operation of the unit shall undergo this program.

The basic training program consists of the following:

- Main concepts. Laws of thermodynamics. Processes. Properties of the fluids.
- Steam cycle. Efficiency. Parameters. Intermediate reheating and regenerative heating. Gas cycle. Efficiency. Parameters. Cycle with regeneration. Combined cycle. Types. Parameters. Computing examples.
- Fuels availability and characterization. Combustion stoechiometry. Air excess and gases analyzers. Boilers. Types and constructive characteristics. Burners. Thermal balance. Tests. Recovery boilers. Types. Pressure levels. Temperature profiles. Computing examples.
- Steam turbines. Processes in the stage. Types of stages. Losses and efficiency. Sealing, lubrication and adjustment system.
- Gas turbines. Aeroderivative and industrial turbines. Constructive characteristics. Off-design operation.
- Steam cycle CTE. Influence of the initial and final parameters on efficiency. Schemes and parameters for intermediate reheating. Schemes of regenerative heating. Water and steam balance. Auxiliary equipments: condenser, cooling train, fans, regenerative heaters, deaerators and water treatment systems.

- Combined cycle power plant (CTE). Schemes with single and multiple axes. Pressure levels. Combined cycle CTE for solid fuels. Parametric studies.
- Electric generators, transformers, circuit breakers and protections. Operation in charge. Operation in short circuit. Excitation systems. Protection systems. Interaction with the electric system. Transmission and distribution. Synchronous private generators. Excitation systems and voltage adjusters. Frequency charge control. Primary adjustment. Secondary adjustment. Technical influences on system operation.
- Automatic control of CTE. Charge control. Fuel control. Combustion air control. Feeding water control. Steam temperature control. Combined cycle CTE automatic control system.
- Trading. Electricity pricing. Operation marginal cost. Effects of transmission restrictions. MAE rules. Electric power trader.
- Charge graphs. Indexes. Parameters that characterize the CTE operation. Flexibility. Energetic characteristics. Steam CTE operation. Units startup. Stopping. Nominal charge operation. Partial charge operation. Combined cycle CTE operation. Off-design operation. Startup curves of a combined cycle unit. Organization of thermoelectric plants maintenance. Heat rate and charge degradation. Gas turbines and combined cycle CTE maintenance.
- Thermoelectric plants environmental control: major pollutants. Gas turbines emissions. Influence of the combustion plan. Water and steam injection. Dry methods for emission control. Selective catalytic reduction. Catalytic combustion.

8.2 EMERGENCY BRIGADES

Endesa Fortaleza thermoelectric plant will also have an emergency brigade, with basic equipment and training for emergencies involving fire and explosion risks and accidents with the chemicals used.

The content of this emergency brigade's training will be:

- Fire theory;

- Fire propagation;
- Classes of fire;
- Fire prevention;
- Fire extinguishing agents and methods;
- Individual protection equipments;
- Fire fighting equipments;
- Leakage restraint actions involving dangerous products
- Detection and communication;
- Area evacuation;
- First Aids and Basic Life System;
- Victims' transportation.

Due to the reduced number of employees and the distance from the main medical centers of Ceará State, the brigade shall act on a primarily preventive and quick aid basis. Resources from Fortaleza shall be contacted in more severe situations.

With the development of the CIPP and the installation of a greater number of industries, the creation of a Mutual Aid Plan – PAM is expected for the region's companies.

Figure 9B Details of submarine emissay plant.

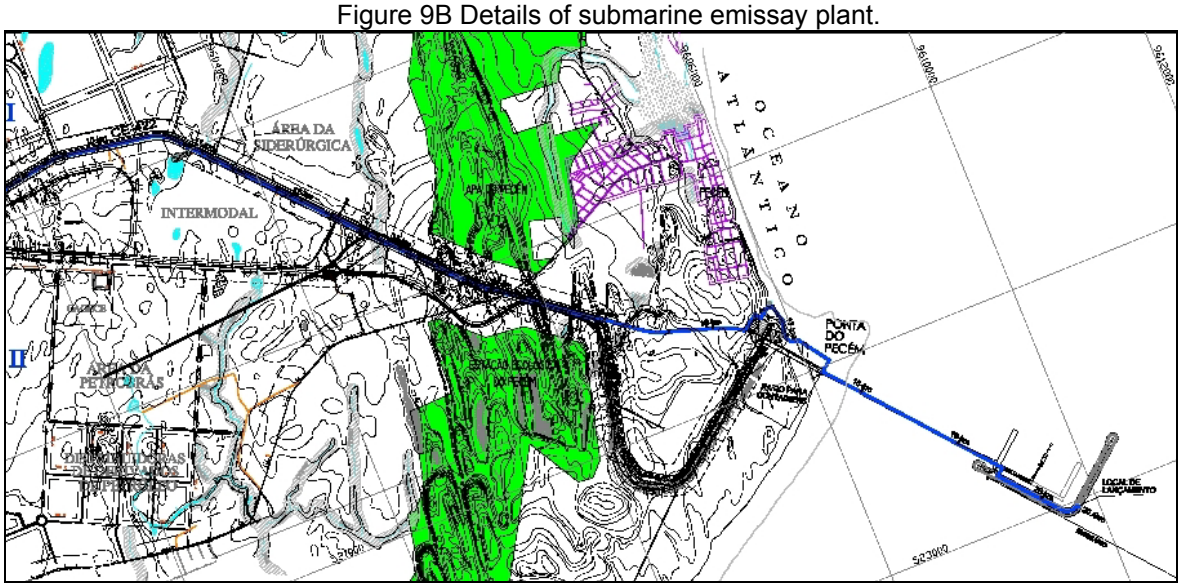
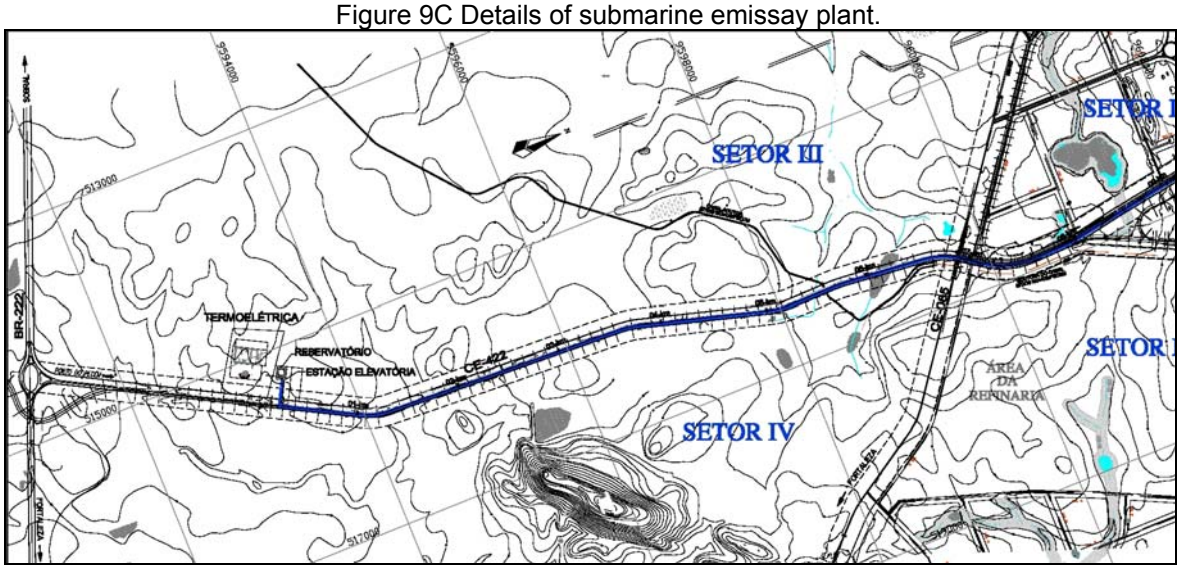


Figure 9C Details of submarine emissay plant.



ANNEX

ANNEX 1

CONSTRU Serh
Construtizando Idéias

Engenharia Consultoria em RH
Psicoterapia e Serviços Ltda.

WORK DEVELOPED FOR
- CGTF – CENTRAL GERADORA TERMELÉTRICA FORTALEZA S.A.
PURPOSES

SPECIALIZED WORK

- IN HUMAN RESOURCES -

FORTALEZA – JULY/2002

Av. Washington Soares, 2155 S/56 - Shopping Água Fria - CEP: 60 811 341 - Fone: (85) 238 0485 - Fax: (85) 276 1496
CEL.: 9111.7744 - Fortaleza - CE.

III-6 – Considerations

It is a simple, humble, stable and happy family. There can be noticed the evolution of the quality of life of the inhabitants after the changes. Now they have more freedom and satisfaction within the family components.
OBS: Aiming at joining efforts to gather more interaction, it was given by the landowner, a real state property next to Mr. Eliênio's to house his relatives, assuring more security to all, considering the robberies and thefts that used to happen in the former property.

IV – Interdisciplinary Group

Maria Dione Queiroz e Cavalcanti

- Psychologist, Adults and 3rd Age Psychotherapist, formation in Psychodrama, Psychotherapy, Brief Psychotherapy, Gestalt Therapy, Group Dynamics and Therapeutic Massage (Californian). Post-Graduation in Human Resources Administration. Experience on Recruiting, Selection, Training and Staff Development, Climate Research, Bio-psycho-socio-functional Diagnostic, Professiongraphic analysis, Consultancy and Events. Also works as a Behaviorist Instructor.

Regina Lúcia Braun da Cunha

Social Assistant, formation in Group Dynamics, Emotional Intelligence, Neurolinguistic Programming, Rebirth, Group Facilitator, Human Development in Organizations and Basic Formation of Training and Personal Development Educators. Management and Education Consultant with experience in Organization in areas such as: Human Potential Development, Recruiting, Selection, Following, Climate Research and Events like Workshops, Lectures and Trainings on Integration, Quality of Life, Creativity and Health.

V- Performance

CONSTRUSERH – Engenharia, Consultoria em Recursos Humanos, Psicoterapia e Serviços Ltda.
(Engineering, Human Resources Consultancy, Psychotherapy and Services Ltd.)

Address: Avenida Washington Soares 2155 sala 56 Shopping Água Fria.
Cep: 60811341 / Phone: 239 04 85. / Fax: 278 14 96 / Cellular phone: 91 11 77 44.

III-3 – Quality of Life

- Housing

A nice house made of "taipo" (clay, carnauba and roof) facing the rising side, 5 rooms (1 big sitting room, 2 bedrooms, 1 kitchen) and 1 bathroom in the backyard. The power is generated by battery and water comes from Rio Cauipe.

- Transport

They have got two adult bicycles and 1 child bicycle.

- Other goods

Sound system, television, fire wood cooker-stove, 1 double and 1 single bed.

- Leisure

Fishing and swimming in Rio Cauipe. Barbecue with the landowner – Mr. Orlando, television and music. They like nature.

- Health

As far as diet is concerned, the family have milk, eggs and chicken, fresh fish from the river, ducks, beef and pork meat and natural fruit from the region like lemon, coconut, guava and cashew.
They have 3 meals:

- Breakfast (milk, coffee, biscuits)
- Lunch (chicken, fish or red meat, rice, spaghetti and beans)
- Dinner (The same as the lunch)

They are natives without vices and with healthy habits of going to sleep and waking up early.

III-4 – Dreams

To have a happy life with the family and give them better life conditions.

III-5 –Changes' Benefits

- much nicer climate due to the proximity to Rio Cauipe;
- security and tranquility as far as robberies and violence are concerned;
- own house (it used to be attached to Mr. Orlando's);

SPECIALIZED WORK IN HUMAN RESOURCES
- CGTF -

I – Objective

- To investigate the Quality of Life of the former inhabitants of property bought by CGTF – Fortaleza, through an evaluation of their social conditions.

II – Contents

- Contact with the former owner – Mr. Orlando Ferreira Pereira
- A visit to the place
- Interview with the relatives
- Social Report
- Meeting with the projects' director – Dr. Valdênia Barros Reis

III – Technical Impressions

III-1 – Identification

- Name: Eliênio Rocha Ferreira
- Age: 27
- Marital Status: married
- Place of Origin: Fazenda (Farm) Maringá-Cauipe
- Education: 3ª série do 1º grau (3rd grade/ primary school)
- Religion: Catholic

III-2 – Family/Economic Situation

He has been married for 6 years to Mrs. Rita Erismilda dos Santos Souza, 24 years old. They have two daughters: Géssica – 5 years old and Brena – 3 years old. Both attend nursery school in the morning. Sandra Santos Souza, 16, his sister-in-law, lives with them. She is at the fifth grade of primary school. The family earn R$ 200,00 (two hundred reais) monthly. They spend the money on clothes and food.

SUMMARY

Services Rendered - Clients

-COELCE;
-CHESF;
-ENDESA:
-WOBBEN WINDPOWER;
-SYNAPSIS – BRASIL;
-PETROBRÁS;
-CAIXA ECONÔMICA;
-PROCURADORIA GERAL DA JUSTIÇA;
-SECR.SAÚDE DO ESTADO DO CEARÁ;
-SECR.ADMINISTRAÇÃO DO ESTADO DO CEARÁ;
-UNIVERSIDADE ESTADUAL DO CEARÁ;
-UNIVERSIDADE DE FORTALEZA;
-ASSOCIAÇÃO CEARENSE DE MEDICINA DO TRABALHO;
-ASSOCIAÇÃO BRASILEIRA DE RECURSOS HUMANOS;
-ORTOBOM;
-TAM;
-JORNAL O POVO;
-SEBRAE;
-FAELCE;
-BEC;
-BANCO DO BRASIL;
-RUMASA;
-COGERH;
-NORQUIP;
-COOPELETRIC;
-ESCOLA TÉCNICA;
-FUNCAP;
-NATURALIS;
-GAPA;
-TELECEARÁ;
-FAST SHOP;
-SABIAGUABA PARK;
-SHOPPING PIZZA;
-CONSELHO REGIONAL DE SERVIÇO SOCIAL;
-CONDOMÍNIO STAR CITY;
-COOPECE;
-EMBRATEL;
-LABORATÓRIO LOUIS PASTEUR;
-INSTITUTO VIVEKANANDA;
-LAR FABIANO DE CRISTO;
-APAE-BA;
-FORD.
-MAGEM e DOMÍNIO;
-COLÉGIO SANTO INÁCIO;
-DOCE GULA;
-FORTALEZA ÓTICA;
-SPIC;
-NÚCLEO DE PSICOLOGIA APLICADA;
-DAG;

ANNEX 2

AVALIAÇÃO TÉCNICA

FAZENDAS

PEDRO LOPES, SALGADINHO E VÁRZÉA DOS BURACOS

Distrito de Catuana – Município de Caucaia – Ceará

Interessado:

Central Geradora Termelétrica Fortaleza S/A

C.G.T.F.

Proprietários:

José Roberto Barros Ferreira

Mônica Beatriz Porfírio Sampaio da Silva

M.P.X. – TERMOCEARÁ LTDA

AVALIAÇÃO TÉCNICA

AVALIAÇÃO DE PARTE DOS IMÓVEIS RURAIS DENOMINADOS PEDRO LOPES, SALGADINHO E VÁRZEA DOS BURACOS, SITUADOS NO DISTRITO DE CATUANA, MUNICÍPIO DE CAUCAIA, NESTE ESTADO.

* ASSUNTO : Avaliação Técnica
* OBJETIVO : Avaliação de Parcelas de Fazendas Rurais
* FINALIDADE : Indenização
* LOCAL : Fazendas Pedro Lopes, Salgadinho e Várzea dos Buracos Distrito de Catuana – Município de Caucaia/Ce.
* INTERESSADO : CENTRAL GERADORA TERMELÉTRICA FORTALEZA S/A – CGTF
* PROPRIETÁRIOS : JOSÉ ROBERTO BARROS FERREIRA
MÔNICA BEATRIZ PORFÍRIO SAMPAIO DA SILVA
M.P.X. – TERMOCEARÁ LTDA

01. IDENTIFICAÇÃO

01.1 - INTRODUÇÃO

O presente LAUDO DE AVALIAÇÃO, tem por objetivo, o levantamento, inspeção, exame tecnológico e análise pormenorizada da situação no trecho e segmento da CE-422.

Visa primordialmente esclarecer e demonstrar tecnicamente o valor real e atual das Glebas que será utilizado para fins de trecho de servidão.

01.2 - OBJETIVO

O presente trabalho objetiva avaliar o trecho a ser utilizado para obras de linha de servidão que interligará a UTE Fortaleza a SE Cauípe CHESF.

01.3 - LOCAL DOS TRABALHOS

CE-422 – no entrocamento da BR-222, trecho situado no Distrito de Catuana, Município de Caucaia, neste Estado.

01.4 - INTERESSADO

CENTRAL GERADORA TERMELÉTRICA FORTALEZA S/A – CGTF – Sociedade Anônima, inscrita no CNPJ nº 04.659.917/0001-53, estabelecida à Av. Barão de Studart, nº 2.917/83 – Aldeota – Cep: 60.120.900 – Fones: (85) 216-1154 / 216-1160 – Fax: (85) 216-1363 – Fortaleza/Ce.

01.5 - PROPRIETÁRIOS

José Roberto Barros Ferreira, brasileiro, solteiro, maior, comerciante, identidade nº 2072255-90 – SSP/Ce, CPF nº 583.776.703-72, residente e domiciliado na Av. Major João Martins, nº 01 – Distrito de Catuana, Município de Caucaia/Ce;

Mônica Beatriz Porfírio Sampaio da Silva, brasileira, solteira, universitária, inscrita no CPF nº 252.021.693-87, portadora da identidade nº 29414781 – SSP/Ce, residente e domiciliada na Av. Antonio Justa, nº 2.667 – apto. 501, Meireles, Fortaleza/Ce.

M.P.X – TERMOCEARÁ LTDA, empresa inscrita no CNPJ nº 04.605.162/0001-04, com Sede à Rua A, nº C–03, Conjunto Brasília, Icaraí – Caucaia/Ce.

01.6 - NÍVEL DE RIGOR DA AVALIAÇÃO

Todos os elementos e dados intervenientes na elaboração deste LAUDO, são de absoluta confiança e idoneidade, sendo criteriosamente selecionados de forma a assegurar, a satisfação dos requisitos oficiais, no que diz, respeito ao Nível de Rigor – PRECISÃO.

Este documento obedece aos mais exigentes preceitos legais, tendo sido concluído dentro de estritas regras de rigor e medição. A sua elaboração, exigiu a atenção e esforço duma eficiente equipe técnica com formação científica, registrado no CREA e CORECON, experiente e especificamente preparada para a AVALIAÇÃO.

Todo o processo se integra absolutamente dentro de critérios impostos pelas NORMAS TÉCNICAS BRASILEIRAS de AVALIAÇÃO, nºs. 5676, 8799, 8851, 8976 e 8977, respectivamente de NOV/85, FEV/85, JUL/85 e AGO/85 da A.B.N.T.

Segue os princípios fundamentais da ENGENHARIA DE AVALIAÇÕES, pois cumpre integralmente as determinações, do BACEN, BNDES, BNB, CEF, e IBAPE, atendendo também às deliberações, da CVM e do IBRACOM.

01.7 - LEGISLAÇÃO

. Foi elaborado de acordo e respeito rigoroso às Leis Intervenientes:

. Lei Federal 3470-58; 4504 (ESTATUTO DA TERRA) 20/NOV/64; 6406 (Artº.18) 15/DEZ/66; 5194.24/DEZ/66; 5584.26/JUN/70; 81621.3/MAI/78.

. Lei 6385-76; 6404 (Artº.8); 6766; 8200.

. Decreto-Lei 1483-76 e 1598-26/DEZ/77.

. Resoluções da CONFEA nºs. 205, 218-29/JUN/73 e 235-9/OUT/75.

01.8 - DOCUMENTAÇÃO

A documentação imprescindível à formação deste LAUDO foi cedida pelos proprietários. Por premissa, é considerada útil e válida, constando de cópias de escritura, matrículas e plantas, que foram verificadas e sujeitas a pesquisa bibliográfica, investigação em Cartório, Órgãos Estatais, Municipais e Públicos.

01.9 - MÉTODOS E CRITÉRIOS UTILIZADOS - SISTEMÁTICA DE TRABALHO

Com vista ao ajuizamento perfeito e ao estudo correto de cada situação, bem como na escolha de dados, foram efetuados diferentes demarches e adotados variados procedimentos, de acordo com o objetivo em análise, a que damos devido realce nos capítulos correspondentes.

02. CARACTERIZAÇÃO

O trecho a ser utilizado, faz parte das Fazendas Pedro Lopes, Salgadinho e Várzea dos Buracos, que tem acesso partindo-se de Fortaleza pela BR-222 – Km 38, tomando-se a direita a CE-422, situando-se o terreno objeto da avaliação. Os referidos terrenos apresentam as seguintes coordenadas:

LATITUDE (S):	3° 40'
LONGITUDE (N):	38° 48'
ALTITUDE:	60m

02.1 – Limites e Confrontações

Todo trecho a ser utilizado têm seus limites e confrontações dentro das próprias fazendas.

02.2 – Vias de Acesso

A propriedade dista aproximadamente 30 km para a cidade de Caucaia e mais 10 km para a cidade de Fortaleza. Para o Porto do Pecém, o referido terreno dista apenas 26 km, onde se implanta o maior complexo portuário e metal-mecânico do Ceará, situando-se na região metropolitana de Fortaleza.

2.3 – Vegetação

A flora das propriedades, ou seja, a sua cobertura vegetal, é composta de várias espécies, observando-se um tipo de transição entre a mata de tabuleiros litorâneos e a caatinga hiperxerófila, com passagem por área de mangue costeiro, que se apresenta de forma perenifolia, de aspecto verde o ano todo. Esta vegetação se caracteriza pelas seguintes espécies: pau-ferro, salsa, pinheirinho, pinhão-bravo, cordão de São Francisco, murici da praia, catingueira, mofumbo, ubaia, guabiraba, bitupitá, cipauba, marmeleiro, sabiá e formações campestres e de manguesais, mas que formam uma boa cobertura vegetal de regular valor comercial.

2.6 – Relevo e Solos

As Fazendas apresentam relevo plano (0-2% de declividade), em 80% de sua área e suave ondulado (2 a 6% de declividade), no restante.

A predominância no imóvel é um solo, com associação de Podzólico Vermelho Amarelo, Abrupto Phintico, Textura Areno Argilosa + Litossol Vermelho Amarelo Distrófico com Fragipan, de textura média.

Todos se apresentam A fraco e moderado, fase caatinga hiperxerófila.

02.7 – Textura

São solos de textura areno-argilosa, profundos, de fertilidade limitada e regular drenagem.

A análise físico-químico demonstra a presença de quatro variedades texturais, que contemplam, areia branca, franco argilo-arenoso, franco arenoso e areia.

03 – ASPECTOS SÓCIOS ECONÔMICOS

Os imóveis, objeto deste trabalho pericial, vêm sendo pouco explorados pelos proprietários, não se conhecendo no ato da visita, nenhuma atividade agropecuária.

04 – INFRA-ESTRUTURA

Basicamente a infra-estrutura das propriedades consiste no seguinte:

- Na propriedade do Sr. José Roberto Barros Ferreira, não existem nenhum benfeitoria, contendo carnaúbas e cerca com estaca e arame farpado, na extensão do limite da área de servidão do DERT, com área destacada para o plantio temporário;
- Na propriedade a Sra. Mônica Beatriz Porfirio Sampaio, existem 03 residências rurais, sendo uma edificada em área de 6,90 metros de frentes e 15,50 metros de fundos, com testada e paredes internas de alvenaria e paredes laterais de taipa, com cobertura de telha comum e caibros e linhas de carnaúba, com sete cômodos. As outras residências são totalmente de taipa, com telha comum e caibros e linha de carnaúba com 4 (quatro) cômodos cada uma, com uma área edificada de 5,00 metros de frente por 12,00 metros de fundos. O açude existente na área tem uma parede de 299 metros de comprimento com um talude de 8,00 metros na base e 5,00 metros no eixo. Cercas internas perimétricas limitando a linha de servidão do DERT e com a propriedade da CGTF, estradas de circulação interna, área destacada para plantios temporários.
- Na propriedade da MPX Termoceará, está delimitado todo espaço com cerca de concreto e instalado o canteiro de obras da Companhia, onde não foi permitido acesso para termos maiores detalhes quando a ocupação do terreno.

05 – METODOLOGIA E TÉCNICA DE VALOR

- METODOLOGIA IMOBILIÁRIA DA REGIÃO

. **INVESTIGAÇÃO:** Numa cuidadosa e pormenorizada inspeção que a equipe técnica efetuou no TERRENO AVALIANDO, foi feito levantamento criterioso e detalhado de todas as características e melhoramentos encontrados. Procedeu-se a pesquisa cuidadosa na região – área geoeconômica – de terrenos para preferência em transação comercial, selecionamos, examinamos e ponderamos devidamente quanto à localização, grau de semelhanças pontos primordiais e perspectivas futuras. Consultas metódicas na mesma região, junto de profissionais de mesma idoneidade assegurada, de Corretores, de Imobiliárias, de Particulares, de Órgãos Públicos, Bancos, através de jornais e junto dos Imóveis comercializados ou em oferta, durante este período nas proximidades do complexo. Consultamos o Sindicato dos Corretores de Imóveis do Estado do Ceará, que dispõe de um completo mapa estatístico de toda a área metropolitana de Fortaleza, assegurando está o mercado aquecido e que a procura é grande, principalmente na região que se instala o complexo metal-mecânico do Pecém, que deve se transformar em pouco tempo, no maior Distrito Industrial do Ceará, sendo portanto uma das mais valorizadas regiões do Ceará.

05.1 – Terreno

Na determinação do valor do hectare da terra nua do imóvel avaliando, adotou-se o método comparativo de dados de mercado, método este, que traduz perfeitamente as oscilações do mercado.

a) Pesquisa de Preços

Numa pesquisa constatamos que na região os imóveis rurais, passam de pais para filhos, no entanto, foi arbitrado um "valor médio", por peritos da região e proprietários locais, tendo em vista, que a Região vem sendo objeto de especulação imobiliária, face a instalação do Complexo Portuário do Pecém, principalmente agora, que o referido Porto, vem de iniciar as suas atividades portuárias, instalando-se também, várias indústrias, observando-se a implantação de várias empresas ligadas as atividades da Região.

A pesquisa constatou os seguintes valores:

a) Pesquisa de Preços

Elemento	Data	Fonte de Informação	Localização	VTN / Ha		Valor Médio
1	15/05/02	Corretores	Caucaia – Ce	8.000,00	8.000,00	8.000,00
2	15/05/02	Corretores	Caucaia – Ce	6.000,00	6.000,00	6.000,00
3	15/05/02	Corretores	Caucaia – Ce	5.000,00	5.000,00	5.000,00
4	15/05/02	Corretores	Caucaia – Ce	4.000,00	4.000,00	4.000,00
5	15/05/02	Corretores	Caucaia – Ce	3.000,00	3.000,00	3.000,00

b) Tratamento Estatístico

a) Designando os elementos pesquisados de terra nua em ordem crescente, temos:

T1 = R$ 8.000,00

T2 = R$ 6.000,00

T3 = R$ 5.000,00

T4 = R$ 4.000,00

T5 = R$ 3.000,00

b) Cálculo da Mediana

A mediana é constituída do elemento T3, ou seja, R$ 5.000,00

c) Cálculo da Moda

A moda é constituída dos elementos T1, T2, T3, T4 e T5, ou seja,

R$ 8.000,00 – R$ 6.000,00 – R$ 5.000,00 – R$ 4.000,00 – R$ 3.000,00

d) Cálculo da Média Aritmética

A média é constituída de todos os elementos T1+T2+T3+T4+T5, dividido pelo número total de elementos – R$ 5.200,00

e) Cálculo do Desvio Padrão (S)

Elemento	**Valor**	**Valor da Média**	**(B) – (C)**	**(D) ^2)**
(A)	**(B) – R$**	**(C) – R$**	**(D) – R$**	**(E) – R$**
1	8.000,00	5.200,00	2.800,00	7.840.000,00
2	6.000,00	5.200,00	800,00	640.000,00
3	5.000,00	5.200,00	(200,00)	40.000,00
4	4.000,00	5.200,00	(1.200,00)	1.440.000,00
5	3.000,00	5.200.00	(2.200,00)	4.840.000,00
T O T A L				**14.800.000,00**

S = R$ Raiz do Total / (5 – 1)

14.800.000,00 / (5 – 1)

S = R$ 1.923,538

f) Cálculo do Coeficiente de Variação (Cv)

(%) Cv = [(S) Média] x 100

(%) Cv = [(1.923,53) / 5.200,00] x 100

(%) Cv = 36,99

g) Eliminação de dados suspeitos de acordo com a tabela de CHAUVENET

Número de amostras igua a 5 (cinco)

$(\bar{D} / \bar{S}) = 1,\bar{73}$

[dn/s] = [(Tn – X) / s]

[d1/s] = [(Tn – X) / s]

1,46 < 1,65

[d2/s] = [(Tn – X)] / s]

0,42 < 1,65

[d3/s] = [(Tn – X)] / s]

0,10 < 1,65

[d4/s] = [(Tn – X)] / s]

0,62 < 1,65

[d5/s] = [(Tn – X)] / s]

1,14 < 1,65

c) Tabulação dos Dados Remanescentes

a) Designando os elementos pesquisados CONFIÁVEIS de terra nua em ordem crescente, temos:

T1	=	R$	8.000,00
T2	=	R$	6.000,00
T3	=	R$	5.000,00
T4	=	R$	4.000,00
T5	=	R$	3.000,00

b) Cálculo da Mediana

A mediana é o elemento T3, ou seja, R$ 5.000,00

c) Cálculo da Moda

A moda é constituída dos elementos T1, T2, T3, T4 e T5, ou seja,

R$ 8.000,00 – R$ 6.000,00 – R$ 5.000,00 – R$ 4.000,00 – R$ 3.000,00

d) Cálculo da Média Aritmética

A média é constituída de todos os elementos T1+T2+T3+T4+T5, dividido pelo número total de elementos.

R$ 5.200,00

e) Cálculo do desvio padrão (S)

Elemento	Valor	Valor da Média	(B) – (C)	(D) ^2)
(A)	(B) – R$	(C) – R$	(D) – R$	(E) – R$
1	8.000,00	5.200,00	2.800,00	7.840.000,00
2	6.000,00	5.200,00	800,00	640.000,00
3	5.000,00	5.200,00	(200,00)	40.000,00
4	4.000,00	5.200,00	(1.200,00)	1.440.000,00
5	3.000,00	5.200.00	(2.200,00)	4.840.000,00
T O T A L				**14.800.000,00**

S = R$ Raiz do Total / (5 – 1)

14.800.000,00 / (5 – 1)

S = R$ 1.923,54

f) Cálculo do Coeficiente de Variação (Cv)

(%) Cv = [(S) Média] x 100

(%) Cv = [(1.923,54) / 5.200,00] x 100

(%) Cv = 36,99

g) Campo de Arbítrio

Para um intervalo de confiabilidade de 80%, conforme, preceitua a Norma (NB – 502), deve-se calcular aplicando a Distribuição "t" de Student, com (n – 1) graus de liberdade para n – 1 = 4, então, T4 = 1,533.

u = Média + (S x 1,533) / Raiz (n – 1)

u(1) = R$6.674,392

u(2) = R$ 3.725,608

d) Unidade Adotada

No intervalo de confiança entre R$ 6.674,392 a R$ 3.725,608, está o preço médio do hectare por terra nua, na região de abrangência da área desapropriada.

Para determiná-lo faremos a distribuição de freqüência com 3 classes:

(I) Amplitude do intervalo de confiança = n(1) – n(2) = R$ 2.948,784

(II) Amplitude de classe = (I) Amplitude confiança / 3 = R$ 982,928

Distribuição de Freqüência

Classe (R$)		Freqüência	Elementos
3725,608	4708,536	2	T4 e T5
4708,536	5691,464	1	T3
5691,464	6674,392	1	T2
6674,392	7657,320	----	----
7657,320	8640,248	1	T1

e) Cálculo da Média Ponderada

Mp = (T1 x 1 + Moda x 5) / 6

Mp = (8.000,00 x 1 + 6.000,00 x 1 + 5.000,00 x 1 + 4.000,00 x 1 + 3.000,00 x 1) / 6

Mp = R$ 5.666,667

Com base no método escolhido, concluímos que o valor básico do hectare de terra nua, é de R$ 5.666,667.

Considerando que o valor da Terra Nua encontrado de R$ 5.666,667 e aplicando-se o fator desvalorizante, constante da tabela do Professor Otávio Mendes Sobrinho, em se tratando de acessibilidade muito boa, tem-se:

Para o Terreno pertencente a José Roberto Barros Ferreira, temos:

Classe	%	Área (ha) (A)	Fator Desvalorizante (F)	Valor / Classe (R$) V = vm . A . F
I	100,00	1,5172	(5.666,66) (0,765)	6.577,05
Total	**100,00**	**1,5172**	**(5.666,66) (0,765)**	**6.577,05**

Valor Médio da Terra Nua = R$ 4.335,00

Para o Terreno pertencente a Sra. Mônica Beatriz Porfírio Sampaio da Silva, temos:

Classe	%	Área (ha) (A)	Fator Desvalorizante (F)	Valor / Classe (R$) V = vm . A . F
I	100,00	2,6068	(5.666,66) (0,765)	11.300,46
Total	**100,00**	**2,6068**	**(5.666,66) (0,765)**	**11.300,46**

Valor Médio da Terra Nua = R$ 4.335,00

Para o Terreno pertencente a Empresa M.P.X. – TERMOCEARÁ LTDA, temos:

Classe	%	Área (ha) (A)	Fator Desvalorizante (F)	Valor / Classe (R$) V = vm . A . F
I	100,00	0,6568	(5.666,66) (0,765)	2.847,22
Total	**100,00**	**0,6568**	**(5.666,66) (0,765)**	**2.847,22**

Valor Médio da Terra Nua = R$ 4.335,00

06 – Valores dos Terrenos

a) Pertencente ao Sr. José Roberto Barros Ferreira com área de 379,30 m² x 40,00m = 15.172,00 m² ou 1,5172 ha.
1,5172 ha x R$ 4.335,00 ..... R$ 6.577,05

b) Pertencente a Sra. Mônica Beatriz Porfírio Sampaio da Silva, com área de 651,70m x 40,00m = 26.068,00 m² ou 2,6068 ha.
2,6068 ha x R$ 4.335,00 ..... R$ 11.300,46

c) Pertencente à Empresa MPX – TERMOCEARÁ LTDA, com área de 164,20m x 40,00m = 6.568,00 m² ou 0,6568 ha.
0,6568 ha x R$ 4.335,00 ..... R$ 2.847,22

CENTRALIZAÇÃO DOS BENS AVALIADOS

Descrição	Área/ha	Valor
Terrenos		
- Sr. José Roberto Barros Ferreira	1,5172	R$ 6.577,05
- Sra. Mônica Beatriz Porfírio Sampaio	2,6068	R$ 11.300,46
- MPX – TERMOCEARÁ LTDA	0,6568	R$ 2.847,22
T o t a l	**4,7808**	**R$ 20.724,73**

IMPORTA, o valor da presente avaliação em R$ 20.724,73 (Vinte mil, setecentos e vinte e quatro reais e setenta e três centavos).

Fortaleza(Ce), 13 de Junho de 2002

Eng.º José Eloísio M. Gouveia
CREA nº 359-D/CE

Econom. Zeneida Benevides Gouveia
CORECON nº 881-Ce

CONSIDERAÇÕES

Consideramos os terrenos avaliados, livres e desembaraçados, em conformidade com as escrituras apresentadas.

Como o estudo é de caráter INDENIZATÓRIO e para tal, necessário se faz saber qual o valor da terra, considerando as benfeitorias existentes, conforme especificado no laudo, encontramos o valor de R$ 4.335,00 (Quatro mil trezentos e trinta e cinco reais), equivalente a 1,00 ha de terra nua.

Como base de negociação junto aos proprietários, **sugerimos** o valor de R$ 1.734,00 (Hum mil setecentos e trinta e quatro reais), correspondente a 40% (quarenta por cento) do valor do hectare, considerando:

a) Os proprietários ficarão na posse mansa e pacífica dos imóveis;
b) Não haverá descaracterização dos imóveis no trecho onde passará a linha de servidão;
c) Os proprietários poderá explorar a terra respeitando o espaço aéreo no trecho que interligará a CGTF a CHESF, através da linha de servidão.

As medidas principais e os dados mais importantes, referidos neste LAUDO, foram levantados no local pela nossa equipe técnica.

A avaliação foi realizada pelos seguintes técnicos: Eng.º JOSÉ ELOÍSIO MARAMALDO GOUVEIA, CREA Nº 359-D/CE, Economista ZENEIDA BENEVIDES GOUVEIA, todos com vasta experiência em Engenharia de Avaliação e Transações Imobiliárias.

Os técnicos acima citados, além de seus registros nos Conselhos Competentes, são credenciados juntos aos principais Bancos, destacando-se o **BANCO DO NORDESTE, Banco Nacional de Desenvolvimento Econômico e Social – BNDES** e junto as diversas **VARAS DA JUSTIÇA FEDERAL.**

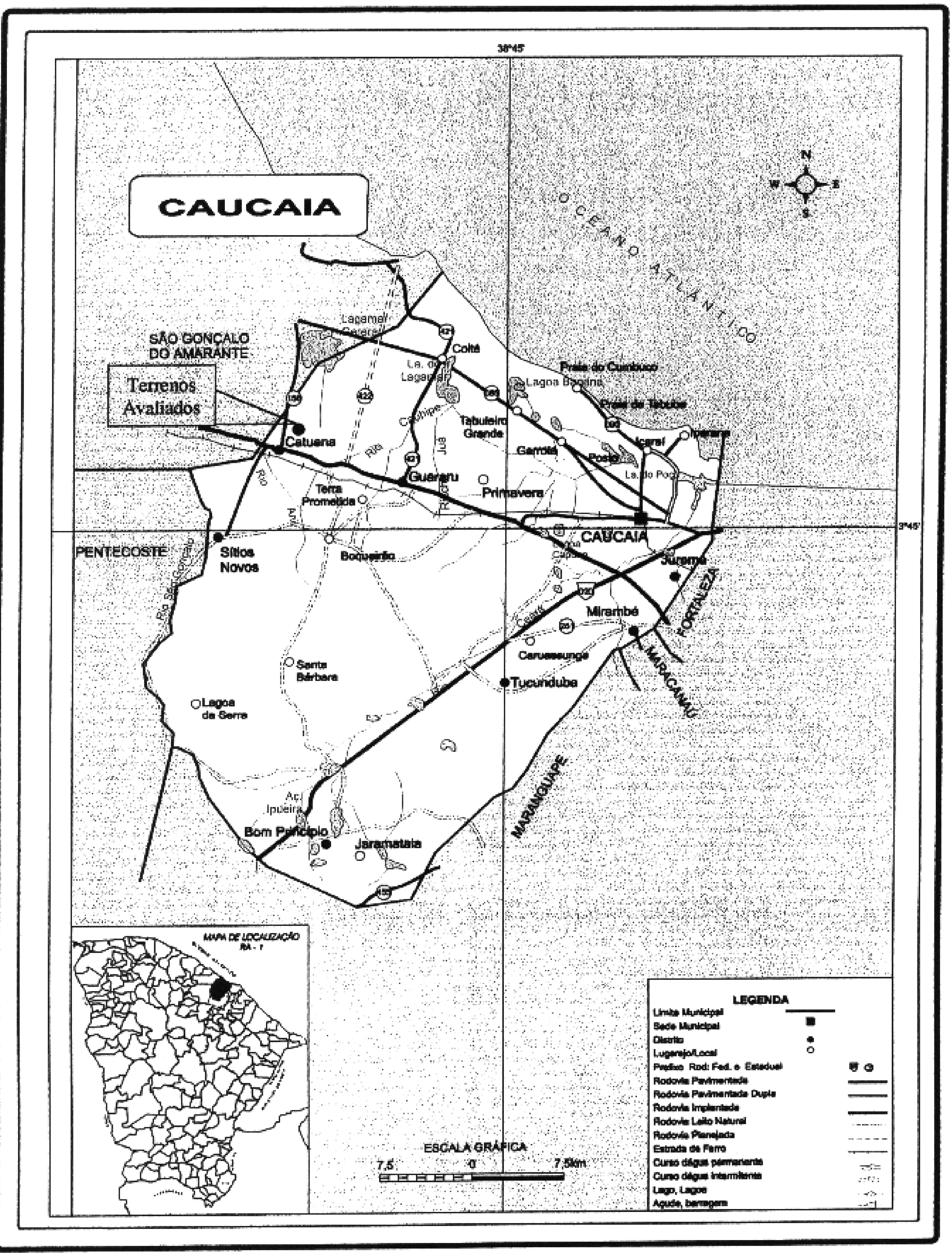
Para outras informações que sejam necessárias, os referidos técnicos, mantém escritório no seguinte endereço:

EG – Projetos, Consultoria, Avaliações e Assistência Técnica
Av. Bezerra de Menezes, 2071, Sala 404 – São Gerardo
Fone: (85) 287-3669 / Telefax: (85) 287-2873 / Celular: 9983-4450
CEP: 60.325-004 – Fortaleza – Ceará.

Damos assim por concluído o presente **LAUDO TÉCNICO**, devidamente datado e assinado pelos profissionais responsáveis e credenciados.

E.G. Projetos, Consultoria e Avaliações
Engº. Agrº. José Eloísio M. Gouveia
CREA 359-D-CE

* MAPA DE LOCALIZAÇÃO


CAUCAIA
OCEANO ATLÂNTICO
N
S
E
W
38°45'
3°45'
SÃO GONÇALO DO AMARANTE
Terrenos Avaliados
Catuana
Guararu
Terra Prometida
Primavera
Tabuleiro Grande
Colté
Lagamar
Praia do Cumbuco
Praia de Tabuba
Icaraí
Garrote
Potal
CAUCAIA
Jurema
Mirambé
Caruassunga
Tucunduba
Boqueirão
Sítios Novos
PENTECOSTE
Santa Bárbara
Lagoa da Serra
Bom Princípio
Jaramataia
MARANGUAPE
MARACANAÚ
FORTALEZA
MAPA DE LOCALIZAÇÃO RA - 1
ESCALA GRÁFICA
7,5
0
7,5km
LEGENDA
Limite Municipal
Sede Municipal
Distrito
Lugarejo/Local
Prefixo Rod. Fed. e Estadual
Rodovia Pavimentada
Rodovia Pavimentada Dupla
Rodovia Implantada
Rodovia Leito Natural
Rodovia Planejada
Estrada de Ferro
Curso dágua permanente
Curso dágua intermitente
Lago, Lagoa
Açude, barragem

ANNEX 3

RESOLUÇÃO CONAMA Nº 20, de 18 de junho de 1986

http://www.mma.gov.br/port/conama/res/res86/res2086.html

Publicado no D.O.U. de 30/07/86

O CONSELHO NACIONAL DO MEIO AMBIENTE - CONAMA, no uso das atribuições que lhe confere o art. 7º, inciso IX, do Decreto 88.351, de 1º de junho de 1983, e o que estabelece a RESOLUÇÃO CONAMA Nº 003, de 5 de junho de 1984;

Considerando ser a classificação das águas doces, salobras e salinas essencial à defesa de seus níveis de qualidade, avaliados por parâmetros e indicadores específicos, de modo a assegurar seus usos preponderantes;

Considerando que os custos do controle de poluição podem ser melhor adequados quando os níveis de qualidade exigidos, para um determinado corpo d'água ou seus diferentes trechos, estão de acordo com os usos que se pretende dar aos mesmos;

Considerando que o enquadramento dos corpos d'água deve estar baseado não necessariamente no seu estado atual, mas nos níveis de qualidade que deveriam possuir para atender às necessidades da comunidade;

Considerando que a saúde e o bem-estar humano, bem como o equilíbrio ecológico aquático, não devem ser afetados como conseqüência da deterioração da qualidade das águas;

Considerando a necessidade de se criar instrumentos para avaliar a evolução da qualidade das águas, em relação aos níveis estabelecidos no enquadramento, de forma a facilitar a fixação e controle de metas visando atingir gradativamente os objetivos permanentes;

Considerando a necessidade de reformular a classificação existente, para melhor distribuir os usos, contemplar as águas salinas e salobras e melhor especificar os parâmetros e limites associados aos níveis de qualidade requeridos, sem prejuízo de posterior aperfeiçoamento ;

RESOLVE estabelecer a seguinte classificação das águas, doces, salobras e salinas do Território Nacional:

Art. 1º - São classificadas, segundo seus usos preponderantes, em nove classes, as águas doces, salobras e salinas do Território Nacional :

ÁGUAS DOCES

1 - Classe Especial - águas destinadas:

a) ao abastecimento doméstico sem prévia ou com simples desinfecção.

b) à preservação do equilíbrio natural das comunidades aquáticas.

II - Classe 1 - águas destinadas:

a) ao abastecimento doméstico após tratamento simplificado;

b) à proteção das comunidades aquáticas;

c) à recreação de contato primário (natação, esqui aquático e mergulho);

d) à irrigação de hortaliças que são consumidas cruas e de frutas que se desenvolvam rentes ao Solo e que sejam ingeridas cruas sem remoção de película.

e) à criação natural e/ou intensiva (aquicultura) de espécies destinadas á alimentação humana.

III - Classe 2 - águas destinadas:

a) ao abastecimento doméstico, após tratamento convencional;

b) à proteção das comunidades aquáticas;

c) à recreação de contato primário (esqui aquático, natação e mergulho);

d) à irrigação de hortaliças e plantas frutíferas;

e) à criação natural e/ou intensiva (aquicultura) de espécies destinadas à alimentação humana.

IV - Classe 3 - águas destinadas:

a) ao abastecimento doméstico, após tratamento convencional;

b) à irrigação de culturas arbóreas, cerealíferas e forrageiras;

c) à dessedentação de animais.

V - Classe 4 - águas destinadas:

a) à navegação;

b) à harmonia paisagística;

c) aos usos menos exigentes.

ÁGUAS SALINAS

VI - Classe 5 - águas destinadas:

a) à recreação de contato primário;

b) à proteção das comunidades aquáticas;

c) à criação natural e/ou intensiva (aquicultura) de espécies destinadas à alimentação humana.

VII - Classe 6 - águas destinadas:

a) à navegação comercial;

b) à harmonia paisagística;

c) à recreação de contato secundário.

ÁGUAS SALOBRAS

VIII - Classe 7 - águas destinadas:

a) à recreação de contato primário;

b) à proteção das comunidades aquáticas;

c) à criação natural e/ou intensiva (aquicultura) de espécies destinadas à alimentação humana.

IX - Classe 8 - águas destinadas:

a) à navegação comercial;

b) à harmonia paisagística;

c) à recreação de contato secundário

Art. 2º - Para efeito desta resolução são adotadas as seguintes definições.

a) CLASSIFICAÇÃO: qualificação das águas doces, salobras e salinas com base nos usos preponderantes (sistema de classes de qualidade).

b) ENQUADRAMENTO: estabelecimento do nível de qualidade (classe) a ser alcançado e/ou mantido em um segmento de corpo d'água ao longo do tempo.

c) CONDIÇÃO: qualificação do nível de qualidade apresentado por um segmento de corpo d'água, num determinado momento, em termos dos usos possíveis com segurança adequada.

d) EFETIVAÇÃO DO ENQUADRAMENTO: conjunto de medidas necessárias para colocar e/ou manter a condição de um segmento de corpo d'água em correspondência com a sua classe.

e) ÁGUAS DOCES: águas com salinidade igual ou inferior a 0,50 %o.

f) ÁGUAS SALOBRAS: águas com salinidade igual ou inferior a 0,5 %o. e 30 %o.

g) ÁGUAS SALINAS: águas com salinidade igual ou superior a 30 %o.

Art. 3º - Para as águas de Classe Especial, são estabelecidos os limites e/ou condições seguintes:

COLIFORMES: para o uso de abastecimento sem prévia desinfecção os coliformes totais deverão estar ausentes em qualquer amostra.

Art. 4º - Para as águas de classe 1, são estabelecidos os limites e/ou condições seguintes:

a) materiais flutuantes, inclusive espumas não naturais: virtualmente ausentes;

b) óleos e graxas: virtualmente ausentes;

c) substâncias que comuniquem gosto ou odor: virtualmente ausentes;

d) corantes artificiais: virtualmente ausentes;

e) substâncias que formem depósitos objetáveis: virtualmente ausentes;

f) coliformes: para o uso de recreação de contato primário deverá ser obedecido o Art. 26 desta Resolução. As águas utilizadas para a irrigação de hortaliças ou plantas frutíferas que se desenvolvam rentes ao Solo e que são consumidas cruas, sem remoção de casca ou película, não devem ser poluídas por excrementos humanos, ressaltando-se a necessidade de inspeções sanitárias periódicas. Para os demais usos, não deverá ser excedido um limite de 200 coliformes fecais por 100 mililitros em 80% ou mais de pelo menos 5 amostras mensais colhidas em qualquer mês; no caso de não haver na região meios disponíveis para o exame de coliformes fecais, o índice limite será de 1.000 coliformes totais por 100 mililitros em 80% ou mais de pelo menos 5 amostras mensais colhidas em qualquer mês.

g) DBO_5 dias a 20°C até 3 mg/l O_2;

h) OD, em qualquer amostra, não inferior a 6 mg/lO_2;

i) Turbidez até 40 unidades nefelométrica de turbidez (UNT);

j) cor: nível de cor natural do corpo de água em mg Pt/l

l) pH: 6,0 a 9,0;

m) substâncias potencialmente prejudiciais (teores máximos) :

Alumínio:	0,1 mg/l Al
Amônia não ionizável:	0,02 mg/l NH_3.
Arsênio:	0,05 mg/l As
Bário:	1,0 mg/l Ba.
Berílio:	0,1 mg/l Be
Boro:	0,75 mg/l B
Benzeno :	0,01 mg/l
Benzo-a-pireno:	0,00001 mg/l
Cádmio:	0,001 mg/l Cd
Cianetos:	0,01 mg/l CN
Chumbo:	0,03 mg/l Pb
Cloretos:	250 mg/l Cl
Cloro Residual:	0,01 mg/l Cl
Cobalto:	0,2 mg/l Co
Cobre:	0,02 mg/l Cu
Cromo Trivalente:	0,5 mg/l Cr
Cromo Hexavalente:	0,05 mg/l Cr
1,1 dicloroeteno :	0,0003 mg/l
1,2 dicloroetano:	0,01 mg/l
Estanho;	2,0 mg/l Sn
Índice de Fenóis:	0,001 mg/l C_6H_5OH
Ferro solúvel:	0,3 mg/l Fe
Fluoretos:	1,4 mg/l F
Fosfato total:	0,025 mg/l P
Lítio:	2,5 mg/l Li
Manganês:	0,1 mg/l Mn
Mercúrio:	0,0002 mg/l Hg
Níquel:	0,025 mg/l Ni
Nitrato:	10 mg/l N
Nitrito:	1,0 mg/l N
Prata:	0,01mg/l Ag
Pentaclorofenol:	0,01 mg/l
Selênio:	0,01mg/l Se
Sólidos dissolvidos totais:	500 mg/l
Substâncias tenso-ativas quereagem com o azul de metileno :	0,5 mg/l LAS
Sulfatos:	250 mg/l SO_4
Sulfetos (como H_2S não dissociado):	0,002 mg/l S
Tetracloroeteno:	0,01 mg/l
Tricloroeteno:	0,03 mg/l
Tetracloreto de carbono:	0,003 mg/l
2, 4, 6 triclorofenol:	0,01 mg/l

Urânio total:	0,02 mg/l U
Vanádio:	0,1 mg/l V
Zinco:	0,18 mg/l Zn
Aldrin:	0,01 mg/l
Clordano:	0,04 µg/l
DDT;	0,002 µg/l
Dieldrin:	0,005 µg/l
Endrin:	0,004 µg/l
Endossulfan:	0,056 µg/l
Epôxido de Heptacloro:	0,01 µg/l
Heptacloro:	0,01 µg/l
Lindano (gama.BHC)	0,02 µg/l
Metoxicloro:	0,03 µg/l
Dodecacloro + Nonacloro:	0,001 µg/l
Bifenilas Policloradas (PCB'S):	0,001 µg/l
Toxafeno:	0,01 µg/l
Demeton:	0,1 µg/l
Gution:	0,005 µg/l
Malation:	0,1 µg/l
Paration:	0,04 µg/l
Carbaril:	0,02 µg/l
Compostos organofosforados e carbamatos totais:	10,0 µg/l em Paration
2,4 - D:	4,0 µg/l
2,4,5 - TP:	10,0 µg/l
2,4,5 - T:	2,0 µg/l

Art. 5º - Para as águas de Classe 2, são estabelecidos os mesmos limites ou condições da Classe 1, à exceção dos seguintes:

a) não será permitida a presença de corantes artificiais que não sejam removíveis por processo de coagulação, sedimentação e filtração convencionais;

b) Coliformes: para uso de recreação de contato primário deverá ser obedecido o Art. 26 desta Resolução. Para os demais usos, não deverá ser excedido uma limite de 1.000 coliformes fecais por 100 mililitros em 80% ou mais de pelo menos 5 amostras mensais colhidas em qualquer mês; no caso de não haver, na região, meios disponíveis para o exame de coliformes fecais, o índice limite será de até 5.000 coliformes totais por 100 mililitros em 80% ou mais de pelo menos 5 amostras mensais colhidas em qualquer mês;

c) Cor: até 75 mg Pt/l

d) Turbidez: até 100 UNT;

e) DBO_5 dias a 20°C até 5 mg/l O_2;

f) OD, em qualquer amostra, não inferior a 5 mg/l O_2.

Art. 6º - Para as águas de Classe 3 são estabelecidos os limites ou condições seguintes:

a) materiais flutuantes, inclusive espumas não naturais: virtualmente ausentes;

b) óleos e graxas: virtualmente ausentes;

c) substâncias que comuniquem gosto ou odor: virtualmente ausentes;

d) não será permitida a presença de corantes artificiais que não sejam removíveis por processo de coagulação, sedimentação e filtração convencionais;

e) substâncias que formem depósitos objetáveis: virtualmente ausentes;

f) número de coliformes fecais até 4.000 por 100 mililitros em 80% ou mais de pelo menos 5 amostras mensais colhidas em qualquer mês; no caso de não haver, na região, meios disponíveis para o exame de coliformes fecais, índice limite será de até 20.000 coliformes totais por 100 mililitros em 80% ou mais de pelo menos 5 amostras mensais colhidas em qualquer mês;

g) DBO_5 dias a 20°C até 10 mg/l O_2;

h) OD, em qualquer amostra, não inferior a 4 mg/l O_2

1) Turbidez: até 100 UNT;

j) Cor: até 75 mg Pt/l;

l) pH: 6,0 a 9,0

m) Substâncias potencialmente prejudiciais (teores máximos) :

Alumínio:	0,1 mg/l Al
Arsênio:	0,05 mg/l As
Bário:	1,0 mg/l Ba
Berílio:	0,1 mg/l Be
Boro:	0,75 mg/l B
Benzeno:	0,01 mg/l
Benzo-a-pireno:	0,00001 mg/l
Cádmio:	0,01 mg/l Cd
Cianetos:	0,2 mg/l CN
Chumbo:	0,05 mg/l Pb
Cloretos:	250 mg/l Cl
Cobalto:	0,2 mg/l Co
Cobre:	0,5 mg/l Cu
Cromo Trivalente:	0,5 mg/l Cr
Cromo Hexavalente:	0,05 mg/l Cr
1,1 dicloroeteno:	0,0003 mg/l
1.2 dicloroetano:	0,01 mg/l

Estanho:	2,0 mg/l Sn
Índice de Fenóis:	0,3 mg/l C_6H_5OH
Ferro solúvel:	5,0 mg/l Fe
Fluoretos:	1,4 mg/l F
Fosfato total:	0,025 mg/l P
Lítio:	2,5 mg/l Li
Manganês:	0,5 mg/l Mn
Mercúrio:	0,002 mg/l Hg
Níquel:	0,025 mg/l Ni
Nitrato:	10 mg/l N
Nitrito:	1,0 mg/l N
Nitrogênio amoniacal:	1,0 mg/l N
Prata:	0,05 mg/l Ag
Pentaclorofenol:	0,01 mg/l
Selênio:	0,01mg/l Se
Sólidos dissolvidos totais:	500 mg/l
Substâncias tenso-ativas que reagem com o azul de metileno:	0,5 mg/l LAS
Sulfatos:	250 mg/l SO_4
Sulfatos (como H_2S não dissociado):	0,3 mg/l S
Tetracloroetano:	0,01 mg/l
Tricloroetano:	0,03 mg/l
Tetracloreto de Carbono:	0,003 mg/l
2, 4, 6 triclorofenol:	0,01 mg/l
Urânio total:	0,02 mg/l U
Vanádio:	0,1 mg/l V
Zinco:	5,0 mg/l Zn
Aldrin:	0,03 µg/l
Clordano:	0,3 µg/l
DDT:	1,0 µg/l
Dieldrin:	0,03 µg/l
Endrin:	0,2 µg/l
Endossulfan:	150 µg/l
Epóxido de Heptacloro:	0,1 µg/l
Heptacloro:	0,1 µg/l
Lindano (gama-BHC):	3,0 µg/l
Metoxicloro:	30,0 µg/l
Dodecacloro + Nonacloro:	0,001 µg/l
Bifenilas Policloradas (PCB'S):	0,001 µg/l
Toxafeno:	5,0 µg/l
Demeton:	14,0 µg/l
Gution:	0,005 µg/l
Malation:	100,0 µg/l
Paration:	35,0 µg/l
Carbaril:	70,0 µg/l
Compostos organofosforados e carbamatos totais em Paration:	100,0 µg/l
2,4 - D:	20,0 µg/l
2,4,5 - TP:	10,0 µg/l
2,4,5 - T:	2,0 µg/l

Art. 7º - Para as águas de Classe 4, são estabelecidos os limites ou condições seguintes:

a) materiais flutuantes, inclusive espumas não naturais: virtualmente ausentes;

b) odor e aspecto: não objetáveis;

c) óleos e graxas: toleram-se iridicências;

d) substâncias facilmente sedimentáveis que contribuam para o assoreamento de canais de navegação: virtualmente ausentes;

e) índice de fenóis até 1,0 mg/l C6H5OH ;

f) OD superior a 2,0 mg/l O2, em qualquer amostra;

g) pH: 6 a 9.

ÁGUAS SALINAS

Art. 8º - Para as águas de Classe 5, são estabelecidos os limites ou condições seguintes:

a) materiais flutuantes: virtualmente ausentes;

b) óleos e graxas: virtualmente ausentes;

c) substâncias que produzem odor e turbidez: virtualmente ausentes;

d) corantes artificiais: virtualmente ausentes;

e) substâncias que formem depósitos objetáveis: virtualmente ausentes;

f) coliformes: para o uso de recreação de contato primário deverá ser obedecido o Art. 26 desta Resolução. Para o uso de criação natural e/ou intensiva de espécies destinadas à alimentação humana e que serão ingeridas cruas, não deverá ser excedida uma concentração média de 14 coliformes fecais por 100 mililitros, com não mais de 10% das amostras excedendo 43 coliformes fecais por 100 mililitros. Para os demais usos não deverá ser excedido um limite de 1,000 coliformes fecais por 100 mililitros em 80% ou mais de pelo menos 5 amostras mensais colhidas em qualquer mês; no caso de não haver, na região, meios disponíveis para o exame de coliformes totais por 100 mililitros em 80% ou mais de pelo menos 5 amostras mensais colhidas em qualquer mês;

g) DBO5 dias a 20°C até 5 mg/l O2 ;

h) OD, em qualquer amostra, não inferior a 6 mg/l O2 ;

i) pH: 6,5 à 8,5, não devendo haver uma mudança do pH natural maior do que 0,2 unidade;

j) substâncias potencialmente prejudiciais (teores máximos) :

Alumínio:	1,5 mg/l Al
Amônia não ionizável:	0,4 mg/l NH_3
Arsênio:	0,05 mg/l As
Bário:	1,0 mg/l Ba
Berílio:	1,5 mg/l Be
Boro:	5,0 mg/l B
Cádmio:	0,005 mg/l Cd
Chumbo:	0,01 mg/l Pb
Cianetos:	0,005 mg/l CN
Cloro residual:	0,01 mg/l Cl
Cobre:	0,05 mg/l Cu
Cromo hexavalente:	0,05 mg/l Cr
Estanho:	2,0 mg/l Sn
Índice de fenóis:	0,001 mg/l C_6H_5OH
Ferro:	0,3 mg/l Fe
Fluoretos:	1,4 mg/l F
Manganês:	0,1 mg/l Mn
Mercúrio:	0,0001 mg/l Hg
Níquel:	0,1 mg/l Ni
Nitrato:	10,0 mg/l N
Nitrito:	1,0 mg/ N
Prata:	0,005 m/l Ag
Selênio:	0,01 mg/l Se
Substâncias tensoativas que reagem com o azul de metileno:	0,5 mg/l - LAS
Sulfetos com H_2S:	0,002 mg/l S
Tálio:	0,1 mg/l Tl
Urânio Total:	0,5 mg/l U
Zinco:	0,17 mg/l Zn
Aldrin:	0,003 µg/l
Clordano:	0,004 µg/l
DDT:	0,001 µg/l
Demeton:	0,1 µg/l
Dieldrin:	0,003 µg/l
Endossulfan:	0,034 µg/l
Endrin:	0,004 µg/l
Epóxido de Heptacloro:	0,001 µg/l
Heptacloro:	0,001 µg/l
Metoxicloro:	0,03 µg/l
Lindano (gama - BHC):	0,004 µg/l
Dodecacloro + Nonadoro:	0,001 µg/l
Gution:	0,01 µg/l
Malation:	0,1 µg/l
Paration:	0,04 µg/l
Toxafeno:	0,005 µg/l
Compostos organofosforados e carbamatos totais:	10,0 µg/l em Paration
2,4 .- D:	10,0 µg/l
2, 4, 5 - TP:	10,0 µg/l
2, 4, 5 - T	10,0 µg/l

Art. 9º - Para as águas de Classe 6, são estabelecidos os limites ou condições seguintes:

a) materiais flutuantes; virtualmente ausentes:

b) óleos e graxas: toleram-se iridicências;

c) substâncias que produzem odor e turbidez: virtualmente ausentes;

d) corantes artificiais: virtualmente ausentes;

e) substâncias que formem depósitos objetáveis: virtualmente ausentes;

f) coliformes: não deverá ser excedido um limite de 4,000 coliformes fecais por 100 ml em 80% ou mais de pelo menos 5 amostras mensais colhidas em qualquer mês; no caso de não haver na região meio disponível para o exame de coliformes fecais, o índice limite será de 20.000 coliformes totais por 100 mililitros em 80% ou mais de pelo menos 5 amostras mensais colhidas em qualquer mês;

g) DBO5 dias a 20°C até 10 mg/l O2

h) OD, em qualquer amostra, não inferior a 4 mg/l O2;

i) pH: 6,5, a 8,5, não devendo haver uma mudança do pH natural maior do que 0,2 unidades;

ÁGUAS SALOBRAS

Art. 10 - Para as águas de Classe 7, são estabelecidos os limites ou condições seguintes:

a) DBO_5 dias a 20°C até 5 mg/l O_2;

b) OD, em qualquer amostra, não inferior a 5 mg/l O_2;

c) pH: 6,5 a 8,5

d) óleos e graxas: virtualmente ausentes:

e) materiais flutuantes: virtualmente ausentes;

f) substâncias que produzem cor, odor e turbidez: virtualmente ausentes;

g) substâncias que formem depósitos objetáveis: virtualmente ausentes;

h) coliformes; para uso de recreação de contato primário deverá ser obedecido o Art. 26 desta Resolução, Para o uso de criação natural e/ou intensiva de espécies destinadas à alimentação

humana e que serão ingeridas cruas, não deverá ser excedido uma concentração média de 14 coliformes fecais por 100 mililitros com não mais de 10% das amostras excedendo 43 coliformes fecais por 100 mililitros. Para os demais usos não deverá ser excedido um limite de 1.000 coliformes fecais por 100 mililitros em 80% ou mais de pelo menos 5 amostras mensais, colhidas em qualquer mês; no caso de não haver na região, meios disponíveis para o exame de coliformes fecais, o índice limite será de até 5.000 coliformes totais por 100 mililitros em 80% ou mais de pelo menos 5 amostras mensais, colhidas em qualquer mês;

i) substâncias potencialmente prejudiciais (teores máximos) ;

Amônia:	0,4 mg/l NH_3
Arsênio:	0,05 mg/l As
Cádmio:	0,005 mg/l Cd
Cianetos:	0,005 mg/l CN
Chumbo:	0,01 mg/l Pb
Cobre:	0,05 mg/l Cu
Cromo hexavalente:	0,05 mg/l Cr
Índice de fenóis:	0,001 mg/l C_6H_5OH
Fluoretos:	1,4 mg/l F
Mercúrio:	0,0001 mg/l Hg
Níquel:	0,1 mg/l Ni
Sulfetos como H_2S:	0,002 mg/l S
Zinco:	0,17 mg/l Zn
Aldrin:	0,003 µg/l
Clordano:	0,004 µg/l
DDT:	0,001 µg/l
Demeton:	0,1 µg/l
Dieldrin:	0,003 µg/l
Endrin:	0,004 µg/l
Endossulfan:	0,034 µg/l
Epóxido de heptacloro:	0,001 µg/l
Gution:	0,01 µg/l
Heptacloro:	0,001 µg/l
Lindano (gama . BHC):	0,004 µg/l
Malation:	0,1 µg/l
Metoxicloro:	0,03 µg/l
Dodecacloro + Nonacloro:	0,001 µg/l
Paration:	0,04 µg/l
Toxafeno:	0,005 µg/l
Compostos organofosforados e carbamatos totais:	10,0 µg/l em Paration
2,4 - D:	10,0 µg/l
2, 4, 5 - T:	10,0 µg/l
2, 4, 5 - TP:	10,0 µg/l

Art.11 - Para as águas de Classe 8, são estabelecidos os limites ou condições seguintes:

a) pH: 5 a 9

b) OD, em qualquer amostra, não inferior a 3,0 mg/l O_2;

c) óleos e graxas: toleram-se iridicências;

d) materiais flutuantes: virtualmente ausentes;

e) substâncias que produzem cor, odor e turbidez: virtualmente ausentes;

f) substâncias facilmente sedimentáveis que contribuam para o assoreamento de canais de navegação: virtualmente ausentes;

g) coliformes: não deverá ser excedido um limite de 4.000 coliformes fecais por 100 ml em 80% ou mais de pelo menos 5 amostras mensais colhidas em qualquer mês; no caso de não haver, na região, meios disponíveis para o exame de coliformes recais, o índice será de 20.000 coliformes totais por 100 mililitros em 80% ou mais de pelo menos 5 amostras mensais colhidas em qualquer mês;

Art. 12 - Os padrões de qualidade das águas estabelecidos nesta Resolução constituem-se em limites individuais para cada substância. Considerando eventuais ações sinergéticas entre as mesmas, estas ou outras não especificadas, não poderão conferir às águas características capazes de causarem efeitos letais ou alteração de comportamento, reprodução ou fisiologia da vida.

§ 1º - As substâncias potencialmente prejudiciais a que se refere esta Resolução, deverão ser investigadas sempre que houver suspeita de sua presença,

§ 2º - Considerando as limitações de ordem técnica para a quantificação dos níveis dessas substâncias, os laboratórios dos organismos competentes deverão estruturar-se para atenderem às condições propostas. Nos casos onde a metodologia analítica disponível for insuficiente para quantificar as concentrações dessas substâncias nas águas, os sedimentos e/ou biota aquática deverão ser investigados quanto a presença eventual dessas substâncias.

Art. 13 - Os limites de DBO, estabelecidos para as Classes 2 e 3, poderão ser elevados, caso o estudo da capacidade de autodepuração do corpo receptor demonstre que os teores mínimos de OD, previstos, não serão desobedecidos em nenhum ponto do mesmo, nas condições críticas de vazão ($Q_{crit.} = Q_{7,10}$, onde $Q_{7.10}$, é a média das mínimas de 7 (sete) dias consecutivos em 10 (dez) anos de recorrência de cada seção do corpo receptor).

Art. 14 - Para os efeitos desta Resolução, consideram-se entes, cabendo aos órgãos de controle ambiental, quando necessário, quantificá-los para cada caso.

Art. 15 - Os órgãos de controle ambiental poderão acrescentar outros parâmetros ou tornar mais restritivos os estabelecidos nesta Resolução, tendo em vista as condições locais.

Art. 16 - Não há impedimento no aproveitamento de águas de melhor qualidade em usos menos exigentes, desde que tais usos não prejudiquem a qualidade estabelecida para essas águas.

Art. 17 - Não será permitido o lançamento de poluentes nos mananciais sub-superficiais.

Art. 18 - Nas águas de Classe Especial não serão tolerados lançamentos de águas residuárias, domésticas e industriais, lixo e outros resíduos sólidos, substâncias potencialmente tóxicas, defensivos agrícolas, fertilizantes químicos e outros poluentes, mesmo tratados. Caso sejam utilizadas para o abastecimento doméstico deverão ser submetidas a uma inspeção sanitária preliminar.

Art. 19 - Nas águas das Classes 1 a 8 serão tolerados lançamentos de desejos, desde que, além de atenderem ao disposto no Art. 21 desta Resolução, não venham a fazer com que os limites estabelecidos para as respectivas classes sejam ultrapassados.

Art. 20 - Tendo em vista os usos fixados para as Classes, os órgãos competentes enquadrarão as águas e estabelecerão programas de controle de poluição para a efetivação dos respectivos enquadramentos, obedecendo ao seguinte:

a) o corpo de água que, na data de enquadramento, apresentar condição em desacordo com a sua classe (qualidade inferior à estabelecida,), será objeto de providências com prazo determinado visando a sua recuperação, excetuados os parâmetros que excedam aos limites devido às condições naturais;

b) o enquadramento das águas federais na classificação será procedido pela SEMA, ouvidos o Comitê Especial de Estudos Integrados de Bacias Hidrográfica; - CEEIBH e outras entidades públicas ou privadas interessadas;

c) o enquadramento das águas estaduais será efetuado pelo órgão estadual competente, ouvidas outras entidades públicas ou privadas interessadas;

d) os órgão competentes definirão as condições especificas de qualidade dos corpos de água intermitentes;

e) os corpos de água já enquadrados na legislação anterior, na data da publicação desta Resolução, serão objetos de reestudo a fim de a ela se adaptarem;

f) enquanto não forem feitos os enquadramentos, as águas doces serão consideradas Classe 2, as salinas Classe 5 e as salobras Classe 7, porém, aquelas enquadradas na legislação anterior permanecerão na mesma classe até o reenquadramento;

g) os programas de acompanhamento da condição dos corpos de água seguirão normas e procedimentos a serem estabelecidos pelo Conselho Nacional do Meio Ambiente - CONAMA.

Art. 21 - Os efluentes de qualquer fonte poluidora somente poderão ser lançados, direta ou indiretamente, nos corpos de água desde que obedeçam às seguintes condições:

a) pH entre 5 a 9;

b) temperatura : inferior a 40°C, sendo que a elevação de temperatura do corpo receptor não deverá exceder a 3°C;

c) materiais sedimentáveis: até ml/litro em teste de 1 hora em cone Imhoff. Para o lançamento em lagos e lagoas, cuja velocidade de circulação seja praticamente nula, os materiais sedimentáveis deverão estar virtualmente ausentes;

d) regime de lançamento com vazão máxima de até 1,5 vezes a vazão média do período de atividade diária do agente poluidor;

e) óleos e graxas:

- óleos minerais até 20 mg/l

- óleos vegetais e gorduras animais até 50 mg/l;

f) ausência de materiais flutuantes;

g) valores máximos admissíveis das seguintes substâncias:

Amônia:	5,0 mg/l N
Arsênio total:	0,5 mg/l As
Bário:	5,0 mg/ Ba
Boro:	5,0 mg/l B
Cádmio:	0,2 mg/l Cd
Cianetos:	0,2 mg/l CN
Chumbo:	0,5 mg/l Pb
Cobre:	1,0 mg/l Cu
Cromo hexavelente:	0,5 mg/l Cr
Cromo trivalente:	2,0 mg/l Cr
Estanho:	4,0 mg/l Sn
Índice de fenóis:	0,5 mg/l C_6H_5OH
Ferro solúvel:	15,0 mg/l Fe
Fluoretos:	10,0 mg/l F
Manganês solúvel:	1,0 mg/l Mn
Mercúrio:	0,01 mg/l Hg
Níquel:	2,0 mg/l Ni
Prata:	0,1 mg/l Ag
Selênio:	0,05 mg/l Se

Sulfetos:	1,0 mg/l S
Sulfito:	1,0 mg/l SO_3
Zinco:	5,0 mg/l Zn
Compostos organofosforados e carbonatos totais:	1,0 mg/l em Paration
Sulfeto de carbono:	1,0 mg/l
Tricloroeteno:	1,0 mg/l
Clorofórmio :	1,0 mg/l
Tetracloreto de Carbono:	1,0 mg/l
Dicloroeteno:	1,0 mg/l
Compostos organoclorados não listados acima (pesticidas, solventes, etc):	0,05 mg/l
outras substâncias em concentrações que poderiam ser prejudiciais: de acordo com limites a serem fixados pelo CONAMA.	

h) tratamento especial, se provierem de hospitais e outros estabelecimentos nos quais haja despejos infectados com microorganismos patogênicos.

Art. 22 - Não será permitida a diluição de efluentes industriais com aluas não poluídas, tais como água. de abastecimento, água de mar e água de refrigeração.

Parágrafo Único - Na hipótese de fonte de poluição geradora de diferentes despejos ou emissões individualizadas, os limites constantes desta regulamentação aplicar-se-ão a cada um deles ou ao conjunto após a mistura, a critério do órgão competente.

Art. 23 - Os efluentes não poderão conferir ao corpo receptor características em desacordo com o seu enquadramento nos termos desta Resolução.

Parágrafo Único - Resguardados os padrões de qualidade do corpo receptor, demonstrado por estudo de impacto ambiental realizado pela entidade responsável pela emissão, o competente poderá autorizar lançamentos acima dos limites estabelecidos no Art. 21, fixando o tipo de tratamento e as condições para esse lançamento.

Art. 24 - Os métodos de coleta e análise« das águas devem ser os especificados nas normas aprovadas pelo Instituto Nacional de Metrologia, Normatização e Qualidade Industrial - INMETRO ou, na ausência delas, no Standard Methods for the Examination of Water and Wastewater APHA-AWWA-WPCF, última edição, ressalvado o disposto no Art. 12. O índice de fenóis deverá ser determina do conforme o método 510 B do Standard Methods for the Examination of Water and Wastewater, 16ª edição, de 1985.

Art. 25 - As indústrias que, na data da publicação desta Resolução, possuírem instalações ou projetos de tratamento de seus despejos, aprovados por órgão integrante do Sistema Nacional do Meio Ambiente - SISNAMA. que atendam à legislação anteriormente em vigor, terão prazo de três (3) anos, prorrogáveis até cinco (5) anos, a critério do Estadual Local, para se enquadrarem nas exigências desta Resolução. No entanto, as citadas instalações de tratamento deverão ser

mantidas em operação com a capacidade, condições de funcionamento e demais características para as quais foram aprovadas, até que se cumpram as disposições desta Resolução.

BALNEABILIDADE

Art. 26 - As águas doces, salobras e salinas destinadas à balneabilidade (recreação de contato primário) serão enquadradas e terão sua condição avaliada nas categorias EXCELENTE, MUITO BOA. SATISFATÔRIA e IMPRÓPRIA, da seguinte forma:

a) EXCELENTE (3 estrelas) : Quando em 80% ou mais de um conjunto de amostras obtidas em cada uma das 5 semanas anteriores, colhidas no mesmo local, houver, no máximo, 250 coliformes fecais por l,00 mililitros ou 1.250 coliformes totais por 100 mililitros;

b) MUITO BOAS (2 estrelas): Quando em 80% ou mais de um conjunto de amostras obtidas em cada uma das 5 semanas anteriores, colhidas no mesmo local, houver, no máximo, 500 coliformes fecais por 100 mililitros ou 2.500 coliformes totais por 100 mililitros;

c) SATISFATÓRIAS (1 estrela): Quando em 80% ou mais de um conjunto de amostras obtidas em cada uma das 5 semanas anteriores, colhidas no mesmo local, houver, no máximo 1.000 coliformes recais por 100 mililitros ou 5.000 coliformes totais por 100 mililitros;

d) IMPRÓPRIAS: Quando ocorrer, no trecho considerado, qualquer uma das seguintes circunstâncias:

1. não enquadramento em nenhuma das categorias anteriores, por terem ultrapassado os índices bacteriológicos nelas admitidos;

2. ocorrência, na região, de incidência relativamente elevada ou anormal de enfermidades transmissíveis por via hídrica, a critério das autoridades sanitárias;

3. sinais de poluição por esgotos, perceptíveis pelo olfato ou visão;

4. recebimento regular, intermitente ou esporádico, de esgotos por intermédio de valas, corpos d'água ou canalizações, inclusive galerias de águas pluviais, mesmo que seja de forma diluída;

5. presença de resíduos ou despejos, sólidos ou líquidos, inclusive óleos, graxas e outras substâncias, capazes de oferecer riscos à saúde ou tornar desagradável a recreação;

6. pH menor que 5 ou maior que 8,5 ;

7. presença, na água, de parasitas que afetem o homem ou a constatação da existência de seus hospedeiros intermediários infectados;

8. presença, nas águas doces, de moluscos transmissores potenciais de esquistossomo, caso em que os avisos de interdição ou alerta deverão mencionar especificamente esse risco sanitário;

9. outros fatores que contra-indiquem, temporariamente ou permanentemente, o exercício da recreação de contato primário.

Art. 27 - No acompanhamento da condição das praias ou balneários as categorias EXCELENTE, MUITO BOA e SATISFATÓRIA poderão ser reunidas numa única categoria denominada PRÓPRIA.

Art. 28 - Se a deterioração da qualidade das praias ou balneários ficar caracterizada como decorrência da lavagem de vias públicas pelas águas da chuva, ou como conseqüência de outra causa qualquer, essa circunstância deverá ser mencionada no Boletim de condição das praias e balneários.

Art. 29 - A coleta de amostras será feita, preferencialmente, nos dias de maior afluência do público às praias ou balneários.

Art. 30 - Os resultados dos exames poderão, também, se referir a períodos menores que 5 semanas, desde que cada um desses períodos seja especificado e tenham sido colhidas e examinadas, pelo menos, 5 amostras durante o tempo mencionado.

Art. 31 - Os exames de colimetria, previstos nesta Resolução, sempre que possível, serão feitos para a identificação e contagem de coliformes fecais, sendo permitida a utilização de índices expressos em coliformes totais, se a identificação e contagem forem difíceis ou impossíveis.

Art. 32 - À beira mar, a coleta de amostra para a determinação do número de coliformes fecais ou totais deve ser, de preferência, realizada nas condições de maré que apresentem, costumeiramente, no local, contagens bacteriológicas mais elevadas.

Art. 33 - As praias e outros balneários deverão ser interditados se o órgão de controle ambiental, em qualquer dos seus níveis (Municipal, Estadual ou Federal), constatar que a má qualidade das águas de recreação primária justifica a medida.

Art. 34 - Sem prejuízo do disposto no artigo anterior, sempre que houver uma afluência ou extravasamento de esgotos capaz de oferecer sério perigo em praias ou outros balneários, o trecho afetado deverá ser sinalizado, pela entidade responsável, com bandeiras vermelhas constando a palavra POLUÍDA em cor negra.

DISPOSIÇÕES GERAIS

Art. 35 - Aos órgãos de controle ambiental compete a aplicação desta Resolução, cabendo-lhes a fiscalização para o cumprimento da legislação, bem como a aplicação das penalidades previstas, inclusive a interdição de atividades industriais poluidoras.

Art. 36 - Na inexistência de entidade estadual encarregada do controle ambiental ou se, existindo, apresentar falhas, omissões ou prejuízo sensíveis aos usos estabelecidos para as águas, a Secretaria Especial do Meio Ambiente poderá agir diretamente, em caráter supletivo.

Art. 37 - Os estaduais de controle ambiental manterão a Secretaria Especial do Meio Ambiente informada sobre os enquadramentos dos corpos de água que efetuarem, bem como das normas e padrões complementares que estabelecerem.

Art. 38 - Os estabelecimentos industriais, que causam ou possam causar poluição das águas, devem informar ao órgão de controle ambiental, o volume e o tipo de seus efluentes, os equipamentos e dispositivos antipoluidores existentes, bem como seus planos de ação de emergência, sob pena das sanções cabíveis, ficando o referido órgão obrigado a enviar cópia dessas informações ao IBAMA, à STI (MIC), ao IBGE (SEPLAN) e ao DNAEE (MME).

Art. 39 - Os Estados, Territórios e o Distrito Federal, através dos respectivos órgãos de controle ambiental, deverão exercer sua atividade orientadora, fiscalizadora e punitiva das atividades potencialmente poluidoras instaladas em seu território, ainda que os corpos de água prejudicados não sejam de seu domínio ou jurisdição.

Art. 40 - O não cumprimento ao disposto nesta Resolução acarretará aos infratores as sanções previstas na Lei nº 6.938, de 31 de agosto de 1981, e sua regulamentação pelo Decreto nº 88.351, de 01 de junho de 1983.

Art. 41 - Esta Resolução entrará em vigor na data de sua publicação, revogadas as disposições em contrário.

Deni Lineu Schwartz
Presidente

ANNEX 4

CENTRAL GERADORA TERMELÉTRICA DE FORTALEZA S.A.

PROGRAMA DE CONSULTA AO PÚBLICO

AVALIAÇÃO PARCIAL DOS QUESTIONÁRIOS APLICADOS NAS COMUNIDADES ISOLADAS

MUNICÍPIOS DE SÃO GONÇALO DO AMARANTE E CAUCAIA

CEÁRA - BRASIL

Rio de Janeiro

Março de 2003

INTRODUÇÃO

Visando o cumprimento do Programa de Consulta ao Público, a CGTF iniciou em 22 de fevereiro de 2003, a execução de atividades visando conhecer a comunidade existente no entorno da Usina termelétrica Endesa Fortaleza.

Esta atividade consiste na aplicação de questionários padronizados, que possam caracterizar de forma satisfatória a comunidade, além de garantir a recebimento de todos os anseios, curiosidades e expectativas dessas pessoas, sobre a obra e funcionamento da usina termelétrica.

A aplicação destes questionários é de responsabilidade da empresa *NOBIS – Tecnologia, Meio Ambiente e Segurança Industrial Ltda*, que contratou uma historiadora, com vasto conhecimento da região do Pecém e atuação no GTP - Grupo De Trabalho Participativo, órgão ligado ao Governo do Estado do Ceará (Secretaria de Infraestrutura – SEINFRA), criado com o objetivo de preparar e inserir a comunidade na área de influência do CIPP para as mudanças que adviriam com efetivação do distrito industrial do Pecém.

COMUNIDADES SELECIONADAS PARA A PRIMEIRA FASE

Para a primeira etapa de aplicação dos questionários foram escolhidas as comunidades num raio de até 3km da Usina termelétrica Endesa Fortaleza, consideradas pela empresa como as que mais relacionadas com a usina termelétrica.

Esta comunidade vive em casas isoladas ou pequenos aglomerados dispersos, com pouca ou nenhuma estrutura urbana.

QUESTIONÁRIO

O questionário aplicado nesta fase (anexo 1 do Programa de Consulta ao Público), é deliberadamente sucinto e simples, estando dividido basicamente em duas partes:

A primeira caracteriza a família ou moradores, o tipo de ocupação dos entrevistados, sua relação com a terra e com a comunidade, e o acesso a meios de comunicação em geral (rádio, televisão, entre outros).

A segunda determina o seu conhecimento e expectativas sobre a obra. Nesta parte o questionário foi montado com vistas a liberar o entrevistado a expor tudo o que pensa sobre o empreendimento.

A entrevistadora foi orientada a não direcionar qualquer tipo de resposta do entrevistado, bem como incentivá-lo a expor tudo o que pensa sobre a usina.

RESULTADOS ATÉ 07.02.2003

Até o dia 07.02.2003, foram visitadas 45 residências distribuídas pelas seguintes localidades:

São Gonçalo do Amarante		Caucaia	
Cabatã	8	Cauipe	6
Padre Holanda	4	Salgadinho	7
Chaves	1	Olhos D'água	2
Tabuleiro	13		
Campo Grande	4		
Sub Total	**30**	**Subtotal**	**15**

Em função das condições meteorológicas adversas (chuvas intensas), e a falta de condições das estradas, o número de questionários pode ser considerado pequeno, mas prevê-se que até o final de março as comunidades isoladas na área prevista estarão devidamente contatadas através dos questionários.

AVALIAÇÃO PRELIMINAR DOS RESULTADOS

Na análise preliminar dos questionários, pode-se caracterizar a comunidade como tipicamente rural. Foram visitadas 45 residências, responderam ao questionário 29 homens e 16 mulheres.

De acordo com as entrevistas pode-se verificar as seguintes características da população e suas condições:

a) Dos entrevistados 36% se declararão agricultores, 24% desenvolvem serviços domésticos, 9% dos entrevistados estão desempregados, 2% dos entrevistados estão trabalhando na Usina termelétrica Endesa Fortaleza e 27% dos entrevistados desenvolvem atividades variadas (religiosos, criadores de cães, artesãos, etc).

b) Das residências visitadas 96% não recebem energia elétrica nas casas, apesar das redes passarem próximas a maioria das casas.

c) Apesar disso, 90% declararam que têm TV ou rádio a bateria e utilizam regularmente estes meios de comunicação para se informarem ou como forma de lazer, sendo o horário preferido para assitir TV é a noite.

d) 70% dos entrevistados informaram que participam de algum tipo de associação ou organização social, sendo que 50 % pertencentes a grupos

religiosos católicos ou evangélicos. As outras instituições citadas foram Pastoral da Terra ou associação de moradores.

e) Dos entrevistados, 70% conhecem pelo menos uma pessoa que trabalha no local.

f) Apesar de 70 % declararem que conhecem alguma pessoa que trabalha no local, 40% dos entrevistados declararam que não tem nenhuma tipo informação da usina.

A partir destes dados, recomenda-se que devam ser elaborados planos de divulgação da usina que atinjam as comunidades isoladas.

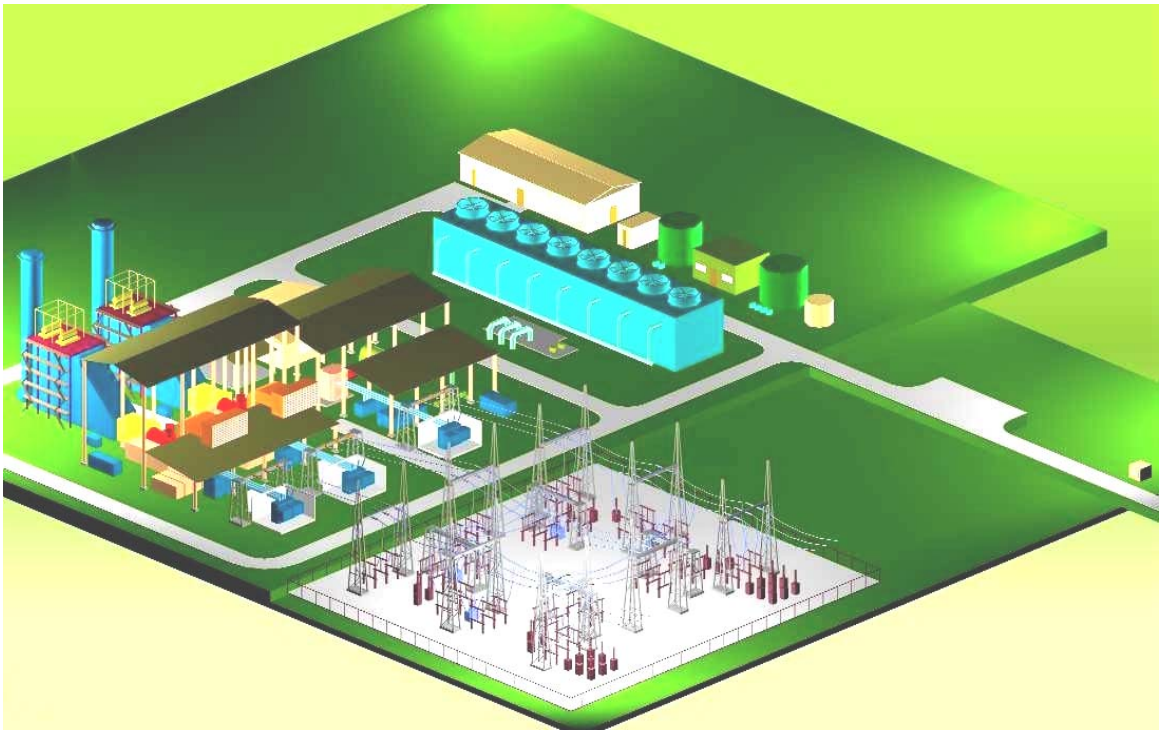
endesa fortaleza

NOBIS
TECNOLOGIA, MEIO AMBIENTE E SEGURANÇA INDUSTRIAL

CENTRAL GERADORA TERMELÉTRICA DE FORTALEZA S.A.

ENDESA FORTALEZA THERMOELETRIC PLANT

PUBLIC CONSULTATION PROGRAM



Rio de Janeiro

February 2003

1 – INTRODUCTION

The use of public consultations during the installation of large enterprises has become an increasingly common practice in present days, either being determined by environmental laws, demanded by Environmental and/or Financing Agencies, or constituting the reflex of the implantation of proper policies to support a harmonic relationship with and the consolidation of a company's image in face of the industry and its neighboring and/or affected communities.

Public consultations or meetings with the actors and sectors involved in order to clarify aspects related to the installation and operation of the enterprises help eliminate mistrusts or erroneous expectations that arise from large-scale works or facilities.

With this view, CGTF – Central Geradora Termelétrica Fortaleza S.A., by means of the activities described in this Program, intends to establish a permanent dialogue channel with the surrounding community and to develop a direct, harmonious and transparent relationship with the communities that are somehow affected by the construction and/or operation of the plant.

2 – PURPOSES

In order to implement the Public Consultation Program, CGTF has established the following purposes:

- To situate the Power Plant within the local and/or regional context in the affected communities;
- To identify and respond, as much as possible, to the desires of such communities;
- To evaluate and adequately deal with public requests and concerns;

- To obtain support in order to adapt procedures that somehow affect or may affect such communities.

3 – GUIDELINES AND PREMISES OF THE PROGRAM

For the Program's development, the following premises were defined:

- Creation of an Internal Policy for involvement with the public;
- Mobilization for the discussion of ideas with the public;
- Direct involvement of the Company's Direction with the Program;
- Elaboration of a Public Consultation Program by means of periodic meetings, visits and/or informative materials;
- Treatment of the ideas proposed by the public;
- Consideration of the characteristics of actors and sectors involved;
- Assurance of the Company's responsibility for outsourced services;
- Interaction with Public Agencies, Non governmental Organizations related to the project and other companies to be installed in the complex;
- Transparency of the information relative to the Power Plant.

4 – INFORMATION TO BE PROVIDED TO THE PUBLIC

The public will be provided information that characterizes the project in its stages of construction and operation, its management programs and, especially, the results of the environmental monitoring program.

5 – TARGET PUBLIC OF THE PROGRAM

The target public of the Program is composed by all persons susceptible to the potential impacts the Power Plant might have, either positive or negative.

Therefore, the most immediate target public are the communities of Pecém, Primavera and Catuana, which are the urban centers that are closer to the Power Plant.

Apart from these centers, the Program will contemplate isolated families in the Power Plant's surroundings, for whom specific consultation and communication strategies will be developed.

Finally, large urban centers represented by the municipalities of Caucaia, São Gonçalo do Amarante and Fortaleza will be the target of a broader information strategy.

In every stage of the Public Consultation Program, we will receive any critics and suggestions by the following telephone number: (085) 216-1154 e (085) 216-1160

6 – METHODOLOGY

The methodology for the implantation of the Consultation Program is estimated in different stages and by means of different activities and communication strategies.

Important stages of the Program's implantation are:

- Identification of target publics and consultation/information strategies relative to the Power Plant;
- Identification of different local means of communication and their range as instruments to provide information on the Power Plant;
- Definition of the information to be provided to the public and its format;
- Preparation of information and consultation materials for the communities;
- Execution of consultations to the communities involved and provision of information on the Power Plant;
- Evaluation of the Program and planning of future activities.

Some of these activities were developed during the Program's initial design stage, allowing the definition of some essential aspects for its implantation.

Thus, the target public was divided in three groups:

- Group I – Properties isolated from urban centers and located in the Power Plant's surroundings, within a radius of 3 km.
- Group II – Urban centers located within the area of Pecém's Industrial and Port Complex, including Pecém (São Gonçalo do Amarante), Catuana and Primavera (Caucaia).

- Group III – Municipalities of Fortaleza, Caucaia and São Gonçalo do Amarante.

As consultation and information strategy for Group I, with a small number of inhabitants whose interests and expectations are more individualized, the questionnaire is the most appropriate instrument.

By applying the questionnaire or opinion poll, the community's profile and its expectations and/or concerns relative to the Power Plant can be characterized.

For Group II, the strategy will be to organize consultation meetings with the community or to perform interviews. Specifically for the Pecém community, district of São Gonçalo do Amarante, which is to be the one most affected by the implantation of CIPP, consultation meetings will be held in different stages of the Power Plant's implantation.

Apart from the community as a whole, some relevant institutions for the purposes of the Program will be invited to participate, such as Associação das Famílias de Pecém (ASSFAP – Association of Families of Pecém), Associação de Pescadores (Association of Fishermen), local religious congregations, commerce representatives, and school headmasters and teachers, among others.

For Group III, the strategy will focus on the use of means of communication with greater reach, such as local newspapers and radios.

The Program will be developed with the support of Grupo de Trabalho Participativo (Group of Participative Work), associated to the State Government of Ceará by means of the SEINFRA - Secretaria de Infraestrutura (Infrastructure Department), which already performs the task of articulating the State Government's actions with the community affected by the implantation of CIPP.

All stages in this Program will be duly documented by means of reports on the different activities developed.

Given the dynamic nature of and the continuity intended for the Program's activities, its execution is estimated in different phases (initially, phases 1, 2 and

3), which will be repeated and complemented along the development of the Program, thus allowing for the return of information to the communities and the bi-directional flow of information.

7 – ACTIVITY SCHEDULE

For the activities defined for the Program, its duration is estimated in 6 months organized as follows:

Schedule of information and consultation activities with the affected communities

Duration / ACTIVITIES	2003					
	feb	mar	apr	may	jun	jul
Identification of target public and consultation/information strategies						
Identification of the means of communication that better reach the region						
Preparation of information and consultation materials for the community						
Visits and application of questionnaires to inhabitants of isolated properties within a radius of 3 km from the enterprise	**phase 1**	**phase 2**	**phase 3**			
Meetings and provision of information in the district of Pecém (municipality of São Gonçalo do Amarante)	**phase 1**	**phase 2**	**phase 3**			
Interviews and provision of information in Catuana (municipality of Caucaia)		**phase 1**	**phase 2**	**phase 3**		
Interviews and provision of information in Primavera (municipality of Caucaia)		**phase 1**	**phase 2**	**phase 3**		
Information on the project in the city of Caucaia						
Information on the project in the city of São Gonçalo do Amarante						
General evaluation of results						
Adequacy of the Program						
Final Report						

8 – EVALUATION OF THE CONSULTATION PROGRAM

All stages of the Program are to be evaluated, as well as the replies obtained in the meetings and interviews.

Such evaluation will support decision taking, providing answers to doubts raised by the communities, and other activities to be developed by the Company.

9 – COMMUNITY DEVELOPMENT AND SOCIAL PROGRAMS

A program for interaction with the communities will be developed, seeking to contribute by means of basic information, towards improvement in quality of life. The communities to be served are: Catuana, Pecém and Primavera.

CGTF plans to commence activities related to interaction with the communities, at the onset of commercial operations. The resources to be allocated by CGTF for development activities will define the duration of the Program.

The timetable for execution and detailing of activities, regarding human and material resources, content of the themes to be discussed as well as venues where meetings will be held, will be established in due course. This task will involve lectures on environmental awareness, health and accident prevention in the home, support for education at schools and nursery schools in the region, lectures at Community Groups on AIDS prevention, citizenship etc.

10 – ANNEXS

ANNEX I – Standard Questionnaire

ANNEX II – Pecém's Public Meeting

ANNEX III – Assessment of the applied questionnaires

CENTRAL GERADORA TERMELÉTRICA FORTALEZA CGTF

PROGRAMA DE CONSULTA AO PÚBLICO

QUESTIONÁRIO FASE 1

1	**DATA:**	**HORA:**	**ENTREVISTA Nº:**
2	**LOCAL DA ENTREVISTA (situação, localidade, município):**		

PERFIL DO ENTREVISTADO

3	**NOME DO ENTREVISTADO:**		
4	**ATIVIDADE DESENVOLVIDA NA PROPRIEDADE OU FONTE DE RENDA:**		
	Área da propriedade (ha): _____	**( ) Rural**	**( ) Urbana**
	Condição da ocupação:	**( ) Proprietário**	**( ) Empregado**
		( ) Arrendatário	**( ) Outra Qual?**
5	**ENDEREÇO DO ENTREVISTADO:**		
6	**TEMPO DE RESIDÊNCIA:** **Quantos moradores?**		**DISTÂNCIA ATÉ A UTE**
7	**VEÍCULO DE INFORMAÇÃO UTILIZADO:**		
	( ) Jornal	**Qual?**	**Horário preferido:**
	( ) Rádio	**Qual?**	**Horário preferido:**
	( ) TV	**Qual?**	**Horário preferido:**
8	**PARTICIPA DE ALGUMA ASSOCIAÇÃO? QUAL E HÁ QUANTO TEMPO?**		
9	**NÚMERO DE CRIANÇAS:**	**Total:**	**Na escola:**
	Qual (quais) escola(s)?		
	Localidade(s):		

GRAU DE INFORMAÇÃO / PERCEPÇÃO

10	**JÁ FOI INFORMADO OU CONHECE O EMPREENDIMENTO?**		
	( ) Rádio	**( ) Quando viu o movimento da obra**	
	( ) Jornal	**( ) Contato direto com técnico**	
	( ) TV	**( ) Outros Quais?**	
11	**CONHECE ALGUÉM QUE TRABALHE NA OBRA DA UTE?** **Quem?**		
12	**O QUE PENSA DO EMPREENDIMENTO?**		
13	**ALGUMA INFORMAÇÃO QUE GOSTARIA DE TER SOBRE O EMPREENDIMENTO?**		
14	**OUTRAS OBSERVAÇÕES:**		

15	**NOME DO ENTREVISTADOR:**	**ASSINATURA:**

ANNEX IV – Flyer Endesa Fortaleza thermoeletric plant project

Central Geradora Termelétrica Fortaleza - CGTF

endesa fortaleza

Número 1 – Janeiro / 2003

UTE FORTALEZA

A CGTF, empresa geradora de energia elétrica, está construindo uma usina termelétrica no Complexo Industrial-Portuário do Pecém - CIPP

Esta usina, denominada Usina Termelétrica Fortaleza, além de atender aos mais modernos padrões de segurança e eficiência, utilizará gás natural como combustível, cuja queima produz muito menos poluentes que outros tipos de combustível, como carvão e óleo.

A tecnologia utilizada permite que a queima de uma mesma quantidade de gás produza quase o dobro da energia gerada nos processos convencionais, pois utiliza o processo chamado ciclo combinado, onde o vapor produzido na queima do gás movimenta outra turbina, sem que seja necessária uma quantidade adicional de combustível.

Esta usina terá capacidade para produzir até 310,7 MW, o que equivale a energia suficiente para abastecer 90 % das residências do Ceará, aumentando a oferta de energia e facilitando a implantação de novas indústrias na região.

Central Geradora Termelétrica Fortaleza – CGTF
Rua Adolfo Pinheiro n.º176 – Dionísio Torres – Fortaleza – Ceará – Brasil
Fone (85) 216-1154 e 216-1160

ANNEX V – Flyer Endesa Fortaleza thermoeletric plant works

Central Geradora Termelétrica Fortaleza - CGTF

Número 2 – Fevereiro / 2003

A CONSTRUÇÃO DA UTE FORTALEZA

A construção da Usina Termelétrica Fortaleza foi iniciada em janeiro de 2002 e sua operação comercial está prevista para novembro de 2003.

As obras da UTE Fortaleza empregam atualmente cerca de 1.000 operários, nas mais diversas atividades.

Quase a totalidade dos trabalhadores são de Caucaia, São Gonçalo do Amarante e região, sendo aproximadamente 500 do Distrito de Pecém.

Com a conclusão da usina, haverá diversificação e mais oferta de energia, facilitando a implantação de novas indústrias na região.

Central Geradora Termelétrica Fortaleza – CGTF
Rua Adolfo Pinheiro n.º176 – Dionísio Torres – Fortaleza – Ceará – Brasil
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CENTRAL GERADORA TERMELÉTRICA DE FORTALEZA S.A.

PROGRAMA DE CONSULTA AO PÚBLICO

1ª REUNIÃO COM A COMUNIDADE DO DISTRITO DE PECÉM

MUNICÍPIO DE SÃO GONÇALO DO AMARANTE

CEÁRA - BRASIL

Pecém

Fevereiro de 2003

INTRODUÇÃO

Visando o cumprimento do Programa de Consulta ao Público, a CGTF realizou em 26 de fevereiro de 2003, a 1ª reunião com a comunidade do Distrito de Pecém, Município de São Gonçalo do Amarante, Ceará.

Esta reunião contou com o apoio do Grupo De Trabalho Participativo - GTP, órgão ligado ao Governo do Estado do Ceará (Secretaria de Infra-estrutura – SEINFRA), criado com o objetivo de preparar e inserir a comunidade na área de influência do CIPP para as mudanças que adviriam com a efetivação do distrito industrial do Pecém.

O GTP já havia organizado reuniões com objetivos semelhantes, e tem identificado as estruturas e as instituições envolvidas com a comunidade, além da dinâmica social do Distrito de Pecém.

ORGANIZAÇÃO DO EVENTO

Com a colaboração do GTP, foram distribuídos 150 convites para o seguinte público alvo (Anexo 1 - figuras 1A e 1B):

a) pessoas físicas identificadas pelo GTP como formadoras de opinião;

b) principais organizações representantes da sociedade civil organizada da comunidade:

- Associação das Famílias do Pecém, que congrega mais de 400 famílias de associados, sendo uma das mais ativas ONGs de atuação local;

- Associação dos Pescadores;

- Representantes do comércio: restaurantes, posto de gasolina, livrarias, mercados, entre outros;
- Congregações religiosas: católica e evangélica;
- Instituições de ensino;
- Representantes dos serviços de saúde pública

A reunião foi marcada para as 16:00h nas dependências do GTP (Anexo 1 - figuras 2A, 2B e 2C).

Envolvidos diretamente como o evento estavam 6 técnicos da GRUPO ENDESA, 4 integrantes do GTP e 2 consultores da NOBIS.

DINÂMICA DA REUNIÃO

A reunião foi assim desenvolvida:

A reunião começou às 16:00h. Inicialmente foram feitas as apresentações das pessoas envolvidas com o projeto e com a reunião.

Após este contato inicial, foi apresentado um pequeno audiovisual que caracterizava o empreendimento. Este mesmo material foi utilizado na apresentação do projeto à SEMACE (órgão ambiental estadual).

Depois do audiovisual, foi aberta ao público a possibilidade de perguntas orais ou por escrito (Anexo 1 - figuras 3A e 3B), .

Utilizando as perguntas como link, foram mostradas apresentações relativas à saúde, segurança e meio ambiente e sobre as características das obras civis (figura 4).

Foram feitas 9 manifestações, sendo 8 (oito) orais através do microfone, e 1 (uma) por escrito através do formulário padrão.

A reunião encerrou-se as 18:45 e assinaram a lista de presenças 56 pessoas da comunidade (figura 5).

Convém observar que a reunião foi documentada através de gravação de por fotografias.

AS PREOCUPAÇÕES DA COMUNIDADE

As manifestações da comunidade estão relacionadas abaixo:

a) 4 pessoas manifestaram-se sobre a relação da obra e do funcionamento da usina com a geração de empregos, temporários ou permanentes (1 por escrito).

As respostas da CGTF para estas questões foram no sentido de:

- Deixar claro para os presentes, as questões relativas aos empregos durante a fase de implantação e de operação no que tange ao número de trabalhadores e a qualificação necessária.
- A política da empresa com relação às empreiteiras e a seleção de empregados, sendo a maior parte da mão de obra, nesta fase do empreendimento, do CIPP, em especial do Pecém.

b) 2 pessoas perguntaram sobre o aumento de poluição aérea com a entrada em operação da usina termelétrica.

As respostas da CGTF para estas questões foram as seguintes:

- Deixar claro para os presentes o cumprimento integral por parte da termelétrica dos padrões determinados pela legislação brasileira.
- Apresentar os dados de emissões atmosféricas demonstrados nos estudos ambientais da termelétrica.

c) 1 pessoa estava interessada em saber sobre as fontes de financiamento da obra e se havia financiamento de instituições ou bancos estatais brasileiros.

As respostas da CGTF para estas questões foram as seguintes:

- Deixar claro que até então a empresa vem utilizando recursos próprios para a construção da termelétrica.
- Deixar claro também que estamos dando seqüência às tratativas de financiamento com instituição internacional.

d) 1 pessoa mostrou preocupação sobre o retorno (impostos) que empreendimentos deste porte podem ter em relação à comunidade de Pecém, já que o mesmo é um distrito de São Gonçalo do Amarante, e a termelétrica está situada no município de Caucaia.

As respostas da CGTF para estas questões foram as seguintes:

- A política da empresa obriga empreiteiras a terem escritórios no(s) município(s) da obra e com isso taxas e impostos são pagas para este município.
- Que o município mais beneficiado é o de Caucaia, já que as obras estão sendo realizadas nos limites deste município.
- Porém, realçou que a operação da usina propiciará a instalação de novos empreendimentos no CIPP, independentemente de estar do lado de Caucaia ou São Gonçalo do Amarante, novos empreendimentos gerarão riqueza para a região e para o Estado.

e) 1 pessoa manifestou-se favoravelmente à reunião e aos esclarecimentos que foram dados.

A CGTF informou que novos contatos deverão ser feito com a comunidade, e qualquer questionamento será respondido.

AVALIAÇÃO GERAL DA REUNIÃO

A reunião transcorreu dentro de um clima de cordialidade e sem anomalias.

As preocupações com emprego e poluição eram esperadas e, via de regra, são as preocupações mais debatidas na comunidade e na mídia.

Esta reunião deverá ser reavaliada junto com os questionários para o desenvolvimento de novas estratégias de contato com a comunidade.

ANEXO 1 Fotografias da Reunião

Figura 1A - Distribuição de convites na Associação dos Pescadores

Figura 1B - Distribuição de convites na Associação das Famílias do Pecém

Figura 2A - Instalações de GTP

Figura 2B - Área onde foi realizada a reunião

Figura 2C. Local da reunião já com toldo e cadeiras colocadas, formando um espaço para 120 pessoas

Figura 3A – Perguntas e colocações dos participantes

Figura 3B - Perguntas e colocações dos participantes

Figura 4 Técnicos da ENDESA respondendo questionamentos e colocações

Figura 5 Vista geral da reunião