APPENDIX

BASELINE SUMMARY

OPERATING LICENSE (LO)

EL PASO GUIDELINES FOR CONTRACTORS

LIST OF SELECTED REFERENCES

BASELINE SUMMARY

The Direct Area of Influence (DAI) of the Macaé Merchant Power Plant includes the area surrounding the plant site. In terms of liquid effluents and atmospheric emissions, part of the Macaé River basin is included within the direct area of influence of this project. The area of intervention (AI) is restricted to the plant site.

It is in the Macaé Municipality where social and economic aspects become more important.

There are no sites of historical or archeological interest or areas suitable for the preservation of rare or endangered species in this DAI. It should be stressed that the area is basically used as pastures, making it an area of predominantly rural use, as stipulated in the Municipal Master Plan. A brief summary of the regional characteristics is given below, with all the data presented here summarized from the Environmental Impact Study (EIA).

Climate and Meteorological Aspects

The Macaé region features a subtropical climate with moderate humidity, with dry winters and rainy summers, according to its latitude (22° 37' S and 41° 47' W) and the influence of the Atlantic Ocean.

Data from Station 83749 run by the National Meteorology Institute (INEMET) at Macaé were used for the following parameters: temperature, rainfall, evaporation, sunshine and relative humidity.

For the wind analysis, data were collected in both the Rio de Janeiro and Macaé regions, since the data available for the Macaé region cover only one incomplete year. The collection sites were at the Rio de Janeiro International Airport and DEPV/Infraero in Macaé. The average wind speed measured at the International Airport area was 2.7 m/s.

Data from the city of Rio de Janeiro were used to calculate the average heights of the mixing layer. This selection was based in the similarities of the altitudes and of the micro-meteorological conditions between Rio de Janeiro and the Macaé region. These values resulted in an annual weighted average of 795 m for the mixing layer height. Later, additional studies were also presented with hourly wind data at the Macaé Station, including air-mixing layer data and stability class determination for ISC input.

Air Quality

No air quality data for the region were found in the available literature. This was expected, as there are no other emission sources in the area capable of posing a problem, other than the BR-101 Highway itself. Recent air quality assessment studies, which took place 500 meters from the Presidente Dutra Highway[1], analyzed SO_2 and NO_2 concentrations

[1] BRANDT, EIA/RIMA - RioGen Thermo-Power Plant (Annex V – Volume II)

over a five-day period. The results showed values below the detection limits of the methods employed (<0.006 mg for SO_2 and <0.002 mg for NO_2).

Noise Levels

In order to classify the noise levels generated by the operation of the Macaé Merchant thermo-power plant, measurements taken at eleven different points within the area under analysis on October 11, 2000. The main source of noise in this region is traffic on the BR-101 Highway, with the estimated traffic volumes during the measurement period ranging from five to seven vehicles per minute.

Background noise levels ranged from 41.9 to 67.3 dB(A), characterizing an area that is extremely sensitive to noise pollution.

Geology / Geomorphology / Soils

The Direct Area of Influence (DAI) is located in the Macaé Geographic Micro-Region, which in turn lies within the Southeastern section of the Brazilian Platform, represented by the geotectonic domain of the Mobile Atlantic Belt or Coastal Belt. This area is composed of two units: crystaline Pre-Cambrain rock and Quaternary alluvia.

Regarding geomorphology, the site lies within two Morphostructural Domains, known as the Sedimentary Deposits and Remobilized Fold Corridors, which are in turn represented by two Geomorphological Units in the area: Coastal Lowlands and Fluvial Accumulation Models, and Hills and Coastal Massifs.

Classes or taxonomic units were established for soils in accordance with the criteria and norms proposed by Embrapa Solos (Embrapa 1988) and Lemos & Santos (1996).

The site where the thermo-power plant is to be installed falls under the Red-Yellow Latosol category on a hill approximately fifty meters high, with a gradient of less than 10% and limited susceptibility to erosion .

Surface Water Resources

Most of the Macaé municipality is included in the natural drainage basin of the Macaé River.

The Macaé River rises in the Serra do Macaé hills near the Pico do Tinguá peak (altitude 1,560 meters) in Nova Friburgo, running some 136 kilometers before flowing into the Atlantic Ocean near the town of Macaé. The main tributaries on its right bank are the Bonito, Purgatório and Pedrinhas rivers; the Abacaxi and Carão streams; the Teimoso River, the Roça Velha and Belarmino streams and the Três Pontes River. The main tributaries on its left bank are the Sana, Atalaia, São Domingos, Santa Bárbara, Ouro

Macaé, São Pedro and Jurumirim rivers and the Genipapo, Guanandirana and Sabiá streams.

There are three fluviometric stations operating in the Macaé River basin. The minimum flow-rate ($Q_{7,10}$) for the Macaé River varies from 3.6 to 4.9 m^3/s.

The DBO parameter in 10% of the measurements in the Macaé River remained above 5 mg/l (maximum permitted level for Class 2 waters), reaching an 60.0 mg/l. This pollution reading meant that the concentration of dissolved oxygen remained below the upper 6.40 mg/l level acceptable for Class 2 waters in only 10% of the readings obtained, reaching a minimum value of 0.1 mg/l for what was probably the most critical organic pollution condition.

The total phosphorus parameter produced a maximum value of 0.4 mg/l, which is very high in relation to the Class 2 standard. In 90% of the measurements, total phosphorus concentrations exceeded 0.036 mg/l (the norm being 0.025 mg/l). Fifty percent of samples obtained during the period showed concentrations of over 0.05 mg/l.

Phenol concentrations in 10% of samples obtained were found to exceed 0.005 mg/l, with a maximum recorded value of 0.009 mg/l. It should be remembered that the Class 2 limit stands at 0.001 mg/l.

Biological Resources

The area directly affected by the project is covered by vegetation consisting almost entirely of anthropic fields (meadowlands) composed mainly of grassy species and invading plants.

Poorly-drained lowland stretches and swampy areas are also noted.

Terrestrial wildlife is characteristic of meadowlands, with little interesting birdlife in conservation terms, due to the fact that the species noted are basically those common to many different environments and geographic locations.

The fishlife observed at a location close to the direct intervention site (i.e. where the BR-101 Highway crosses the Macaé River) is characteristic of lower river courses and backwater areas, namely the lower reaches of the Macaé River.

The presence of certain euryaline marine species was observed in the DAI. This indicates that these species move between the estuary and the area under analysis, due possibly to anthropic and/or reproductive strategies

Social and Economic Aspects at Macaé

The Macaé Municipality has undergone many sweeping changes over the past two decades.

For many years, sugarcane was the backbone of the Macaé economy. After the establishment of the PETROBRAS terminal here and its associated oil exploration and production activities, the local economy began to focus more on the industrial, commercial and service sectors, attracting a migrant population.

Many outlying areas – often sheltering mangrove swamps and sandspit formations – have been settled by newly-arrived low-income job-seekers. The ever-increasing urban migration of the past few decades caused severe alterations to the region's natural and urban environments. The last survey conducted by the IBGE at Macaé in 1999 showed the migrant percentage to be 32.66%.

But if on one hand the population has benefited from the growth ushered in by the implementation of these new enterprises, boosting the supply of goods, jobs, services and income, on the other, the town has grown in a disorganized fashion, without providing the basic public services infrastructure required to meet these new demands.

Government of the State of Rio de Janeiro
State Department of Environment
State Committee for Environmental Control

FEEMA - State Environmental Engineering Foundation

OPERATING LICENSE **LO Nr. 439/2001**

Pursuant to Deliberation No. 003, dated December 28, 1977, issued by the State Committee for Environmental Control (CECA), the State Environmental Engineering Foundation (FEEMA), according to the powers granted thereto by Decree-Law No. 134, dated June 16, 1975, Article 8, and the Polluting Activity License System, established by Decree No. 1633, dated December 21, 1977, hereby issues this Operating License (LO), which authorizes

Company: EL PASO RIO CLARO LTDA.
CNPJ/CPF: 02.290.787/0001-07
Address: Praia de Botafogo No. 440 – 14º andar – Botafogo
Adm. Reg/District Court: 6th RA – Botafogo
Municipality of Rio de Janeiro, State of Rio de Janeiro
registered under FEEMA Code N° 10009420/35.11.10,
to develop implementation studies for activity(ies) related to a thermo-power plant fired by natural gas.
Located at: Highway BR-101, km 169 – Sítio Severina – Barra de Macaé, Macaé Municipality.

with the following constraints:

1. Within thirty (30) days of the date of issue of this License, comply with NA-052 – Regulation for Issue of Obligatory Licenses and Environmental Impact Study for the Polluting Activity License System, approved by CECA Deliberation No. 2538, dated 11/12/91 (Government Gazette, June 12, 1991), forwarding copies to FEEMA, within the same period.

2. This License refers to environmental aspects and does not exempt the entrepreneur from complying with the other aspects required by law.

3. This License shall not be amended in any way, nor plastic-coated, under penalty of losing its validity.

This Operating License is effective through to October 31, 2006 as of the date hereof, as FEEMA Proceeding No. E-07/202.534/01, in compliance with the conditions set forth in this document and its appendices, which although not transcribed herein shall be an integral part hereof.

Rio de Janeiro, October 31, 2001.

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ISAURA FRAGA
President, FEEMA

The construction, reform, extension, installation or operation of potentially polluting establishments, works or services, in violation of the applicable legal standards and regulations or non-compliance with legal or contractual obligations of relevant environmental interest may result in the crimes set forth in Articles 60 and 68 of Act No. 9,605, dated December 2, 1998, and the violator, as an individual or corporate legal entity, shall be subject to the penalty of detention or payment of a fine.

OPERATING LICENSE CONSTRAINTS

4. This Operating License shall be renewed within one hundred and twenty (120) days prior to its expiry date, in order to invoke the use of Article 10, Paragraph 4, of CONAMA Resolution Nº 237/97.
5. Implement the Liquid Effluents Monitoring program as agreed during the development of the Basic Environmental Plan (*Plano Basico Ambiental* – PBA). The results of the Monitoring Program shall be presented to FEEMA as part of the Liquid Effluents Self-Monitoring Program – (PROCON ÁGUA) and in accordance with the following regulatory documentation: "DZ-942 R-07 - Guideline of the Liquid Effluents Self-control Program - PROCON ÁGUA, approved by CECA Deliberation nº 1007, dated October 10,1990, as published in the Rio de Janeiro State Government Gazette on January 14, 1991."
6. Compliance with NT-202 R-10- Criteria and Standards for Liquid Effluents Disposal, approved by CECA Deliberation nº 1007, dated December 4, 1986, published in the Rio de Janeiro State Government Gazette, dated December 12, 1986.
7. Implement the Water Quality Monitoring program proposed in the PBA document, and undertake the necessary adjustments to this Program within six months, based on test results and with particular emphasis on the biological test findings.
8. Present water quality monitoring results in electronic format, using the sample format provided by FEEMA and in accordance with the commitments established in the PBA document.
9. Perform continuous monitoring of atmospheric emissions from one (01) out of every four stacks, measuring the following parameters for the gas emissions: exit rate , temperature and flow rates, (identifying O_2, NO_2 and CO). The data collected shall be transmitted in real time to the FEEMA Air Quality Central Database.
10. Performance of Emissions Monitoring Manual Rounds for the remaining three (03) stacks of each group, according to the schedule indicated below during a period of 24 (twenty four) months. At the end of this period, the monitoring frequency will be reassessed. The initial monitoring rounds shall be scheduled in the following manner:
    - Round 1: two months after the beginning of each group operation.
    - Round 2: three months after completion of the first round.
    - Round 3: six months after completion of the second campaign.
    - Round 4 and subsequent: rounds every six months.
11. Perform continuous monitoring of ambient air quality parameters using Continuous Emissions Monitoring (CEM) station to be installed outdoors in the plant area of interest, in order to monitor the following parameters: NO_X, NO, NO_2, O_3, HCT, CO, temperature, relative humidity, solar radiation, wind direction and speed. Data shall be transmitted in real-time to the FEEMA Air Quality Central Database.
12. Perform continuous monitoring of wind direction and speed in the plant area of interest.
13. Re-assess the suitability of the CEM station location eighteen months after the start-up of plant operations.

Government of the State of Rio de Janeiro
State Department of Environment
State Committee for Environmental Control

FEEMA - State Environmental Engineering Foundation

OPERATIING LICENSE **LO Nr. 439/2001**

Company: EL PASO RIO CLARO LTDA.
Address: Highway BR-101, km 169 – Sítio Severina, Macaé Municipality.

OPERATING LICENSE CONSTRAINTS

14. Perform Noise Monitoring program with presentation of biannual monitoring reports containing the following information:
    - Sound level measurements, in units of dB(A).
    - Noise Period or statistical distribution for variable noise levels.
    - Operating conditions at the source of noise and prevailing climate conditions during the monitoring period (e.g, temperature, and wind direction and speed).
    - Time at which noise measurements were performed.
    - Corrections for background sound levels.
    - Measured background noise level.
    - Noise values criteria including corrections for monitoring period (day / night) and type of monitoring zone (residential, industrial, etc).
    - Sketches with location of measurement points.
15. Implement Landscaping and Reclamation Project, replanting species in accordance with the PBA document specifications regarding the following activities:
    - Landscaping inner and outer traffic circulation areas for the premises.
    - Planting strips of vegetation along the fenced perimeter.
    - Creation and preservation of forested and planted areas within the undeveloped highlands and lowlands located around the facilities.
    - Increase the density of vegetation along the banks of the Macaé River. The riverbank marks the plant site boundaries to the North and Northeast.
16. Implement a Risk Management Plan (RMP) that includes local communities and plant staff in case of incidents caused by the existence of the thermo-power plant, its facilities, operations, and/or use of hazardous substances. The Risk Management Plan (RMP) shall be signed by the parties responsible for the following activities: Plant Management; Risk Management Program; Distribution of Standard Operating Procedures (SOPs) and Facility Conditions Manual; Training Program; Recycling Program; Equipment and Systems Integrity, Reliability and Warranty Program; and Emergency Action Plan.
17. Implement the groundwater and soil monitoring program as established by the PBA document. Results shall be forwarded to FEEMA on completion of each scheduled monitoring round.
18. Implement the Erosion Protection Plan to minimize erosive processes within the facilities in accordance with the PBA document specifications.
19. Forward copies of the Status Reports to FEEMA on tasks completed in compliance with agreements signed with the State Department of Environment and Sustainable Development – SEMADS on their completion of these at scheduled intervals.
20. Submit any planned modifications to the established programs and plans for analysis by FEEMA, with suggestions, prior to their implementation.

ADDENDUM

a) Change of Activity:

“Natural gas-fired thermo-power plant with a maximum generating capacity of 895 MW with 20 (twenty) turbo-generator units."

b) Inclusion of restrictions:

21 - Continuously monitor ambient air quality conditions via a second Automatic Monitoring Station installed at a location near the urban center of the Macaé Municipality. The following parameters shall be monitored at the station installation: NO_x, NO, NO_2, O_3, HCT, CO, temperature, relative humidity, solar radiation, wind direction and speed. These data shall be transmitted in real time to the FEEMA Air Quality Data Center.

22 - Operate and maintain a continuous atmospheric emissions monitoring system for each of the last four turbo-generator units to measure the following parameters: gas exit speed, temperature, pressure and flow rate; O_2, NO_x and CO_2. These data shall be transmitted in real time to the FEEMA Air Quality Center Database.

June 21, 2002.
(Signed)

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Paulo Coutinho
President, FEEMA