

Chapter 4 ENVIRONMENTAL LAWS AND INSTITUTIONS

4.1 National System

The Republic of Argentina consists of 23 provinces and their independence is highly respected. The nation has her constitution and laws. The provinces have authority to have their own constitutions and laws and to execute them as long as they do not infringe on the authority and roles of the nation. The City of Buenos Aires, as the capital of the nation, is equal to a province in power.

4.2 National Environmental Laws and Institutions

4.2.1 Environmental Legislation

There are two types of laws: general and individual. The Environmental Law (1973) is a general law. Individual laws include those on air (National Law No. 20,284, 1973, #11), soil (National Law No. 22,428), animals (National Law No. 22,421), and hazardous wastes (National Law No. 24,051, #10). The problem is that most of the laws were enacted before the amendment of the National Constitution in 1994. To meet the amendment, revisions of national environmental laws and regulations are underway by the Ministry of Social Development and Environment (Ministry of Environment).

The National Constitution amended in 1994 has fundamental environmental issues as follows (#151):

- (1) Right and obligation of the people
 - Right to enjoy suitable environment for cultivating healthy humanity
 - Obligation to preserve environment for themselves and future generations
 - Obligation to restore environment by people who damage it
- (2) Common roles between national and provincial authorities
 - Protection of the environmental right
 - Rational utilization of natural resources
 - Preservation of the natural and cultural heritage
 - Protection of biodiversity
 - Preparation of environmental information and education
 - Ban of entry of hazardous and radioactive wastes into the country
- (3) Division of roles between national and provincial authorities
 - The nation is responsible to provide for minimum requirements.
 - The provinces supplement the national provisions
 - Natural resources belong to the province where they are located.

4.2.2 Environmental Legislation

Air Preservation Law (National Law No. 20,284, #11) enacted in 1973 stipulates;

- Air quality standards should be established by the nation
- Air quality standards have levels of normal, alert, alarm and emergency
- Emission standards for stationary sources should be set by local authorities (provinces and municipalities)
- Vehicle emission gas standards should be set by the nation

Table 4.2.1 shows the national air quality standards (#11 Annex 2 and #48). The standards are said to be in a process of revision. There is also a national standard on air quality measurement (SO₂, NO_x, PM₁₀, O₃, CO, etc.) and flue gas measurement (SO₂, NO_x, PM, CO, etc.) shown in the Resolution No. 708/1996 by the then-Environmental Agency (its manual, #60).

Table 4.2.1 National Air Quality Standards in Argentina

Pollutant	Evaluation Time	Normal	Alert	Alarm	Emergency
CO (ppm)	1 hr	50	100	120	150
	8 hrs	10	15	30	50
NO _x (ppm)	1 hr	0.45	0.6	1.2	n. a.
	24 hrs	0.15	0.3	0.4	n. a.
SO ₂ (ppm)	1hr	1	5	10	n. a.
	8 hrs	n. a.	0.3	n. a.	n. a.
	one month	0.03	n. a.	n. a.	n. a.
O ₃ (includes general oxidants)	1 hr	0.1	0.15	0.25	0.4
TSP (µg/m ³)	one month	150	n. a.	n. a.	n. a.
Settling dust (mg/cm ²)	30 days	1.0	n. a.	n. a.	n. a.

n. a.: not available

There are no general national emission standards for stationary sources except for thermal power plants (see Section 4.4). Emission standards for new motor vehicles are stipulated as shown in Table 4.2.2 (#220).

Table 4.2.2 National Emission Standards for New Motor Vehicles in Argentina

Light-duty vehicles		(unit: g/km)			
Pollutants	1994	1995	1996	1998	1999
CO	24.0	12.0	12.0	6.2	2.0
HC	2.1	1.2	1.2	0.5	0.3
NOx	2.0	1.4	1.4	1.43	0.6
PM ⁽¹⁾			0.373 ⁽²⁾	0.16 ⁽³⁾	0.124 ⁽⁴⁾

(1) Applicable only to diesel vehicles

(2) Applicable to vehicles with a weight of less than 1,700 kg

(3) 0.31 for vehicles with a weight of less than 1,700 kg

(4) Applicable to all light duty vehicles

Heavy-duty diesel vehicles		(unit: g/kWh)			
Pollutants	1994	1995 ⁽¹⁾	1996 ⁽²⁾	1998 ⁽¹⁾	2000 ⁽²⁾
CO	11.2	4.9	4.9	4.0	4.0
HC	2.4	1.23	1.23	1.1	1.1
NOx	14.406	9.0	9.0	7.0	7.0

(1) Applicable only to town mini buses

(2) Applicable to all heavy-duty vehicles

PM for diesel vehicles (unit: g/kWh)

Pollutant	1996	2000
PM	0.4 ⁽¹⁾	0.15 ⁽¹⁾

(1) A factor of 1.7 should be multiplied for vehicles with a engine power of 85 kW or less.

4.2.3 Environmental Impact Assessment

There is no national law regarding the environmental impact assessment. However, the assessments have been conducted at a ministry or an agency level. Among them are;

- Energy projects such as hydraulic power generation, thermal power generation and gas pipeline
- Hazardous waste
- Mining
- Public works such as roads

4.2.4 Institutional Framework

At the national level, the Environment Agency (Agency of Sustainable Development and Environmental Policies) of the Ministry of Social Development and Environment is in charge of

national environmental policies, whose major roles include (#221);

- Use, conservation, restoration, protection and development of renewable natural resources
- Formulation and proposition of standards and rules for environmental pollutions
- Formulation and proposition of rules for coordination among political organizations
- Diagnosis of regional environment in cooperation with national, provincial and municipal authorities
- Promotion of environmental education
- Provision of environmental information

The Federal Committee for Environment (Consejo Federal de Medio Ambiente) was established under the Environment Agency in 1990. It aims to formulate nationwide comprehensive environmental policies and to coordinate strategies, plans and programs for environmental management at the national and the local levels. All the 23 Provinces and the City of Buenos Aires join the committee.

4.3 Provincial Environmental Laws and Institutions

4.3.1 General Features

Characteristics of provincial environmental laws and their enforcement framework differ depending on their history, nature, social and economic conditions. As a result, since the amendment of the National Constitution in 1994, each Province has established its own environmental laws, environmental standards, emission standards, etc.

The environmental laws and institutions of the Province of Buenos Aires, City of Buenos Aires and Province of Mendoza are summarized below.

4.3.2 Province of Buenos Aires

1) Environmental Legislation

Article 28th of the Constitution of Province of Buenos Aires provides the environmental right and obligation of the people in the province to preserve the environment, and roles of the provincial government to protect the environment. The principles of the environmental policy are expressed in the General Environmental Law (Provincial Law No. 11,723). There are also the following individual laws and their related decrees.

- Industrial Installation Law (Provincial Law No. 11,459, #141) and its Regulatory Decree (Provincial Decree No. 1,741/96, #141)
- Law of Protection of Water and Air (Provincial Law 5,965, #140) and its Regulatory Decree (Provincial Decree No. 3,395/96, #140)
- Law of Special Wastes (Provincial Law No. 11,720, #142) and its Regulatory Decree (Provincial Decree No. 806/97, #142)

2) Industries

The key points of the Industrial Installation Law and its Regulatory Decree (#141):

- Factories are obliged to observe the Laws and Decrees from the planning stage.
- Factories cannot operate without a Certificate of Environmental Qualification (Certificado de Aptitud Ambiental).
- Factories are classified into 3 categories by the Level of Environmental Complexity (Nivel de Complejidad Ambiental) (N.C.A).
- Factories in the 2nd or 3rd category must conduct an Environmental Impact Assessment (EIA) before they can be installed. They can obtain their Certificate only after their EIA is approved.
- Factories in the 3rd category are obliged to periodically monitor their environments and keep the monitored results. Inspectors can examine these results.

A prior approval by the province is needed to construct a new factory. Factories built originally before 1996 are not allowed to expand or change model, if they are not located in the industrial areas. An expansion or a model-change of a factory is not allowed if the factory is in the residential area. Measures for environmental protection should be implemented for an expansion or a model-change of a factory.

A Factory Classification

All the factories are categorized by their N.C.A as shown in Table 4.3.1. The provincial government sets their category. San Nicolas Power Plants belong to the 3rd category.

Table 4.3.1 Factory Classification in the Province of Buenos Aires

Category	Evaluation	N.C.A
1	Harmless (inocuo)	Less than 11
2	Troublesome (incomodo)	11 ~ 24
3	dangerous (peligroso)	25 and more

Here, N.C.A is defined as follows.

$$N.C.A = Ru + ER + RI + Di + Lo$$

Where Ru: Classification by the factory activity including raw materials and manufacturing process

ER: Quality of emissions, effluents and wastes

Ri: Potential danger of the factory activity

Di: Scale of the factory (personnel, consumed power and area)

Lo: Location (city zoning and available services)

B Certificate of Environmental Qualification

A Certificate of Environmental Qualification is issued by evaluating influences on the health, safety and property of the personnel and the people living around the factory. The certifiers are shown by factory category in Table 4.3.2. All the factories located in harbor zones receive their Certificates from the province. The Certificate is valid for 2 years. It must be renewed every 2 years. An environmental audit report must be submitted for the renewal.

**Table 4.3.2 Certifier of Environmental Qualification
in the Province of Buenos Aires**

Factory Category	Certifier
1	Municipality
2	Province or municipality ⁽¹⁾
3	Province
Harbor zone	Province

(1) Depends on the agreement between the province and municipality

C Factories and Environmental Impact Assessment

Plans to install factories of the 2nd or 3rd category are not authorized without approval of their EIA. The reviewer of EIAs is the province for factories of the 3rd category, for those of the 2nd category, either of the province or municipality can be the reviewer, depending upon their agreement. Factories of the 3rd category can present the methodology of the EIA to the province, upon which, the latter must judge it to be approved, observed or denied.

D Control of Factories by Administration

a. Division of factory control between the province and municipalities

The following rules regulate the control of the factory between the province and municipalities.

- Control of factories of the 1st category can be delegated to municipalities.
- Control of factories of the 2nd category can be partially or entirely delegated to municipalities depending on their capacity to control.
- Control of factories of the 3rd category can be only partially delegated to municipalities.

San Nicholas City supervises only factories of the 1st category by its agreement with the province.

The province intends to transferring the control of factories of the 2nd category to the municipalities where they are located.

b. Inspection

The province or municipalities have the following authority over factories.

- Free entrance to any place in a factory
- Acquisition of all the documents necessary for the inspection

3) Thermal Power Plants

The Provincial Law No. 11769/96 (#257) stipulates that the thermal power plants located in the province are under the jurisdiction of the Provincial Ministry of Public Works and Services. The provincial entity (Ente) established under the Ministry control generation, transmission and distribution of electric power. This law stipulates that a decree should be enacted concerning rules for environmental protection applied to the power sector in the province. However the decree has not been drafted yet.

Thermal power plants in the province submit ENRE and the province the same environmental reports. However, they are not submitted to the city of San Nicholas.

4) Legislation Related to Ambient Air

The Provincial Law No. 5,965 (#140), as a law to protect water and air, stipulates that all the cooperative bodies and persons are obliged to protect water and air.

A Standards and Rules Related to Ambient Air

a. Factories

The Regulatory Law No. 3,395/96 (#140) complementary to the Law No. 5,965 (#140)

imposes the following requirements upon factories.

- To apply to the administrative authorities for permission to emit gaseous pollutants to the air (factories of the 3rd category to the province, those of the 1st or the 2nd category either to the province or the municipality where they are located depending on the agreement between them)
- To study relations between their air pollutant emissions and the air quality standards
- To observe the emission regulations

The administrative office in charge (the province or the municipality) authorizes the operation of the factories from its judgement of the above requirements. The permission must be renewed every 2 years. The method to calculate influence of air pollutant emissions on the air is given in the Provincial Resolution No. 242/97 (#143).

b. Air Quality Standards

There are air quality standards for basic pollutants (Table 4.3.3) and guidelines for special pollutants.

Table 4.3.3 Air Quality Standards in the Province of Buenos Aires (Basic Pollutants)

Pollutants	Chemical Formulas	mg/m ³	ppm	Evaluation Times
Sulfur Dioxide	SO ₂	1.300 ⁽¹⁾	0.50 ^(1,2)	3 hours
		0.365 ⁽¹⁾	0.14 ⁽¹⁾	24 hours
		0.080 ⁽¹⁾	0.03 ⁽⁴⁾	1 year
Suspended Particulate Matter	PM ₁₀	0.050 ⁽⁴⁾		1 year
		0.150 ⁽¹⁾		24 hours ⁽³⁾
Carbon Monoxide	CO	10.000 ⁽¹⁾	9 ⁽¹⁾	8 hours
		40.082 ⁽¹⁾	35 ⁽¹⁾	1 hour
Ozone	O ₃	0.235 ⁽¹⁾	0.12 ⁽¹⁾	1 hour
Nitrogen Oxides (as NO ₂)	NOx	0.400	0.2	1 hour
		0.100 ⁽⁴⁾	0.053 ⁽⁴⁾	1 year
Lead ⁽⁵⁾	Pb	0.0015 ⁽¹⁾ (arithmetic mean)		3 months
Settling Dust		1 mg / cm ²		1 month

(1) not permitted to exceed more than once in a year (4) annual average (arithmetic mean)

(2) corresponds to the secondary standard

(5) sampled from Total Particle Matter

(3) 24 hours (0:00~0:00)

Note. Standard of US-EPA 25°C and 1 ATM

c. Air Quality Monitoring

Although the province is not monitoring air quality now, it has a plan to install an

automatic and continuous monitoring system. The province has no rule on measurement methods for air quality. However, it recommends applying the US-EPA methods.

d. Emission Regulation

There are two kinds of emission regulation for factories: a guideline for emissions from new industrial facilities (Table 4.3.4) and regulations for black smoke by Ringelman’s chart (Table 4.3.5) and chemical smoke and inert mist by opacity (Table 4.3.6) The emission guideline has no specification of oxygen concentration.

Table 4.3.4 Emission Guideline for New Industrial Facilities in BA Province
(at 0°C and 1 ATM, 1 hour average value, measured at stacks)

Pollutants	Concentration (mg/Nm ³)	Emission (g/sec)
Sulfuric acid	150	–
Ammonia	–	83
Hydrogen cyanide and cyanide *	5	–
Chlorine	230	–
Hydrogen chloride	460	–
Sulfur dioxide	500	–
Fluoride hydroxide	100	–
Hydrogen sulfide	7.5	–
Lead	10	–
Sulfide trioxide	100	–
Soot and dust	250	–
Carbon monoxide (solid fuels)	250	–
(liquid fuels)	175	–
(gas fuels)	100	–
Nitrogen oxides (as NO ₂)		–
(industrial facilities)	200	
(combustion facilities)	450	

Note: *: no emission of mercury cyanide

Table 4.3.5 Smoke Regulation by Ringelman’s Chart in Province of Buenos Aires

Ringelman’s Index	Permissible Time (minutes)	Observation Time (hours)
1 and 2	-	-
2	5	1
3	3	1
	15	8
4	2	1
	10	8
5	1	1
	7	8

Note: excludes emergency

**Table 4.3.6 Smoke Regulation by Opacity
in the Province of Buenos Aires**

Opacity	Judgement
less than 20%	Permitted
20% and more	not permitted

Note: excludes emergency

5) Environmental Impact Assessment

A Target Projects

There are provisions on EIA in the General Environmental Law (Provincial Law No. 11,723, #157). The province and municipalities have different kinds of project reviews. Their assignments are as follows.

(1) Province

- Power generation (hydraulic, thermal and nuclear) and transmission
- Administration of water service for urban and suburban
- Localization of industrial parks
- Construction of dams, etc.
- Construction of railways, roads, etc.
- Installation of factories of the 3rd category

(2) Municipalities (examples)

- Development or enlargement of housing complexes
- Development of centers for tourism, sports, camping, etc.
- Development of graveyards
- Installation of factories of the 1st and the 2nd category

Note that each municipality can determine the projects subject to EIA.

B EIA Procedure

Though a decree on EIA is under preparation, its basic procedure is as follows. Support S4-1 illustrates its flow.

- (1) Application for factory categorization
- (2) Determination of the category
- (3) Submission of EIA reports
- (4) Submission of comments by citizens, etc. and replying to them

- (5) Opening of public hearings, if necessary
- (6) Declaration of Environmental Impact

Public hearings are held for projects of public services such as electricity and gas services. The province itself judges EIA Reports without consultation of outside technical professionals.

C Thermal Power Plants

EIA for the extension of San Nicholas Power Plant focused on air quality.

D Cooperation with ENRE

Deliberations are underway between the province and ENRE to make an agreement of cooperation in EIA of thermal power plants in such fields as exchange of information, review and consultation with entrepreneurs.

4.3.3 City of Buenos Aires

1) Environmental Legislation

The Constitution of the City of Buenos Aires (#222) stipulates in Article 26th:

- Environment is a common property.
- All the citizens not only have a right to enjoy a healthy environment, but also have an obligation to preserve and protect it for present and future generations.
- Activities to cause or likely to cause damage to the environment should not be done.
- Persons causing damages to the environment need to restore them.

The Article 30th stipulates the obligation of EIA and public hearing to all the public and private projects which are threatening to significant impacts on the environment.

The Rule of Prevention of Environmental Contamination (el Código de Prevención de la Contaminación Ambiental, 1983) (#197) is an environmental legislation which stipulates air quality standards and regulations on stationary sources.

Improvement of the system of environmental laws, as a part of the Program of Clean Air, is under way. As for EIA, the law (Law No. 123) (#83) was established in 1999 and the related decrees, resolutions, etc. have almost been completed.

A law for environmental information (Law No. 303, #203) was also promulgated, and the Law of Clean Air is under deliberation at the Assembly.

2) Air Quality Standards

Current air quality standards are shown in Table 4.3.7 (#197).

Table 4.3.7 Air Quality Standards in the City of Buenos Aires

Pollutants	Short term (20 minutes)	Long term (24 hours)
TSP (mg/m ³)	0.500	0.150
CO (mg/m ³)	15	3
NOx (as NO ₂) (mg/m ³)	0.4	0.1
SO ₂ (mg/m ³)	0.5	0.07
O ₃ (mg/m ³)	0.1	0.03
Pb (mg/m ³)	0.01	0.001
Settling Dust (monthly average) (mg/cm ²)	1.0	

* 1 ATM and 25°C

* No movement of equipment during measurement

* Measurement should be done under bad conditions of air pollution, and at places where health and / or public properties are threatened.

3) Regulations of Stationary Sources

Open burnings other than those for cooking or those permitted by the municipal authorities are prohibited. New installation of domestic waste incinerators is also prohibited. There are no emission standards on stationary sources. However, they are not allowed to exceed the air quality standards at their maximum emission level. The major rules are as follows (#197).

- Obligatory use of natural gas at any time when it is available.
- To obtain permission of the city to use other fuels than natural gas in case natural gas is unsuitable for manufacturing processes or there is a shortage of its supply.
- Industry-owned power generators are not obliged to use natural gas.
- Facilities to be installed should be equipped with measuring ports, scaffolds, etc.
- Existing facilities should be equipped with measuring ports, scaffolds, etc in case the authorities concerned request it.

4) Industries

The level of influence on the environment classifies activities such as factories into 3

categories (high, medium, and low). The following requirements should be fulfilled to install and operate factories (#88).

- Factories cannot operate without a Certificate of Environmental Qualification.
- EIA. should be carried out for planned factories in the high or medium category. They can obtain their Certificates only after their EIA is approved.
- The certificate is valid for 5 years, which must be renewed every 5 years.
- Factories in the high or medium category must submit an Environmental Audit to renew their Certificates.

The equation for the categorization is defined as follows (#86).

$$PIA = ER + Ri + Pau + Di + In$$

Where ER: Quality of emissions, effluents and wastes
Ri: Potential danger of the factory activity
Pau: Potential change of urban and environment
Di: Scale of the factory (area)
In: Use of service infrastructure

Note that power plants belong to “high” category.

5) Measures against Motor Vehicles

Motor vehicles are the major source of air pollution in the City of Buenos Aires. As a part of the Clean Air Program, the municipal government is exempting from 1998 the payment by 50 % for business license of commercial vehicles using CNG. The exemption is valid for 2 years after installation of the CNG systems.

6) Environmental Impact Assessment

Projects are classified into 3 categories according to their potential environmental impact (PIA) as shown above. Projects in the medium category are subject to a summary procedure, while, those in high category are subject to a full procedure.

The basic procedure for EIA is as follows. Its flow is shown in Support S4-2.

- (1) Application for project categorization
- (2) Determination of the category
- (3) Submission of EIA reports (Manifiesto de Impacto Ambiental and Estudio Técnico de Impacto Ambiental)
- (4) Technical Judgment (Dictamen Técnico)

- (5) Public hearing
- (6) Declaration of Environmental Impact (Declaración de Impacto Ambiental)
- (7) Issue of Certificate of Environmental Qualification

7) Clean Air Law

Clean Air Law (draft, #82) now under deliberation at the Diet, stipulates,

- Establishment of air quality standards and emission standards within two years based on the results of air quality monitoring
- Provisional use of the air quality standards of U.S.EPA (Table 4.3.8)
- Determination of emission standards of stationary sources by type
- Adoption of stricter emission standards in highly polluted areas
- Automatic continuous monitoring of air pollution and meteorology
- Development of stationary source inventories

In the proposed air quality standards, NO₂ instead of NO_x is assigned as a pollutant for evaluation.

**Table 4.3.8 Proposed Air Quality Standards in the City of Buenos Aires
(Major pollutants)**

Pollutants	Chemical Formulas	mg/m ³	ppm	Evaluation Times
Sulfur Dioxide	SO ₂	0.080	0.03	1 year
		0.365	0.14	24 hours
		1.3	0.50	3 hours
Suspended Particulate Matter	PM ₁₀	0.050		1 year
		0.150		24 hours
	PM _{2.5}	0.015		1 year
		0.065		24 hours
Carbon Monoxide	CO	10	9	8 hours
		40	35	1 hour
Ozone	O ₃	0.157	0.08	8 hour
		0.235	0.12	1 hour
Nitrogen Dioxide	NO ₂	0.100	0.053	1 year
Lead	Pb	0.0015 (arithmetic mean)		3 months
Settling Dust		1 mg/cm ²		30 days

4.3.4 Province of Mendoza

1) Province of Mendoza

A Environmental Legislation

The General Environmental Law (Provincial Law No. 5,961) established in 1992 provides the environmental criteria and basic principles of environmental policies in the Province of Mendoza. The Law approves the environmental right of the people in the province, and aims to preserve the environment for ecological equilibrium and sustainable growth. It states that the Provincial Government formulates, executes and supervises environmental plans in cooperation with municipalities in order to preserve, protect, defend, and improve all the environmental components of the cities, agriculture and nature, etc. The province is to actively provide environmental information to the people and to promote environmental education. It also stipulates principal issues on EIA to prevent environmental degradation from happening.

B Legislation on Ambient Air

The Provincial Law No. 5,100 (1986, #227) is a law to protect air quality.

a. Division of Roles between the Province and Municipalities

According to the Provincial Law No. 5,100, the Province is to make a plan to prevent any emergency situation where air quality levels are at dangerous levels, and to establish emission standards on stationary sources. The municipalities are to implement the emission standards (to monitor and supervise the sources). However, the present situation is that the province monitors SO_x, NO_x, and PM at 25 stations in places of the greater Mendoza. One station is installed at the Lujan de Cuyo Power Plant. Besides this, the province owns a mobile station to monitor both air quality and meteorology such as wind, temperature and humidity.

Under the present law, the province has no power to investigate air pollutant emission from stationary sources. So, revision of the law to give the province power to conduct flue gas measurement is underway.

b. Air Quality Standards

The Province of Mendoza has adopted air quality standards of the national government without having its own. While, it sets air quality at the alert level for air quality management (Table 4.3.9) (#184).

c. Emission Standards

The Province of Mendoza has no emission standard on stationary sources. It will be established after the revision of the Provincial Law No. 5,100.

Table 4.3.9 Air Quality Standards at Alert Level in the Province of Mendoza

Pollutants	Concentration	Evaluation Times
Particulate Matter (PM)	200 $\mu\text{g}/\text{m}^3$	24 hours
	100 $\mu\text{g}/\text{m}^3$	30 days
Nitrogen Oxides (NOx)	200 $\mu\text{g}/\text{m}^3$	24 hours
	100 $\mu\text{g}/\text{m}^3$	1 year
Lead	10 $\mu\text{g}/\text{m}^3$	30 days
Sulfur Dioxide (SO ₂)	80 $\mu\text{g}/\text{m}^3$	8 hours
	260 $\mu\text{g}/\text{m}^3$	1 hour
Ozone (O ₃)	125 $\mu\text{g}/\text{m}^3$ (63 ppb)	1 hour
Carbon Monoxide (CO)	40 mg/m^3 (36 ppm)	1 hour
	10 mg/m^3 (9 ppm)	8 hours
Hydrocarbons Non-methane Total	190 ppb	3 hours
	160 $\mu\text{g}/\text{m}^3$ (240 ppb)	

C Environmental Impact Assessment

The laws related to EIA are the General Environmental Law (#193) and its Decree No. 2,109/94 (#224).

a. Target Projects

The province and municipalities review each different kind of project. Their major assignments are as follows.

(1) Province

- Power generation (hydraulic, thermal and nuclear)
- Administration of water service for urban and suburban
- Localization of industrial parks
- Construction of railways, roads, etc.
- Strip mining

(2) Municipalities

- Development or enlargement of housing complexes
- Development of centers for tourism, sports, camping, etc.
- Development of graveyards

Note that each municipality can determine the projects subject to EIA.

b. EIA Procedure

The provincial EIA consists of summary and detailed EIAs. The basic procedure of the detailed EIA is as follows. The whole EIA flow is shown in Support S4-3.

- (1) Submission of EIA report (Manifestación General de Impacto Ambiental)
- (2) Submission of special EIA report (Manifestación Específica de Impacto Ambiental), if necessary
- (3) Technical Judgment
- (4) Sending of a copy of Technical Judgment to related public organizations and receiving their observations (Sectoral Judgment)
- (5) Publication of a summary of the EIA reports by news papers
- (6) Public hearing
- (7) Declaration of Environmental Impact

Entrepreneurs who are dissatisfied with judgement on their DIA can file a suit. Municipalities can provide their own EIA procedures.

Entrepreneurs of EIA projects are not given Certificates of Environmental Qualification without approval of their EIAs, and therefore, are not allowed to implement their projects.

An entrepreneur who does not want to choose the detailed EIA procedures has to submit his project notice together with the technical judgment to the province or municipality where it is located. Upon his request, the authority concerned judges whether to accept his request or not.

c. Participation of ENRE

In case of EIAs for thermal power plants, ENRE participates in the Sectoral Judgment and can submit its comments from the professional standpoint.

d. Thermal Power Plants

There have been 2 EIAs presented for extension of thermal power plants since the implementation of the EIA system. Both EIAs followed the summary EIA procedure.

Note that installation of a new thermal power plant is to go through the detailed EIA procedure.

e. Technical Guidelines and Manuals

The province has neither technical guidelines nor manuals on EIA. Instead, it recommends use of existing published manuals such as those of US EPA and ENRE.

f. Prediction and Evaluation

An EIA matrix (a matrix of environmental components and project activities) makes prediction and evaluation possible. Environmental impacts are evaluated one by one due to the difficulty of the comprehensive evaluation.

There are 2 kinds of criteria on evaluation of air quality. One is a comparison of the sum of the impact concentration and the background concentration with the air quality standard. The other is to evaluate a ratio of the impact concentration to the background concentration. However the latter criterion has no definite rule.

g. Air Quality and Meteorology

Air quality data monitored by the province are available for EIA. In principle, the entrepreneurs should pay their EIA expenses.

One year of data is principally required for meteorological parameters.

h. Confirmation Study

Monitoring during construction and operation stages is legally under examination to confirm the results of the EIA study.

2) Lujan de Cuyo City

A Factory Registration

Factories located at Lujan de Cuyo City should register in the municipality for tax payment.

B Regulation of Stationary Sources

The Municipal Ordinance No. 694-1993 (#259-5) stipulates regulation of stationary sources. Open burnings other than those for cooking or those permitted by the municipality are prohibited. The major emission standards of combustion and industrial facilities are shown below.

a. Combustion Facilities

The PM emission standards of combustion facilities using non-solid fuel are given in Table 4.3.10. PM emission standards for combustion facilities using solid fuels are as follow.

$$0.2 \text{ kg} / 10^6 \text{ kcal}^{(1)}$$

0.7 mg / Nm³ ⁽²⁾ (at 12 % of CO₂ concentration)

(1) kg / 10⁶ cal in the original

(2) kg / Nm³ in the original

SO_x and NO_x emission standards are

SO_x (as SO₂) 2.18 kg / 10⁶ kcal for combustion facilities using solid fuels ⁽¹⁾

NO_x (as NO₂) 0.55 kg / 10⁶ kcal for all combustion facilities ⁽¹⁾

(1) kg / 10⁶ cal in the original

**Table 4.3.10 PM Emission Standards for Combustion Facilities
(Lujan de Cuyo City)**

Fuel (non-solid) consumption (ton / h)	PM emission (kg / h)
4	4.535
8	6.803
12	9.070
18	12.250
24	14.970
32	18.140
More than 40	0.45 kg /ton fuel

b. Industrial Facilities

PM emission standards for industrial facilities are shown in Table 4.3.11.

**Table 4.3.11 PM Emission Standards for Industrial Facilities
(Lujan de Cuyo City)**

Exhaust gas (dry) (Nm ³ / min)	PM (g / Nm ³)
~ 50	1,000
100	704
200	535
400	400
600	360
800	325
1,000	292
5,000	163
10,000	125
20,000	93

1. Exact values are calculated by extrapolation

2. Excludes combustion of liquid or gas fuels for steam or gas turbines

c. Comparison with National Emission Standards

By assuming that power generating facilities are in the class of combustion facilities, the municipal emission standards of combustion facilities and the national emission standards of thermal power plants (Table 4.4.1) were compared in Table 4.3.12. The national standards were converted into the caloric basis. This Table shows the national emission standards of SO_x and PM are stricter than those of Lujan de Cuyo. While, the situation is different in NO_x. For steam turbine, the national values for liquid and solid fuels are milder. For gas turbine, the national value of 100 ppm is stricter. While, the value of 200 ppm is milder.

Table 4.3.12 Emission Standards Comparison of National and Lujan de Cuyo City (Thermal Power Plants)

Pollutant		SO _x	NO _x	PM
City		2.18	0.55	0.2
Nation	Fuel Oil	-	0.72 (X)	0.17 (O)
	Gas Oil	-	0.72 (X)	0.17 (O)
	Coal	1.63 (O)	1.31 (X)	0.17 (O)
	Natural Gas	-	0.49 (O)	0.01 (O)

Pollutant		SO _x	NO _x		PM
City		2.18	0.55		0.2
Nation	[Original Standards]		[100 ppm]	[200 ppm]	
	Gas Oil	-	0.36 (O)	0.72 (X)	0.07 (O)
	Natural Gas	-	0.37 (O)	0.74 (X)	0.02 (O)

1. (O) means the national standard is stricter, and (X) means looser.
2. The values of Tables 3.2.2 and 3.2.3 were used as properties of liquid and solid fuels and natural gas.
3. Low calorific value was used to calculate heat value.

C Supervision

The city has a power to enter any factory at any time and at any place for measurement and survey.

The Province of Mendoza receives the same reports from the power plant in the city that ENRE does. However, the city does not receive them.

4.4 Environmental Laws and Institutions for Thermal Power Plants

4.4.1 Secretariat of Energy

1) Roles

The major roles of the Secretariat are as follows (#153).

- To determine sectoral policies in accordance with the national policies
- To lead actions in order to follow the sectoral policies and to lead development of new technologies for the public interests
- To solve objections against suits filed by national regulating authorities

The Secretariat of Energy has the power by the Electric Law (the National Law 24,065, 1992, #9) to lay down rules necessary for environmental considerations and to preserve river basins and ecological systems concerned.

The environmental rules, which the Secretariat applies to the electric power sector, include:

- Manual for environmental management of hydraulic power plants
- Manual for environmental management of conventional thermal power plants
- Manual for environmental management of ultra high-tension transmission lines
- Gaseous emission standards on thermal power plants

Note that the gaseous emission standards on thermal power plants have been established by the “resolution” to be applied uniformly throughout the country (#208).

For installation of hydraulic or thermal power plants and transmission lines, the Secretariat reviews their EIA and authorizes them. The EIA procedure taken by the Secretariat is as follows,

- (1) Submission of EIA reports
- (2) Public inspection of the EIA reports
- (3) Submission of opinions
- (4) Public hearing, if necessary
- (5) Declaration of environmental impacts

Public hearings are to be presided over by ENRE. No public hearing has been held yet.

The Secretariat publishes an annual report on energy in which one chapter is assigned to environmental affairs. The Report 1999 (PROSPECTIVA 1999, #144) deals with emission of Green House Gas (CO₂) from thermal power plants in the country.

2) Basic Features of Power Generating Sector

Among the electric power sectors, transmission and distribution sub-sectors have roles of public services, while, the power generating is a private market composed of many power companies (#226).

4.4.2 Ente National Regulador de la Electricidad

ENRE was registered in 1992 by the Electric Law (#9) in the organization of the Ministry of Economy. It is independent from SE. ENRE operates based on its annual budget. A portion of the revenue of the electric power sector is paid into it via the Ministry of Economy.

ENRE supervises activities of generation, transmission and distribution of electrical power in order to have an adequate operation of the electricity market in accordance with national policies. For environmental matters, ENRE supervises whether the power generating, transmission and distribution sectors observe the environmental regulatory rules issued by the Secretariat, the resolutions by its executive board and current national, provincial and municipal regulations, etc.

ENRE has to prepare the basis of methodologies necessary for the effective execution of the environmental regulations issued by the Secretariat of Energy. ENRE reviews EIAs for the extension or alteration of existing power plants and authorizes their projects.

4.4.3 History of Environmental Rules on Thermal Power Plants

The environmental regulatory rules on thermal power plants have undergone the following changes.

a. The Resolution of the Secretariat of Energy No. 149/90

This Resolution (#1) normalized the procedure for the environmental management of thermal power plants by issuing a manual for the environmental management of conventional thermal plants. This manual obliges entrepreneurs to carry out EIA for installation and extension of thermal power plants.

b. The Resolution of the Secretariat of Energy No. 154/93

This Resolution (#2) provided the following issues for the thermal power plants under operation or to be installed in the future.

- Allowable emission level of SO₂ and PM
- Installation of low-NO_x burners to steam power plants of 50 MW and over
- Source monitoring

c. Resolution of ENRE No. 32/94

This Resolution (#4) has obliged all the thermal power plants joining the electricity wholesale market to formulate environmental management plans. It has also provided a guideline for the following minimum contents in the management plan. It gives the technical branch (Area tecnica) of ENRE the power to approve the presented management plan and supervise its execution.

- Treatment of solid and semi-solid wastes and liquid and gaseous effluents
- Program to prevent emergencies
- Environmental monitoring program
- Permissions
- Management system organization
- Environmental investments (option)
- Reports to ENRE

d. Resolution of ENRE No. 51/95

This resolution (#5) prescribes the obligation of thermal power plants to observe all the national, provincial and municipal laws and regulations, and the punishments for their violation.

e. Resolution of Secretariat of Energy No. 182/95 (#03)

This Resolution is a revision of its Regulation No. 154/93 (#02).

- Permissible emission level of SO₂, NO_x and PM by generating types and fuel types
- Facilities subject to NO_x regulation
- Source monitoring

f. Resolution of ENRE No. 195/96 (#07)

This Resolution made rules of the procedure for the extension or change of thermal power plant configurations.

g. Resolution of ENRE No. 13/97 (#8)

This Resolution specified a practical guide to EIA or to environmental diagnosis submitted to ENRE on the extension or change of thermal power plants.

h. Resolution of ENRE No. 881/99 (#36)

This Resolution complements the Resolution of ENRE No. 182/95 (#03) in accordance with the Resolution of the Environmental Agency No. 708/96 on the flue gas measurement. It specified the following items.

- Method of flue gas measurement
- Standardization of measured results
- Conversion from opacity to PM
- Allowable emission level for mixed fuel firing
- Frequency of measurement
- Reports to ENRE

i. Resolution of Secretariat of Energy No. 108/01 (#174)

This Resolution modified the NO_x emission standards, frequency of flue gas measurement and its analysis in consideration of the following fact.

- Installation of efficient power plants which easily satisfied the Resolution of the Secretariat of Energy No. 182/95 (#03)
- Remarkable decrease in operation hours of low-horsepower gas turbines

4.4.4 Current Emission Standards of Thermal Power Plants

Table 4.4.1 shows current allowable emission level of thermal power plants (#02, #03, #174).

4.4.5 Flue Gas Measurement

Table 4.4.2 gives items and frequency of flue gas measurement at thermal power plants (#36, #174). One analysis of SO₂ or NO_x by a portable analyzer requires more than 3 measurements with a minimum period of 5 minutes, according to ENRE (#36).

Table 4.4.1 Current Allowable Emission Level of Thermal Power Plants in Argentina

Generation type	Fuel type	Standard oxygen concentration (%)	Pollutants	Units	Permitted date of installation or expansion		
					Before 15/01/1992	From 16/01/1992 to 31/01/2001	After 01/02/2001
Steam turbine	Liquid fuel (fuel oil, etc.)	3 %	SO ₂	mg/Nm ³	1,700	1,700	1,700
			PM ^{(1), (2)}	mg/Nm ³	140	140	140
			NOx	mg/Nm ³	-	600	600
	Natural gas	3 %	SO ₂	mg/Nm ³	-	-	-
			PM ^{(1), (2)}	mg/Nm ³	6	6	6
			NOx	mg/Nm ³	-	400	400
	Solid fuel (coal, etc.)	6 %	SO ₂	mg/Nm ³	1,700	1,700	1,700
			PM ^{(1), (2)}	mg/Nm ³	120	120	120
			NOx	mg/Nm ³	900	900	900
	Mixed firing	The highest one among those of the fuels used	SO ₂	mg/Nm ³	Weighted average by total heat value of each fuel ⁽¹⁾		
PM ^{(1), (2)}			mg/Nm ³				
NOx			mg/Nm ³				
Gas turbine	Natural gas	15 %	SO ₂	mg/Nm ³	-	-	-
			PM ⁽¹⁾	mg/Nm ³	6	6	6
			NOx	mg/Nm ³	200	200	100
	Liquid fuel	15 %	Sulfur content	(%)	0.5	0.5	0.5
			PM ⁽¹⁾	mg/Nm ³	20	20	20
			NOx	mg/Nm ³	200	200	100
Combined cycle	Natural gas only	15 %	SO ₂	mg/Nm ³	-	-	-
			PM ⁽¹⁾	mg/Nm ³	6	6	6
			NOx	mg/Nm ³	200	200	100
	Liquid fuel only	15 %	Sulfur content	(%)	0.5	0.5	0.5
			PM ⁽¹⁾	mg/Nm ³	20	20	20
			NOx	mg/Nm ³	200	200	100
	Fuels of gas and steam turbines are different	15 %	Sulfur content	mg/Nm ³	Calculated values by the same method of the mixed firing of the steam turbine		
			PM ⁽¹⁾	mg/Nm ³			
			NOx	mg/Nm ³			

(1) In case opacity is measured by a continuous monitoring instead of PM, the allowable level of opacity is 5 % for use of natural gas only and 20 % for other fuels.

(2) For steam turbine, not applicable during soot blow, and hammering of EP in case of solid fuels (#36)

(3) Use lower calorific values.

**Table 4.4.2 Item and Frequency of Flue Gas Measurement of Thermal Power Plants
in Argentina**

Steam turbine

Type		Measured Item	Frequency
Gas firing		NO _x PM O ₂	Once in 3 months
Others	More than 75MW	SO ₂ NO _x PM O ₂	Continuous
	75MW or less	All for of the above	Monthly

Gas turbine

Fuel	Measured Item	Frequency
Liquid fuel	NO _x PM O ₂ Sulfur content	Monthly
Natural gas	NO _x PM O ₂	Once in 3 months

Combined cycle

Additional Fuel Used	Total Capacity	Measured Item	Frequency
Fuel oil	250MW 以上	SO ₂ NO _x PM O ₂	Continuous
None		Fuel of gas turbine	
Natural gas		Fuel of gas turbine	
Light oil		Liquid fuel of gas turbine	

4.4.6 Environmental Department

1) Staff

The Environmental Department of ENRE is made up of 4 members, of whom 2 are engineers. One had been the head of Central Costanera Power Plant for many years and the other worked in the water section of the previous Environment Agency. Both joined the department in 1994. They are talented with ability, knowledge and experience. They are in charge of the following roles in cooperation with each other.

2) Roles

The major roles include

- Supervision of environmental affairs (thermal power plants, trunk transmission lines, and distribution facilities)
- Preparation of documents for internal audit
- Preparation of documents for external audit
- Development of manuals, etc. to attain or supervise environmental regulatory rules issued by the Secretariat of Energy.

The document for internal audit is a statistical semiannual report concerning approvals and punishments that the department has made. It is submitted to and examined by the executive board.

The document for external audit is a summary of the annual activities of the department, which is a part of ENRE's annual report on their activities on the electric sector. This report is submitted to and reviewed by the national audit bureau (Auditoria General de la Nación).

With extension of hydraulic electric plants, ENRE has not participated in their EIA review and authorization, although ENRE receives their EIA reports.

A Trunk Transmission Lines

As for transmission lines, ENRE controls trunk transmission lines (over 500 KV) throughout the country. The department reviews their EIA for extension and authorizes them. Branch transmission lines are outside of ENRE's jurisdiction.

Because transmission lines pass by residential areas, opinions of people in the affected areas are reported in the EIAs for the extension projects of trunk transmission lines. The EIA reports are open to public inspection, and public hearings are held. The hearings are held by either the province where the extended line passes by or the City of Buenos Aires where the ENRE headquarters is located. Prior to the public hearing, it is widely publicized through newspapers with national circulation and major local papers in the province.

B Distribution Facilities

ENRE manages distribution facilities in the Buenos Aires Metropolitan Area. The department is also in charge of the environmental issue of insulating oil in transformers.

C Thermal Power Plants

The major task of the department is environmental supervision of the thermal power plants throughout the country. Its main duties are as follows.

- (1) Routine works

The followings are reviewed and approved.

- Environmental management plan
- Progress of environmental management

(2) Non-routine works

- Review and authorization of EIA on extension of thermal power plants
- Development of guidelines and manuals for the EIA of thermal power plants
- Development of guidelines and manuals for environmental management
- Flue gas measurement for cross-check

3) Environmental Supervision of Thermal Power Plants

A Power Plants

The Environmental Department manages 40 power plants with around 200 stacks throughout the country. Combined cycle systems have rapidly increased in number in the last 2 or 3 years. Thermal power plants in Argentina are usually located on riverside.

B Environmental Management and Supervision

a. Environmental Management Plan

According to the ENRE Resolution No. 32/94, thermal power plants formulate their environmental management plans for the 1 or 2 years period and submit it to ENRE. They should include the environmental activities to be taken in the period. ENRE reviews and approves it with necessary corrections.

b. Environmental Supervision

Thermal power plants execute the environmental management based on their plan. They report to ENRE every 3 months, the progress of the plan with the results of flue gas measurement and their compliance with the emission standards. ENRE in turn checks and approves it.

c. Job Handling

The department has been very busy with check and approval of the reports of environmental management plans and their progress reports due to recent increase in new and extended installations of thermal power plants. Submission of the reports tends to be late, which delays the departmental review from the schedule.

C Flue Gas Measurement

a. Reporting Item

Reports of flue gas analyses have to include the following items in addition to analyzed data and the data corrected to the standard oxygen concentration.

(1) Measurement by portable analyzers

- Date of the analysis
- Meteorological conditions (wind direction and speed, temperature and relative humidity)
- Person responsible for the analyses
- Analytical methods
- Certificates of analyzers for calibration and purchase records of standard gases
- Flue gas sampled points
- Comments

(2) Continuous monitoring

- Person responsible for the monitoring
- Certificates of analyzers for calibration and purchase records of standard gas
- Monitored points
- Comments

For continuous monitoring, the following data have to be reported too.

- Fuel consumption of each unit
- Oxygen concentration (maximum and minimum)
- Concentrations of NO_x, SO₂, and PM (maximum, minimum and average)
- Emission standards (instantaneous or daily ones in case of mixed firing)
- Period of and cause of violation of emission standard

b. Observance of Emission Standards

ENRE has to check all the data of continuous monitoring. Repeated violations of the emission standards will be fined together with the order of a correction. There are 2 or 3 sanctions each year.

c. Accuracy Control

To check the submitted results of the flue gas analyses and to check the state of analyzers,

ENRE has entrusted the analyses to CNEA, according to the technical agreement between them in 1994. Upon the request of ENRE, more than 80 measurement campaigns have been carried out in different thermal plants throughout the country, selected according to generation capacities, geographical locations and prospective emission levels.

For calibration check of continuous monitoring equipment, CNEA measures flue gas by its portable analyzers parallel to continuous monitoring. Both measured values are compared to judge whether the continuous monitoring is in a normal operation.

If plants are analyzing with portable analyzers other than CNEA's, the owner of the analyzers should bring them into CNEA or other reliable laboratory every 3 months to have calibration check by a calibration gas officially certified by US EPA. A fee is charged for the check. The owner has additional calibration checked upon request of ENRE.

In case ENRE judges an analytical result is unreliable, it orders a repeat of the analyses carried out by portable or continuous monitoring. The reliable portable analyzers have to be mobilized to recheck the dubious ones.

The introduction of the control mentioned above has greatly enhanced the accuracy of flue gas analyses of thermal power plants in Argentina.

D Environmental Impact Assessment

ENRE has a power to review EIAs on extension of thermal power plants and to authorize them. However, the entrepreneurs who are not satisfied with judgments of ENRE, can appeal to the Secretariat of Energy. In such a case, the Secretariat makes final decision on the permission of the project.

a. EIA Procedure

The EIA procedures for extension of thermal power plants are as follows.

- (1) Prior consultation (current survey, prediction, evaluation and report)
- (2) Submission of EIA reports
- (3) Technical judgment
- (4) Inquiry to entrepreneurs
- (5) Reply from entrepreneurs
- (6) Declaration of environmental impact

b. Public Hearing

Public hearing of EIA is not required for extension of thermal power plants. While, it is required for extension of trunk transmission lines. This is because ENRE has an understanding that the latter may give direct influence on daily life of the citizen, while, the former has rather a technological character.

c. Cooperation with Local Governments

With EIAs for extension of thermal power plants, ENRE has close contacts with local authorities where the plants are located. ENRE has much knowledge and experience in EIA for thermal power plants. While, local governments have environmental information necessary for EIA. Their cooperation is indispensable to conduct EIA efficiently and to enhance its quality.

A deliberation is underway between ENRE and the Province of Buenos Aires to make an agreement on their cooperation in EIA of thermal power plants in such fields as exchange of information, review and consultation with the entrepreneurs.

d. Provision of Information to Citizens

ENRE by itself provides no information on EIA for extension of thermal power plants to citizens in affected areas. ENRE relies on local authorities concerned for provision of information and collection of opinions to and from citizens.

e. EIA Reports

There is a standard format for the EIA reports submitted to ENRE (#1).

ENRE requests the entrepreneurs of extension of thermal power plants to submit the same EIA reports to ENRE and the local governments concerned. This is desirable from both standpoints of review by the local governments and saving of the entrepreneurs' expenses and exertions.

f. Technical Support

The ENRE staff reviews the EIA reports with necessary scientific and technical supports from experts at universities and research institutes such as CNEA.

g. Technical Guidelines and Manuals

The appendix of ENRE Resolution 13/97 (#8) is the EIA manual of air preservation from new or extended installations of thermal power plants.

For environmental components other than air, internationally published or national standard guidelines or manuals are used. There are US EPA manuals for water and I.R.A.M. No. 4,062/84 for noise pollution.

h. Monitoring for Confirmation of EIA Study

For extensions of Central Costanera Power Plant and Nuevo Puerto Power Plant in the City of Buenos Aires where comparatively high air pollution is found, 4 years monitoring in winter (June, July and August) at the same 3 sites monitored for the pre-EIA has been conducted. The purpose includes verification of their predicted results and simulation

models. To have a reliable measurement, ENRE has entrusted CNEA the monitoring at the sites.

i. Background Concentration

Comparison of the sum of the impact concentration and the background concentration with the air quality standard evaluates air quality. It is very difficult to predict the future background. Therefore, the current background concentration is used as the future one.

E Provision of Information

The major requests of environmental information to ENRE come from governmental organizations of national or local levels, NGOs and private consultants.

ENRE provides information through its home page. However, no concrete information is given on environmental affairs of thermal power plants.

4.5 Environmental Management of Thermal Power Plants

4.5.1 Environmental Management Subject to Legislation

Thermal power plants should observe the national and local (provincial and municipal) legislation and those by the Secretariat of Energy and ENRE. The environmental considerations of thermal power plants from planning to operation stipulated by the Secretariat and ENRE are summarized in Table 4.5.1.

Table 4.5.1 Environmental Considerations for New and Extended Installation of Thermal Power Plants

Project Stage	Main Issues	Environmental Tasks	Target Area	Results	Submission of Reports
Planning	Definition of alternatives (installation zone, power generation type, fuel, transmission and cost, etc.)	<ul style="list-style-type: none"> * Study of the general environment in the zones * Estimation of environmental loads of the alternatives 	Zone	<ul style="list-style-type: none"> * Understanding of the general environment * Environmental problems and their possible solutions 	to Secretariat of Energy
Pre-feasibility	Overall evaluation of the alternatives from technological, economical, social and environmental aspects	<ul style="list-style-type: none"> * Preliminary diagnosis of the environment in the zone * Preliminary analysis of the environmental effects of the alternatives * Preliminary identification of monitoring items 	Zone	<ul style="list-style-type: none"> * Outline of the environmental effects of the alternatives * Expected monitoring items * Future environmental trend in the zone 	to Secretariat of Energy
Feasibility	Analysis of the alternatives from the standpoints of investments, financial plan and environment	<ul style="list-style-type: none"> * Deepening of environmental diagnosis in the zone * Preliminary evaluation of environment impact 	Zone	<ul style="list-style-type: none"> * Selection of the final alternative * Identification of the affected area * Preliminary environmental measures * Preliminary design of monitoring network * Preliminary guiding principles of environmental management plan 	to Secretariat of Energy
Implementation Plan	<ul style="list-style-type: none"> * Detail design * Construction plan * Approval of the plan * Bids 	<ul style="list-style-type: none"> * Study of environmental impact assessment * Formulation of basic environmental management plan * Formulation of environmental management plan * Formulation of source and environmental monitoring plan 	Affected area	<ul style="list-style-type: none"> * Guiding principles of environmental monitoring * Environmental measures * Programs for environmental management * Structure of environmental management * Programs for source and environmental monitoring * Staff training 	<ul style="list-style-type: none"> * EIA reports for new installation to Energy Secretariat for expansion to ENRE * Environmental management to ENRE
Construction	Construction, implementation and test run based on the environmental management plan	<ul style="list-style-type: none"> * Environmental management * Source and environmental monitoring * Environmental diagnosis 	Affected area	<ul style="list-style-type: none"> * Improvement of environmental management * Start of source and environmental monitoring * Improvement of environmental measures 	to ENRE
Operation	Promotion and improvement of environmental management plan	<ul style="list-style-type: none"> * Environmental management * Operation of source and environmental monitoring network * Environmental diagnosis * Staff training * Provision of environmental information to citizens and environmental communication * Renewal of environmental management plan 	Affected area	<ul style="list-style-type: none"> * Improvement of environmental management system * Improvement of environment * Understanding by community 	to ENRE

1) Environmental Management Stipulated by ENRE

A Environmental Management Plan

As shown in Item 2) of Article 4.4.6 of this Report, thermal power plants should have their environmental management plans and their progresses should be approved by ENRE. Non compliance with this rule is punished. The power plant management is responsible for the education and training of people in charge of the environmental management. ENRE plays no intervention to this process.

B Flue Gas Measurement

Results of flue gas analyses have to be reported to ENRE in every 3 months. Concentrations over the emission standard are sanctioned.

Flue gas analyses by portable analyzers are usually entrusted to professional companies. A reliable laboratory should be asked to calibrate portable analyzers in every 3 months. CNEA's portable analyzers check continuous monitoring analyzers at the plant sites.

ENRE can order re-analysis if it judges the results are unreliable. Reliable portable analyzers have to be used to check the ordered re-analysis of the results monitored continuously.

2) Environmental Management Stipulated by Local Governments

Construction and operation of a power plant require the authorization of the province where it is located (including the City of Buenos Aires). However, the conditions of authorization, documents to be submitted and their contents differ from province to province. The Province of Buenos Aires requests air quality monitoring with no definite rules.

3) Environmental Impact Assessment

New or extended installation of thermal power plants should be authorized both by national government (installation; the Secretariat of Energy, extension; ENRE) and local government (province). EIA is indispensable for their authorization by the national government. While, for local authorization, EIA is not always required because several provinces do not have EIA system.

4.5.2 Voluntary Environmental Management

Voluntary environmental management has been spreading also in Argentina; enterprises make their own environmental targets and plans and control their activities along them. There are international standards on voluntary environmental management, among which ISO 14000s are the most popular in the world. Among them, ISO 14001 is a representative standard.

In Argentina, as of January 31, 2001, total 118 enterprises have acquired ISO14001 certificate, including one thermal power plant (#228).

International businesses and capitals have entered thermal power generation businesses in Argentina since liberalization of the business. To be active as a global business, to borrow money from international financial institutions, the environmental consideration is one of the highest priorities.

The JICA Study Team visited all target thermal power plants to find that they had observed environmental legislation and that they had been actively coping with environmental problems. Actually a certain power plant had its own environmental policy, and was trying to acquire ISO 14001 certificate. Acquisition of ISO 14001 by thermal power plants is expected to increase steadily.