

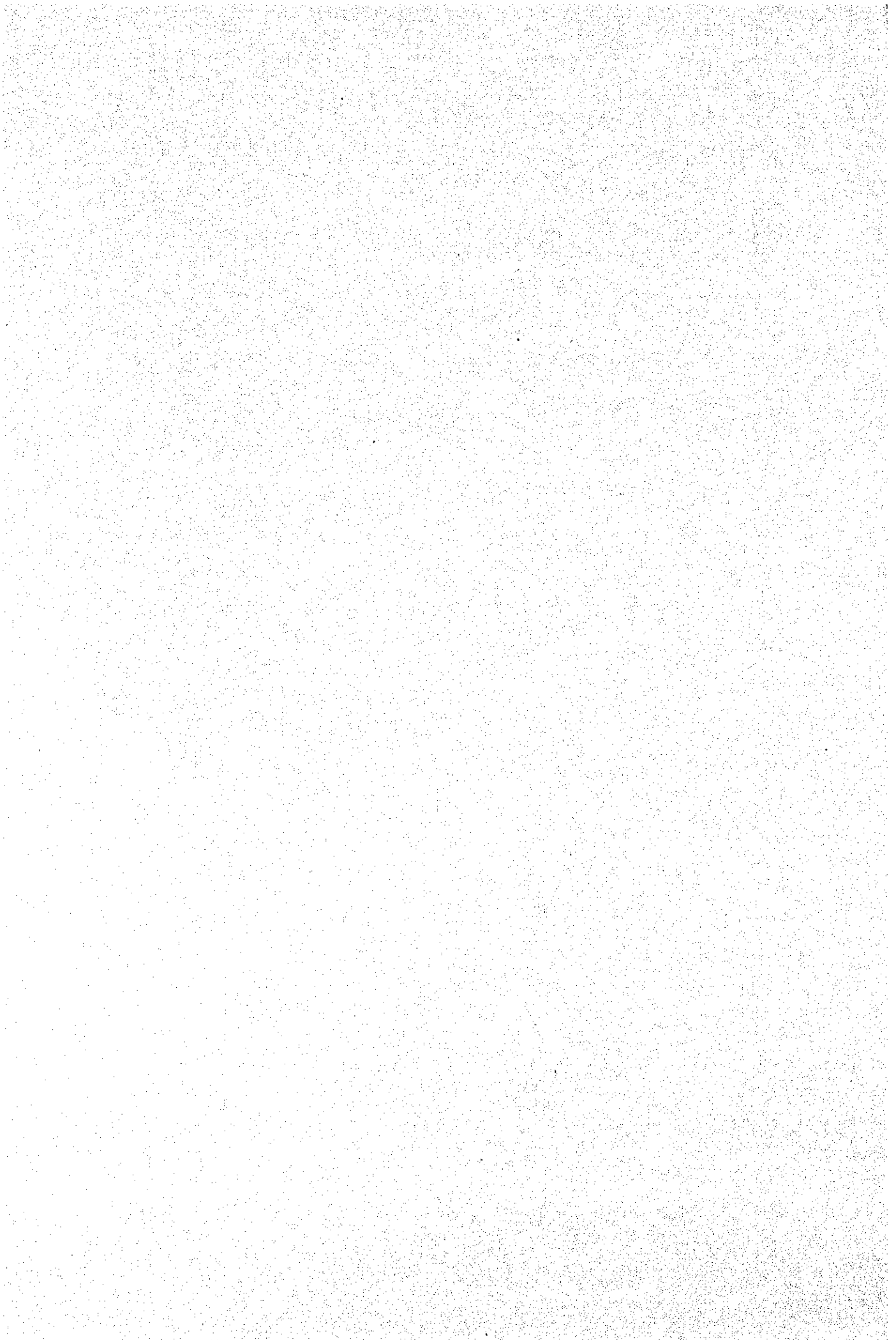
**THE STUDY  
ON  
THE COMBUSTION TECHNOLOGIES AND  
THE AIR POLLUTION CONTROL OF  
STATIONARY SOURCES  
IN  
THE METROPOLITAN AREA OF  
THE CITY OF MEXICO**

**Final Report  
Two Vols.**

**SEPTEMBER 1984**

**FINANCIADO POR EL INSTITUTO FEDERAL DE  
DEVELOPAMIENTO Y ASISTENCIA SOCIAL  
Y EL INSTITUTO NACIONAL DE ESTADÍSTICA Y CENSO**





**JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)**

**NATIONAL INSTITUTE OF ECOLOGY**

**THE UNITED MEXICAN STATES**

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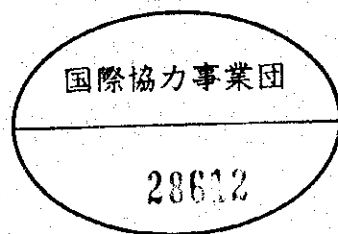
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**SEPTEMBER 1995**

**PACIFIC CONSULTANTS INTERNATIONAL, TOKYO**

**In association with**

**JAPAN ENVIRONMENT ASSESSMENT CENTER CO., LTD., TOKYO**



In this report, project costs are estimated based on July 1995 prices with an exchange rate of 1 US\$ = N\$6.00 (= ¥90)

**The Study on the Combustion Technologies for  
the Air Pollution Control of Stationary Sources in  
the Metropolitan Area of the City of Mexico**

**Final Report**

**Data Book**

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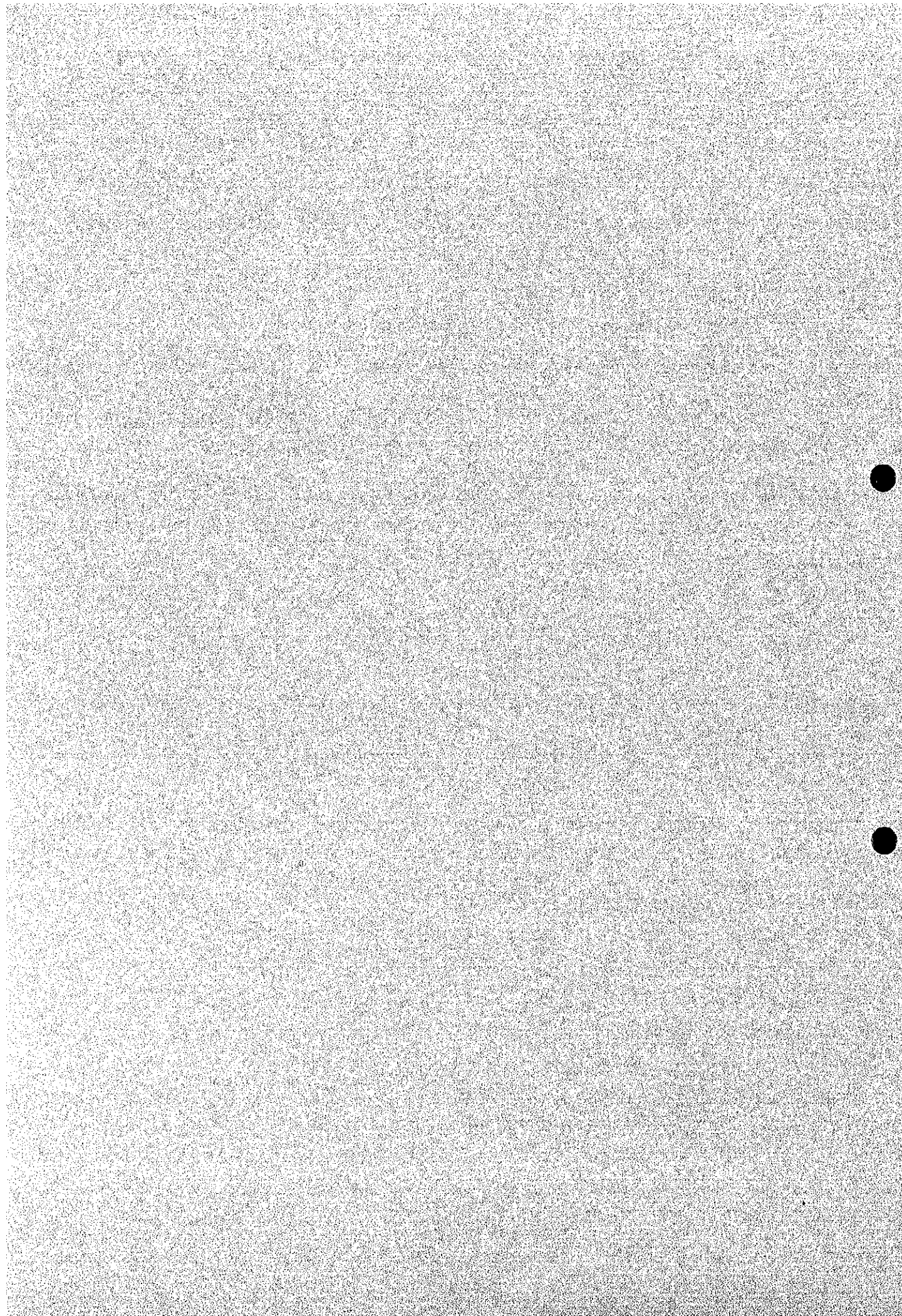
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**Data for Chapter 2**





## 2.1 Operation Data of H-Oil Process

Table A2.1.1 Yield and Product Data of the H-Oil Process Operated on a Blend of Arabian Light and Arabian Heavy Vacuum Residua

Number of Stages	Case 1	Case 2	Case 3
Capacity (BPSD)	20,000	20,000	20,000
Conversion (565 °C+ basis) (V%)	90	65	55
Sulfur / Nitrogen Content (W%)	S/N	S/N	S/N
Feed	5.33 / 0.44	5.33 / 0.44	5.33 / 0.44
C <sub>4</sub> <sup>+</sup> Product	1.48 / 0.27	0.64 / 0.21	0.71 / 0.23
565 °C <sup>+</sup> Product	4.41 / 0.73	1.50 / 0.42	1.41 / 0.39
<b>Yields</b>			
H <sub>2</sub> S, NH <sub>3</sub> (W%)	4.5	5.3	5.2
C <sub>1</sub> ~ C <sub>3</sub> (W%)	6.7	3.2	1.9
C <sub>4</sub> (V%)	3.1	2.1	1.5
C <sub>5</sub> ~ 221 °C (V%)	28.2	15.5	9.7
221 ~ 371 °C (V%)	34.2	22.1	19.6
371 ~ 565 °C (V%)	33.1	34.1	33.8
565 °C <sup>+</sup> (V%)	9.2	32.2	41.4
C <sub>4</sub> <sup>+</sup> Product (V%)	107.8	106.0	106.0
C <sub>4</sub> <sup>+</sup> Product, Sp.Gr	0.88	0.91	0.93
<b>Chemical Hydrogen</b>			
Consumption (m <sup>3</sup> /bbl)	52	37	32
Catalyst Usage (cents/bbl)	70	45	38

Source : Ref. D5.

Table A2.1.2 Typical Operation Data of H-oil Process in Salamanca, Mexico

Feed	BPSD	M <sup>3</sup> /D
H <sub>2</sub>		170,889
Dry gas		104,050
Light cycle oil	99	
Vacuum gas oil	1,111	
Residue	3,917	
Yeild and Products	BPSD	M <sup>3</sup> /D
Sour gas		129,083
Gasoline	79	
Kerosine	175	
Light gas oil	1,268	
Heavy gas oil	2,085	
Light cycle oil	145	
Residue	1,993	

Source: Ref. D6.

According to Table A2.1.2, H<sub>2</sub> gas consumption per fed oil volume is calculated at about 33 m<sup>3</sup>/bbl, which is almost the same as that of Case 3 in Table A2.1.1.

## 2.2 New Draft for Ambient Air Quality Standards

Table A2.2.1 New Draft for Ambient Air Quality Standards  
(NOM-020-SSA1-1993~NOM-026)

Pollutant	Averaging Time	Present	New Draft
Ozone	1 hr.	0.11 ppm	0.11 ppm
CO	8 hr.	11 ppm	11 ppm
SO <sub>2</sub>	24 hr.	0.13 ppm	0.13 ppm
	1 yr.	–	0.03 ppm
NO <sub>2</sub>	1 hr.	0.21 ppm	0.21 ppm
TSP	24 hr.	275 µg/m <sup>3</sup>	260 µg/m <sup>3</sup>
	1 yr.	–	75 µg/m <sup>3</sup>
PM10 *)	24 hr.	–	150 µg/m <sup>3</sup>
	1 yr.	–	50 µg/m <sup>3</sup>
Pb	3 mon.	–	1.5 µg/m <sup>3</sup>

Source: Ref. C7.

Note: \*) Suspended particulate matter of diameters less than 10 µm.

### 2.3 Emission Standards for Indirect Heating Equipment

(1) NOM-CCAT-019-ECOL / 1993 (NE) (previous standards)

(a) For Existing Equipment

Capacity MJ/hr (HP)	Fuel Type	Smoke blot Nr.or opacity	Smoke dust mg/m <sup>3</sup> (1)			SO <sub>2</sub> (ppm v) (1)			NO <sub>x</sub> (ppm v) (1)			CO (ppm v) (2)
			critical zone		RP	critical zone		RP	critical zone		RP	
			ZMCM	others		ZMCM	others		ZMCM	others		
up to 5,250 (~150 HP) (4)	heavy oil ~gasoil	6	NA	NA	NA	NA	NA	NA	NA	NA	NA	250
	other liquid	5	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	gas	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
5,251~43,000 (151~1,200 HP)	liquid	NA	100	300	400	1,100	1,650	2,600	150	200	270	400
	gas	NA	NA	NA	NA	NA	NA	NA	130	150	180	
43,001~110,000 (1,201~3,100 HP)	liquid	NA	70	250	350	1,000	1,500	2,500	140	180	250	400
	gas	NA	NA	NA	NA	NA	NA	NA	120	140	160	
above 110,000 (3,100 HP~)	liquid	10 % (3)	70	200	300	800	1,200	2,200	130	150	230	400
	gas	NA	NA	NA	NA	NA	NA	NA	100	130	150	

(b) For New Equipment

Capacity MJ/hr (HP)	Fuel Type	Smoke blot Nr.or opacity	particulates mg/m <sup>3</sup> (1)		SO <sub>2</sub> (ppm v) (1)		NOx (ppm v) (1)		CO (ppm v) (2)		
			critical zone ZMCM	RP others	critical zone ZMCM	RP others	critical zone ZMCM	RP others			
up to 43,000 (~1,200 HP)	everyone	above mentioned values for ZMCM should be satisfied and low NOx emission technology should be additionally adopted	50	150	250	400	400	1,500	100	140	200
above 43,000 (1,200 HP~)	liquid	10 % (3)	NA	NA	NA	NA	NA	NA	75	100	130
major repair or rebuild of existing equipment	gas	NA	NA	NA	NA	NA	NA	NA	75	100	130
above mentioned values for ZMCM should be satisfied and low NOx emission technology should be additionally adopted											

Notes:

(1) Concentration referred to is defined under the condition of 25°C, 760 mm Hg, 5 % oxygen and dry in volume. Calculation formula is as shown below:

$$F=16 / (21-O_2 \text{ conc. measured})$$

(2) Concentration referred to means that acquired during operation.

(3) percentage of opacity

(4) Oxygen concentration should be controlled not more than the following level:

gas-fired equipment: 6.3 %

liquid-fired equipment: 10.5 %

RP: other area than critical zone of the country

ZMCM: Metropolitan Zone of Mexico City

NA: no application

(2) NOM-085-ECOL - 1994 (new standards)  
Emission Standards for Indirect Heating Equipment

(a) Effective from 1994 to December 31, 1997

Capacity MJ/hr (HP)	Fuel Type	Smoke blot Nr.or opacity	particulates mg/m <sup>3</sup> (kg/10 <sup>6</sup> kcal)			SO <sub>2</sub> (ppm v) (kg/10 <sup>6</sup> kcal)			NO <sub>x</sub> (ppm v) (kg/10 <sup>6</sup> kcal)			Excess Air Rate volu me %
			ZMCM	ZC	RP	ZMCM	ZC	RP	ZMCM	ZC(3)	RP(6)	
up to 5,250 (~150 HP)	heavy oil ~ gasoil	4	NA	NA	NA	1,100 (4.08)	2,100 (7.80)	2,600 (9.81)	NA	NA	NA	60
	other liquid	3	NA	NA	NA	1,100 (4.08)	2,100 (7.80)	2,600 (9.81)	NA	NA	NA	
	gas	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	
5,251~43,000 (151~1,200 HP)	liquid	NA	100 (0.142)	425 (0.604)	600 (0.852)	1,100 (4.08)	2,100 (7.80)	2,600 (9.81)	300 (0.801)	400 (1.064)	50	
	gas	NA	NA	NA	NA	NA	NA	NA	220 (0.563)	300 (0.767)		400 (1.023)
43,001~110,000 (1,201~3,100 HP)	liquid	NA	100 (0.142)	425 (0.604)	550 (0.781)	1,100 (4.08)	2,100 (7.81)	2,600 (9.81)	300 (0.801)	400 (1.069)	40	
	gas	NA	NA	NA	NA	NA	NA	NA	180 (0.460)	300 (0.767)		400 (1.023)
above 110,000 (3,100 HP~)	liquid	NA	70 (0.099)	325 (0.462)	435 (0.664)	1,100 (4.32)	2,100 (8.24)	2,600 (9.29)	280 (0.748)	400 (1.069)	30	
	gas	NA	NA	NA	NA	NA	NA	NA	160 (0.409)	280 (0.716)		400 (1.023)

(b) Effective from January 1, 1998

Capacity MJ/hr (HP)	Fuel Type	Smoke (blot Nr. or opacity)	particulates mg/m <sup>3</sup> (kg/10 <sup>6</sup> kcal)			SO <sub>2</sub> (ppm v) (kg/10 <sup>6</sup> kcal)			NOx (ppm v) (kg/10 <sup>6</sup> kcal)			Excess Air Rate volume %
			ZMCM	ZC	RP	ZMCM	ZC	RP	ZMCM	ZC	RP	
up to 5,250 (~150 HP)	heavy oil	3	NA	NA	NA	550	1,100	2,200	NA	NA	NA	50
	~gasoil				(2.04)	(4.08)	(8.16)					
	other liquid	2	NA	NA	NA	550	1,100	2,200	NA	NA	NA	
5,251~43,000 (151~1,200 HP)	gas	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	40
	liquid	NA	75 (0.106)	350 (0.497)	450 (0.639)	550 (2.04)	1,100 (4.08)	2,200 (8.16)	190 (0.507)	190 (0.507)	375 (1.0)	
43,001~110,000 (1,201~3,100 HP)	gas	NA	NA	NA	NA	NA	NA	NA	190 (0.486)	190 (0.486)	375 (0.959)	30
	liquid	NA	60 (0.085)	300 (0.426)	400 (0.568)	550 (2.04)	1,100 (4.08)	2,200 (8.16)	110 (0.294)	110 (0.294)	375 (1.0)	
above 110,000 (3,100 HP~)	gas	NA	NA	NA	NA	NA	NA	NA	110 (0.281)	110 (0.281)	375 (0.959)	25
	solid	NA	60 (0.090)	250 (0.375)	350 (0.525)	550 (2.16)	1,100 (4.13)	2,200 (8.16)	110 (0.309)	110 (0.309)	375 (1.052)	
	liquid	NA	60 (0.085)	250 (0.355)	350 (0.497)	550 (2.04)	1,100 (4.08)	2,200 (8.16)	110 (0.294)	110 (0.294)	375 (1.0)	
	gas	NA	NA	NA	NA	NA	NA	NA	110 (0.281)	110 (0.281)	375 (0.959)	

## 2.4 Emission Standards for Specific Stationary Sources

### (1) SO<sub>2</sub>, SO<sub>3</sub> and Sulfuric Acid Mist at Sulfuric Acid Factory (NOM-PA-CCAT-001/93 draft)

Table A2.4.1 Permissible Maximum Amount of SO<sub>2</sub> and SO<sub>3</sub> Emission at Existing Factory in the Critical Zone

Capacity of Factory (t / d)	Permissible Maximum Emission Amount (weight of SO <sub>2</sub> in kg/tonnage of 100% sulfuric acid)
1 to 500	17.5
501 to 700	13.0
701 to 1,000	9.0
> 1,000	4.0

Table A2.4.2 Permissible Maximum Amount of SO<sub>2</sub> and SO<sub>3</sub> Emission at Existing Factory in the Other Area of the Country

Capacity of Factory (t / d)	Permissible Maximum Emission Amount (weight of SO <sub>2</sub> in kg/tonnage of 100% sulfuric acid)
1 to 500	28.0
501 to 700	20.0
701 to 1,000	14.0
> 1,000	7.0

Table A2.4.3 Permissible Maximum Amount of SO<sub>2</sub> Emission at the Factory Site

in the Critical Zone	0.234 ppm
out of the Critical Zone	0.3 ppm

Table A2.4.4 Permissible Maximum Amount of SO<sub>2</sub> and SO<sub>3</sub> Emission at New Factory

Capacity of Factory (t / d)	Permissible Maximum Emission Amount (weight of SO <sub>2</sub> in kg/tonnage of 100% sulfuric acid)
1 to 500	13.0
> 500	3.0



**Table A2.4.5 Permissible Maximum Amount of SO<sub>3</sub> and Sulfuric Acid Mist Emission**

Capacity of Factory (t / d)	Permissible Maximum Emission Amount (weight of SO <sub>2</sub> in kg/tonnage of 100% sulfuric acid)
C	C

(2) Dust at Cement Factory (NOM-PA-CCAT-002/93 draft)

**Table A2.4.6 Permissible Maximum Amount of Dust Emission From Calcination Process**

Capacity of Process	Permissible Maximum Emission Amount (kg / h)
less than 300 t/h	0.6319 C 0.7502
300 t/h or more	0.15 C

**Table A2.4.7 Permissible maximum Amount of Dust Emission From Crushing and Cooling Process**

Process	Permissible Maximum Emission Amount (mg/Nm <sup>3</sup> )
Crushing	80
Crushing without dryer	80
Crushing with dryer	380
Cement milling	80
Clinker cooling	150

Note: Nm<sup>3</sup>=defined under the normal dry condition

(3) Dust, Carbon Monoxide, Sulfur Dioxide and Nitrogen Oxides at Coal-fired Power Plant (NOM-PA-CCAT-005/93 draft)

**Table A2.4.8 Permissible Maximum Amount of Emission**

Pollutants	Permissible Maximum Emission (kg/m <sup>3</sup> )*
particles	3.60
CO	.27
SO <sub>2</sub>	51.3
NO <sub>x</sub>	10.00

Note: \* unit coal consumption is expressed in m<sup>3</sup> on dry base  
 \*\* amount of NO<sub>x</sub> is expressed as NO<sub>2</sub>

(4) Dust From Stationary Sources (NOM-PA-CCAT-006/93 draft)

Table A2.4.9 Permissible Maximum Amount of Dust Emission

Flow Volume (m <sup>3</sup> /min)	Critical Zone (mg/m <sup>3</sup> )	Outside Critical Zone (mg/m <sup>3</sup> )*
5	1,536	2,304
10	1,148	1,722
20	858	1,287
30	724	1,086
40	641	962
50	584	876
60	541	811
80	479	719
100	437	655
200	326	489
500	222	333
800	182	273
1,000	166	249
3,000	105	157
5,000	84	127
8,000	69	104
10,000	63	95
20,000	47	71
30,000	40	60
50,000	32	48

Note: Permissible value for intermediate flow volume and for outrange, can be given by the following equation:

Critical Zone:  $E=3,020 * C^{-0.42}$

Outside Critical Zone:  $E=4,529.7 * C^{-0.42}$

where, E: Permissible level in mg/Nm<sup>3</sup>

C: Flow volume of gas in Nm<sup>3</sup>/min

(5) SO<sub>2</sub>, SO<sub>3</sub> and Sulfuric Acid Mist at Dodecilbenzenesulfonic Acid Factory  
(NOM-PA-CCAT-009/93 draft)

Table A2.4.10 Permissible Maximum Amount of SO<sub>2</sub> and SO<sub>3</sub> Emission at Existing Factory in the Critical Zone

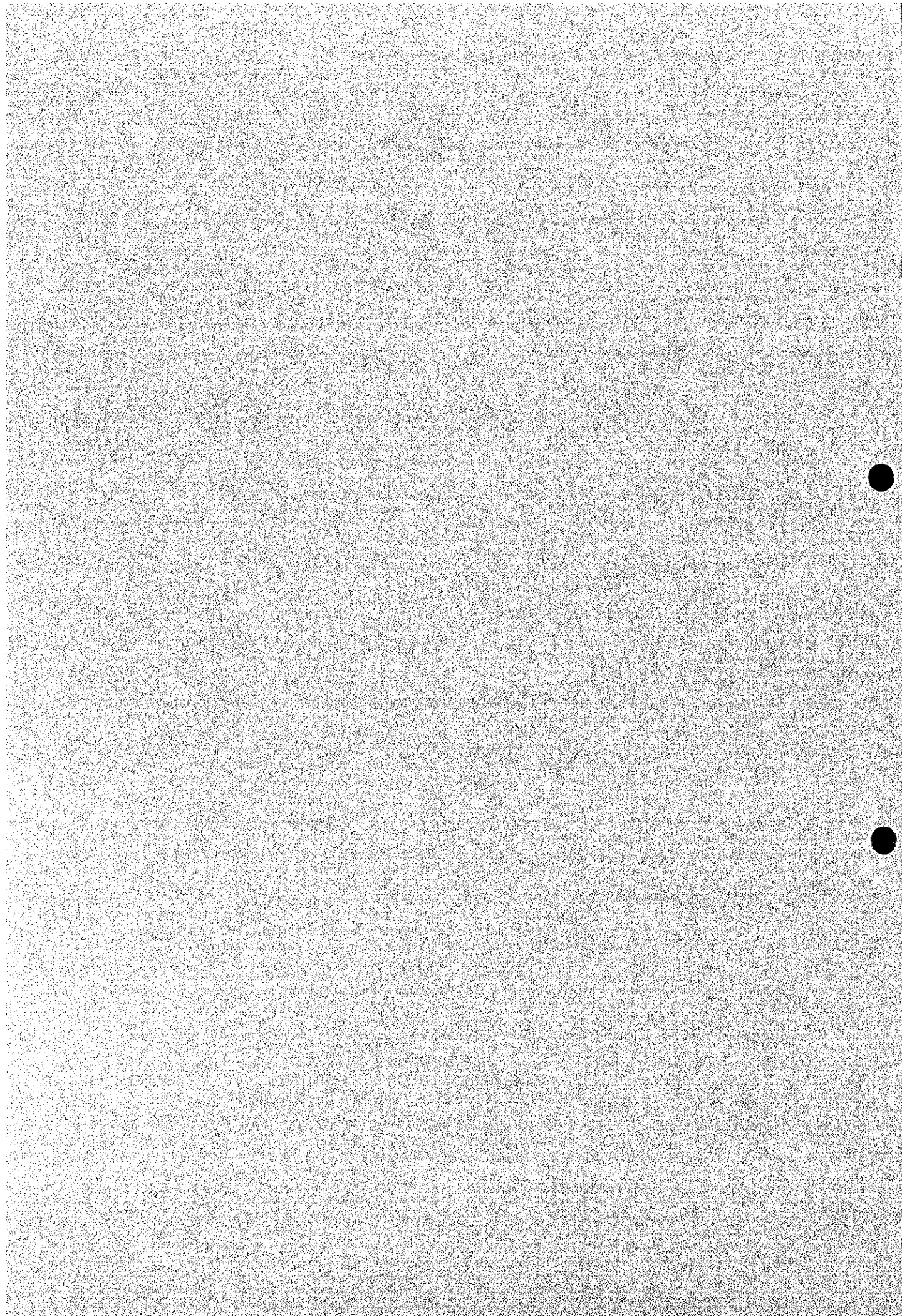
Pollutant	Permissible Maximum Emission Amount (weight of SO <sub>2</sub> in kg/tonnage of 100% Dodecilbenzenesulfonic acid)	
	Existing Plant	New Plant
Sulfur dioxide	3.0 g	2.0 g
Mist of SO <sub>3</sub> and Sulfuric acid	1.2 g	1.2 g

(6) Permissible Sulfur Content of Gasoil for Industrial Use in AMCM  
(NOM-PA-CCAT-015/93)

Maximum permissible sulfur content is decided at 2 % in weight for the equipment larger than 3,500 MJ/h (100 CC).



**Data for Chapter 3**



### 3.1 Questionnaire Items for Stationary Sources

Please write answers by blocked letters or typing.

#### 1. General Information on the Company

##### 1.1 Company name

The name registered to Ministry of Commerce and Industry

##### 1.2 Address

Clearly write the name of street and address number

##### 1.3 Name of responsible person:

Legally responsible person in the field of pollution control

##### 1.4 Personnel

###### 1.4.1 Number of employees

Write numbers of administrative staff, technical staff, and executives.

###### 1.4.2 Number of laborers in the plant

Numbers of laborers and assistants

##### 1.5 Activities of the company

Clearly write the present activities of the company.

#### 2. Manufacturing Processes

##### 2.1 Description of the processes

- 1) Describe the processes separately from this form.
- 2) List chemical reactions, physical and chemical characteristics, chemical formula, process type (e.g., continuous, cycle, batch).
- 3) Flow chart: complete chart showing manufacturing flow with operation conditions and working spaces.
- 4) Identify the operations which cause atmospheric emissions: e.g., plants for sulfuric acid, hydrochloric acid and nitric acid, boilers, heating furnaces.
- 5) Detailed description of burner positioning in the combustion chamber and firing method
- 6) Indicate whether or not soot is adhered on water tubes or side walls (including smoke chamber) being hit by burner flames.

- 7) Indicate the maximum number of trucks per day that enter and go out of the plant for transportation of materials and products.

## 2.2 Operation time (combustion equipment)

Indicate operation hours per day, days per week, and weeks per year.

## 2.3 Combustion equipment

### 1) Fuel

Indicate kind(s) of fuel used such as kerosene, diesel, gas oil, gas (natural gas, LPG, etc.).

### 2) Fuel consumption per hour

Indicate the amount of fuel consumption per hour in the unit characteristic to each fuel such as kg/hr, ton/hr, m<sup>3</sup>/hr, etc.

### 3) Combustion equipment

Indicate kinds of combustion equipment such as boiler with its type (water tube, smoke tube, once-through, heat transfer medium) and other furnaces.

### 4) Maximum capacity (hp/hr or ton/hr)

Indicate the maximum capacity of the combustion equipment in hp/hr or ton/hr.

### 5) Shape and dimensions of the combustion chamber

Dimension: W x D x H (m)

Sectional area: m<sup>2</sup>

Volume: m<sup>3</sup>

### 6) Burner type

Indicate burner type such as rotary type, mechanical atomizing oil type, jet type, and others.

### 7) Maximum fuel consumption rate of the burner

Indicate the consumption per hour and number of burners.

### 8) Mixing method

Indicate kind of atomizing medium (air or steam) and method of mixing the fuel and the atomizing medium (internal mixing or external mixing).

### 9) Age of the combustion equipment

Indicate the age of the boiler or furnace. If the burners are newer than the boiler or furnace, indicate the age of the burners.

## 2.4 Combustion control equipment

Indicate kinds of combustion control equipment installed in the plant.

## 2.5 Safety control equipment

Indicate kinds of safety control equipment installed in the plant.



2.6 Indicate whether or not an air preheater exists. If there is, indicate the temperature of the air for combustion.

2.7 Indicate the method of drafting combustion air.

2.8 Indicate times of maintenance of boiler and burner.

### 3. NOx Emission

#### 3.1 Atmospheric emission of NOx due to combustion

1) Equipment used

Indicate names of combustion equipment: boiler (water tube, smoke tube) and/or furnace.

2) Indicate exhaust gas temperature and oxygen concentration.

3) Indicate exhaust gas NOx concentration value converted at 5 % oxygen.

4) Indicate emission rate of NOx.

5) Indicate emission rate of particulate matter (PM).

6) Indicate exhaust gas CO concentration.

#### 3.1.2 Measuring equipment

Indicate whether or not the plant has exhaust gas measuring equipment.

#### 3.2 NOx pollution control measures

3.2.1 Indicate the measures employed in the plant.

3.2.2 NOx pollution control equipment

1) Enter names of control equipment presently employed in the plant in the first column.

2) In the case you have ever changed the equipment, please indicate the reason.

3) Indicate the NOx reduction efficiency (%) of the control equipment.

4) Indicate total investment amount for the plant's control equipment in the 3rd column.

5) Indicate in the 4th column the cost for operation and maintenance of the control equipment during the operation of manufacturing processes.

3.3 Check yes or no. Explain each program and indicate investment amount.

3.4 Answer by checking.

1) Indicate whether or not your plant has a person who is responsible in keeping watch on environmental problems and taking action for solution.

2) Indicate his field of expertise and title in the company.

**3.5 Answer by checking**

Indicate the category (rank) of the operator.

**3.6 Indicate name, title, work place of the answerer to this questionnaire. Give the date and signature.**

### 3.2 Questionnaire Answering Form for Stationary Sources

#### 1. General Information on the Company

1.1 Company name \_\_\_\_\_

1.2 Address (Street and Number) \_\_\_\_\_

Area name \_\_\_\_\_

Colony \_\_\_\_\_ Municipality \_\_\_\_\_

Federal entity \_\_\_\_\_ Zip code \_\_\_\_\_ Telephone \_\_\_\_\_

1.3 Name of responsible person \_\_\_\_\_

#### 1.4 Personnel

1.4.1 Number of employees \_\_\_\_\_

1.4.2 Number of laborers in the plant \_\_\_\_\_

1.5 Activities of the company \_\_\_\_\_

#### 2. Process(es)

##### 2.1 Description of the process(es)

Please describe on Items 1) through 4) below in separate sheets.

1) Process description

2) Chemical reactions, physical and chemical characteristics, chemical formula, and process type

3) Plant flow chart

4) Operations causing atmospheric emissions

5) Positioning of burners and firing method (tangential type, frontal type, counter firing type)

6) Is there soot on water tubes or side walls (including smoke chamber) that are hit by flames?

Yes( ) No( )

7) Maximum number of trucks per day that enter and go out of the plant for transportation of materials and products

Primary material \_\_\_\_\_ Product \_\_\_\_\_

Primary material \_\_\_\_\_ Product \_\_\_\_\_

Primary material \_\_\_\_\_ Product \_\_\_\_\_

Primary material \_\_\_\_\_ Product \_\_\_\_\_

2.2 Operation time (combustion equipment)

Operation hour: from \_\_\_\_\_ hrs. to \_\_\_\_\_ hrs.  
 \_\_\_\_\_ days/week \_\_\_\_\_ weeks/year

2.3 Combustion equipment

Kind of fuel					
Consumption per hour					
Combustion equipment (maker name)					
Maximum capacity (HP or ton/hr)					
For combustion chamber -Dimension (W*D*H in meter) -Sectional area (m <sup>2</sup> ) -Volume (m <sup>3</sup> )					
Burner type (maker name)					
For burner -Maximum fuel consumption and number of pieces -Number of burner tip holes and diameter -Atomization angle					
-Atomizing medium -Method for mixing fuel and atomizing medium					
Age of the equipment					

2.4 Existence of combustion control equipment

	Yes	No
1) Automatic combustion control unit	( )	( )
2) Water level gaug	( )	( )
3) Low water level cut-off device	( )	( )
4) Steam pressure gauge	( )	( )
5) Automatic water supply device	( )	( )
6) Water supply flow meter	( )	( )
7) Oil supply flow meter	( )	( )
8) Oil temperature thermometer	( )	( )
9) Steam temperature thermometer	( )	( )
10) Combustion chamber pressure gauge	( )	( )

2.5 Existence of safety control equipment

	Yes	No
1) Flame eye (flame detector)	( )	( )
2) Shut off valve unit	( )	( )
3) Air pressure sensor (draft pressure indicator switch)	( )	( )
4) Oil pressure gauge	( )	( )
5) Atomizing steam pressure gauge	( )	( )
6) Pressure gauge after regulator	( )	( )
7) Pressure gauge after shut-off valve	( )	( )
8) Gas pressure gauge at burner inlet	( )	( )
9) Upper and lower limits switch for gas pressure	( )	( )
10) Test cock (purge valve)	( )	( )
11) Gas flow meter	( )	( )

2.6 Existence of recuperator

Yes      No  
 ( )      ( )

If "Yes", temperature of the air for combustion: \_\_\_\_\_ °C

2.7 Method of drafting combustion air

Please mark below.

- 1) Forced draft            ( )
- 2) Balanced draft        ( )
- 3) Induced draft         ( )
- 4) Natural draft          ( )



3.2.2 NOx pollution control equipment

Control equipment or method employed	NOx reduction efficiency (%)	Investment amount for the equipment	Expenses for operation and maintenance

3.3 Did your plant invest for pollution prevention programs and/or air pollution mitigation measures other than those written in Section 3.2 ?

Yes( ) No( )

If, "Yes" please explain the content and give the investment amount.

3.4 Is there a person in your plant who is responsible in keeping watch on environmental problems and taking action for solution ?

Field of expertise \_\_\_\_\_ Title \_\_\_\_\_

3.5 Do the combustion equipment operators have the certificate of Ministry of Labor ?

Yes( ) No( ) Category \_\_\_\_\_

3.6 Person who answered this questionnaire

Name \_\_\_\_\_ Title \_\_\_\_\_

Work place \_\_\_\_\_ Date \_\_\_\_\_

Signature \_\_\_\_\_

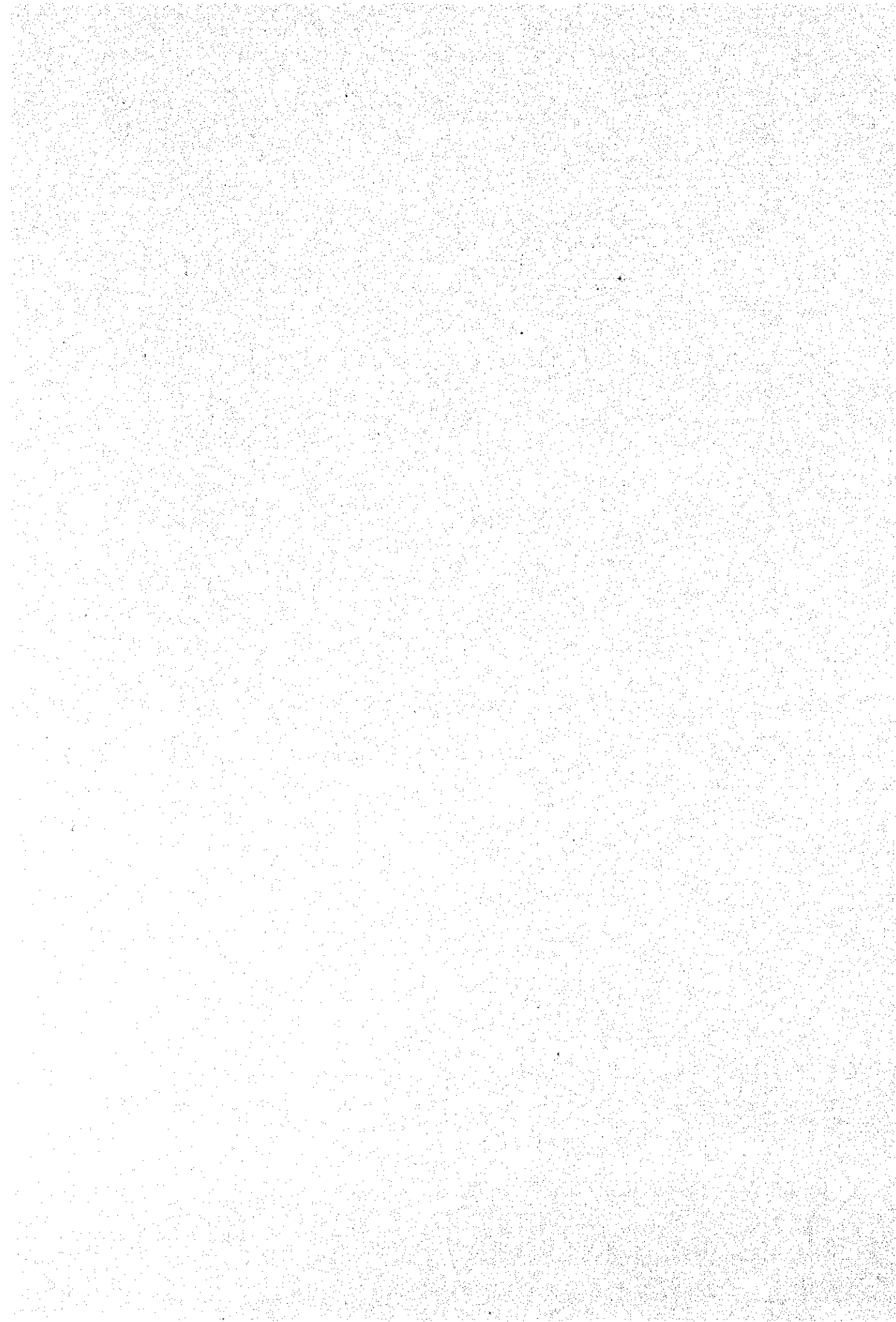




Results of Questionnaire Survey on Factories (2 of 3)

No.	Name of Factory	Type of Industry or products	Num. of Empls (staff) (worker)	Combustion Facility and Manufacturer	Max Capacity	Kind of Fuel	Fuel Consum. gas(m <sup>3</sup> /h) oil (l/h)	Chamber Dimension W'D'H (m)	Chamb. Volume (m <sup>3</sup> )	Heat Trans. Area (m <sup>2</sup> )	Type of Burner	Burner Capacity gas(m <sup>3</sup> /h) oil (l/h)	Atomizing Media & Mixing Method	Age (yr)	Combustion Control Equip.										Operational Safety Control Equip.								Combustion Air Temp. (deg. C)	Combust. Air Supply Method	Exhaust Gas Temp. (deg. C)	O <sub>2</sub> Conc. (%)	NO <sub>x</sub> Conc. at 5% O <sub>2</sub> (ppm)	NO <sub>x</sub> Rate (kg/h)	PM Emiss. Rate (kg/h)	CO Conc. (ppm)	Exhaust Gas Monitor Equip.	NO <sub>x</sub> Emiss. Control Method	NO <sub>x</sub> in the Previous Study (ppm)	Remarks	Wish to Attend Seminar						
															AC	WL	LW	SP	AW	WF	OF	OT	FE	SV	AP	OP	ASP	PR	PS	GPB	GPL	GF																			
16	American Textil	textile	690 138	1) Boiler, CARO TEK	5.5 l/h	Gas oil	180	3.0(dia) * 8.0			H. oil burner	200 x 1	steam/oil	10	y	y	y	y	y	-	y	y	y	y	-	y	y	-	-	-	-	-	-	normal	forced	300	7.00	3.25(?)	0.0214	0.43	5	O2 (DKK)									y
				2) Boiler, B & W	8.3 l/h		240	2'3"2.4	14	B & W	370 x 1	26		y	y	y	y	y	-	y	y	y	-	y	y	-	-	-	-	-	-	-	-	-	-	-	-	270	6.00	3.8(?)	0.02	0.39	7								
				3) Boiler, Nebraska	8.6 l/h		240	2'3"2.3	13.7	PEC	380 x 1	10		y	y	y	y	y	-	y	y	y	-	y	y	-	-	-	-	-	-	-	-	-	-	-	260	8.00	3.75(?)	0.013	0.76	10									
17	Cartonajes Estrella	carton boxes	700 313	1) WTB, Zum	107 l/h	N. gas	4,000	2.74*13.12*2.08	74.8		EM, Zum	8 gate	air/gas	3	y	y	y	y	y	-	y	y	y	y	y	y	y	y	y	y	y	normal	forced	150	3.00	75	4.96	0.052	39	Orsat	Economizer			EGR and LNB planned							
				2) WTB, Riley Stoker	63.6 l/h		4,000	5.4*4.85*9.00	235.7	EM, Peabody	gun type	21		y	y	y	y	y	-	y	y	y	-	y	y	y	y	y	y	y	y	y	y	y	y	balanced															
				3) WTB, Steinmuller	37.5 l/h		2,500	4.14*5.13*5.63	124	EM, B & W	6 gate	25		y	y	y	y	y	-	y	y	y	-	y	y	y	y	y	y	y	y	y	y	y	y	forced?															
18	Vidro Fibras	glass fiber	342 125	1) TF-UMT	30.5 l/d	N. gas	250	8"24"3.6			Linde		O2/gas	0.9	y							y	y	y							532	forced				6.04	0.02	0.83	0	O2 (DKK)	O2 burner		heat insulation gas scrubbing								
				2) TF-RT	25.5 l/d		380	6.6'21.6'6.1		North American		13		y											y	y	y							532	balanced	881	8.75	433	3.5	1.43	0										
19	Silicatos & Derivados	Na <sub>2</sub> SiO <sub>3</sub> K <sub>2</sub> SiO <sub>3</sub>	71 105	1) Heater	200 l/h	N. gas	1,000	8.3'23.4'3.5	680			4 burners	air/gas	5	-	-							y										900	forced	370	17.00		8.65	1.03		portable	use of natural gas									
				2) STB, C & B	9.4 l/h		300	1.2(dia)*4.2	4.75	C & B	1 burner	7		y	y	y	y	y	-	-	y	y	y	-	-	y	y	y	y	y	y	y	y	?	induced	63	10.20		0.66	0.002		MAX 5									
				3) STB, C & B	6.27 l/h		250	0.9(dia)*3.8	2.42	C & B	1 burner	10		y	y	y	y	y	-	-	y	y	y	-	-	y	y	y	y	y	y	y	y	?	induced	63	10.20		0.66	0.002											
20	Procter & Gamble, Poniente	soap cosmetics	1531 270	1) WTB, B & W	9.1 l/h	N. gas	950	circulation type D			B & W	950 x 1	air/oil	17	y	y	y	y	y	-	y	y	y	y	y	y	y	-	-	y	y	-	normal	forced	166	12.55	52	1.06		1	NOx (chemi-lumi.)	energy save									
				2) Heater, No.1, No.2	60,000 mm btu		2,625	2.8 (dia) * 7.2	44.31	LNB 328/8		burner 0.5		y											-	y	y	y	y	y	y	-	-	y	y	-	normal	forced	65	20	13	0.0028	4.94	0							
21	CIA Hulera Tornel	tyre	620 120	1) STB, C & B	1.96 l/h	Diesel	146	0.56*2.84	0.7		C & B	150 x 1	air/oil	16	y	y	y	y	y	-	-	-	y	y	y	-	-	-	-	-	-	-	normal	forced	191.3	6.40		0.28	0.0042	15.6	Orsat										
				2) STB, C & B	3.136 l/h		121	0.57*3.6	0.92	C & B	163 x 1	13		y	y	y	y	y	-	-	-	y	y	y	-	-	-	-	-	-	-	-	-	-	normal	forced	192	5.12		0.39	0.0158	17.8									
				3) Oil medium boiler	1.9 l/h		136	5.46*4.2*4	91.7		154 x 1	16																									324.8	8.20		0.26	0.038	43.5									
22	Crisoba Ind. (San Rafael)	paper	391 138	1) WTB, B & W	60 l/h	Gas oil	2,800	5'5"6.6	164		front, B & W	800 x 4	steam/oil	27	y	-	-	y	y	y	y	y	-	-	y	y	y	-	-	-	-	200	forced	217	9.80	59.2	3.995	0.035	6.72	none	energy saving			CEGMS							
				2) WTB, Cerrey	60 l/h		2,800	3.9'4.0'7.5	117	front, Peabody	800 x 4	19		y	y	-	y	y	y	y	-	-	y	y	y	-	-	-	-	-	-	-	-	-	200		151	16.50	357	11.154	0.264	19.4					CEGMS				
23	Hule Industrial	rubber	103 47	1) STB, C & B		Diesel	113	0.5(dia) * 2.5	0.5		C & B	30 x 4	air/oil	15	y	y	y	y	y	-	-	-	y	y	-	-	-	-	-	-	-	normal	forced													use of N. gas	boiler maintenance				
24	Industrias de Hule Galgo	rubber product	158 46	1) STB, C & B	3.136 l/h		Diesel	100	0.6(dia)*4.2	1.2		C & B			air/oil	4.5	y	y	y	y	y	-	-	-	y	y	-	-	-	-	-	-	normal	forced	169		39.66	5.3E-06	0.011		cell (DKK)	use of diesel			dust collection		y				
25	Termoelectrica del Valle de Mexico	power generation	44 357	1) WTB, (U-1), C.E.	476.2 l/h	N. gas	32,400	7.9'7.9'18.5	1,155		tangential, multi-fuel for gas (lance) and oil	1,620 X 20	steam	30	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	315	forced	135	4.00	55	57.76	not applicable	10	CEGMS, Orsat, thermometer	use of N. gas, EGR, energy sav.			CEGMS is installed in each boiler unit								
				2) WTB, (U-2), B&W	503.5 l/h		35,200	9.0'9.0'24.0	1,944	2,200 x 16	mechanic.	23		y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y		y	315		135	4.00	35			200										
				3) WTB, (U-3), B&W	503.5 l/h		35,200	ditto	1,944	2,200 x 16	mechanic.	24		y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y		y	315		135	4.00	40			200										
				4) WTB, (U-4), B&W	904.8 l/h		75,000	9.75'9.75'32.9	3,124	5,000 x 15	steam	20		y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y		y	322		126	6.00	120			200										
26	Vidriera Oriental	glass bottles	493 180	1) GMF	180 l/d	Gas oil	720	5.4'13'1.2	70.2		Heyeglass	90,000 x 14	high-pressure	9	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	700	forced	700			1.92		2,110	O <sub>2</sub>	gas off												
				2) GMF	220 l/d		1,041	6.6'15'1.2	99	ditto	90,000 x 18	7		y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y		700		700			0.064		2,307	LNB	570										
				3) GMF	220 l/d		1,041	ditto	99	ditto	ditto	2		y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y		y	700		700																
27	Nueva Fabrica Nacional	glass bottles	2,035 422	1) GMF - RCT	8.3 l/h	N. gas	971	7.24'10.48'1.14	135.97			10 units	air/gas	3	y									y	y	y	y	y	1,200-1,300	forced	325	9.20	503	14.24	2.47		O2 (DKK)	use of N. gas			CEGMS being installed										
				2) GMF - RCT	8.3 l/h		1,575	ditto	ditto	gun-type LNB	10 units	8.5		y												y	y	y	y		y	1,250-1,380		409	7.90	730	26.75	2.58		EPA-7C											
				3) GMF - RCT	13.33 l/h		1,566	7.93'16.06'1.77	317.72	12 units	2	y																y	y		y	y	y	1,250-1,370		385	5.60	515	24.58	4.98											
				4) GMF - RCT	16.60 l/h		2,207	8.46'18.46'1.66	377.42	12 units	7.5	y																y	y		y	y	y	1,300-1,380		463	8.80	485	24.22	3.24											
28	Planta de Asfalto	asphalt	600 173	1) Rotary kiln No.5	120 l/h	Diesel	720	2.5(dia)*8.0	39.25		low pressure air jet		air/oil		y								y	y	y	y	y	y	normal	induced													167	burner change							
				2) Rotary kiln No.6	180 l/h		1,080	2.5(dia)*12	58.87						y											y	y	y	y		y	y	normal														217	being			
				3) Rotary kiln No.7	200 l/h		1,200	2.5(dia)*12	58.87						y												y	y	y		y	y	y	normal														160	planned		
				4) Boiler No.5			50-70								y	y	y	y	y	y	y	y	y	y	y	y	y	y	y		y	y	normal																		
				5) Boiler No.6			50-70								y	y	y	y	y	y	y	y	y	y	y	y	y	y	y		y	y	y	normal																	
				6) Boiler No.7			50-70								y	y	y	y	y	y	y	y	y	y	y	y	y	y	y		y	y	y	normal																	
29	Sosa Texcoco	Na <sub>2</sub> CO <sub>3</sub> NaCl	647 																																																





### 3.4 Questionnaire Answer on Installation of Combustion and Safety Control Equipment to Boilers

entprs.	fuel	AC	WL	LW	SP	AW	WF	FE	SV	AP	PR	OF	OT	OP	ASP	PS	GPB	GPL	GF	Age
20	diesel	1	1	1	1	1	0	1	1	1	0	1	1	1	1	0	1	1	0	17
21	diesel	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	16
21	diesel	1	1	1	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0	13
23	diesel	1	1	1	1	1	0	1	1	0	0	0	0	1	0	0	1	0	0	15
24	diesel	1	1	1	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	5
33	diesel	1	1	1	1	1	0	1	1	0	0	0	0	1	0	0	0	0	0	1
52	diesel	0	1	1	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	37
50	diesel	1	1	1	1	1	0	1	0	0	1	0	1	1	1	0	0	0	1	23
50	diesel	1	1	1	1	1	0	1	0	0	1	0	1	1	1	0	0	0	1	33
50	diesel	1	1	1	1	1	0	1	0	0	1	0	1	1	1	0	0	0	1	40
50	diesel	1	1	1	1	1	0	1	0	0	1	0	1	1	1	0	0	0	1	9
3	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	22
3	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	22
3	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	19
4	gas	1	1	1	1	1	0	1	1	1	1	0	0	1	1	1	1	1	1	1
5	gas	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	40
5	gas	1	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	41
5	gas	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	35
5	gas	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	33
9	gas	1	1	1	1	1	0	1	1	1	1	0	0	0	0	1	1	1	1	26
9	gas	1	1	1	1	1	0	1	1	1	1	0	0	0	0	1	1	0	0	15
9	gas	1	1	1	1	1	0	1	1	1	1	0	0	0	0	1	1	0	0	7
10	gas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	39
10	gas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
10	gas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
10	gas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
10	gas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4
13	gas	1	1	1	1	1	1	0	0	0	1	0	0	0	1	1	1	1	1	38
13	gas	1	1	1	1	1	1	0	0	0	1	0	0	0	1	1	1	1	1	33
13	gas	1	1	1	1	1	1	0	0	0	1	0	0	0	1	1	1	1	1	11
14	gas	1	1	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1	31
14	gas	1	1	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1	26
14	gas	1	1	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	0	20
14	gas	1	1	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1	14
14	gas	1	1	1	1	1	0	1	1	1	1	0	1	1	0	1	1	1	1	5
17	gas	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	3
17	gas	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	21
17	gas	1	1	1	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	25
19	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	7
19	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	10
25	gas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	30

entprs.	fuel	AC	WL	LW	SP	AW	WF	FE	SV	AP	PR	OF	OT	OP	ASP	PS	GPB	GPL	GF	Age
25	gas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	23
25	gas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	24
25	gas	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	20
29	gas	1	1	1	1	1	1	0	1	1	1	0	0	0	0	1	1	0	1	33
29	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	30
29	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	27
29	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	2
29	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	24
29	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	21
29	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	16
29	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	7
32	gas	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1
35	gas	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4
38	gas	1	1	1	1	1	0	1	1	0	1	0	0	0	0	1	1	1	0	20
42	gas	1	1	1	1	1	0	1	1	1	1	0	0	0	0	1	1	0	1	10
42	gas	1	1	1	1	1	0	1	1	1	1	0	0	0	0	1	1	0	1	3
51	gas	1	1	1	1	1	0	1	1	0	1	0	0	0	0	1	1	1	0	25
46	gas	1	1	1	1	1	1	1	1	1	1	0	0	1	1	1	1	1	0	19
47	gas	1	0	1	0	0	1	1	1	0	0	0	0	1	0	1	1	0	1	5
1	gasoil	1	1	1	1	1	1	0	1	0	0	1	1	1	1	0	0	0	0	20
1	gasoil	1	1	1	1	1	1	0	1	0	0	1	1	1	1	0	0	0	0	20
2	gasoil	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	1	1	6
6	gasoil	1	1	1	1	1	0	0	1	0	0	0	1	1	1	0	0	1	0	28
6	gasoil	1	1	1	1	1	1	0	1	0	0	1	1	1	1	0	0	1	0	27
7	gasoil	1	1	1	1	1	0	1	1	1	1	0	0	0	0	1	1	0	0	22
7	gasoil	1	1	1	1	1	0	1	1	1	1	0	0	0	0	1	1	0	0	22
7	gasoil	1	1	1	1	1	0	1	1	1	1	0	0	0	0	1	1	0	0	19
7	gasoil	1	1	1	1	1	0	1	1	1	1	0	0	0	0	1	1	0	0	19
8	gasoil	1	1	1	1	1	0	1	1	0	1	0	0	1	1	1	1	1	1	20
10	gasoil	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
10	gasoil	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	17
12	gasoil	1	1	1	1	1	0	0	1	0	1	1	1	1	1	0	0	0	1	39
12	gasoil	1	1	1	1	1	1	0	1	0	1	1	1	1	1	0	0	0	1	22
16	gasoil	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	0	0	0	10
16	gasoil	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	0	0	0	26
16	gasoil	1	1	1	1	1	0	1	1	0	0	1	1	1	1	0	0	0	0	10
22	gasoil	1	0	0	1	1	1	0	0	1	0	1	1	1	1	0	0	0	0	27
22	gasoil	1	1	0	1	1	1	0	0	1	0	1	1	1	1	0	0	0	0	19
30	gasoil	1	1	0	1	1	1	1	1	1	0	1	0	1	1	0	0	0	0	20
30	gasoil	1	1	1	1	1	1	1	1	1	0	1	0	1	1	0	0	0	0	15
30	gasoil	0	1	0	1	1	1	0	1	1	0	0	0	1	1	0	0	1	0	45
31	gasoil	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	1	11
34	gasoil	1	1	0	1	1	0	1	1	0	1	1	1	1	1	0	1	0	0	20
34	gasoil	1	1	0	1	1	0	1	1	0	1	1	1	1	1	0	1	0	0	25
37	gasoil	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2

entprs.	fuel	AC	WL	LW	SP	AW	WF	FE	SV	AP	PR	OF	OT	OP	ASP	PS	GPB	GPL	GF	Age
39	gasoil	0	1	1	1	1	0	1	0	0	1	0	1	0	0	1	1	1	0	28
47	gasoil	1	0	1	0	0	1	1	1	0	0	0	0	1	0	1	1	0	1	12
48	gasoil	1	1	1	1	1	0	1	1	0	1	0	0	1	0	0	0	0	1	28
48	gasoil	1	1	1	1	1	0	1	1	0	1	0	0	1	0	0	0	0	1	28
48	gasoil	1	1	1	1	1	0	1	1	0	1	0	0	1	0	0	0	0	1	28
49	gasoil	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	0	1	0	12
49	gasoil	1	1	1	1	1	1	1	1	1	0	0	0	1	1	0	0	1	0	30

Note: AC=automatic combustion control unit      OT=oil temperature gauge      Age=by year  
 WL=water level gauge      OP=oil pressure gauge  
 LW=low water level cut-off device      ASP=atomizing steam pressure gauge  
 SP=steam pressure gauge      PR=pressure gauge after regulator  
 AW=automatic water supply device      PS=pressure gauge after shut-off valve  
 WF=water supply flow meter      GPB=burner inlet gas pressure gauge  
 FE=flame eye      GPL=gas pressure limit switch  
 SV=shut-off valve      GF=gas flow meter  
 AP=air pressure sensor      1= installed  
 OF=oil supply flow meter      0= not installed or no answer

### 3.5 Questionnaire Answer on Operational Conditions of Combustion Equipment

enter- prise code	fuel used	type of equipment	result of questionnaire			result of diagnostic survey				emission standard of NOx (ppm)	
			NOx (ppm)	O2 (%)	CO (ppm)	NOx (ppm)	O2 (%)	CO (ppm)	load rate to capcty. (%)	hitherto	from Dec. 1994
20	diesel	boiler	52	12.6	1	-	-	-	-	150	220
21	diesel	boiler	-	6.4	16	*104	*5.6	*12	48	no	no
21	diesel	boiler	-	5.1	18	*139	*5.3	*167	-	150	220
21	diesel	boiler	-	8.2	44	*73	*7.9	*41	90	no	no
23	diesel	boiler	40	-	-	-	s	-	-	150	220
33	diesel	kiln:rotary	108	2.5	-	-	-	-	-	no	no
44	diesel	kiln:rotary	-	11.0	-	-	-	-	-	no	no
3	gas	boiler	40	2.8	7	75	2.8	18	65	130	220
3	gas	boiler	77	2.8	20	60	4.1	0	43	120	180
4	gas	boiler	31	7.0	0	55	8.0	0	-	130	220
5	gas	boiler	281	-	-	337	7.0	220	54	100	160
5	gas	boiler	275	-	-	-	-	-	-	100	160
5	gas	boiler	80	-	-	-	-	-	-	100	160
5	gas	boiler	90	-	-	70	2.4	0	32	100	160
9	gas	boiler	-	-	-	87	6.1	0	51	130	220
10	gas	boiler	111	7.7	-	110	6.5	21	48	120	180
10	gas	boiler	37	2.5	24	#34	#2.3	#320	52	100	160
10	gas	boiler	199	5.2	18	97	3.1	0	46	100	160
10	gas	boiler	205	4.3	25	-	-	-	-	100	160
13	gas	boiler	38	5.0	16	-	-	-	-	120	180
13	gas	boiler	43	8.0	33	140	5.1	629	68	100	160
14	gas	boiler	4	4.2	0	77	7.1	3	64	130	220
14	gas	boiler	6	5.1	0	88	3.0	3	45	130	220
14	gas	boiler	2	4.6	0	-	-	-	-	130	220
14	gas	boiler	6	4.2	0	-	-	-	-	130	220
14	gas	boiler	46	2.1	0	-	-	-	-	130	220
14	gas	boiler	27	3.4	2	-	-	-	-	100	160
17	gas	boiler	75	3.0	39	*90	*6.0	*250	-	100	160
19	gas	boiler	-	10.2	-	-	-	-	-	130	220
19	gas	boiler	-	10.2	-	-	-	-	-	130	220
20	gas	boiler	-	-	1	*43	*4.8	*15	78	130	220
25	gas	boiler	55	4.0	10	-	-	-	*70	100	160
25	gas	boiler	35	4.0	200	-	-	-	*70	100	160
25	gas	boiler	40	4.0	200	-	-	-	*70	100	160
25	gas	boiler	120	6.0	200	-	-	-	*70	100	160
29	gas	boiler	105	7.7	5	-	-	-	-	120	180
29	gas	boiler	87	3.5	6	-	-	-	-	100	160
29	gas	boiler	63	6.1	2	-	-	-	-	120	180
29	gas	boiler	52	3.4	4	-	-	-	-	100	160
35	gas	boiler	-	4.2	-	-	-	-	-	no	no
38	gas	boiler	0	-	0	-	-	-	-	130	220
46	gas	boiler	77	6.1	-	-	-	-	-	120	180
47	gas	boiler	18	8.0	10	-	-	-	-	120	180
11	gas	dryer	28	17.0	0	-	-	-	-	no	no
11	gas	dryer	28	17.0	-	-	-	-	-	no	no
11	gas	dryer	28	17.0	-	-	-	-	-	no	no
11	gas	dryer	28	17.0	-	-	-	-	-	no	no
11	gas	dryer	28	17.0	-	-	-	-	-	no	no
35	gas	dryer	-	15.5	10	-	-	-	-	no	no
36	gas	dryer	72	20.0	0	-	-	-	-	no	no
36	gas	dryer	227	21.0	0	-	-	-	-	no	no

enter- prise code	fuel used	type of equipment	result of questionnaire			result of diagnostic survey				emission standard of NOx (ppm)	
			NOx	O2	CO	NOx	O2	CO	load rate	hitherto	from Dec. 1994
			(ppm)	(%)	(ppm)	(ppm)	(%)	(ppm)	to capcty. (%)		
40	gas	fryer	0	-	-	-	-	-	-	no	no
40	gas	fryer	86	-	-	-	-	-	-	no	no
40	gas	heat exch.	42	-	-	-	-	-	-	no	no
40	gas	heat exch.	95	-	0	-	-	-	-	no	no
19	gas	heater	-	17.0	-	*500	*17.0	*0	-	no	no
20	gas	heater	13	20.0	0	-	-	-	-	no	no
38	gas	heater	-	5.1	0	-	-	-	-	no	no
38	gas	heater	-	7.0	0	-	-	-	-	no	no
42	gas	intermit f.	0	20.3	-	-	-	-	-	no	no
42	gas	kiln:tunnel	1	18.0	-	-	-	-	-	no	no
42	gas	kiln:tunnel	0	19.2	-	-	-	-	-	no	no
42	gas	kiln:tunnel	0	20.2	-	-	-	-	-	no	no
27	gas	melting f.	503	9.2	-	-	-	-	-	no	no
27	gas	melting f.	730	7.9	-	-	-	-	-	no	no
27	gas	melting f.	515	5.6	-	-	-	-	-	no	no
27	gas	melting f.	485	8.8	-	-	-	-	-	no	no
41	gas	melting f.	508	15.5	0	-	-	-	-	no	no
41	gas	melting f.	1008	16.7	0	-	-	-	-	no	no
41	gas	melting f.	523	16.5	0	-	-	-	-	no	no
41	gas	melting f.	2267	17.5	0	-	-	-	-	no	no
43	gas	melting f.	134	-	510	-	-	-	-	no	no
36	gas	melting pot	56	17.0	-	-	-	-	-	no	no
15	gas	reverberatory f.	5	5.0	0	-	-	-	-	no	no
18	gas	tank furnace	433	8.8	0	*6	*4.5	*0	-	no	no
18	gas	tank furnace	272	8.8	0	-	-	-	-	no	no
35	gas	trtmnt. f.	-	9.0	10	-	-	-	-	no	no
47	gas	tank f.	-	-	-	-	-	-	-	no	no
1	gasoil	boiler	-	5.0	0	-	-	-	-	150	220
1	gasoil	boiler	321	5.0	0	98	4.8	0	42	150	220
2	gasoil	boiler	153	5.5	300	100	7.9	490	46	150	220
6	gasoil	boiler	140	4.2	8	110	3.2	10	85	150	220
6	gasoil	boiler	100	8.6	4	-	-	-	-	150	220
7	gasoil	boiler	-	5.0	15	134	2.3	0	-	150	220
7	gasoil	boiler	-	6.0	44	113	4.5	0	-	150	220
7	gasoil	boiler	-	8.0	10	147	7.4	0	-	150	220
7	gasoil	boiler	-	9.0	7	-	-	-	-	150	220
8	gasoil	boiler	-	-	0	200	9.7	0	-	150	220
12	gasoil	boiler	111	5.0	0	65	3.0	0	34	150	220
12	gasoil	boiler	114	4.8	0	-	-	-	-	150	220
16	gasoil	boiler	3	7.0	5	-	-	-	-	150	220
16	gasoil	boiler	4	6.0	7	-	-	-	-	150	220
16	gasoil	boiler	4	8.0	10	-	-	-	-	150	220
31	gasoil	boiler	40	3.1	5	-	-	-	-	150	220
34	gasoil	boiler	-	4.5	-	-	-	-	-	no	no
34	gasoil	boiler	-	4.5	-	-	-	-	-	no	no
37	gasoil	boiler	20	6.0	0	-	-	-	-	no	no
39	gasoil	boiler	148	-	0	-	-	-	-	150	220
47	gasoil	boiler	156	3.6	50	-	-	-	-	150	120
22	heavy oil	boiler	59	9.8	7	-	-	-	-	230	400
22	heavy oil	boiler	357	16.5	19	*150	*4.2	-	88	230	400
11	heavy oil	kiln:cement	320	6.5	1,100	*343	*14.3	*460	84	no	no
11	heavy oil	kiln:cement	320	6.5	1,100	*320	*8.7	*1900	81	no	no

\* : The data was given by the plant owner.  
# : operated with EGR

f. : furnace  
- : no data



### 3.6 List of Establishments for Diagnostic Survey

No	Name of Establishment	Identity in the Main Report
1.	Fibras Sintéticas	Petrochemical Products Factory (A)
2.	Uniroyal	Rubber Products Factory (A)
3.	Kimex	Petrochemical Products Factory (B)
4.	CIA. Papelera El Fenix	Paper Factory (A)
5.	Jorge Luque Power Plant	Thermoelectric Power Plant (A)
6.	Empaque de Carton United	Paper Products Factory (A)
7.	Papelera Iruña	Paper Products Factory (B)
8.	Química Lucava	Chemical Products Factory (A)
9.	Penwalt	Chemical Products Factory (B)
10.	Cervecería Modelo	Alcoholic Drinks Factory
11.	Cementos Anahuac	Cement Factory
12.	Empaque de Cartón	Paper Products Factory (C)
13.	Crisoba Productos	Paper Factory (B)
14.	Jabon La Corona	Chemical Products Factory (C)
15.	Alcomex	Metal Products Factory (A)
16.	American Textil	Textile Factory
17.	Cartonajes Estrella	Paper Products Factory (D)
18.	Vitro Fibras	Glass Factory (A)
19.	Silicatos y Derivados	Chemical Products Factory (D)
20.	Procter & Gamble, Poniente	Chemical Products Factory (E)
21.	CIA Hulera Tornel	Rubber Products Factory (B)
22.	Crisoba Ind. (San Rafael)	Paper Factory (C)
23.	Hule Industrial	Rubber Factory
24.	Industrias de Hule Galgo	Rubber Products Factory (C)
25.	Termoeléctrica del Valle de México	Thermoelectric Power Plant (B)
48.	Hospital ABC	Hospital (A)
49.	C. Deportivo Chapultepec	Sport Center
50.	Hospital General de México	Hospital (B)
51.	Hotel Camino Real	Hotel
52.	Quinonas de México	Medicine Firm