Charqueadas (1)

No.	NAME	15/02/96 to 22/02/96		22/02/96 to 29/02/96		01/04/96 to 01/05/96		01/05/96 to 01/06/96		01/06/96 to 01/07/96	
		SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)
1	OBJA	2.8	< 0.8	< 1.0	< 0.8	< 1.0	2.2	< 1.0	2.6	< 1.0	3.2
2	Arranca Toco	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	3.7	< 1.0	3.3	< 1.0	3.7
3	DEPREC*	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.7	< 1.0	1.9	< 1.0	2.5
4	Antonio Camboim	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.5	< 1.0	1.3	< 1.0	1.7
5	Escola Barao do Jacui	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	0.9	< 1.0	0.9	< 1.0	1.4
6	Otoli Panta	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.7	1.0	1.5	< 1.0	1.7
7	Escola Vasconcelos Jardim	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.4	< 1.0	1.5	< 1.0	2.0
8	Telmo Machri*	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.4	< 1.0	1.6	< 1.0	1.9
9	Escola Afonso M.Coelho*	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	2.7	1.1	2.6	< 1.0	3.8
10	Hospital Sao Jeronimo	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	2.5	< 1.0	2.2	< 1.0	3.4
11	CORSAN	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.3	< 1.0	1.6	< 1.0	1.9
12	Adi Campos Cornelio *	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.8	< 1.0	1.7	< 1.0	1.9
13	Jose Manoel	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	2.4	< 1.0	2.4	< 1.0	3.7
14	Gilberto Kuball	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.6	< 1.0	1.5	< 1.0	2.4
15	Fazenda Capororoca	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.0	< 1.0	0.8	< 1.0	1.7
16	COPELMI	< 1.0	1.0	< 1.0	1.0	< 1.0	4.8	1.3	3.9	< 1.0	4.7
17	Pedro Ferreira*	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.8	< 1.0	1.5	< 1.0	1.6
18	Penitenciaria Est. do Jacui	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	2.4	< 1.0	1.3	< 1.0	3.4
19	Inelio da Rosa*	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.7	< 1.0	2.8	< 1.0	2.7
20	Fernando Kroeff	2.1	< 0.8	< 1.0	< 0.8	< 1.0	1.6	< 1.0	1.9	< 1.0	3.3

* 16/02/96 to 23/02/96 23/02/96 to 01/03/96

Charqueadas (2)

No.	NAME	01/07/96 to 01/08/96		01/08/96 to 01/09/96		01/09/96 to 01/10/96		01/10/96 to 01/11/96		01/11/96 to 01/12/96	
		SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)
1	OBJA	1.1	2.2	1.6	3.4	< 1.0	1.5	1.2	2.8	< 1.0	1.7
2	Arranca Toco	< 1.0	5.5	< 1.0	6.5	< 1.0	4.4	1.7	4.2	< 1.0	3.4
3	DEPREC	< 1.0	3.1	< 1.0	3.3	< 1.0	2.9	1.7	2.1	< 1.0	1.7
4	Antonio Camboim	< 1.0	2.2	< 1.0	2.2	< 1.0	1.1	< 1.0	1.9	< 1.0	1.0
5	Escola Barao do Jacui	< 1.0	1.8	< 1.0	2.0	< 1.0	< 0.8	< 1.0	1.2	< 1.0	1.0
6	Otoli Panta	< 1.0	2.5	< 1.0	3.0	< 1.0	1.6	2.0	2.1	< 1.0	1.4
7	Escola Vasconcelos Jardim	2.4	2.6	< 1.0	3.2	< 1.0	1.5	2.5	1.7	< 1.0	1.2
8	Telmo Machri	2.2	2.4	< 1.0	2.4	< 1.0	2.0	1.4	1.7	< 1.0	1.2
9	Escola Afonso M. Coelho	< 1.0	3.9	< 1.0	4.2	< 1.0	2.6	1.6	2.6	< 1.0	2.3
10	Hospital Sao Jeronimo	2.2	4.0	1.3	4.1	< 1.0	2.4	1.5	2.4	< 1.0	1.7
11	CORSAN	< 1.0	2.2	< 1.0	2.4	< 1.0	1.1	< 1.0	1.8	< 1.0	1.2
12	Adi Campos Cornelio	< 1.0	2.3	< 1.0	2.9	< 1.0	1.4	< 1.0	1.4	< 1.0	1.3
13	Jose Manoel	1.7	3.3	< 1.0	4.0	< 1.0	1.9	< 1.0	2.5	< 1.0	1.8
14	Gilberto Kuball	< 1.0	2.5	< 1.0	2.5	< 1.0	1.0	< 1.0	1.4	< 1.0	1.3
15	Fazenda Capororoca	< 1.0	1.7	< 1.0	8.5	< 1.0	< 0.8	< 1.0	1.4	< 1.0	1.0
16	COPELMI	1.2	6.6	< 1.0	6.9	< 1.0	5.6	< 1.0	4.8	< 1.0	4.2
17	Pedro Ferreira	< 1.0	2.6	< 1.0	2.9	< 1.0	1.7	< 1.0	1.8	< 1.0	1.6
18	Penitenciaria Est. do Jacui	2.4	4.1	< 1.0	4.0	< 1.0	1.8	1.0	2.2	< 1.0	2.0
19	Inelio da Rosa	1.0	3.0	< 1.0	1.1	< 1.0	1.5	4.6	2.1	< 1.0	1.6
20	Fernando Kroeff	< 1.0	2.8	< 1.0	2.4	< 1.0	1.7	1.0	1.7	1.1	1.4

Charqueadas (3)

No	NAME	01/12/96 to 01/01/97		01/01/97 to 01/02/97		01/02/97 to 01/03/97		01/03/97 to 01/04/97			
		SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)		
1	OBJA	< 1.0	2.2	< 1.0	1.3	< 1.0	1.6	< 1.0	2.4		
2	Arranca Toco	< 1.0	3.6	< 1.0	3.4	< 1.0	2.3	< 1.0	4.2		
3	DEPREC	< 1.0	2.1	< 1.0	1.9	< 1.0	1.4	< 1.0	2.4		
4	Antonio Camboim	2.1	2.0	< 1.0	1.6	< 1.0	1.1	< 1.0	1.4		
5	Escola Barao do Jacui	2.0	1.6	< 1.0	1.9	2.9	1.1	1.1	< 0.8		
6	Otoli Panta	1.0	2.5	< 1.0	1.7	1.1	1.4	< 1.0	1.6		
7	Escola Vasconcelos Jardim	< 1.0	2.0	< 1.0	1.9	< 1.0	1.2	1.8	1.8		
8	Telmo Machri	1.6	1.8	< 1.0	1.5	< 1.0	1.4	< 1.0	1.6		
9	Escola Afonso M.Coelho	< 1.0	2.7	< 1.0	2.4	< 1.0	1.6	< 1.0	2.5		
10	Hospital Sao Jeronimo	< 1.0	2.8	< 1.0	2.2	< 1.0	1.6	< 1.0	2.0		
11	CORSAN	< 1.0	1.8	< 1.0	1.7	< 1.0	0.8	2.0	1.4		
12	Adi Campos Cornelio	< 1.0	2.2	< 1.0	1.7	1.8	1.1	< 1.0	2.2		
13	Jose Manoel	< 1.0	2.4	< 1.0	2.0	1.1	1.5	< 1.0	2.1		
14	Gilberto Kuball	1.2	2.6	< 1.0	1.7	1.5	1.2	< 1.0	1.7		
15	Fazenda Capororoca	< 1.0	1.7	< 1.0	1.8	2.1	< 0.8	1.1	0.9		
16	COPELMI	< 1.0	4.1	< 1.0	1.8	1.8	4.3	1.8	5.0		
17	Pedro Ferreira	< 1.0	1.9	< 1.0	1.8	< 1.0	1.1	1.4	2.3		
18	Penitenciaria Est. do Jacui	< 1.0	2.3	< 1.0	1.8	< 1.0	1.4	1.5	3.0		
19	Inelio da Rosa	1.0	2.1	< 1.0	2.0	1.3	1.4	< 1.0	2.4		
20	Fernando Kroeff	< 1.0	2.2	< 1.0	2.0	< 1.0	1.0	< 1.0	2.1		

Candiota (1)

No.	NAME	22/02/96 to 29/02/96		29/02/96 to 07/03/96		01/04/96 to 02/05/96		02/05/96 to 03/06/96		03/06/96 to 02/07/96	
		SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)
1	Tres Lagoas	1.2	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	2.4	< 0.8
2	Aeroporto	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.8	< 1.0	1.4
3	Candiotão	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8
4	Brigada Militar	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.1	1.2	1.2
5	Lago	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	0.8	< 1.0	1.3	1.6	1.1
6	E.T.A. Colegio	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	2.0	0.9	< 1.0	< 0.8
7	Igreja	< 1.0	< 0.8	< 1.0	< 0.8	3.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8
8	Passo do Arroio	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8
9	Hulha Negra	< 1.0	< 0.8	2.1	< 0.8	< 1.0	< 0.8	1.6	< 0.8	< 1.0	< 0.8
10	Tunel	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	0.9	< 1.0	1.5	1.9	1.0
11	Passo do Tigre	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	1.8	< 0.8
12	Barão do Itaqui	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	1.9	< 0.8
13	8 de Agosto	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	1.0	< 0.8
14	CORSAN	< 1.0	< 0.8	—*	—*	< 1.0	< 0.8	< 1.0	1.1	2.0	0.9
15	João Geraldino	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	1.8	< 0.8
16	Pedras Altas	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8
17	D.Pedro II	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	3.2	< 0.8
18	Jose Otavio	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	1.7	< 0.8
19	Pinheiro Machado	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	1.2	< 0.8
20	Acegua	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	1.3	< 0.8

* No Data

Candiota (2)

No.	NAME	02/07/96 to 01/08/96		01/08/96 to 02/09/96		02/09/96 to 01/10/96		01/10/96 to 04/11/96		04/11/96 to 02/12/96	
		SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)
1	Tres Lagoas	< 1.0	1.2	< 1.0	2.0	< 1.0	1.2	< 1.0	1.3	< 1.0	1.0
2	Aeroporto	< 1.0	2.1	< 1.0	2.4	< 1.0	1.1	< 1.0	1.4	< 1.0	1.0
3	Candiotão	< 1.0	< 0.8	< 1.0	1.7	< 1.0	1.0	< 1.0	< 0.8	1.0	< 0.8
4	Brigada Militar	< 1.0	1.8	< 1.0	2.2	< 1.0	0.9	—*	—*	< 1.0	0.8
5	Lago	< 1.0	1.5	< 1.0	1.7	< 1.0	1.8	< 1.0	1.4	< 1.0	1.0
6	E.T.A.Colegio	< 1.0	1.2	< 1.0	1.8	< 1.0	< 0.8	< 1.0	0.8	< 1.0	< 0.8
7	Igreja	< 1.0	1.0	< 1.0	1.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	1.0
8	Passo do Arroio	< 1.0	< 0.8	< 1.0	1.0	< 1.0	0.9	< 1.0	< 0.8	1.5	0.8
9	Hulha Negra	< 1.0	< 0.8	< 1.0	1.6	< 1.0	1.1	< 1.0	< 0.8	< 1.0	< 0.8
10	Tunel	< 1.0	1.8	< 1.0	2.2	< 1.0	1.7	< 1.0	1.1	< 1.0	1.1
11	Passo do Tigre	< 1.0	0.8	< 1.0	1.4	< 1.0	1.0	< 1.0	0.9	1.0	< 0.8
12	Barão do Itaqui	< 1.0	0.9	< 1.0	1.6	< 1.0	1.4	< 1.0	0.8	< 1.0	< 0.8
13	8 de Agosto	< 1.0	< 0.8	< 1.0	1.5	< 1.0	< 0.8	< 1.0	1.0	< 1.0	< 0.8
14	CORSAN	—*	—*	< 1.0	2.7	< 1.0	1.1	< 1.0	1.2	< 1.0	< 0.8
15	João Geraldino	< 1.0	0.9	< 1.0	2.3	< 1.0	1.0	< 1.0	0.9	2.5	< 0.8
16	Pedras Altas	< 1.0	< 0.8	< 1.0	1.6	< 1.0	< 0.8	< 1.0	< 0.8	1.3	< 0.8
17	D.Pedro II	< 1.0	< 0.8	< 1.0	1.3	< 1.0	< 0.8	< 1.0	< 0.8	2.0	< 0.8
18	Jose Otavio	< 1.0	< 0.8	< 1.0	1.2	< 1.0	< 0.8	< 1.0	< 0.8	1.3	< 0.8
19	Pinheiro Machado	< 1.0	< 0.8	< 1.0	1.0	< 1.0	0.9	< 1.0	< 0.8	2.2	< 0.8
20	Acegua	< 1.0	1.0	1.2	2.0	< 1.0	0.9	< 1.0	< 0.8	< 1.0	< 0.8

* No Data

Candiota (3)

No.	NAME	02/12/96 to 02/01/97		02/01/97 to 03/02/97		03/02/97 to 03/03/97		03/03/97 to 01/04/97			
		SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)	SO_2 (μg)	NO_2 (μg)		
1	Tres Lagoas	< 1.0	1.4	< 1.0	1.3	< 1.0	0.8	5.6	< 0.8		
2	Aeroporto	< 1.0	1.8	< 1.0	1.2	< 1.0	< 0.8	4.4	1.1		
3	Candiotao	< 1.0	1.0	< 1.0	0.8	< 1.0	0.9	8.9	< 0.8		
4	Brigada Militar	< 1.0	1.3	1.9	1.0	< 1.0	< 0.8	7.8	< 0.8		
5	Lago	1.9	2.8	—*	—*	< 1.0	1.4	3.6	1.3		
6	E.T.A.Colegio	< 1.0	0.8	< 1.0	0.9	< 1.0	< 0.8	1.6	< 0.8		
7	Igreja	2.2	1.3	< 1.0	1.0	< 1.0	1.0	1.6	0.8		
8	Passo do Arroio	< 1.0	1.5	< 1.0	1.1	< 1.0	< 0.8	1.6	< 0.8		
9	Bulha Negra	1.6	1.2	< 1.0	0.9	< 1.0	< 0.8	< 1.0	< 0.8		
10	Tunel	2.3	1.2	< 1.0	1.3	< 1.0	0.9	1.3	< 0.8		
11	Passo do Tigre	1.2	1.3	< 1.0	1.1	< 1.0	1.4	< 1.0	< 0.8		
12	Barão do Itaqui	< 1.0	1.1	< 1.0	1.2	< 1.0	1.0	< 1.0	< 0.8		
13	8 de Agosto	< 1.0	1.0	< 1.0	1.2	< 1.0	< 0.8	3.0	< 0.8		
14	CORSAN	—*	—*	< 1.0	1.1	< 1.0	1.1	< 1.0	0.8		
15	João Geraldino	< 1.0	1.0	< 1.0	0.9	< 1.0	< 0.8	< 1.0	< 0.8		
16	Pedras Altas	2.0	0.9	< 1.0	< 0.8	1.1	2.5	< 1.0	< 0.8		
17	D.Pedro II	< 1.0	1.1	1.1	1.3	< 1.0	< 0.8	< 1.0	< 0.8		
18	Jose Otavio	2.9	1.0	< 1.0	0.9	< 1.0	1.0	< 1.0	< 0.8		
19	Pinheiro Machado	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8	< 1.0	< 0.8		
20	Acegua	< 1.0	< 0.8	< 1.0	0.9	2.3	2.1	< 1.0	< 0.8		

* No Data

Appendix 4-9B Regression Equations for Simple Method

Measurement of simple measurement data was carried out from March, 1996 to March, 1997. For the first 2 weeks of March, 1996, the data concentration obtained was for the period of 1 week. As a result of low concentrations collected, very few obtained data was usable. To increase the frequency of acceptable data, the hourly data averaged for each month was more reasonable for analysis. Therefore, from April, 1996, the collection period was extended to 1 month.

To equalize the data duration of simple data and automated continuous measurement data, hourly data was averaged by each month. If monthly averaged hourly data for both simple and automated continuous measurement were available, the following correlation regression was applied.

Regression equation is,

$$Y = B \times X + A \tag{1}$$

where as,

$$B = \frac{\sum_{i=1}^{n}\left[\left(X_i + \overline{X}\right)\left(Y_i + \overline{Y}\right)\right]}{\sum_{i=1}^{n}\left[\left(X_i + \overline{X}\right)^2\right]} \tag{2}$$

$$A = \overline{Y} - B \times \overline{X} \tag{3}$$

n = Total number of samples.
i = i^{th} Month.
X_i = Monthly averaged simple measurement hourly data(μg).
Y_i = Monthly averaged automated continuous measurement data(ppb).
$\overline{X}$ = Annually averaged X (μg).
$\overline{Y}$ = Annually averaged Y (ppb).

The following equation estimates regression coefficient.

$$R = \frac{\sum_{i=1}^{n}\left[\left(X_i - \overline{X}\right)\left(Y_i - \overline{Y}\right)\right]}{\sqrt{\sum_{i=1}^{n}\left[\left(X_i - \overline{X}\right)^2\right]\sum_{i=1}^{n}\left[\left(Y_i - \overline{Y}\right)^2\right]}} \tag{4}$$

In the case of denominators being zero for equation(2) and (4), both values of B and R was set to be zero as well.

To convert simple measured data from unit of μg to ppb, use the values A and B calculated previously and apply X_i of each month. If acceptable data was not available for i^{th} month, X_i was set as zero concentration.

$$Y_{ippb} = B \times X_i + A \qquad (5)$$

Where as,

Y_{ippb} = Calculated concentration(ppb) of i^{th} month of simple measurement data.

Regression equations for 3 reagions are listed below.

NO_2 :

Candiota	$Y = 1.40 \times X - 0.83$
Charqueadas	$Y = 0.79 \times X + 1.31$
Jorge Lacerda	$Y = 0.91 \times X + 1.79$

If value Y is below zero for a special case of Candiota, the Y value was recorded as zero.

Appendix 4-10

Chemical Analysis of Rain and Dry Precipitation

Jorge Lacerda (Weather Station) (1)

Rain

	29/02/96 to 15/03/96	15/03/96 to 29/03/96	29/03/96 to 12/04/96	12/04/96 to 29/04/96	29/04/96 to 14/05/96	14/05/96 to 29/05/96	29/05/96 to 14/06/96	14/06/96 to 01/07/96	01/07/96 to 17/07/96	17/07/96 to 01/08/96	01/08/96 to 16/08/96
F (mg/ℓ)	< 0.01	0.31	0.03	0.02	0.43	< 0.01	0.02	< 0.01	0.72	0.01	0.12
Cℓ (mg/ℓ)	2.70	5.58	0.60	3.81	10.3	0.55	2.44	0.56	1.07	1.34	0.41
NO_3 (mg/ℓ)	0.15	0.88	0.16	0.31	0.32	0.28	1.18	0.25	0.24	0.26	0.72
SO_4 (mg/ℓ)	1.18	5.02	2.63	2.15	3.74	1.74	2.89	0.82	2.28	1.74	2.72
Na (mg/ℓ)	1.55	3.52	1.12	2.13	5.34	0.62	1.54	0.40	0.53	1.20	0.38
NH_4 (mg/ℓ)	0.21	1.68	0.16	0.41	1.48	0.02	1.12	0.20	0.29	0.05	0.64
K (mg/ℓ)	0.19	0.23	0.15	0.24	0.61	0.07	0.35	0.09	0.18	0.14	0.22
Mg (mg/ℓ)	0.20	0.50	0.18	0.27	0.91	0.22	0.23	0.05	0.06	0.15	0.03
Ca (mg/ℓ)	0.16	0.35	0.60	0.20	0.54	0.96	0.28	0.18	0.60	0.47	0.26
pH	4.2	3.0	5.2	4.2	5.7	6.2	4.5	5.2	4.0	4.7	4.3
EC (mS/m)	1.3	5.1	1.7	2.2	5.7	1.7	2.6	0.6	2.1	2.0	2.7
VOLUME (mℓ)	10.450	3.230	3.350	2.080	1.190	1.820	700	3.600	1.133	900	4.000

Soluble Dry Precipitation

	29/02/96 to 15/03/96	15/03/96 to 29/03/96	29/03/96 to 12/04/96	12/04/96 to 29/04/96	29/04/96 to 14/05/96	14/05/96 to 29/05/96	29/05/96 to 14/06/96	14/06/96 to 01/07/96	01/07/96 to 17/07/96	17/07/96 to 01/08/96	01/08/96 to 16/08/96
F (mg/ℓ)	0.02	0.03	< 0.01	< 0.01	0.01	< 0.01	0.02	< 0.01	0.01	< 0.01	0.03
Cℓ (mg/ℓ)	0.89	2.56	0.85	1.23	0.76	1.62	0.77	0.92	1.04	0.02	1.13
NO_3 (mg/ℓ)	0.02	0.18	0.15	0.02	0.18	0.28	0.20	0.17	0.16	0.24	0.35
SO_4 (mg/ℓ)	11.8	18.4	2.57	2.82	2.53	1.80	1.84	1.22	1.34	1.75	3.06
Na (mg/ℓ)	3.91	9.06	1.11	1.66	0.04	1.40	0.68	0.94	0.95	1.23	1.28
NH_4 (mg/ℓ)	< 0.02	< 0.02	0.28	0.10	< 0.02	0.24	0.26	0.08	0.16	< 0.02	0.18
K (mg/ℓ)	0.14	0.62	0.16	0.24	< 0.01	0.21	0.30	0.18	0.16	0.13	0.21
Mg (mg/ℓ)	0.17	0.50	0.16	0.19	< 0.01	0.17	0.19	0.13	0.13	0.16	0.20
Ca (mg/ℓ)	0.43	1.27	0.53	0.67	0.02	0.41	0.79	0.42	0.37	0.50	0.84
pH	5.4	5.2	5.3	5.3	6.3	6.5	5.3	5.7	5.3	5.3	5.6
EC (mS/m)	3.2	6.8	1.4	1.4	1.3	1.3	1.2	1.0	1.0	1.3	3.3

Jorge Lacerda (Weather Station) (2)

Rain

	16/08/96 to 30/08/96	30/08/96 to 18/09/96	18/09/96 to 02/10/96	02/10/96 to 17/10/96	17/10/96 to 01/11/96	01/11/96 to 18/11/96	18/11/96 to 05/12/96	05/12/96 to 20/12/96	20/12/96 to 08/01/97	08/01/97 to 23/01/97	23/01/97 to 12/02/97
F (mg/ℓ)	0.04	0.08	0.05	0.26	0.19	0.04	2.56	0.27	< 0.01	0.02	0.11
Cℓ (mg/ℓ)	1.00	1.64	1.72	1.17	5.78	0.70	15.3	1.25	0.24	1.47	2.05
NO_3 (mg/ℓ)	1.31	0.44	0.28	0.76	0.43	0.71	0.04	0.86	< 0.01	0.29	0.25
SO_4 (mg/ℓ)	1.87	1.92	0.85	2.88	2.52	2.48	7.68	2.18	< 0.10	1.08	1.43
Na (mg/ℓ)	0.64	1.04	0.97	0.76	3.84	0.49	8.89	0.79	0.50	1.00	1.09
NH_4 (mg/ℓ)	1.29	0.44	0.39	0.52	0.50	0.93	1.29	0.84	0.44	0.48	0.37
K (mg/ℓ)	0.47	0.16	0.11	0.21	0.25	0.17	1.53	0.15	0.08	0.16	0.17
Mg (mg/ℓ)	0.07	0.12	0.13	0.09	0.42	0.09	0.99	0.11	0.07	0.12	0.14
Ca (mg/ℓ)	0.32	0.37	0.15	0.35	0.36	0.38	1.75	0.30	0.18	0.15	0.15
pH	4.9	4.2	5.1	4.2	4.4	4.2	4.1	4.4	4.1	5.0	4.4
EC (mS/m)	2.6	1.8	1.2	2.1	2.1	1.6	9.6	1.9	1.7	1.9	1.9
VOLUME (mℓ)	2.620	1.390	4.370	1.450	2.850	1.450	35	1.500	1.250	3.600	10.000

Soluble Dry Precipitation

	16/08/96 to 30/08/96	30/08/96 to 18/09/96	18/09/96 to 02/10/96	02/10/96 to 17/10/96	17/10/96 to 01/11/96	01/11/96 to 18/11/96	18/11/96 to 05/12/96	05/12/96 to 20/12/96	20/12/96 to 08/01/97	08/01/97 to 23/01/97	23/01/97 to 12/02/97
F (mg/ℓ)	0.03	0.05	< 0.01	0.07	0.04	0.05	0.10	0.04	< 0.01	0.09	0.07
Cℓ (mg/ℓ)	1.49	1.21	0.52	0.83	0.68	0.90	1.34	0.58	0.72	6.00	0.64
NO_3 (mg/ℓ)	0.37	0.03	0.04	0.20	0.18	0.24	0.33	< 0.01	0.22	1.30	0.13
SO_4 (mg/ℓ)	3.34	1.22	1.23	3.03	1.37	3.26	7.27	1.10	2.28	23.5	1.90
Na (mg/ℓ)	2.70	0.84	0.50	0.99	0.74	1.12	3.51	0.57	0.77	16.9	0.67
NH_4 (mg/ℓ)	0.34	< 0.02	0.08	0.10	0.11	0.23	0.28	0.43	0.79	0.54	< 0.02
K (mg/ℓ)	0.37	0.23	0.22	0.21	0.13	0.25	0.56	0.26	0.37	2.02	0.14
Mg (mg/ℓ)	0.33	0.17	0.15	0.31	0.16	0.36	0.45	0.09	0.26	1.04	0.14
Ca (mg/ℓ)	1.08	0.46	0.51	1.21	0.55	1.04	1.46	0.39	0.84	3.66	0.64
pH	5.7	5.0	4.5	5.4	5.6	5.6	5.4	5.6	5.6	7.2	5.2
EC (mS/m)	2.0	1.1	0.8	1.4	0.9	1.7	2.8	0.8	1.3	9.6	0.9

Jorge Lacerda (Weather Station) (3)

Rain

	12/02/97 to 27/02/97	27/02/97 to 12/03/97	12/03/97 to 27/03/97								
F (mg/ℓ)	0.03	0.05	0.40								
Cℓ (mg/ℓ)	0.91	1.16	5.29								
NO_3 (mg/ℓ)	0.40	0.38	0.98								
SO_4 (mg/ℓ)	1.34	1.34	5.56								
Na (mg/ℓ)	0.87	0.67	3.21								
NH_4 (mg/ℓ)	0.48	0.27	1.37								
K (mg/ℓ)	0.26	0.12	0.80								
Mg (mg/ℓ)	0.05	0.09	0.36								
Ca (mg/ℓ)	0.15	0.17	1.02								
pH	4.8	4.9	4.7								
EC (mS/m)	1.3	1.4	3.9								
VOLUME (mℓ)	3.200	760	200								

Soluble Dry Precipitation

	12/02/97 to 27/02/97	27/02/97 to 12/03/97	12/03/97 to 27/03/97								
F (mg/ℓ)	0.05	0.03	0.01								
Cℓ (mg/ℓ)	0.82	0.33	1.12								
NO_3 (mg/ℓ)	0.16	0.14	0.17								
SO_4 (mg/ℓ)	2.42	3.46	2.10								
Na (mg/ℓ)	0.82	8.08	0.75								
NH_4 (mg/ℓ)	1.03	0.11	0.24								
K (mg/ℓ)	1.48	0.14	0.18								
Mg (mg/ℓ)	0.13	0.10	0.19								
Ca (mg/ℓ)	0.50	0.48	0.90								
pH	5.2	5.6	5.7								
EC (mS/m)	1.6	1.2	1.2								

Charqueadas (No. 1 OBJA) (1)

Rain

	15/02/96 to 04/03/96	04/03/96 to 19/03/96	19/03/96 to 02/04/96	02/04/96 to 16/04/96	16/04/96 to 29/04/96	29/04/96 to 14/05/96	14/05/96 to 31/05/96	31/05/96 to 14/06/96	14/06/96 to 28/06/96	28/06/96 to 15/07/96	15/07/96 to 05/08/96
F (mg/ℓ)	0.02	< 0.01	< 0.01	< 0.01			0.05	0.05	< 0.01	< 0.01	0.02
Cℓ (mg/ℓ)	0.71	6.91	0.09	0.17			0.43	1.03	0.26	0.19	1.55
NO_3 (mg/ℓ)	0.54	0.80	0.23	0.23			0.69	0.35	0.20	0.32	1.87
SO_4 (mg/ℓ)	0.92	1.58	0.44	0.34			1.63	1.10	0.46	1.60	1.99
Na (mg/ℓ)	0.57	3.09	0.08	0.13			0.50	1.18	0.19	0.17	0.99
NH_4 (mg/ℓ)	0.58	0.97	0.19	0.28	No Rain	No Rain	0.48	6.96	0.33	0.34	1.14
K (mg/ℓ)	0.13	2.32	0.02	0.03			0.14	1.38	0.04	0.10	0.28
Mg (mg/ℓ)	0.08	0.34	0.02	0.02			0.13	0.19	0.03	0.03	0.16
Ca (mg/ℓ)	0.30	0.39	0.05	0.05			0.47	0.72	0.13	0.23	0.49
pH	5.5	6.1	5.4	5.7			5.5	5.2	5.5	5.0	5.1
EC (mS/m)	1.3	3.1	4.8	0.4			1.1	1.9	0.5	0.9	1.9
VOLUME (mℓ)	998	129	2.570	2.225	0	0	400	62	2.220	850	80

Soluble Dry Precipitation

	15/02/96 to 04/03/96	04/03/96 to 19/03/96	19/03/96 to 02/04/96	02/04/96 to 16/04/96	16/04/96 to 29/04/96	29/04/96 to 14/05/96	14/05/96 to 31/05/96	31/05/96 to 14/06/96	14/06/96 to 28/06/96	28/06/96 to 15/07/96	15/07/96 to 05/08/96
F (mg/ℓ)	0.12	0.02	0.02	0.03	< 0.01	0.02	< 0.01	0.02	< 0.01	< 0.01	0.07
Cℓ (mg/ℓ)	0.93	0.36	0.19	0.43	0.61	0.78	0.43	0.72	0.22	0.24	0.69
NO_3 (mg/ℓ)	0.22	0.26	0.42	0.16	0.31	0.32	0.30	0.22	0.19	0.17	0.74
SO_4 (mg/ℓ)	23.6	18.1	5.06	3.02	1.57	3.54	1.93	1.86	0.65	1.99	4.78
Na (mg/ℓ)	12.1	5.27	2.69	1.34	0.99	1.67	0.80	0.68	0.69	1.05	2.35
NH_4 (mg/ℓ)	0.35	0.15	0.26	0.03	0.18	1.02	< 0.02	0.62	0.10	0.06	0.13
K (mg/ℓ)	0.27	0.15	0.08	0.06	0.10	0.82	0.09	0.67	0.05	0.07	0.10
Mg (mg/ℓ)	0.16	0.11	0.11	0.10	0.14	0.34	0.29	0.24	0.12	0.09	0.24
Ca (mg/ℓ)	0.83	0.50	0.46	0.27	0.43	0.82	1.30	0.64	0.73	0.45	1.06
pH	5.4	5.9	5.8	5.8	6.2	6.0	6.7	3.7	5.8	6.0	5.7
EC (mS/m)	6.9	5.1	1.7	1.3	1.1	3.3	1.2	11.5	0.8	1.0	2.1

Charqueadas (No. 1 OBJA) (2)

Rain

	05/08/96 to 16/08/96	16/08/96 to 02/09/96	02/09/96 to 16/09/96	16/09/96 to 30/09/96	30/09/96 to 16/10/96	16/10/96 to 01/11/96	01/11/96 to 18/11/96	18/11/96 to 03/12/96	03/12/96 to 17/12/96	17/12/96 to 02/01/97	02/01/97 to 15/01/97
F (mg/ℓ)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.04	< 0.01	< 0.01	< 0.01
Cℓ (mg/ℓ)	0.19	0.57	0.21	2.01	0.10	0.47	0.12	2.32	0.92	1.17	0.39
NO_3 (mg/ℓ)	0.75	0.50	0.91	0.67	0.34	0.47	0.38	0.83	0.79	0.80	0.62
SO_4 (mg/ℓ)	0.98	1.36	0.98	1.00	0.46	0.76	0.49	1.72	1.40	2.75	0.83
Na (mg/ℓ)	0.14	0.35	0.15	1.22	0.06	0.35	0.10	1.75	0.61	0.79	0.31
NH_4 (mg/ℓ)	0.64	1.86	0.83	0.70	0.36	0.36	0.48	0.68	1.19	9.76	0.53
K (mg/ℓ)	0.12	0.66	0.11	0.20	0.05	0.07	0.04	0.22	0.22	2.65	0.10
Mg (mg/ℓ)	0.03	0.10	0.03	0.15	0.02	0.05	0.02	0.21	0.08	0.47	0.05
Ca (mg/ℓ)	0.15	0.34	0.18	0.16	0.08	0.09	0.07	0.46	0.18	0.46	0.16
pH	5.1	6.7	5.6	6.1	5.2	5.2	5.1	5.1	6.1	7.6	4.7
EC (mS/m)	0.9	1.7	0.9	1.5	0.5	0.9	0.7	2.1	1.4	8.0	0.9
VOLUME (mℓ)	2.940	3.290	1.100	1.640	2.460	2.580	6.180	99	1.270	595	1.430

Soluble Dry Precipitation

	05/08/96 to 16/08/96	16/08/96 to 02/09/96	02/09/96 to 16/09/96	16/09/96 to 30/09/96	30/09/96 to 16/10/96	16/10/96 to 01/11/96	01/11/96 to 18/11/96	18/11/96 to 03/12/96	03/12/96 to 17/12/96	17/12/96 to 02/01/97	02/01/97 to 15/01/97
F (mg/ℓ)	< 0.01	< 0.01	0.04	< 0.01	< 0.01	< 0.01	0.06	0.05	< 0.01	< 0.01	< 0.01
Cℓ (mg/ℓ)	0.02	0.31	0.15	0.38	0.16	1.06	0.32	0.42	0.28	0.59	0.31
NO_3 (mg/ℓ)	0.02	0.61	0.29	0.20	0.23	0.37	0.27	0.22	0.39	0.30	0.21
SO_4 (mg/ℓ)	13.1	2.05	1.06	1.85	0.83	1.90	0.70	0.60	2.38	0.78	0.94
Na (mg/ℓ)	0.04	1.14	0.43	1.19	0.41	1.64	0.50	0.55	1.36	0.70	0.67
NH_4 (mg/ℓ)	0.02	0.44	0.12	0.05	0.24	0.05	0.20	0.02	0.14	0.10	0.18
K (mg/ℓ)	0.01	0.24	0.07	0.04	0.07	0.12	0.08	0.07	0.35	0.12	0.06
Mg (mg/ℓ)	< 0.01	0.12	0.08	0.06	0.07	0.16	0.07	0.10	0.09	0.13	0.06
Ca (mg/ℓ)	0.02	0.42	0.49	0.20	0.30	0.34	0.26	0.33	0.60	0.49	0.29
pH	3.6	5.6	5.7	5.7	5.7	5.7	5.7	5.6	6.0	5.8	5.2
EC (mS/m)	11.4	1.3	0.7	1.0	0.6	1.4	0.6	0.7	1.4	1.2	0.7

Charqueadas (No. 1 OBJA) (3)

Rain

	15/01/97 to 01/02/97	01/02/97 to 14/02/97	14/02/97 to 01/03/97	01/03/97 to 12/03/97	12/03/97 to 26/03/97	26/03/97 to 02/04/97					
F (mg/ℓ)	< 0.01	< 0.01	< 0.01	0.06	< 0.01						
Cℓ (mg/ℓ)	0.25	0.62	0.46	2.78	0.32						
NO_3 (mg/ℓ)	0.30	0.25	0.33	0.61	0.86						
SO_4 (mg/ℓ)	0.41	0.45	0.77	1.51	0.94						
Na (mg/ℓ)	0.20	0.41	0.31	2.78	0.23						
NH_4 (mg/ℓ)	0.42	0.30	0.31	0.77	0.92	No Rain					
K (mg/ℓ)	0.06	0.10	0.06	0.15	0.10						
Mg (mg/ℓ)	0.03	0.05	0.04	0.19	0.05						
Ca (mg/ℓ)	0.09	0.08	0.09	0.23	0.19						
pH	5.6	5.8	5.0	5.3	5.8						
EC (mS/m)	0.5	0.6	0.8	1.9	0.9						
VOLUME (mℓ)	3.000	2.900	2.750	225	265	0					

Soluble Dry Precipitation

	15/01/97 to 01/02/97	01/02/97 to 14/02/97	14/02/97 to 01/03/97	01/03/97 to 12/03/97	12/03/97 to 26/03/97	26/03/97 to 02/04/97					
F (mg/ℓ)	-*	< 0.01	< 0.01	0.06	0.05	< 0.01					
Cℓ (mg/ℓ)	-*	0.73	0.32	0.24	0.36	0.29					
NO_3 (mg/ℓ)	-*	0.15	0.10	0.13	0.24	0.15					
SO_4 (mg/ℓ)	-*	0.76	0.26	0.47	0.46	0.97					
Na (mg/ℓ)	-*	0.58	0.30	0.43	0.40	0.35					
NH_4 (mg/ℓ)	-*	0.75	0.67	0.19	0.21	1.53					
K (mg/ℓ)	-*	0.35	0.22	0.12	0.08	0.70					
Mg (mg/ℓ)	-*	0.14	0.05	0.07	0.09	0.14					
Ca (mg/ℓ)	-*	0.33	0.15	0.37	0.46	0.35					
pH	-*	5.3	5.8	5.9	6.1	5.3					
EC (mS/m)	-*	0.9	0.5	0.6	0.7	1.5					

* No Data

Candiota (No. 2 Aeroporto) (1)

Rain

	22/02/96 to 07/03/96	07/03/96 to 21/03/96	21/03/96 to 04/04/96	04/04/96 to 18/04/96	18/04/96 to 02/05/96	02/05/96 to 16/05/96	16/05/96 to 30/05/96	30/05/96 to 13/06/96	13/06/96 to 27/06/96	27/06/96 to 11/07/96	11/07/96 to 25/07/96
F (mg/ℓ)	< 0.01	< 0.01	< 0.01	0.20	< 0.01	0.02		0.99	< 0.01	0.02	
Cℓ (mg/ℓ)	1.07	0.28	0.15	1.02	0.21	0.82		3.06	0.33	0.77	
NO_3 (mg/ℓ)	0.34	0.31	0.19	1.14	0.29	0.67		4.80	0.27	0.41	
SO_4 (mg/ℓ)	0.58	0.45	0.47	3.40	0.63	1.46		8.82	0.88	0.90	
Na (mg/ℓ)	0.23	0.21	0.10	0.95	0.10	0.38		1.88	0.28	0.59	
NH_4 (mg/ℓ)	0.36	0.28	0.16	0.17	0.23	0.59	No Rain	1.08	0.23	0.52	No Rain
K (mg/ℓ)	0.18	0.08	0.07	0.09	0.08	0.31		1.64	0.14	0.23	
Mg (mg/ℓ)	0.27	0.30	0.15	0.26	0.07	0.18		0.42	0.06	0.09	
Ca (mg/ℓ)	0.81	0.40	0.19	1.36	0.49	0.56		3.12	0.61	0.88	
pH	6.5	5.7	5.2	5.3	6.1	6.1		6.2	4.8	7.0	
EC (mS/m)	1.0	0.7	0.5	0.4	0.5	1.1		3.2	0.6	0.9	
VOLUME (mℓ)	- *	- *	- *	3.150	1.430	370	0	65	2.130	380	0

Soluble Dry Precipitation

	22/02/96 to 07/03/96	07/03/96 to 21/03/96	21/03/96 to 04/04/96	04/04/96 to 18/04/96	18/04/96 to 02/05/96	02/05/96 to 16/05/96	16/05/96 to 30/05/96	30/05/96 to 13/06/96	13/06/96 to 27/06/96	27/06/96 to 11/07/96	11/07/96 to 25/07/96
F (mg/ℓ)	0.03	0.02	< 0.01	< 0.01	< 0.01	< 0.01	0.04	< 0.01	< 0.01	< 0.01	< 0.01
Cℓ (mg/ℓ)	1.44	0.36	0.15	0.76	0.59	0.51	0.28	0.20	0.38	0.39	0.78
NO_3 (mg/ℓ)	0.08	0.19	0.05	0.12	0.07	0.18	0.14	0.13	0.12	0.10	0.18
SO_4 (mg/ℓ)	9.71	15.7	0.32	2.69	0.32	3.24	0.95	0.62	0.63	0.59	0.73
Na (mg/ℓ)	1.34	5.97	0.25	1.45	0.39	1.33	0.23	0.64	0.30	0.44	0.62
NH_4 (mg/ℓ)	0.11	0.27	0.28	0.17	0.05	0.23	0.09	0.18	0.08	0.07	0.13
K (mg/ℓ)	0.11	0.09	0.14	0.09	0.08	0.11	0.10	0.15	0.08	0.06	0.12
Mg (mg/ℓ)	0.33	0.12	0.08	0.18	0.21	0.17	0.28	0.07	0.12	0.09	0.15
Ca (mg/ℓ)	1.04	1.43	0.09	0.97	0.30	1.88	1.87	0.51	1.35	0.98	0.94
pH	- *	- *	- *	5.5	5.7	6.3	6.6	5.7	4.9	6.0	6.3
EC (mS/m)	- *	- *	- *	1.0	0.5	1.4	0.9	0.4	0.6	0.5	0.8

* No Data

Candiota (No. 2 Aeroporto) (2)

Rain

	25/07/96 to 07/08/96	07/08/96 to 21/08/96	21/08/96 to 06/09/96	06/09/96 to 19/09/96	19/09/96 to 07/10/96	07/10/96 to 16/10/96	16/10/96 to 30/10/96	30/10/96 to 14/11/96	14/11/96 to 28/11/96	28/11/96 to 12/12/96	12/12/96 to 26/12/96
F (mg/ℓ)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.05	< 0.01	< 0.01	< 0.01
Cℓ (mg/ℓ)	1.05	0.25	0.28	0.38	0.91	0.09	0.82	0.84	2.30	1.37	0.46
NO_3 (mg/ℓ)	2.19	0.67	0.71	1.42	2.65	0.07	0.42	0.56	0.71	1.22	0.56
SO_4 (mg/ℓ)	1.94	0.86	0.89	1.48	2.16	0.18	1.08	1.41	1.86	2.48	0.84
Na (mg/ℓ)	0.60	0.17	0.52	0.33	0.55	0.03	0.56	0.38	1.22	1.01	0.38
NH_4 (mg/ℓ)	2.05	1.59	1.02	1.06	2.11	0.10	0.66	0.74	0.49	0.69	0.69
K (mg/ℓ)	0.56	0.36	0.28	0.30	0.37	0.06	0.17	0.30	0.87	0.37	0.22
Mg (mg/ℓ)	0.14	0.02	0.08	0.07	0.12	0.01	0.50	0.05	0.19	0.20	0.07
Ca (mg/ℓ)	0.52	0.21	0.43	0.60	0.88	0.08	0.48	0.54	1.46	1.09	0.40
pH	5.2	6.5	5.7	5.7	5.6	5.3	5.6	5.2	5.8	4.9	6.4
EC (mS/m)	2.7	1.1	0.8	1.2	2.6	1.0	0.8	1.4	2.4	1.9	1.1
VOLUME (mℓ)	350	2.360	3.250	1.210	1.690	600	2.615	910	86	640	690

Soluble Dry Precipitation

	25/07/96 to 07/08/96	07/08/96 to 21/08/96	21/08/96 to 06/09/96	06/09/96 to 19/09/96	19/09/96 to 07/10/96	07/10/96 to 16/10/96	16/10/96 to 30/10/96	30/10/96 to 14/11/96	14/11/96 to 28/11/96	28/11/96 to 12/12/96	12/12/96 to 26/12/96
F (mg/ℓ)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Cℓ (mg/ℓ)	0.10	0.07	0.23	0.50	0.06	0.12	0.73	0.35	0.62	0.12	0.34
NO_3 (mg/ℓ)	0.26	0.25	0.33	0.15	0.11	0.10	0.19	0.16	0.06	0.16	0.18
SO_4 (mg/ℓ)	7.53	0.59	2.00	0.22	2.19	0.22	0.67	0.32	0.19	0.16	0.53
Na (mg/ℓ)	3.36	0.09	1.19	0.38	1.12	0.10	0.72	0.32	0.82	0.12	0.24
NH_4 (mg/ℓ)	0.31	0.12	1.26	0.14	0.20	0.13	0.84	0.15	< 0.02	0.21	0.33
K (mg/ℓ)	0.11	0.07	0.69	0.05	0.06	0.06	0.13	0.11	0.14	0.06	0.07
Mg (mg/ℓ)	0.09	0.05	0.12	0.06	0.02	0.04	0.67	0.06	0.19	0.05	0.07
Ca (mg/ℓ)	0.81	0.61	1.06	0.28	0.11	0.42	0.63	0.34	1.48	0.43	0.74
pH	5.8	6.0	5.8	5.9	5.6	5.3	5.4	5.0	6.4	5.6	6.0
EC (mS/m)	2.6	0.5	0.9	0.4	1.4	0.3	0.7	0.6	1.1	0.4	0.5

Candiota (No. 2 Aeroporto) (3)

Rain

	26/12/96 to 09/01/97	09/01/97 to 23/01/97	23/01/97 to 07/02/97	07/02/97 to 20/02/97	20/02/97 to 06/03/97	06/03/97 to 20/03/97	20/03/97 to 01/04/97				
F (mg/ℓ)		< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02				
Cℓ (mg/ℓ)		1.05	0.25	0.23	2.88	0.50	3.45				
NO_3 (mg/ℓ)		2.19	0.67	0.52	0.67	0.66	0.80				
SO_4 (mg/ℓ)		1.94	0.86	0.41	1.63	0.80	1.34				
Na (mg/ℓ)		0.60	0.17	0.16	4.60	0.30	1.60				
NH_4 (mg/ℓ)	No Rain	2.05	1.59	0.87	0.59	0.62	2.74				
K (mg/ℓ)		0.56	0.36	0.04	0.17	0.26	2.48				
Mg (mg/ℓ)		0.14	0.02	0.03	0.23	0.15	0.10				
Ca (mg/ℓ)		0.52	0.21	0.22	0.85	0.44	0.54				
pH		5.2	6.5	6.7	6.8	6.8	5.7				
EC (mS/m)		2.7	1.1	0.9	2.1	0.7	1.6				
VOLUME (mℓ)	0	350	2,360	89	310	360	19				

Soluble Dry Precipitation

	26/12/96 to 09/01/97	09/01/97 to 23/01/97	23/01/97 to 07/02/97	07/02/97 to 20/02/97	20/02/97 to 06/03/97	06/03/97 to 20/03/97	20/03/97 to 01/04/97				
F (mg/ℓ)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.04	< 0.01				
Cℓ (mg/ℓ)	1.00	0.64	0.67	0.92	1.83	0.49	0.18				
NO_3 (mg/ℓ)	0.25	0.21	0.26	0.27	0.09	0.15	0.19				
SO_4 (mg/ℓ)	0.93	1.69	4.19	0.38	1.21	0.51	0.32				
Na (mg/ℓ)	0.64	1.48	2.60	0.61	2.55	0.45	0.18				
NH_4 (mg/ℓ)	1.79	0.14	0.30	0.43	0.26	0.14	0.46				
K (mg/ℓ)	0.68	0.09	0.10	0.10	0.17	0.10	0.09				
Mg (mg/ℓ)	0.31	0.08	0.12	0.11	0.17	1.12	0.06				
Ca (mg/ℓ)	1.10	0.53	0.93	0.69	0.94	1.62	0.50				
pH	5.3	6.2	6.0	6.5	6.2	7.0	5.4				
EC (mS/m)	2.6	1.1	1.9	0.9	1.3	1.5	0.5				

Candiota (No. 20 Acegua) (1)

Rain

	22/02/96 to 07/03/96	07/03/96 to 21/03/96	21/03/96 to 04/04/96	04/04/96 to 18/04/96	18/04/96 to 02/05/96	02/05/96 to 16/05/96	16/05/96 to 30/05/96	30/05/96 to 13/06/96	13/06/96 to 27/06/96	27/06/96 to 11/07/96	11/07/96 to 25/07/96
F (mg/ℓ)	< 0.01	0.01	< 0.01	< 0.01	0.14	< 0.01		< 0.01	< 0.01	< 0.01	
Cℓ (mg/ℓ)	0.12	2.25	0.10	0.04	0.75	1.50		1.18	0.34	0.70	
NO_3 (mg/ℓ)	0.09	0.13	0.14	< 0.01	0.30	0.72		0.31	0.24	0.37	
SO_4 (mg/ℓ)	0.10	1.01	0.17	0.04	0.54	1.46		0.68	0.49	0.97	
Na (mg/ℓ)	0.04	1.62	0.10	0.03	0.18	0.88		0.81	0.27	0.48	
NH_4 (mg/ℓ)	< 0.02	0.38	0.24	0.08	0.24	1.03	No Rain	0.72	0.18	0.45	No Rain
K (mg/ℓ)	0.06	0.48	0.08	0.03	0.11	0.21		0.35	0.10	0.21	
Mg (mg/ℓ)	0.02	0.93	0.16	0.01	0.06	0.16		0.10	0.05	0.10	
Ca (mg/ℓ)	< 0.02	0.73	0.08	0.02	0.44	0.26		0.19	0.17	0.80	
pH	6.3	6.1	5.4	5.5	4.5	6.2		6.5	4.4	— *	
EC (mS/m)	0.2	1.0	0.3	0.3	0.9	1.4		1.0	0.5	0.9	
VOLUME (mℓ)	— *	— *	— *	1.250	970	280	0	180	2.320	900	0

* No Data

Soluble Dry Precipitation

	22/02/96 to 07/03/96	07/03/96 to 21/03/96	21/03/96 to 04/04/96	04/04/96 to 18/04/96	18/04/96 to 02/05/96	02/05/96 to 16/05/96	16/05/96 to 30/05/96	30/05/96 to 13/06/96	13/06/96 to 27/06/96	27/06/96 to 11/07/96	11/07/96 to 25/07/96
F (mg/ℓ)	0.03	< 0.01	0.06	0.02	< 0.01	0.02	1.17	< 0.01	< 0.01	< 0.01	< 0.01
Cℓ (mg/ℓ)	1.46	0.26	0.27	0.28	0.16	0.52	0.61	0.76	0.22	0.32	0.92
NO_3 (mg/ℓ)	0.08	0.10	0.13	0.02	0.07	0.16	1.38	0.22	0.12	0.10	0.14
SO_4 (mg/ℓ)	9.71	0.43	4.77	0.06	0.33	0.28	3.14	0.49	0.13	0.17	0.37
Na (mg/ℓ)	1.25	0.37	2.56	0.02	0.13	0.34	0.37	0.20	0.33	0.29	0.58
NH_4 (mg/ℓ)	< 0.02	0.48	0.19	0.23	0.13	0.60	0.08	0.35	0.04	0.08	< 0.02
K (mg/ℓ)	0.08	0.09	0.07	0.02	0.05	0.11	0.14	0.12	0.17	0.09	0.47
Mg (mg/ℓ)	0.23	0.18	0.10	0.02	0.03	0.09	0.70	0.05	0.04	0.05	0.16
Ca (mg/ℓ)	0.19	0.18	0.68	0.03	0.16	0.29	0.24	0.18	0.15	0.16	0.39
pH	— *	— *	— *	5.4	5.6	5.3	5.7	5.3	4.3	5.5	5.7
EC (mS/m)	— *	— *	— *	0.1	0.4	0.5	0.4	0.4	0.3	0.3	0.7

* No Data

Candiota (No. 20 Acegua) (2)

Rain

	25/07/96 to 07/08/96	07/08/96 to 21/08/96	21/08/96 to 06/09/96	06/09/96 to 19/09/96	19/09/96 to 07/10/96	07/10/96 to 16/10/96	16/10/96 to 30/10/96	30/10/96 to 14/11/96	14/11/96 to 28/11/96	28/11/96 to 12/12/96	12/12/96 to 26/12/96
F (mg/ℓ)	< 0.01	< 0.01	< 0.01	0.02	< 0.01	< 0.01	< 0.01	< 0.01		< 0.01	< 0.01
Cℓ (mg/ℓ)	0.71	0.26	0.25	0.31	0.65	0.66	0.48	0.19		1.00	0.97
NO_3 (mg/ℓ)	1.62	0.94	0.93	1.34	1.72	1.49	0.37	0.40		0.80	0.73
SO_4 (mg/ℓ)	1.63	1.40	0.84	1.06	1.22	1.98	0.82	0.29		1.32	1.10
Na (mg/ℓ)	0.42	0.12	0.54	0.23	0.49	0.61	0.42	0.25		0.80	0.76
NH_4 (mg/ℓ)	1.39	0.89	1.07	1.04	1.69	0.40	0.50	0.68	No Rain	0.85	0.61
K (mg/ℓ)	0.29	0.21	0.31	0.26	0.50	0.54	0.15	0.09		0.32	0.16
Mg (mg/ℓ)	0.11	0.04	0.04	0.04	0.06	0.14	0.27	0.02		0.14	0.11
Ca (mg/ℓ)	0.81	0.23	0.34	0.23	0.21	1.08	0.32	0.10		0.43	0.34
pH	4.6	5.5	5.8	4.9	5.6	6.5	5.3	4.9		5.7	5.5
EC (mS/m)	3.0	0.9	1.2	1.3	1.6	0.8	0.7	0.5		0.6	1.3
VOLUME (mℓ)	900	551	1.580	1.500	4.456	11	2.080	1.840	0	470	670

* No Data

Soluble Dry Precipitation

	25/07/96 to 07/08/96	07/08/96 to 21/08/96	21/08/96 to 06/09/96	06/09/96 to 19/09/96	19/09/96 to 07/10/96	07/10/96 to 16/10/96	16/10/96 to 30/10/96	30/10/96 to 14/11/96	14/11/96 to 28/11/96	28/11/96 to 12/12/96	12/12/96 to 26/12/96
F (mg/ℓ)	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.03
Cℓ (mg/ℓ)	0.16	0.09	0.84	0.44	0.47	0.16	0.56	0.16	1.27	0.20	1.04
NO_3 (mg/ℓ)	0.02	0.31	0.95	0.97	0.20	0.10	0.13	0.10	0.10	0.24	0.16
SO_4 (mg/ℓ)	0.24	0.24	1.78	0.70	2.87	0.14	0.24	0.12	0.53	0.20	0.56
Na (mg/ℓ)	0.14	0.15	1.39	0.37	2.21	0.12	0.49	0.20	0.41	0.15	1.15
NH_4 (mg/ℓ)	0.08	0.29	0.66	0.37	0.78	0.25	0.43	0.31	0.02	0.11	0.91
K (mg/ℓ)	0.24	0.07	0.43	0.09	0.20	0.11	0.16	0.14	0.10	0.16	0.50
Mg (mg/ℓ)	0.06	0.03	0.18	0.14	0.08	0.02	0.06	0.03	0.71	0.08	0.07
Ca (mg/ℓ)	0.33	0.20	0.79	0.52	0.74	0.19	0.14	< 0.02	0.22	0.38	0.32
pH	6.6	5.7	5.2	5.8	5.7	5.1	5.2	5.5	6.0	4.4	6.0
EC (mS/m)	0.5	0.4	0.8	0.2	0.2	0.3	0.6	0.3	0.5	0.5	0.4

* No Data

Candiota (No. 20 Acegua) (3)

Rain

	26/12/96 to 09/01/97	09/01/97 to 23/01/97	23/01/97 to 07/02/97	07/02/97 to 20/02/97	20/02/97 to 06/03/97	06/03/97 to 20/03/97	20/03/97 to 01/04/97				
F (mg/ℓ)		< 0.01	< 0.01	< 0.01	0.03	0.02	< 0.01				
Cℓ (mg/ℓ)		0.25	0.37	0.51	10.7	2.15	1.31				
NO_3 (mg/ℓ)		0.43	0.12	0.64	0.96	1.84	0.73				
SO_4 (mg/ℓ)		0.35	0.22	0.57	2.45	1.18	1.07				
Na (mg/ℓ)		0.19	0.22	0.32	8.08	1.36	0.84				
NH_4 (mg/ℓ)	No Rain	0.43	0.31	0.66	0.74	1.03	0.80				
K (mg/ℓ)		0.08	0.12	0.10	0.44	0.31	0.35				
Mg (mg/ℓ)		0.05	0.43	0.06	0.70	0.25	0.22				
Ca (mg/ℓ)		0.11	0.10	0.16	1.34	0.55	0.45				
pH		6.2	6.5	5.4	6.1	5.7	5.8				
E.C (mS/m)		0.6	0.4	0.8	5.9	1.5	1.5				
VOLUME (mℓ)	0	1.780	4.550	33	64	90	210				

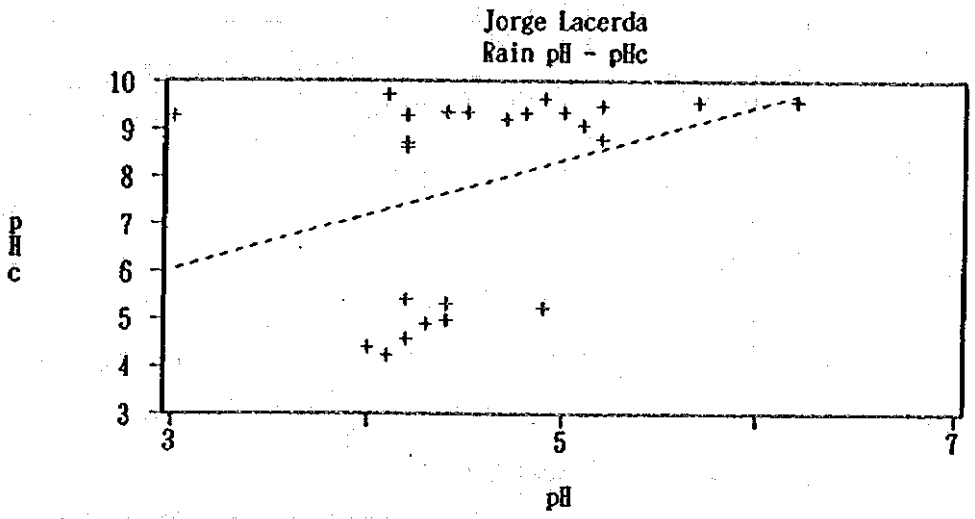
* No Data

Soluble Dry Precipitation

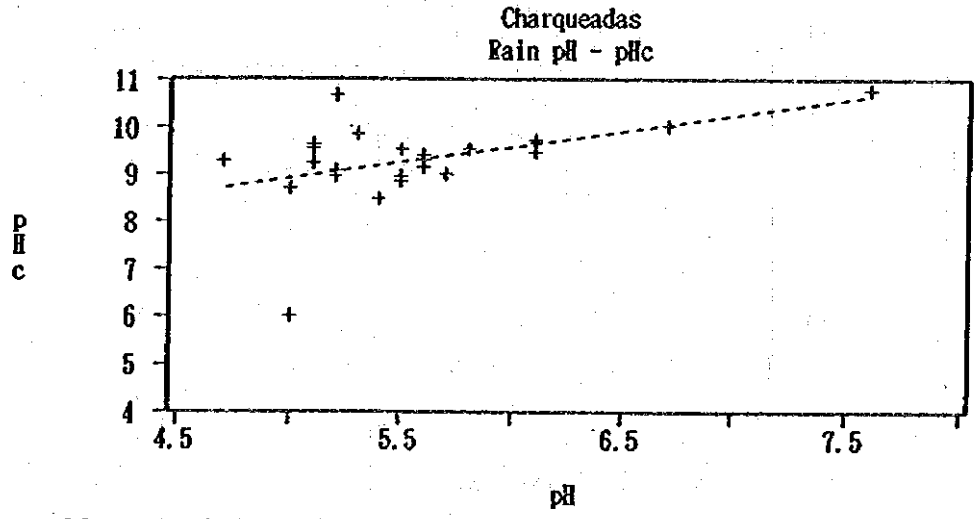
	26/12/96 to 09/01/97	09/01/97 to 23/01/97	23/01/97 to 07/02/97	07/02/97 to 20/02/97	20/02/97 to 06/03/97	06/03/97 to 20/03/97	20/03/97 to 01/04/97				
F (mg/ℓ)	< 0.01	< 0.01	< 0.01	−*	< 0.01	< 0.01	< 0.01				
Cℓ (mg/ℓ)	0.56	0.52	0.71	−*	1.21	0.71	0.18				
NO_3 (mg/ℓ)	0.20	0.26	0.20	−*	0.04	0.20	0.18				
SO_4 (mg/ℓ)	0.42	0.53	0.60	−*	1.28	0.26	0.46				
Na (mg/ℓ)	0.53	0.53	0.48	−*	3.10	0.44	0.22				
NH_4 (mg/ℓ)	0.06	0.10	0.08	−*	0.33	0.17	0.12				
K (mg/ℓ)	0.13	0.12	0.26	−*	0.09	0.43	0.11				
Mg (mg/ℓ)	0.12	0.09	0.11	−*	0.10	2.56	0.05				
Ca (mg/ℓ)	0.26	0.26	0.51	−*	0.19	0.40	0.32				
pH	5.7	5.7	5.7	−*	6.0	7.3	5.6				
EC (mS/m)	0.6	0.7	0.6	−*	1.3	0.6	0.6				

* No Data

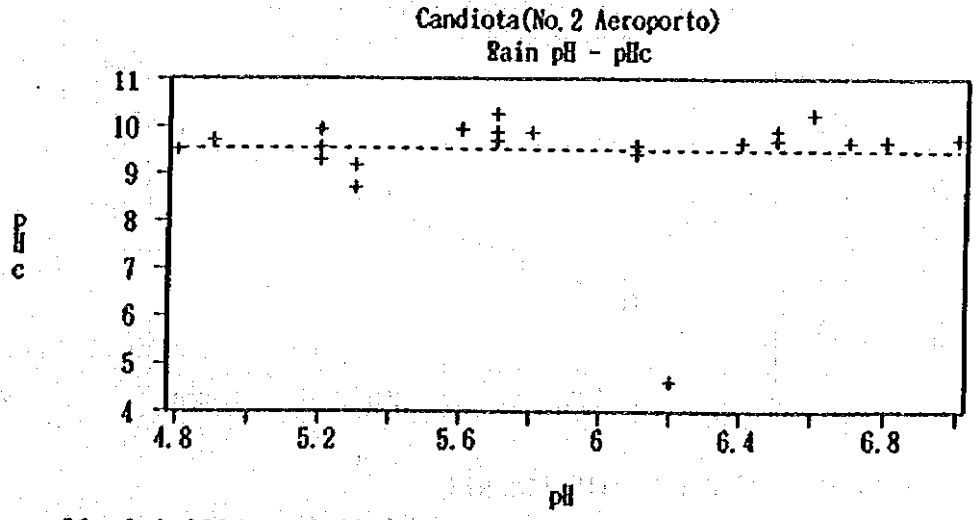
Appendix 4-11A
Correlation graph of Rain and Dry Precipitation Data



n=25 r2=0.1172 y=1.1495x+2.5879

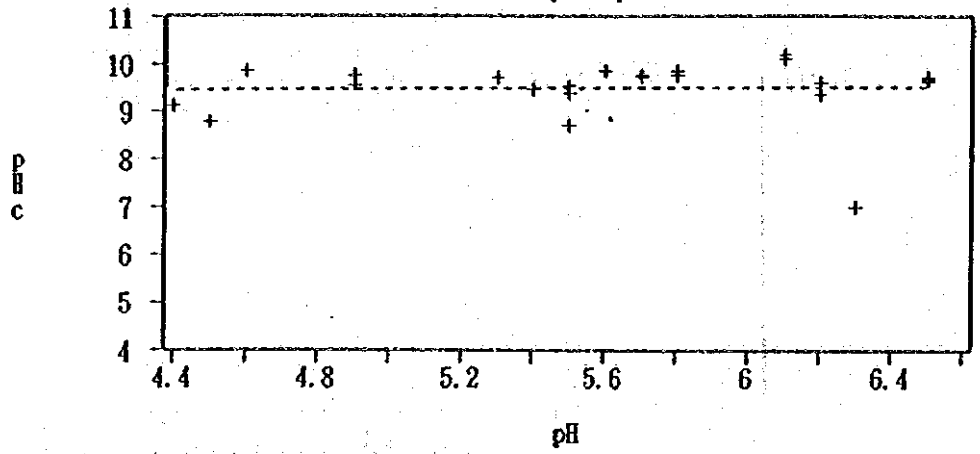


n=25 r2=0.2264 y=0.6696x+5.5628



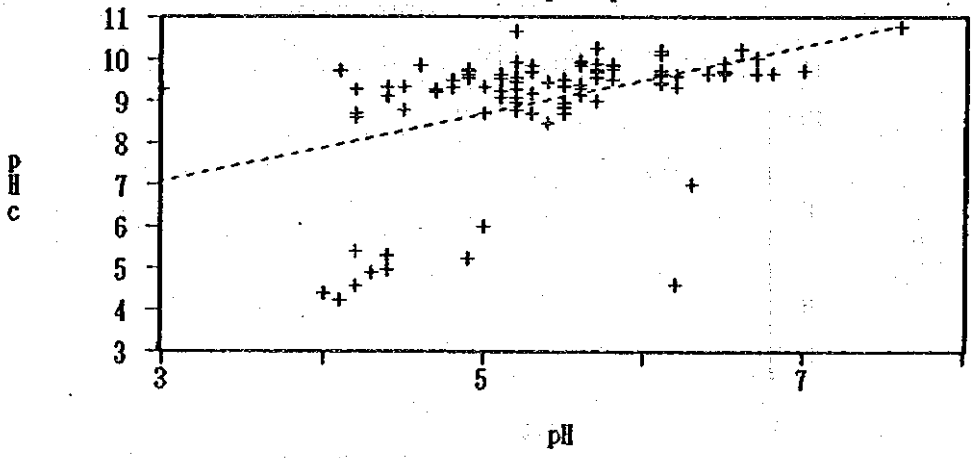
n=26 r2=0.0005 y=-0.0374x+9.7274

Candiota(No. 20 Acegua)
Rain pH - pHc



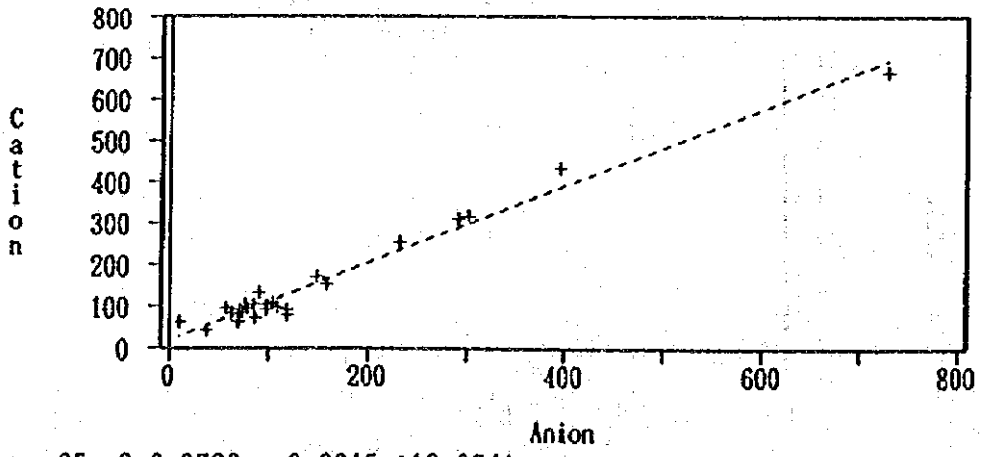
n=24 r2=0.0011 y=0.0329x+9.2981

Total
Rain pH - pHc



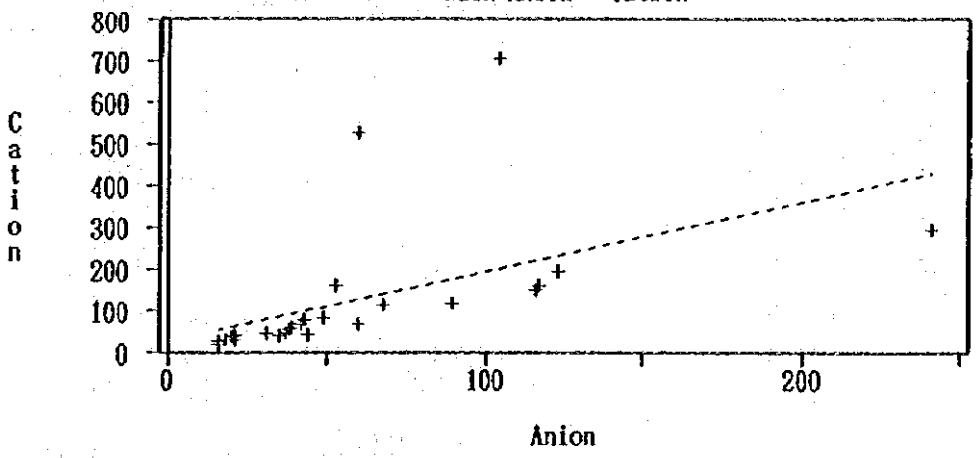
n=100 r2=0.1941 y=0.8141x+4.6316

Jorge Lacerda
Rain Anion - Cation



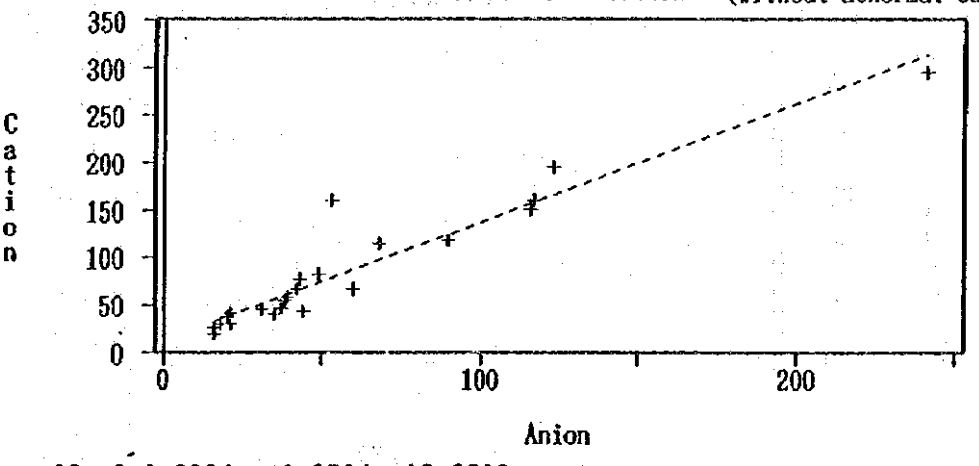
n=25 r2=0.9723 y=0.9315x+18.9741

Charqueadas
Rain Anion - Cation



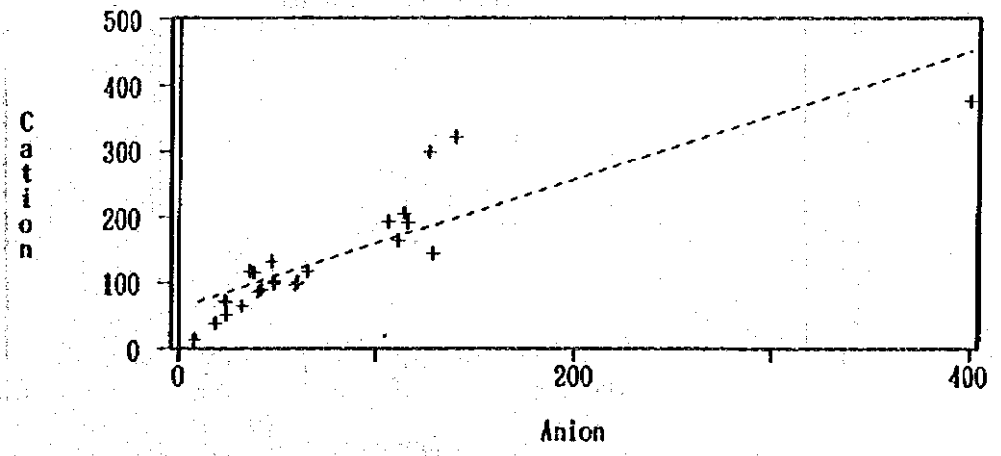
n=25 r2=0.2613 y=1.6617x+27.7527

Charqueadas
Rain Anion - Cation (without abnormal data)



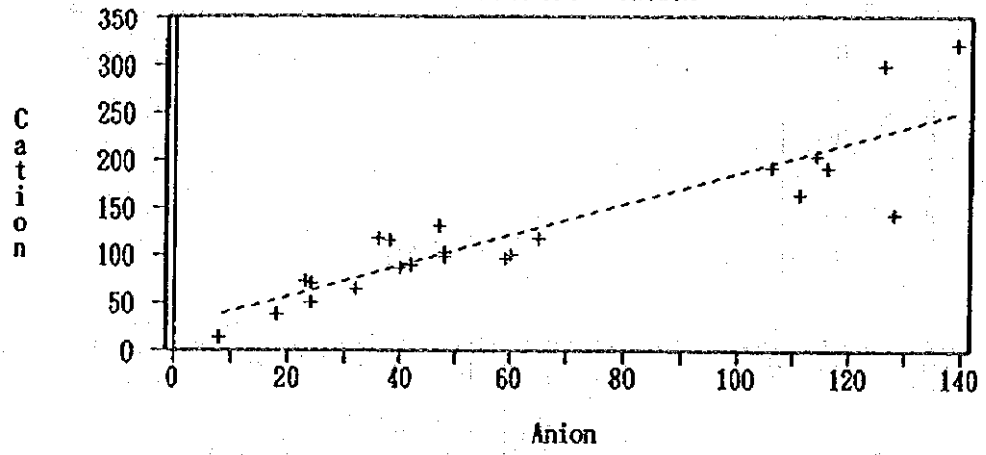
n=23 r2=0.8994 y=1.2504x+12.3593

Candiota(No.2 Aeroporto)
Rain Anion - Cation



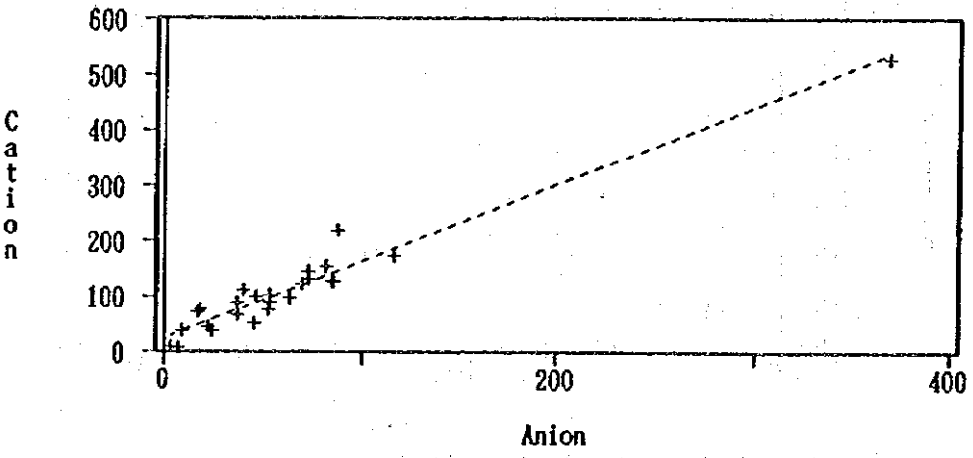
n=26 r2=0.7397 y=0.9736x+62.0263

Candiota(No. 2 Aeroporto)
Rain Anion - Cation (without abnormal data)



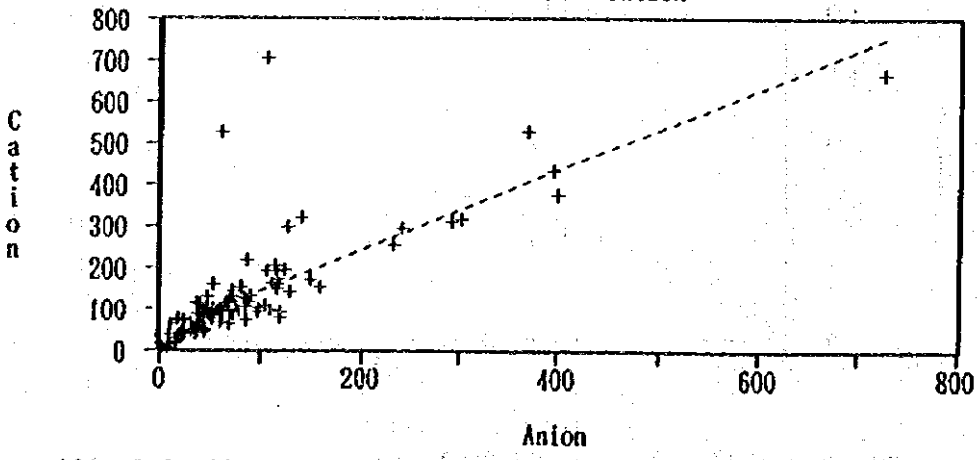
n=25 r2=0.7953 y=1.6194x+23.9087

Candiota(No. 20 Acegua)
Rain Anion - Cation

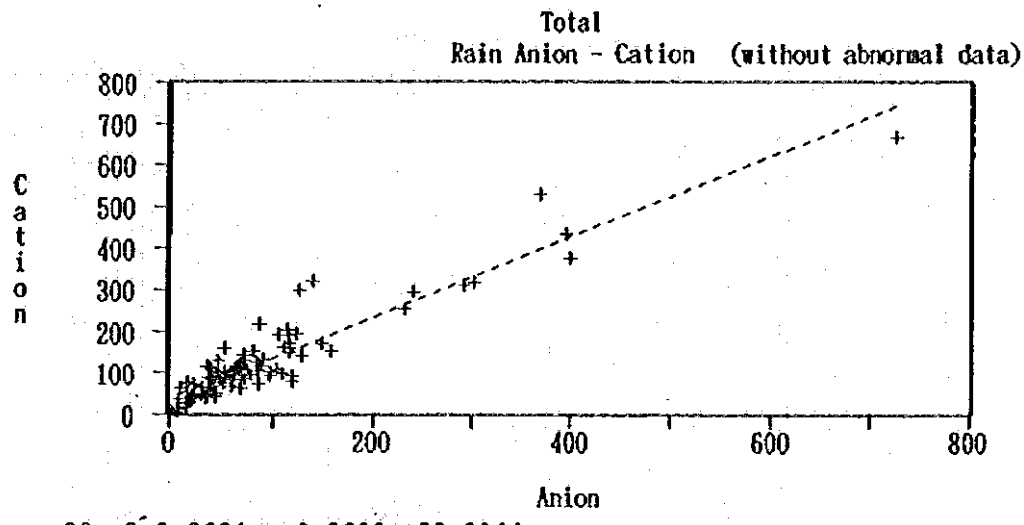


n=25 r2=0.9462 y=1.3913x+24.4879

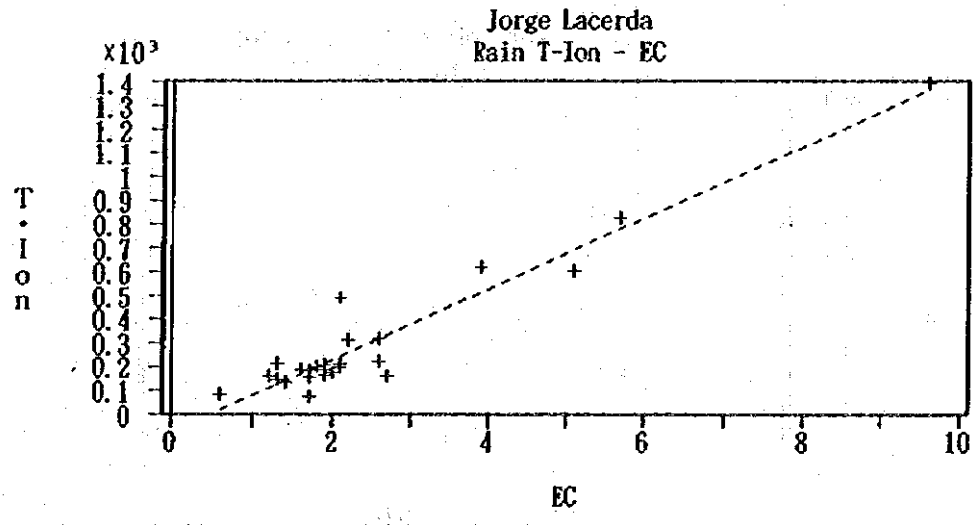
Total
Rain Anion - Cation



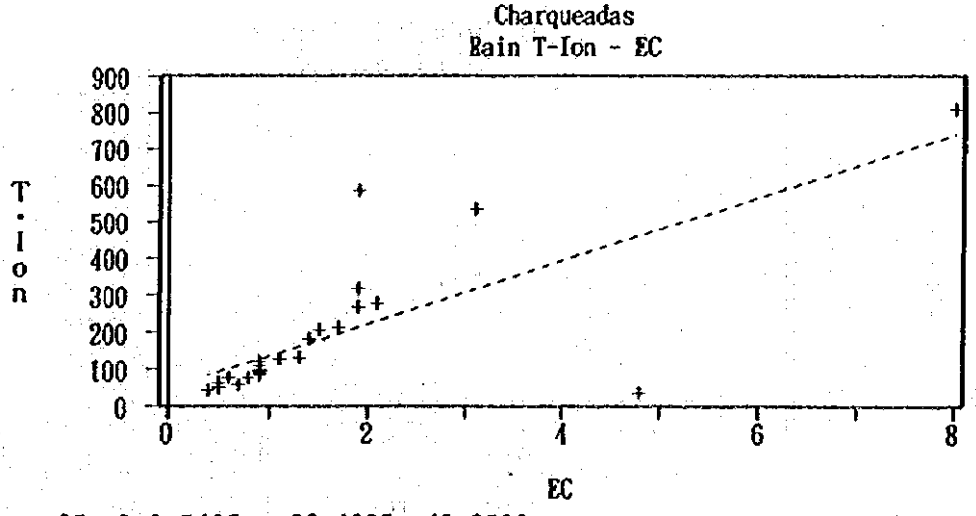
n=101 r2=0.5931 y=0.9683x+49.1904



n=99 r2=0.8631 y=0.9699x+39.2044

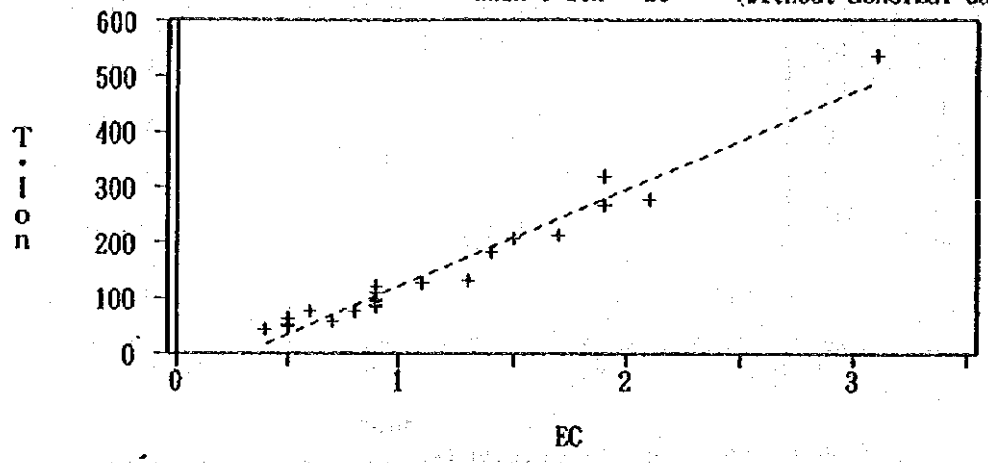


n=25 r2=0.9212 y=149.8265x-71.2448



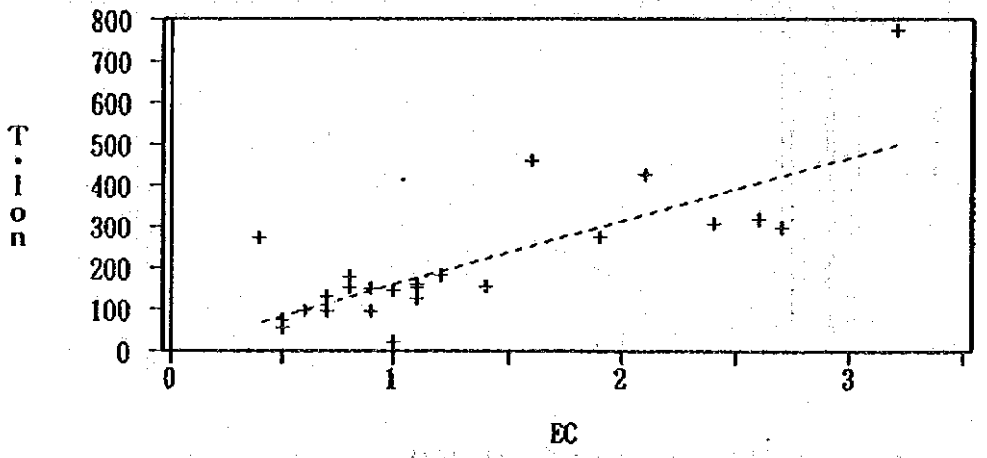
n=25 r2=0.5407 y=86.4627x+48.8738

Charqueadas
Rain T-Ion - EC (without abnormal data)



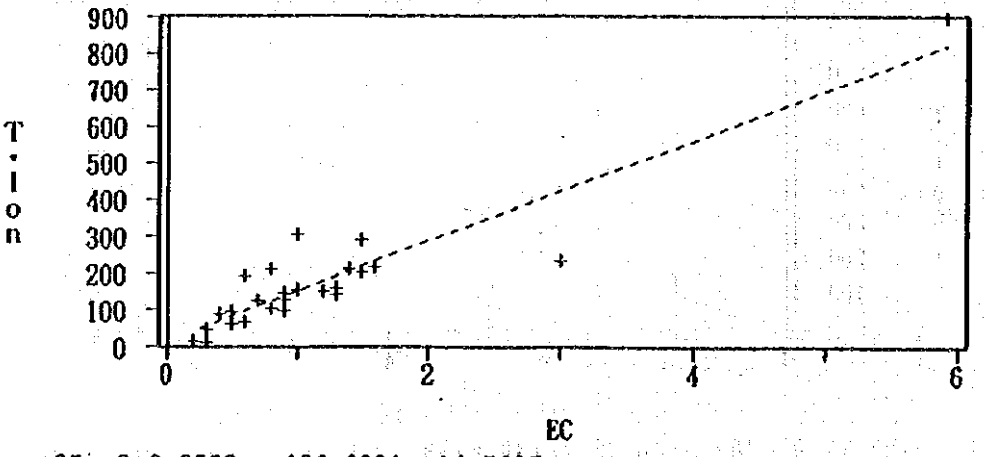
n=22 r2=0.9581 y=174.7870x-53.7086

Candiota(No.2 Aeroporto)
Rain T-Ion - EC

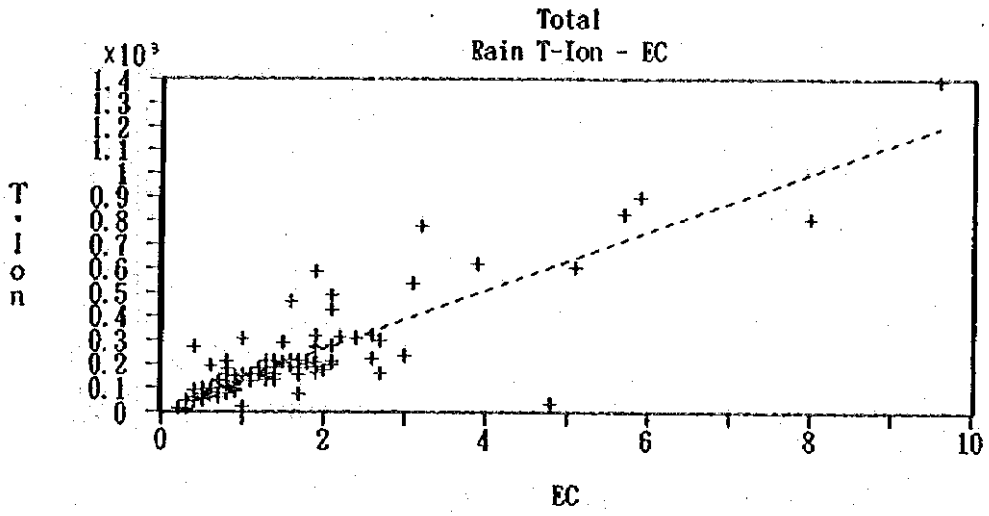


n=26 r2=0.6044 y=154.2927x+5.6828

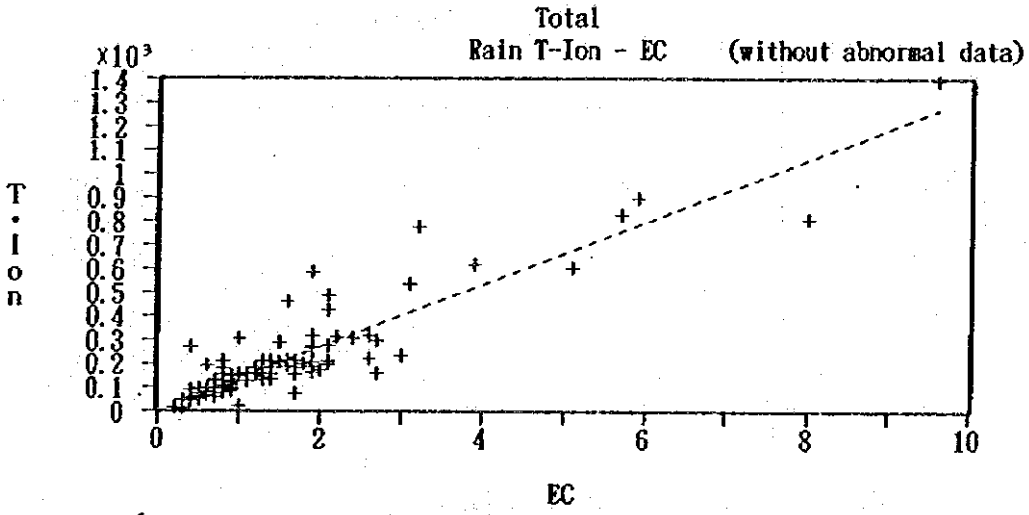
Candiota(No.20 Acegua)
Rain T-Ion - EC



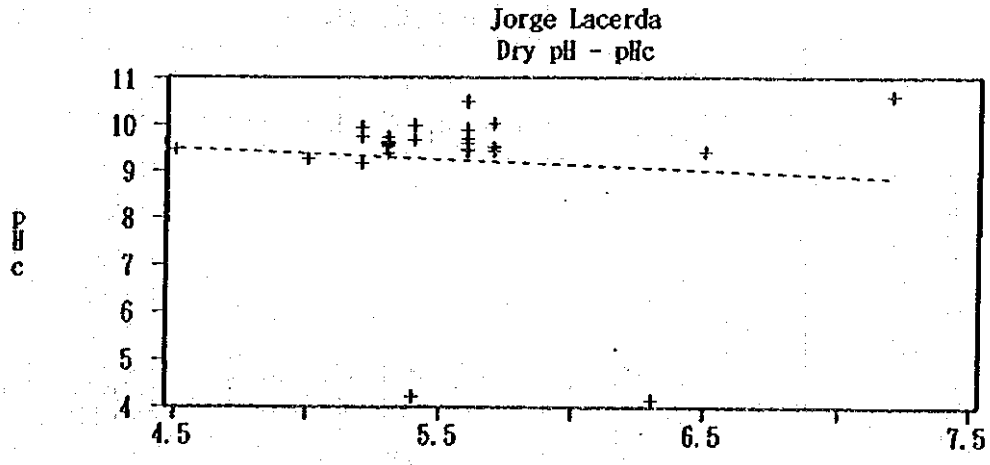
n=25 r2=0.8552 y=136.6291x+14.7637



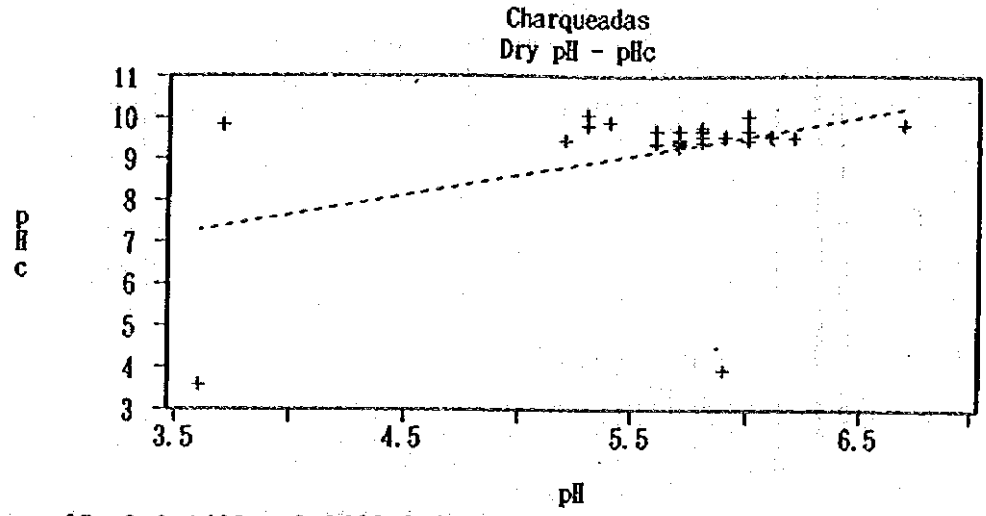
n=101 r2=0.7460 y=122.9311x+16.6119



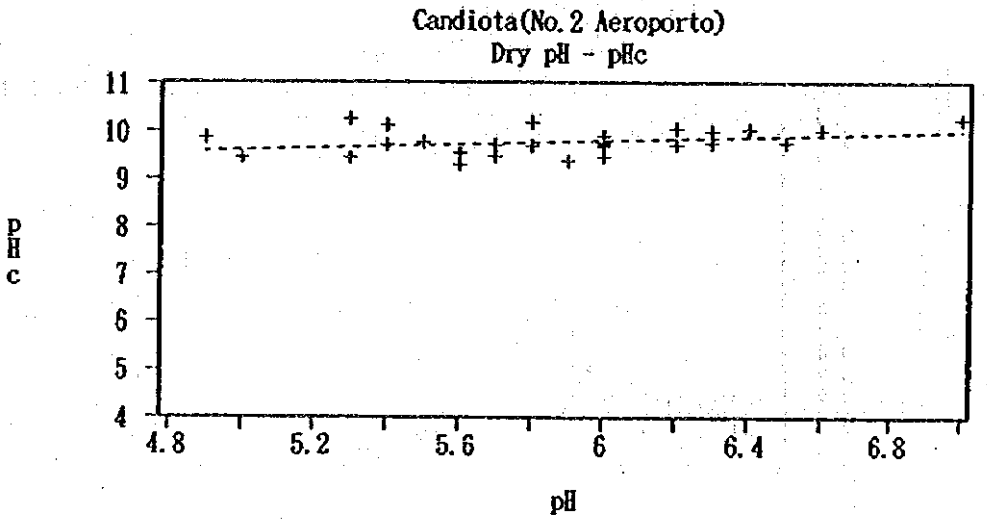
n=100 r2=0.8211 y=131.4615x+8.5009



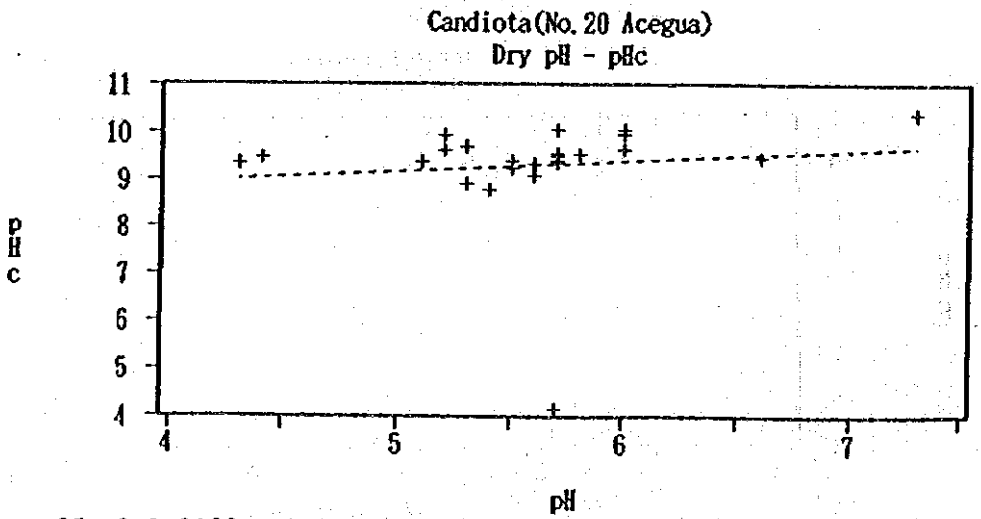
n=25 r2=0.0063 y=-0.2407x+10.5748



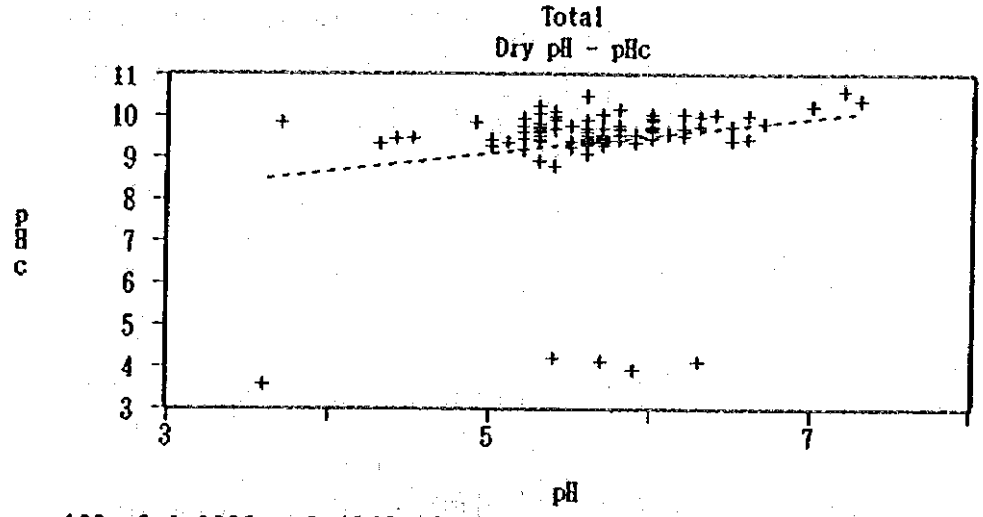
n=27 r2=0.1488 y=0.9502+3.8513



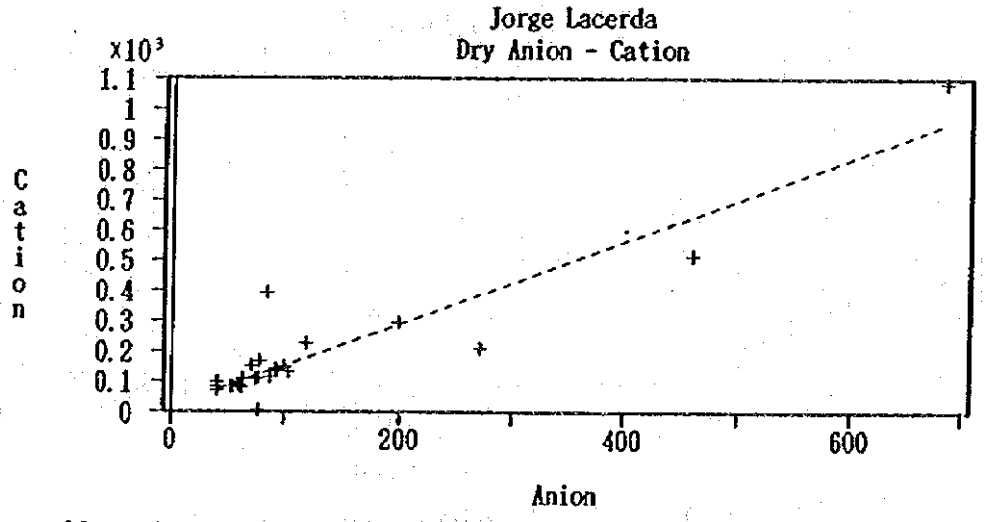
n=26 r2=0.1199 y=0.1908x+8.6526



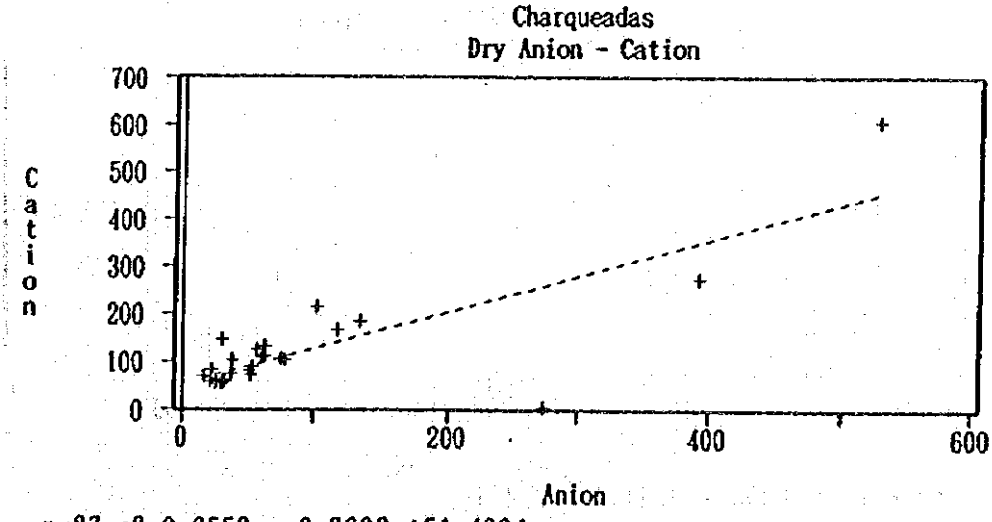
n=25 r2=0.0132 y=0.2197x+8.0660



n=103 r2=0.0388 y=0.4340x+6.9202

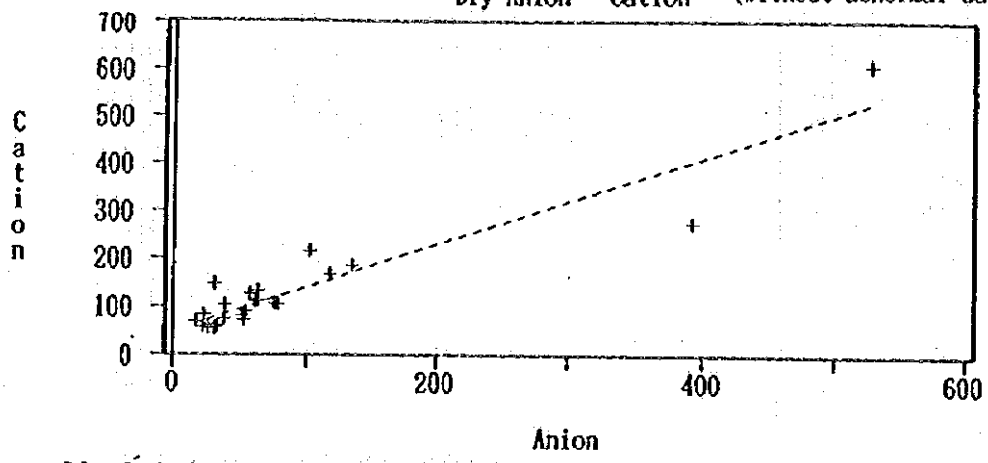


n=25 r2=0.8609 y=1.3705x+14.5885



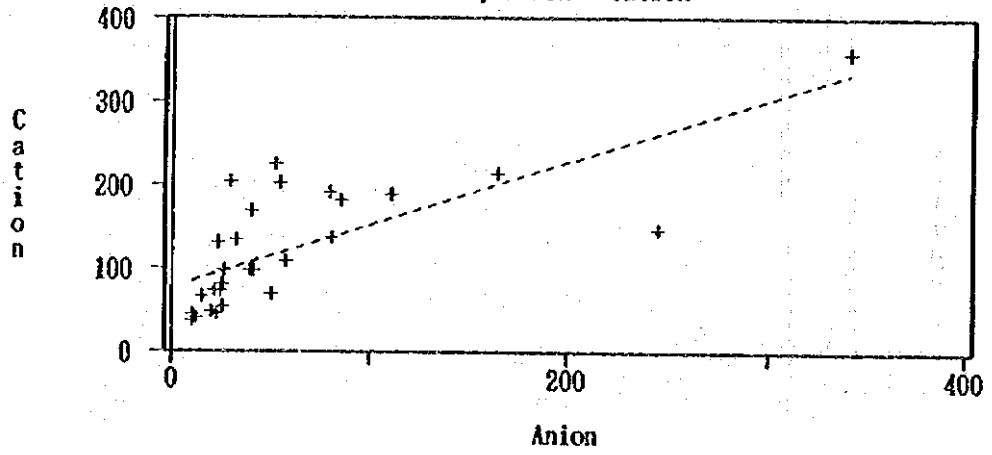
n=27 r2=0.6552 y=0.7632x+51.4294

Charqueadas
Dry Anion - Cation (without abnormal data)



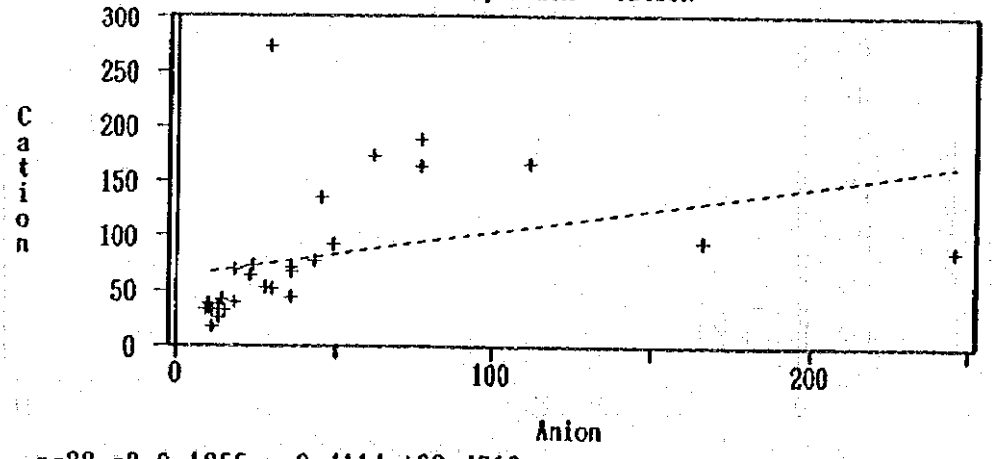
n=26 r2=0.8758 y=0.9069x+49.1752

Candiota(No.2 Aeroporto)
Dry Anion - Cation

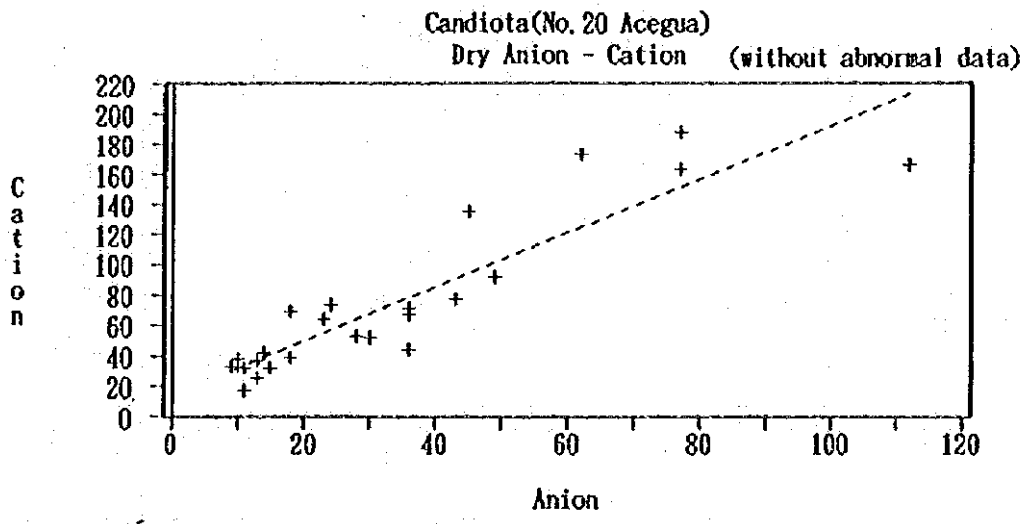


n=29 r2=0.5416 y=0.7540x+77.1402

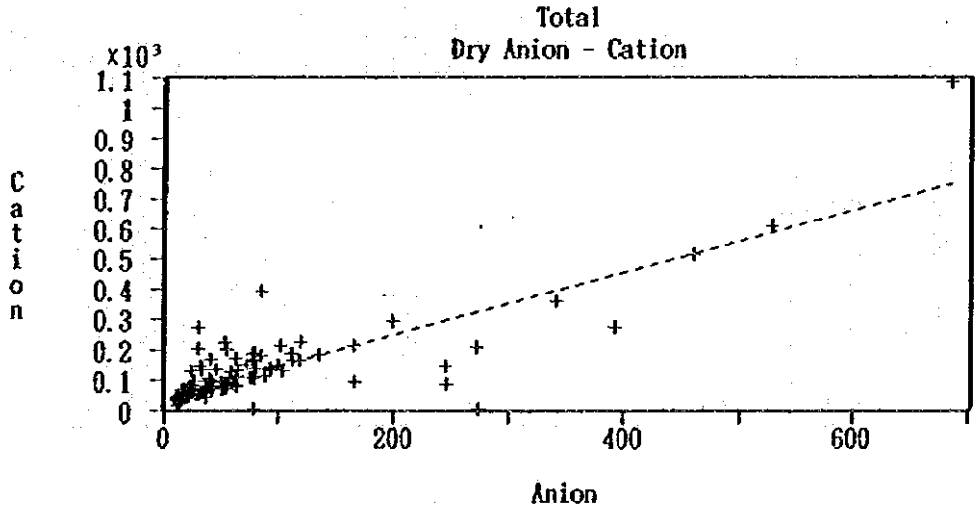
Candiota(No.20 Acegua)
Dry Anion - Cation



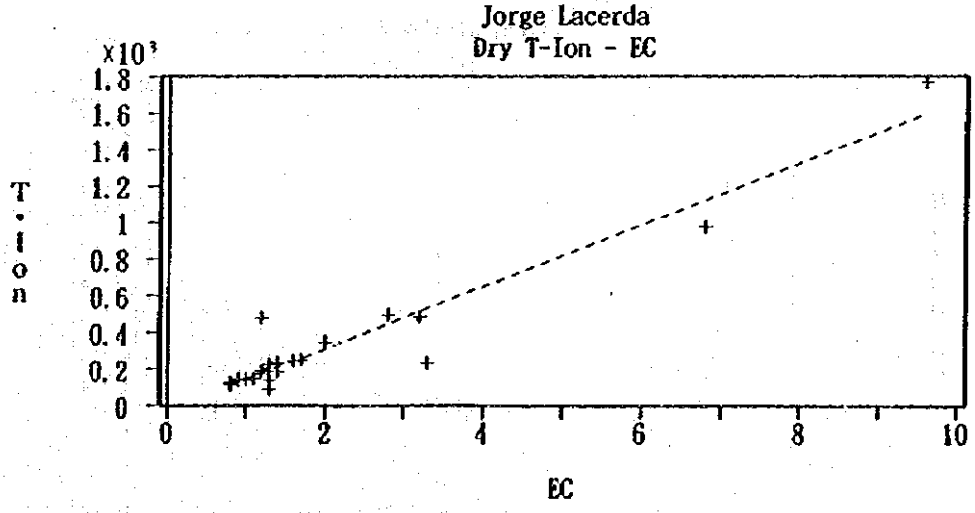
n=28 r2=0.1255 y=0.4114x+62.4719



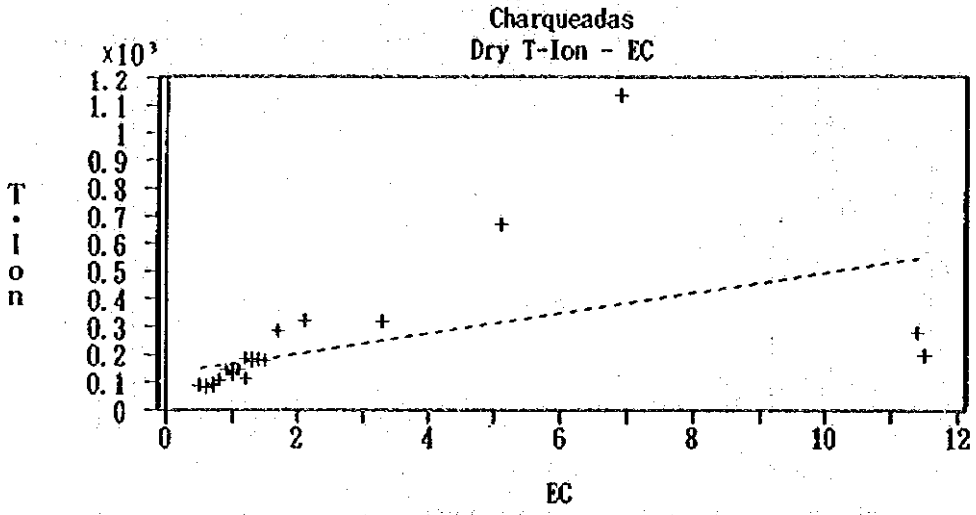
n=25 r2=0.8208 y=1.7799x+14.2200



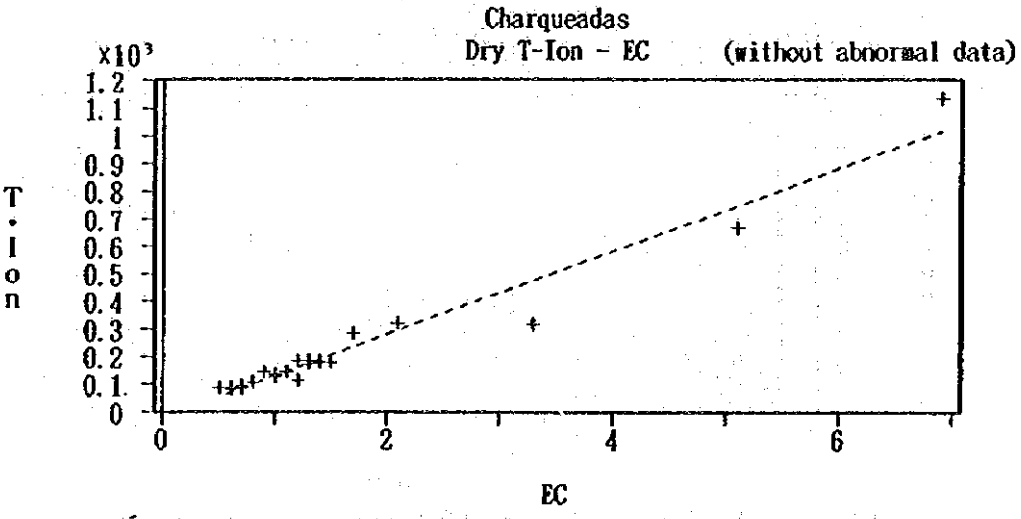
n=109 r2=0.6891 y=1.0290x+44.9968



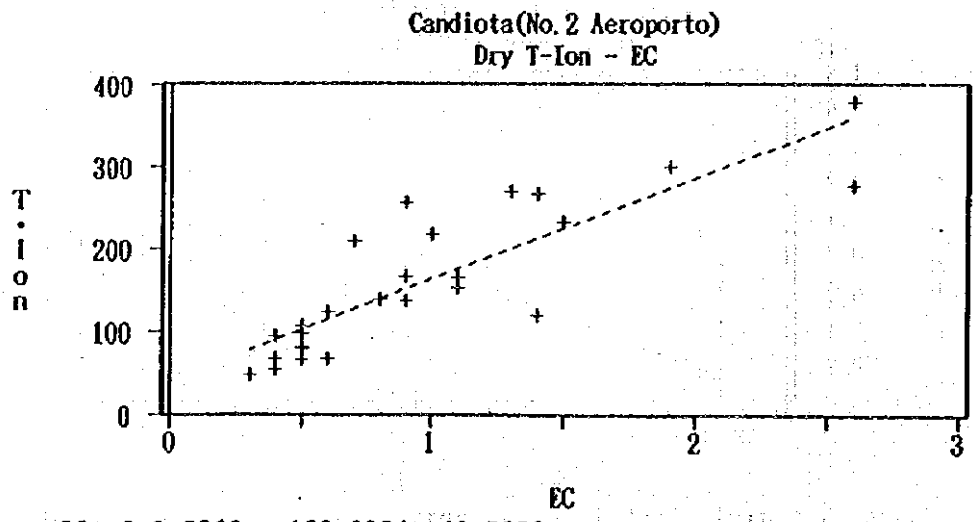
n=25 r2=0.9167 y=169.4610x-27.9912



n=27 r2=0.2446 y=36.3360x+129.7125

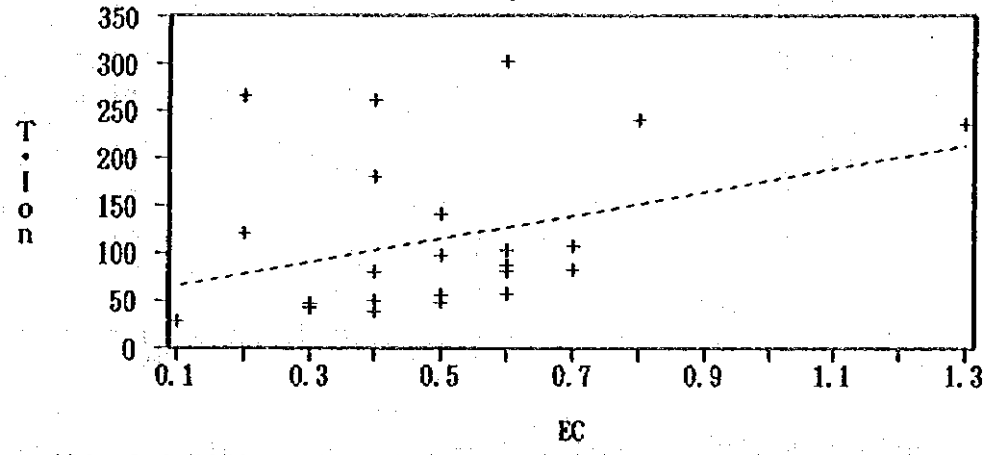


n=25 r2=0.9564 y=150.4922x-20.5541



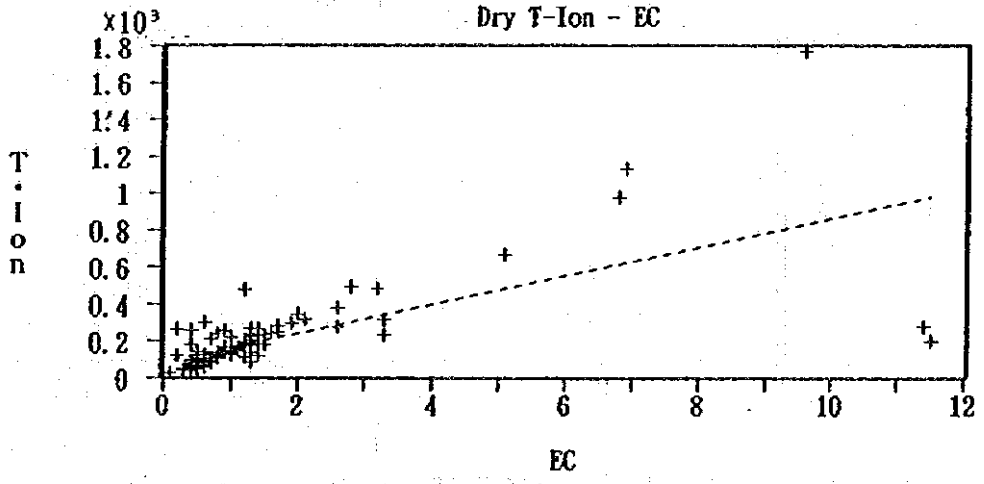
n=26 r2=0.7362 y=123.0354x+40.5079

Candiota(No. 20 Acegua)
Dry T-Ion - EC



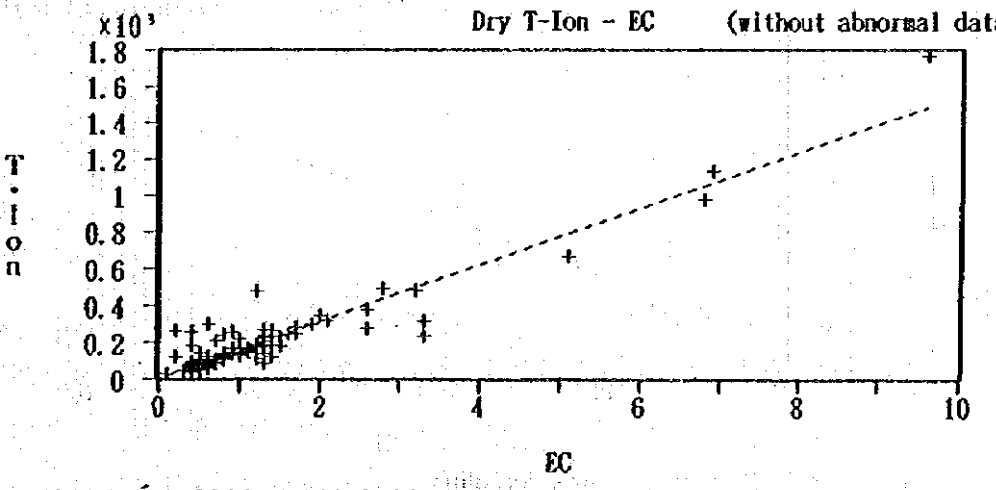
n=25 r2=0.1260 y=122.5x+53.5

Total
Dry T-Ion - EC

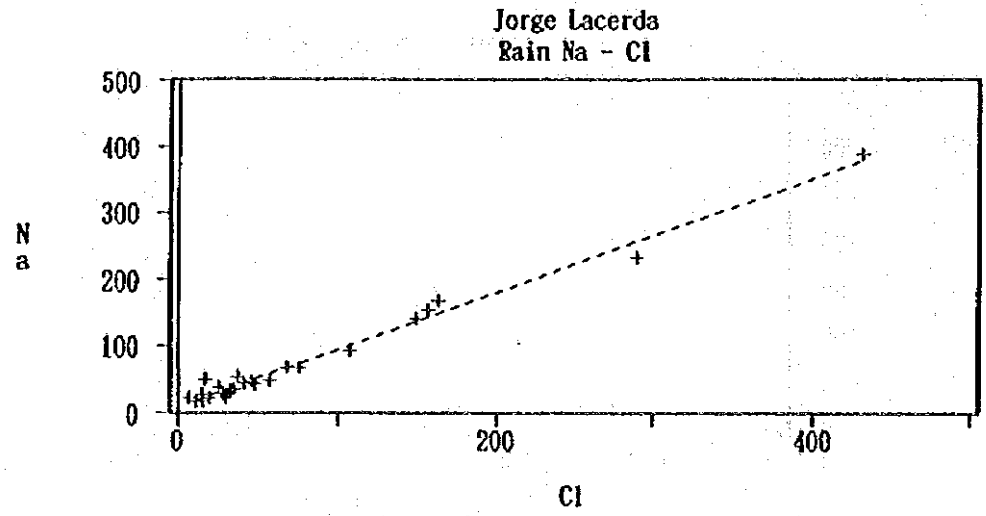


n=103 r2=0.4563 y=77.5272x+87.5237

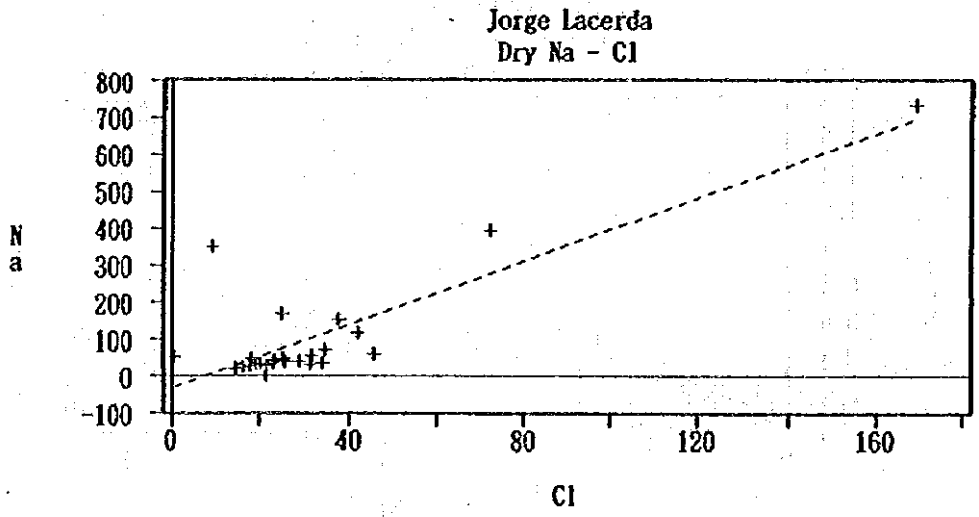
Total
Dry T-Ion - EC (without abnormal data)



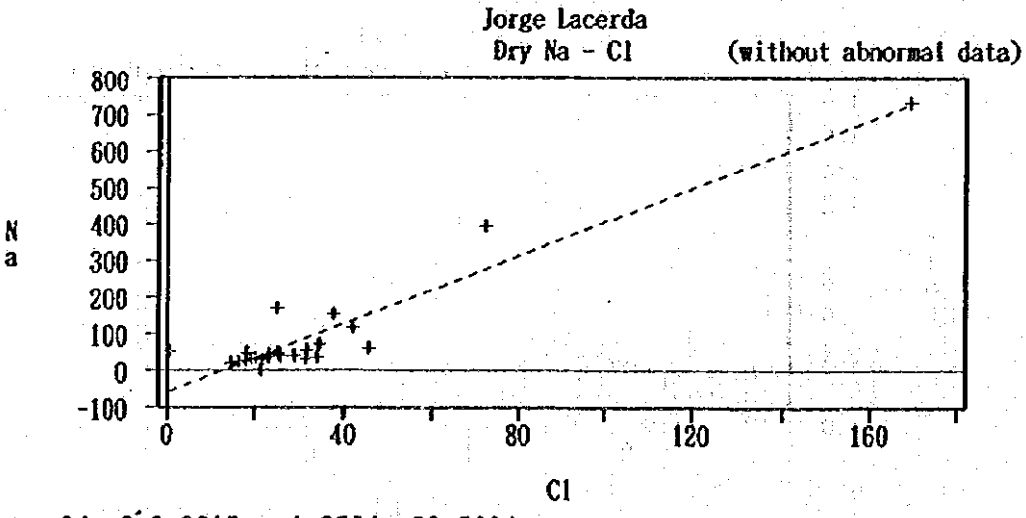
n=101 r2=0.8864 y=154.2715x+6.1535



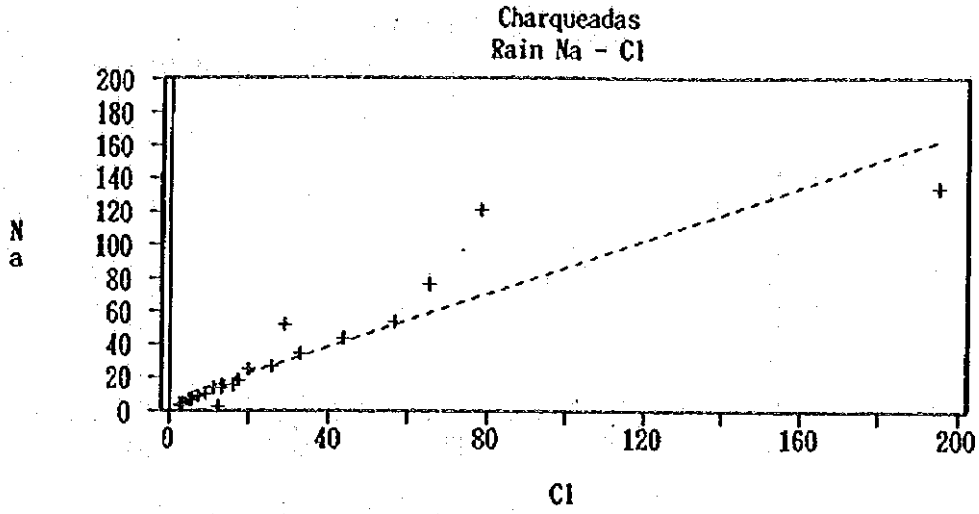
n=25 r2=0.9846 y=0.8561x+8.3886



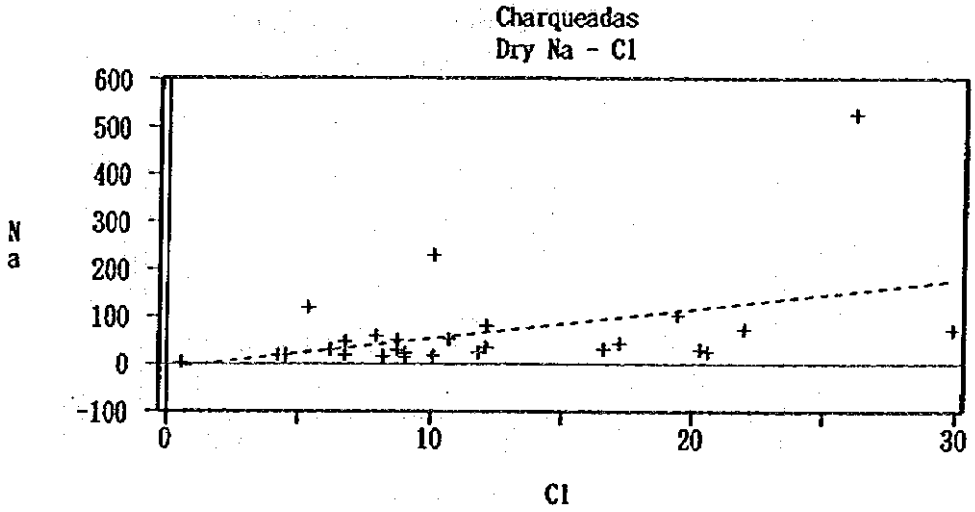
n=25 r2=0.7031 y=4.3165x-33.3516



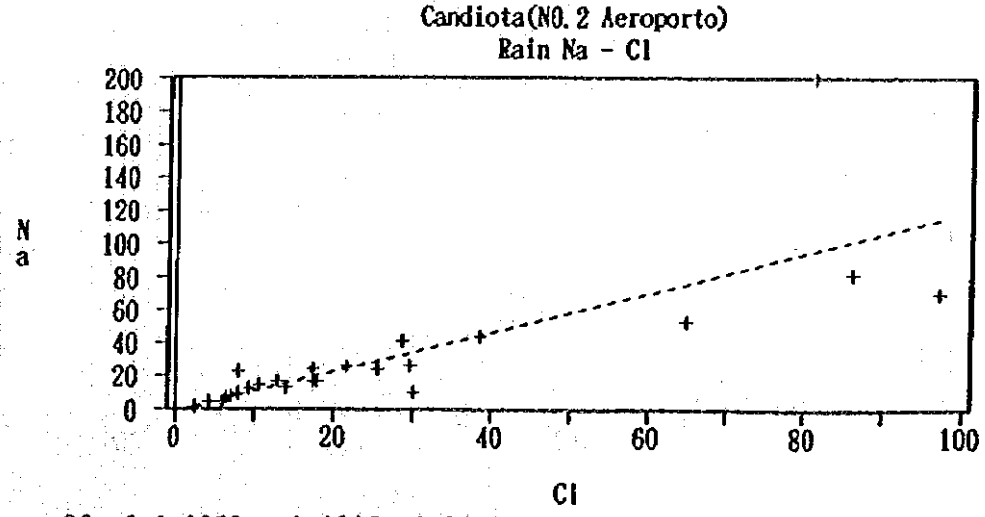
n=24 r2=0.8915 y=4.6704x-59.5004



n=25 r2=0.8421 y=0.8000x+6.3115

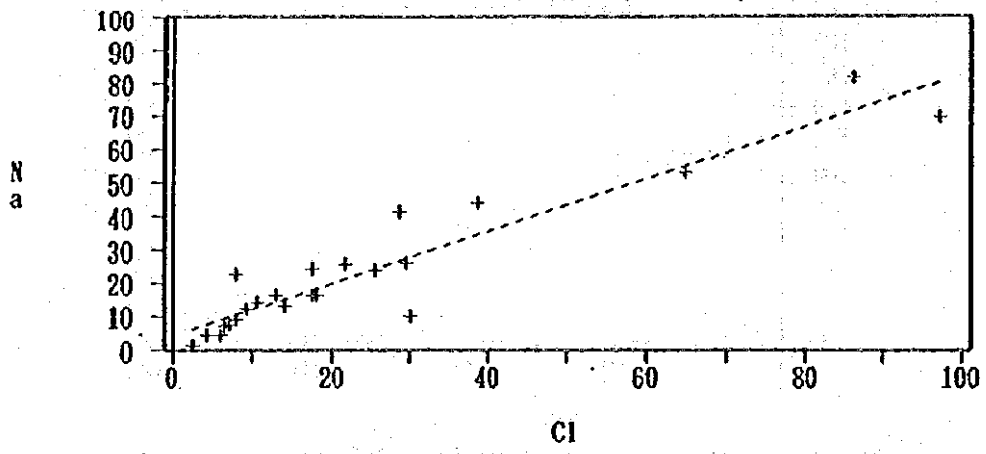


n=27 r2=0.1851 y=6.1810x-8.6909



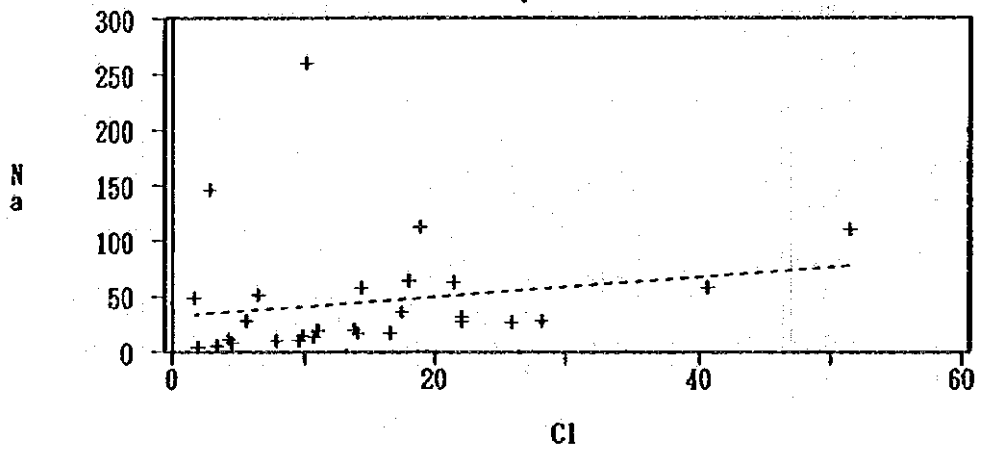
n=26 r2=0.6259 y=1.1915x-1.3421

Candiota(NO.2 Aeroporto)
Rain Na - Cl (without abnormal data)



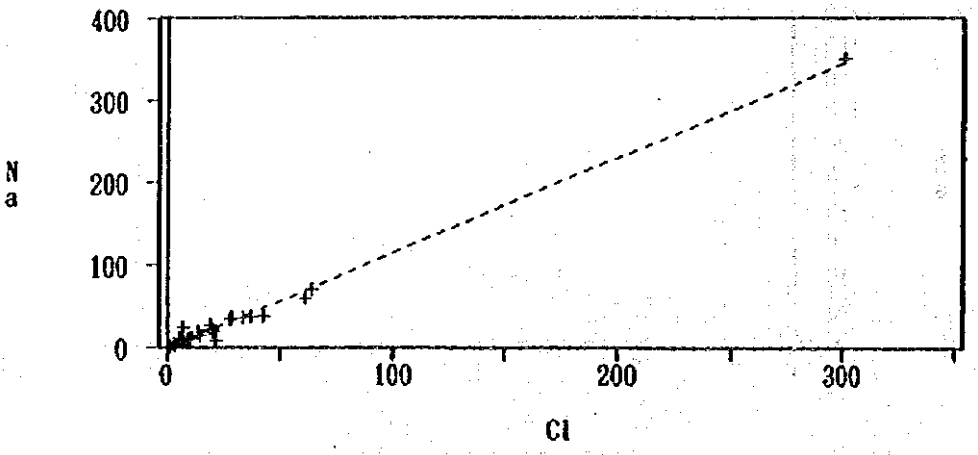
n=25 r2=0.8859 y=0.7808x+4.3459

Candiota(NO.2 Aeroporto)
Dry Na - Cl



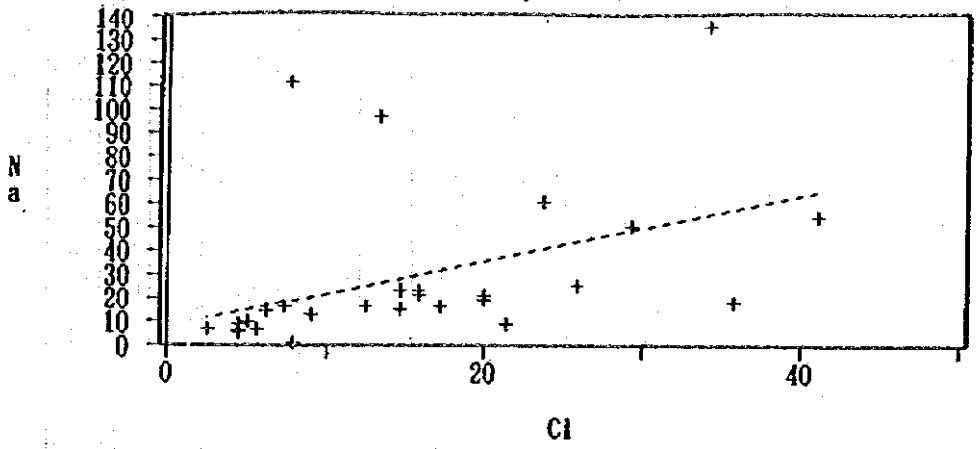
n=29 r2=0.0360 y=0.8908x+32.0390

Candiota(NO.20 Acegua)
Rain Na - Cl



n=25 r2=0.9919 y=1.1566x-1.3083

Candiota(NO.20 Acegua)
Dry Na - Cl



n=28 r2=0.1881 y=1.3795x+7.848

Appendix 4-11B Various Correlation Tables

Rain Analytical Date Correlation

	Monitoring Station	r'	(n)		r''	(n)		Irregular Data
pH－pHc	Jorge Lacerda	0.1172	(25)	×	－		－	－
	Charqueadas	0.2264	(25)	×	－		－	－
	Candiota (No. 2 Aeroporto)	0.0005	(26)	×	－		－	－
	Candiota (No. 20 Acegua)	0.0011	(24)	×	－		－	－
	T o t a l	0.1941	(100)	×	－		－	－
Anion－Cation	Jorge Lacerda	0.9723	(25)	◎	－		－	－
	Charqueadas	0.2613	(25)	×	0.8994	(23)	◎	31/05/96~14/06/96 (NH4) *1 17/12/96~02/01/97 (NH4) *2
	Candiota (No. 2 Aeroporto)	0.7397	(26)	△	0.7953	(25)	○	30/05/96~13/06/96 (F)
	Candiota (No. 20 Acegua)	0.9462	(25)	◎	－		－	－
	T o t a l	0.5931	(101)	△	0.8631	(99)	◎	＊1 (Charqueadas 31/05/96~14/06/96 (NH4)) ＊2 (Charqueadas 17/12/96~02/01/97 (NH4))
Total Ion－EC	Jorge Lacerda	0.9212	(25)	◎	－		－	－
	Charqueadas	0.5407	(25)	△	0.9591	(22)	◎	＊1 (31/05/96~14/06/96 (NH4)) ＊2 (17/12/96~02/01/97 (NH4)) 19/03/96~02/04/96 (EC) *3
	Candiota (No. 2 Aeroporto)	0.6044	(26)	△	－		－	－
	Candiota (No. 20 Acegua)	0.8552	(25)	◎	－		－	－
	T o t a l	0.7460	(101)	△	0.8211	(100)	○	＊3 (Charqueadas 19/03/96~02/04/96 (EC))

EXPLANATORY NOTES

r' : Correlation coefficient squared r'' : Correlation coefficient squared after removed Irregular Data n : Number of Data

◎ : r' = 0.85<
○ : r' = 0.85~0.75
△ : r' = 0.75~0.50
□ : r' = 0.50~0.30
× : r' = 0.30>

Dry Precipitation Analytical Date Correlation

	Monitoring Station	r^2	(n)		$r^{2\prime}$	(n)		Irregular Data
pH－pHc	Jorge Lacerda	0.0063	(25)	×	－		－	－
	Charqueadas	0.1488	(27)	×	－		－	－
	Candiota(No.2 Aeroporto)	0.1199	(26)	×	－		－	－
	Candiota(No.20 Acegua)	0.0132	(25)	×	－		－	－
	Total	0.0388	(103)	×	－		－	－
Anion－Cation	Jorge Lacerda	0.8609	(25)	◎	－		－	－
	Charqueadas	0.6552	(27)	△	0.8758	(26)	◎	05/08/96~16/08/96 (SO_4)
	Candiota(No.2 Aeroporto)	0.5416	(29)	△	－		－	
	Candiota(No.20 Acegua)	0.1255	(28)	×	0.8208	(25)	○	22/02/96~07/03/96 (SO_4) 16/05/96~30/05/96 (F) 06/03/97~20/03/97 (Mg)
	Total	0.6891	(109)	△	－		－	－
Total Ion－EC	Jorge Lacerda	0.9167	(25)	◎	－		－	－
	Charqueadas	0.2446	(27)	×	0.9564	(25)	◎	31/05/96~14/06/96 (EC) ＊4 05/08/96~16/08/96 (EC) ＊5
	Candiota(No.2 Aeroporto)	0.7362	(26)	△	－		－	－
	Candiota(No.20 Acegua)	0.1260	(25)	×	－		－	－
	Total	0.4563	(103)	□	0.8864	(101)	◎	＊4 (Charqueadas 31/05/96~14/06/96 (EC)) ＊5 (Charqueadas 05/08/96~16/08/96 (EC))

EXPLANATORY NOTES

r^2 : Correlation coefficient squared　　$r^{2\prime}$: Correlation coefficient squared after removed Irregular Data　　n : Number of Data.

◎ : $r^2 \geq 0.85$

○ : $r^2 = 0.85 \sim 0.75$

△ : $r^2 = 0.75 \sim 0.50$

□ : $r^2 = 0.50 \sim 0.30$

× : $r^2 \leq 0.30$

Relationship of Na and Cl ions in Precipitation

	Monitoring Station	r '	(n)		r ''	(n)		Irregular Data
Rain Na - Cl	Jorge Lacerda	0.9846	(25)	◎	–		–	–
	Charqueadas	0.8421	(25)	○	–		–	–
	Candiota(No.2 Aeroporto)	0.6259	(26)	△	0.8859	(25)	◎	20/02/97~06/03/97 (Na)
	Candiota(No.20 Acegua)	0.9919	(25)	◎	–		–	–
Dry Precipitation Na - Cl	Jorge Lacerda	0.7031	(25)	△	0.8915	(24)	◎	27/02/97~12/03/97 (Na)
	Charqueadas	0.1851	(27)	×	–		–	–
	Candiota(No.2 Aeroporto)	0.0360	(29)	×	–		–	–
	Candiota(No.20 Acegua)	0.1881	(28)	×	–		–	–

EXPLANATORY NOTES

r ' : Correlation coefficient squared r '' : Correlation coefficient squared after removed Irregular Data n : Number of Data

◎ : r ' = 0.85<
○ : r ' = 0.85~0.75
△ : r ' = 0.75~0.50
□ : r ' = 0.50~0.30
× : r ' = 0.30>

Appendix 4-11 C Cation / Anion Ratios of Rain Samples

Jorge Lacerda

Anion (mg/liter)				Cation (mg/liter)								μeq/liter	μeq/liter	
F	Cl	NO3	SO4	Na	NH4	K	Mg	Ca	pH	EC	VOL	Anion	Cation	C/A
0.01	2.70	0.15	1.18	1.55	0.21	0.19	0.20	0.16	4.2	1.3	10450	103.7	171.5	1.65
0.31	5.58	0.88	5.02	3.52	1.68	0.23	0.50	0.35	3.0	5.1	3230	292.4	1310.7	4.48
0.03	0.60	0.16	2.63	1.12	0.16	0.15	0.18	0.60	5.2	1.7	3350	75.8	112.5	1.48
0.02	3.81	0.31	2.15	2.13	0.41	0.24	0.27	0.20	4.2	2.2	2060	158.3	216.8	1.37
0.43	10.30	0.32	3.74	5.34	1.48	0.61	0.91	0.54	5.7	5.7	1190	396.2	433.7	1.09
0.01	0.55	0.28	1.74	0.62	0.02	0.07	0.22	0.96	6.2	1.7	1820	56.8	96.5	1.70
0.02	2.44	1.18	2.89	1.54	1.12	0.35	0.23	0.28	4.5	2.6	700	149.1	202.5	1.36
0.01	0.56	0.25	0.82	0.40	0.20	0.09	0.05	0.18	5.2	0.6	3600	37.4	49.2	1.31
0.72	1.07	0.24	2.28	0.53	0.29	0.18	0.06	0.60	4.0	2.1	1133	119.4	178.6	1.50
0.01	1.34	0.26	1.74	1.20	0.05	0.14	0.15	0.47	4.7	2.0	900	78.7	114.3	1.45
0.12	0.41	0.72	2.72	0.38	0.64	0.22	0.03	0.28	4.3	2.7	4000	86.1	123.2	1.43
0.04	1.00	1.31	1.87	0.64	1.29	0.47	0.07	0.32	4.9	2.6	2620	90.4	145.7	1.61
0.08	1.64	0.44	1.92	1.04	0.44	0.16	0.12	0.37	4.2	1.8	1390	97.5	165.2	1.69
0.05	1.32	0.28	0.85	0.97	0.39	0.11	0.13	0.15	5.1	1.2	4370	73.4	92.7	1.26
0.26	1.17	0.76	2.88	0.76	0.52	0.21	0.09	0.35	4.2	2.1	1450	118.9	155.2	1.31
0.19	5.78	0.43	2.52	3.84	0.50	0.25	0.42	0.38	4.4	2.1	2850	232.4	293.5	1.26
0.04	0.70	0.71	2.48	0.49	0.93	0.17	0.09	0.38	4.2	1.6	1450	84.9	166.7	1.96
2.56	15.30	0.04	7.68	8.89	1.29	1.53	0.99	1.75	4.1	9.6	35	726.8	745.5	1.03
0.27	1.25	0.86	2.18	0.79	0.64	0.15	0.11	0.30	4.4	1.9	1500	108.7	137.5	1.26
0.01	0.24	0.01	0.10	0.50	0.44	0.08	0.07	0.18	4.1	1.7	1250	9.5	142.4	14.92
0.02	1.47	0.29	1.08	1.00	0.48	0.16	0.12	0.15	5.0	1.9	3600	69.7	101.6	1.48
0.11	2.05	0.25	1.43	1.09	0.37	0.17	0.14	0.15	4.4	1.9	10000	97.4	131.1	1.35
0.03	0.91	0.40	1.34	0.87	0.48	0.26	0.05	0.15	4.8	1.3	3200	61.8	98.5	1.60
0.05	1.16	0.38	1.34	0.67	0.27	0.12	0.09	0.17	4.9	1.4	760	69.4	75.7	1.09
0.40	5.29	0.98	5.56	3.21	1.37	0.80	0.36	1.02	4.7	3.9	200	301.8	336.5	1.11

Charqueadas

Anion (mg/liter)				Cation (mg/liter)								μeq/liter	μeq/liter	
F	Cl	NO3	SO4	Na	NH4	K	Mg	Ca	pH	EC	VOL	Anion	Cation	C/A
0.02	0.71	0.54	0.92	0.57	0.58	0.13	0.08	0.30	5.5	1.3	998	48.9	85.0	1.74
0.01	8.91	0.80	1.58	3.09	0.97	2.32	0.34	0.39	6.1	3.1	129	241.2	295.7	1.23
0.01	0.09	0.23	0.44	0.08	0.19	0.02	0.02	0.05	5.4	4.8	2570	15.9	22.6	1.42
0.01	0.17	0.23	0.34	0.13	0.28	0.03	0.02	0.05	5.7	0.4	2225	16.1	28.1	1.74
0.05	0.43	0.69	1.63	0.50	0.48	0.14	0.13	0.47	5.5	1.1	400	59.8	89.2	1.49
0.05	1.03	0.35	1.10	1.18	6.96	1.38	0.19	0.72	5.2	1.9	62	60.2	530.3	8.80
0.01	0.26	0.20	0.46	0.19	0.33	0.04	0.03	0.13	5.5	0.5	2220	20.7	39.7	1.92
0.01	0.19	0.32	1.60	0.17	0.34	0.10	0.03	0.23	5.0	0.9	850	44.4	52.7	1.19
0.02	1.55	1.87	1.99	0.99	1.14	0.28	0.16	0.49	5.1	1.9	80	116.4	159.0	1.37
0.01	0.19	0.75	0.98	0.14	0.64	0.12	0.03	0.15	5.1	0.9	2940	38.4	62.5	1.63
0.01	0.57	0.50	1.38	0.35	1.86	0.66	0.10	0.34	6.7	1.7	3290	53.0	160.6	3.03
0.01	0.21	0.91	0.98	0.15	0.83	0.11	0.03	0.18	5.6	0.9	1100	41.5	69.3	1.67
0.01	2.01	0.67	1.00	1.22	0.70	0.20	0.15	0.16	6.1	1.5	1640	88.9	118.1	1.33
0.01	0.10	0.34	0.46	0.06	0.36	0.05	0.02	0.08	5.2	0.5	2460	18.4	35.8	1.94
0.01	0.47	0.47	0.76	0.35	0.38	0.07	0.05	0.09	5.2	0.9	2580	37.2	51.9	1.40
0.01	0.12	0.38	0.49	0.10	0.48	0.04	0.02	0.07	5.1	0.7	6180	20.2	45.1	2.23
0.04	2.32	0.83	1.72	1.75	0.68	0.22	0.21	0.46	5.1	2.1	99	116.7	167.6	1.44
0.01	0.92	0.79	1.40	0.61	1.19	0.22	0.08	0.18	6.1	1.4	1270	68.4	114.5	1.67
0.01	1.17	0.80	2.75	0.79	9.76	2.65	0.47	0.46	7.8	8.0	595	103.7	704.8	6.80
0.01	0.39	0.62	0.83	0.31	0.53	0.10	0.05	0.15	4.7	0.9	1430	33.8	77.5	2.00
0.01	0.25	0.30	0.41	0.20	0.42	0.06	0.03	0.09	5.6	0.5	3000	21.0	43.0	2.05
0.01	0.62	0.25	0.45	0.41	0.30	0.10	0.05	0.08	5.6	0.6	2900	31.4	47.8	1.52
0.01	0.46	0.33	0.77	0.31	0.31	0.06	0.04	0.09	5.0	0.8	2750	34.9	50.0	1.43
0.06	2.78	0.61	1.51	2.78	0.77	0.15	0.19	0.23	5.3	1.9	225	122.9	199.6	1.62
0.01	0.32	0.86	0.94	0.23	0.92	0.10	0.05	0.19	5.8	0.9	265	43.0	78.7	1.83

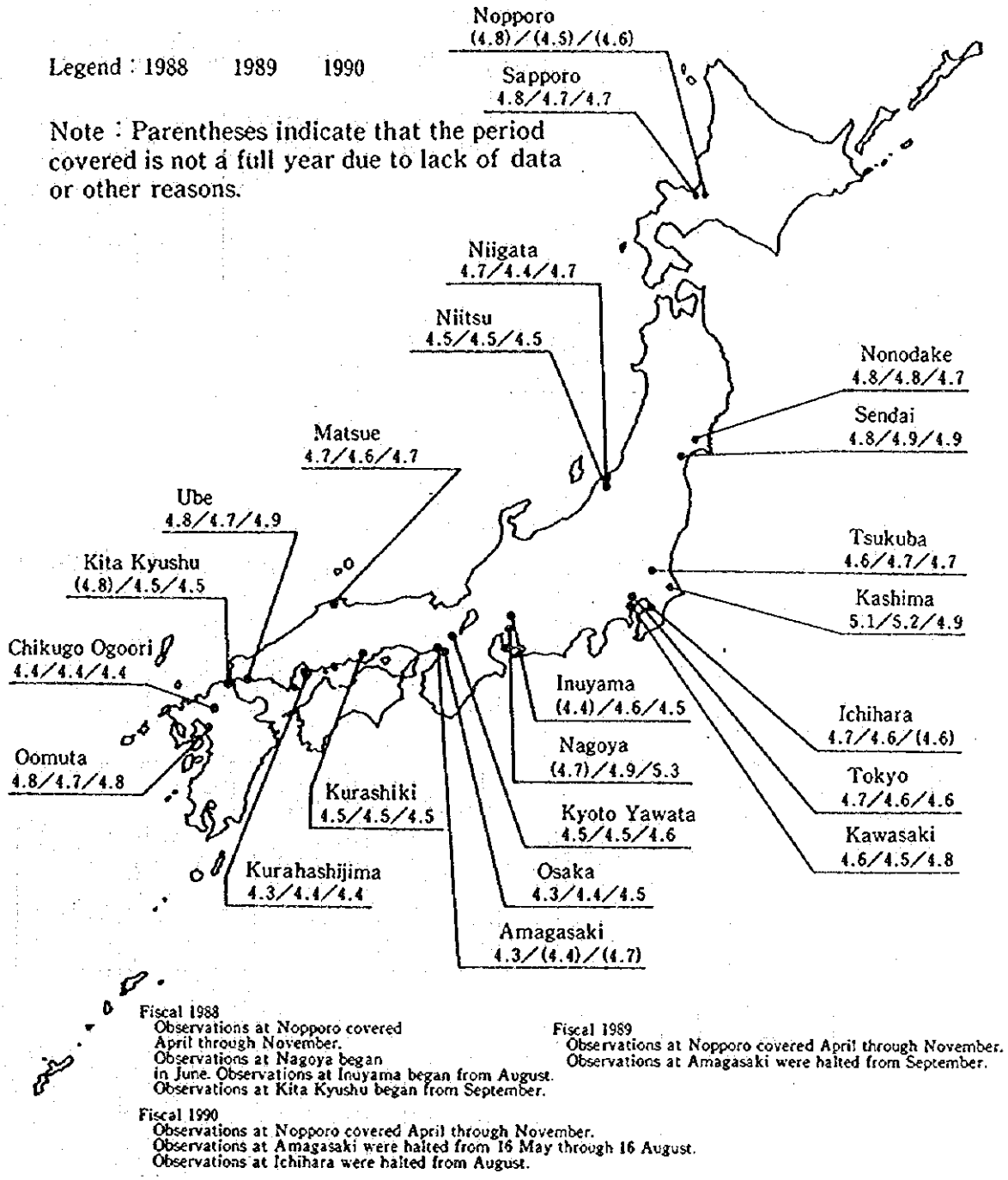
Candiota

Anion (mg/liter)				Cation (mg/liter)								μeq/liter	μeq/liter	
F	Cl	NO3	SO4	Na	NH4	K	Mg	Ca	pH	EC	VOL	Anion	Cation	C/A
0.01	1.07	0.34	0.58	0.23	0.36	0.18	0.27	0.81	6.5	1.0	----	48.3	97.5	2.02
0.01	0.28	0.31	0.45	0.21	0.28	0.08	0.30	0.40	5.7	0.7	----	22.8	73.3	3.22
0.01	0.15	0.19	0.47	0.10	0.16	0.07	0.15	0.19	5.2	0.5	----	17.6	43.1	2.45
0.20	1.02	1.14	3.40	0.95	0.17	0.09	0.26	1.35	5.3	0.4	3150	128.5	147.3	1.15
0.01	0.21	0.29	0.63	0.10	0.23	0.08	0.07	0.49	6.1	0.5	1430	24.2	50.1	2.07
0.02	0.62	0.87	1.46	0.38	0.59	0.31	0.18	0.58	6.1	1.1	370	59.7	100.7	1.69
0.99	3.06	4.80	8.82	1.88	1.08	1.64	0.42	3.12	6.2	3.2	65	399.5	374.5	0.94
0.01	0.33	0.27	0.88	0.28	0.23	0.14	0.06	0.61	4.8	0.6	2130	32.5	79.7	2.45
0.02	0.77	0.41	0.90	0.59	0.52	0.23	0.09	0.68	7.0	0.9	380	48.1	101.8	2.12
0.01	1.05	2.19	1.94	0.60	2.05	0.56	0.14	0.52	5.2	2.7	350	105.9	197.8	1.87
0.01	0.25	0.67	0.88	0.17	1.59	0.36	0.02	0.21	6.5	1.1	2360	35.3	117.2	3.23
0.01	0.28	0.71	0.89	0.52	1.02	0.28	0.08	0.43	5.7	0.8	3250	38.4	118.4	3.03
0.01	0.38	1.42	1.48	0.33	1.06	0.30	0.07	0.60	5.7	1.2	1210	65.0	118.5	1.82
0.01	0.91	2.65	2.18	0.55	2.11	0.37	0.12	0.88	5.6	2.6	1690	113.9	206.6	1.81
0.01	0.09	0.07	0.18	0.03	0.10	0.06	0.01	0.08	5.3	1.0	600	7.9	18.2	2.29
0.01	0.62	0.42	1.08	0.56	0.66	0.17	0.50	0.43	5.6	0.8	2615	47.3	132.9	2.81
0.05	0.64	0.56	1.41	0.38	0.74	0.30	0.05	0.54	5.2	1.4	910	59.1	102.6	1.74
0.01	2.30	0.71	1.85	1.22	0.49	0.87	0.19	1.46	5.8	2.4	86	115.6	192.5	1.67
0.01	1.37	1.22	2.48	1.01	0.69	0.37	0.20	1.09	4.9	1.9	640	110.5	175.1	1.58
0.01	0.46	0.56	0.84	0.38	0.69	0.22	0.07	0.40	6.4	1.1	690	40.0	86.5	2.16
0.01	1.05	2.19	1.94	0.60	2.05	0.56	0.14	0.52	5.2	2.7	350	105.9	197.8	1.87
0.01	0.25	0.67	0.88	0.17	1.59	0.36	0.02	0.21	6.5	1.1	2360	38.3	117.2	3.23
0.01	0.23	0.52	0.41	0.16	0.87	0.04	0.03	0.22	6.7	0.9	89	23.9	69.9	2.92
0.01	2.88	0.67	1.63	4.60	0.59	0.17	0.23	0.85	6.8	2.1	310	126.5	298.7	2.36
0.01	0.50	0.66	0.80	0.30	0.62	0.28	0.15	0.44	6.8	0.7	360	41.9	88.5	2.11
0.02	3.45	0.80	1.34	1.60	2.74	2.48	0.10	0.54	5.7	1.6	19	139.2	322.1	2.31

Acegua

Anion (mg/liter)				Cation (mg/liter)								μeq/liter	μeq/liter	
F	Cl	NO3	SO4	Na	NH4	K	Mg	Ca	pH	EC	VOL	Anion	Cation	C/A
0.01	0.12	0.09	0.10	0.04	0.02	0.06	0.02	0.02	6.3	0.2	1228	7.4	7.5	1.01
0.01	2.25	0.13	1.01	1.62	0.38	0.48	0.93	0.73	8.1	1.0	1228	87.1	217.5	2.50
0.01	0.10	0.14	0.17	0.10	0.24	0.08	0.16	0.08	5.4	0.3	1228	9.1	40.8	4.47
0.01	0.04	0.01	0.04	0.03	0.08	0.03	0.01	0.02	5.5	0.3	1250	2.6	11.5	4.34
0.14	0.75	0.30	0.54	0.18	0.24	0.11	0.06	0.44	4.5	0.9	970	44.6	82.5	1.85
0.01	1.50	0.72	1.45	0.86	1.03	0.21	0.18	0.26	6.2	1.4	280	84.8	128.6	1.49
0.01	1.18	0.31	0.68	0.81	0.72	0.35	0.10	0.19	6.5	1.0	180	53.0	102.1	1.93
0.01	0.34	0.24	0.49	0.27	0.18	0.10	0.05	0.17	4.4	0.5	2320	24.2	76.7	3.17
0.01	0.71	1.82	1.63	0.42	1.39	0.29	0.11	0.81	4.6	3.0	900	80.6	177.3	2.20
0.01	0.26	0.94	1.40	0.12	0.89	0.21	0.04	0.23	5.5	0.9	551	52.2	77.9	1.49
0.01	0.25	0.93	0.84	0.54	1.07	0.31	0.04	0.34	5.8	1.2	1580	40.1	112.6	2.81
0.02	0.31	1.34	1.06	0.23	1.04	0.26	0.04	0.23	4.9	1.3	1500	53.5	101.7	1.90
0.01	0.65	1.72	1.22	0.49	1.69	0.50	0.06	0.21	5.8	1.6	4456	72.0	145.7	2.02
0.01	0.66	1.49	1.98	0.61	0.40	0.54	0.14	1.08	6.5	0.8	11	84.4	128.2	1.52
0.01	0.48	0.37	0.82	0.42	0.50	0.15	0.27	0.32	5.3	0.7	2080	37.1	93.0	2.51
0.01	0.19	0.40	0.29	0.25	0.68	0.09	0.02	0.10	4.9	0.5	1840	18.4	70.1	3.81
0.01	1.00	0.80	1.32	0.80	0.85	0.32	0.14	0.43	5.7	0.6	470	69.1	125.1	1.81
0.01	0.97	0.73	1.10	0.76	0.61	0.16	0.11	0.34	5.5	1.3	870	62.6	100.1	1.60
0.01	0.25	0.43	0.35	0.19	0.43	0.08	0.05	0.11	6.2	0.6	1780	21.8	44.4	2.04
0.01	0.37	0.12	0.22	0.22	0.31	0.12	0.43	0.10	6.5	0.4	4550	17.5	70.5	4.03
0.01	0.51	0.64	0.57	0.32	0.68	0.10	0.06	0.16	5.4	0.8	38	37.1	70.0	1.89
0.03	10.70	0.96	2.45	8.08	0.74	0.44	0.70	1.34	6.1	5.9	64	369.9	529.0	1.43
0.02	2.15	1.84	1.18	1.36	1.03	0.31	0.25	0.55	5.7	1.5	90	115.9	174.2	1.50
0.01	1.31	0.73	1.07	0.84	0.80	0.35	0.22	0.45	5.8	1.5	210	71.5	132.0	1.84

Appendix 4-11D pH of Rain in Japan



Cited from "Quality of the Environment in Japan, 1994",Environment Agency, Government of Japan

Appendix 4-12

Elemental Analysis of Particulate

(1) by the Local Laboratory

mg/kg in sample	PRO AMBIENTE					
	Airborne Particulate			Stack Gas Fly Ash		
	Jorge Lacerda	Charqueadas	Candiota	Jorge Lacerda	Charqueadas	Candiota
Pb*	810	360	200	910	800	760
Ni*	40	< 1	10	< 1	< 1	60
Co*	< 1	< 1	< 1	< 1	< 1	< 1
Cr (VI)**	< 5	< 5	< 5	< 5	< 5	< 5
As*	< 1	< 1	< 1	< 1	< 1	< 1
Be*	< 1	< 1	< 1	< 1	< 1	< 1
F*	< 5	340	620	1470	990	1420
Cl**	10	< 5	< 5	< 5	< 5	50

Analytical Method
* Atomic Absorption Spectrometry
** Absorptiometry

Note: The JICA Team replaced with supposed analysis limitations (with a mark of <) the NDs (not detective) given by ProAmbient.

(2) by JICA Team

mg/kg in sample	JICA TEAM		
	Stack Gas Fly Ash		
	Jorge Lacerda	Charqueadas	Candiota
Pb	12.5	8.9	1.4
Ni	63.0	38.4	63.5
Co	4.2	1.0	2.5
Be	0.7	2.6	0.3

Analytical Method
ICP-MS

(3) by JICA Team and Counterpart Trainee (1997)

JORGE LACERRDA

mg/kg in sample	Counterpart Project Training in Fiscal 1997													
	Coal		Airborne Particulates				Stack Gas Fly Ash							
	II-6(01) 01.07,7	II-6(02) 02.07,97	Vila Moema	Sao Martinho	Capivari	Capivari (SPM)	I-1 30.05,96	I-2 28.05,96	II-3A 29.05,96	II-3B 29.05,96	II-4 03.06,96	III-5 13.11,96	III-6(01) 01.07,97	III-6(02) 02.07,97
Pb*1	24.8	25.2	564.0	542.0	250.0	393.0	56.4	42.2	29.4	14.4	68.0	81.5	44.0	39.7
Ni*1	39.3	35.2	81.2	78.1	39.7	39.4	217.0	143.0	34.5	9.0	241.0	308.0	1,240.0	227.0
Co*1	10.4	7.6	4.4	3.4	4.2	6.2	8.0	1.0	0.8	0.1	12.9	4.8	10.7	7.9
Be*1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1
Fe*1	208.0	241.0	26,100.0	25,100.0	30,400.0	31,300.0	16,500.0	8,440.0	26,100.0	2,820.0	21,500.0	24,400.0	14,300.0	15,800
As*2	12.9	14.8	-	-	-	-	-	-	-	-	-	-	-	-
Hg*3	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-
Cr (VI)*4	<0.5	<0.5	-	-	-	-	-	-	-	-	-	-	-	-
TSP μ g/m^3	-	-	53.62	54.00	75.10	82.20	-	-	-	-	-	-	-	-

CHARQUEADAS

CANDIOTA

mg/kg in sample	Counterpart Project Training in Fiscal 1997										Counterpart Project Training in Fiscal 1997			
	Airborne Particulates						Stack Gas Fly Ash				Airborne Particulates		Stack Gas Fly Ash	
	Arranca Toco 11.05,96	Arranca Toco 18.05,96	OBJA 07.05,96	OBJA 11.05,96	DEPREC 22.04,97	DEPREC 29.04,97	No.1 U. 08.05,96	No.2 U. 09.05,96	No.3 U. 09.05,96	No.4 U. 10.05,96	05.02,96	11.02,96	G1-A1 08.03,96	GIV-B2 07.03,96
Pb*1	286.0	741.0	761.0	770.0	5,580.0	975.0	34.1	94.5	29.7	29.2	1,120.0	2,560.0	234.0	74.7
Ni*1	53.6	79.4	153.0	222.0	380.0	106.0	96.8	636.0	127.0	237.0	85.9	478.0	159.0	26.3
Co*1	5.0	3.9	5.9	7.6	2.0	9.0	6.4	0.2	6.4	1.5	69.9	13.3	3.7	1.8
Be*1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Fe*1	37,000.0	120,000.0	43,700.0	48,000.0	63,600.0	50,100.0	5,140.0	8,730.0	6,870.0	8,020.0	25,600.0	52,800.0	10,900.0	12,200.0
TSP μ g/m^{3}air	129	109	54	52	28	28	-	-	-	-	64.3	15.31	-	-

Analytical Methods

*1 - Atomic Absorption Spectrometry
*2 - Arsenic Hydride Generation-Atomic Absorption Spectrometry
*3 - Reducing Vaporization Atomic Absorption Spectrometry
*4 - Absorptiometry

Marco Antonio Dexheimer

JORGE - LACERDA AIRBOR
AIRBORNE PARTICULATE

PRÓ AMBIENTE
ANÁLISES QUÍMICAS E TOXICOLÓGICAS

LQ - 0544/96

March, 19th, 1996.

ANALYSIS REPORT

1. Sample Data

Material sended by **JIKA BRAZIL COAL POWER AMBIENT AIR STUDY TEAM** identified like "Amostra 03 - Estação São Bernardo - Mat. Part. Total - Amostragem dia 15-16.01.96".

Recieved in March, 5th, 1996.

2. Results

PARAMETER	ANALYTICAL METHOD	WEIGHT % (Filtered Dust)
Pb	Atomic Absorption Spectrometry	0,081
Ni	Atomic Absorption Spectrometry	0,004
Co	Atomic Absorption Spectrometry	ND*
Cr^{+6}	Absorptiometry	ND*
As	Arsenic Hydride-Atomic Absorb Spectro.	ND*
Be	Atomic Absorption Spectrometry	ND*
F	Absorptiometry	ND*
Cl	Absorptiometry	0,001

ND* = Not Detected

3. Comments

The blank filter analysis indicates Fluor concentration that was decreased to obtain the final result. Other parameters are not detected in the blank.

Marcos dos Santos Aldo
CREA RS nº 81632 D

* Certificado na Fundação Estadual de Proteção Ambiental - FEPAM - sob nº 0001/95 - DL

RUA LEOPOLDO BIER, 780 - FONES: (051) 223-3982 - 223-8255 - 223-0990 - 217-0727 - FAX: (051) 223-3105
PORTO ALEGRE - RS - CEP 90620-100

Marco Antonio Dexheimer

CHARQUEADAS

AIRBORNE PARTICULATE

PRÓ AMBIENTE
ANÁLISES QUÍMICAS E TOXICOLÓGICAS

LQ - 0542/96

March, 19th, 1996.

ANALYSIS REPORT

1. Sample Data

Material sended by JIKA BRAZIL COAL POWER AMBIENT AIR STUDY TEAM identified like "Amostra 01 - Filtro HI-VOLL - Estação Arranca-Toco - Data Amostragem 18.02.96".

Recieved in March, 5th, 1996.

2. Results

PARAMETER	ANALYTICAL METHOD	WEIGHT % (Filtered Dust)
Pb	Atomic Absorption Spectrometry	0,036
Ni	Atomic Absorption Spectrometry	ND*
Co	Atomic Absorption Spectrometry	ND*
Cr^{+6}	Absorptiometry	ND*
As	Arsenic Hydride-Atomic Absorb Spectro.	ND*
Be	Atomic Absorption Spectrometry	ND*
F	Absorptiometry	0,034
Cl	Absorptiometry	ND*

ND* = Not Detected

3. Comments

The blank filter analysis indicates Fluor concentration that was decreased to obtain the final result. Other parameters are not detected in the blank.

Marcos dos Santos Aldos
CREA RS nº 81632 D

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PORTO ALEGRE - RS - CEP 90620-100

Marco Antonio Dexheimer

CANDIOTA

AIRBORNE PARTICULATE

PRÓ AMBIENTE
ANÁLISES QUÍMICAS E TOXICOLÓGICAS

LQ - 0543/96

March, 19th, 1996.

ANALYSIS REPORT

1. Sample Data

Material sended by JIKA BRAZIL COAL POWER AMBIENT AIR STUDY TEAM identified like "Amostra 02 - Filtro HI-VOLL - Localidade Candiota III - Data Colocação 17.02.96 - retirada 18.02.96".

Recieved in March, 5th, 1996.

2. Results

PARAMETER	ANALYTICAL METHOD	WEIGHT % (Filtered Dust)
Pb	Atomic Absorption Spectrometry	0,020
Ni	Atomic Absorption Spectrometry	0,001
Co	Atomic Absorption Spectrometry	ND*
Cr^{+6}	Absorptiometry	ND*
As	Arsenic Hydride-Atomic Absorb Spectro.	ND*
Be	Atomic Absorption Spectrometry	ND*
F	Absorptiometry	0,062
Cl	Absorptiometry	ND*

ND* = Not Detected

3. Comments

The blank filter analysis indicates Fluor concentration that was decreased to obtain the final result. Other parameters are not detected in the blank.

Marcos dos Santos Aldor
CREA RS nº 51632 D

* Certificado na Fundação Estadual de Proteção Ambiental - FEPAM - sob nº 0001/95 - DL

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PORTO ALEGRE - RS - CEP 90620-100

Marco Antonio Dexheimer

JORGE – LACERDA
DUST

PRÓ AMBIENTE
ANÁLISES QUÍMICAS E TOXICOLÓGICAS

LQ - 0540/96

March, 19th, 1996.

ANALYSIS REPORT

1. Sample Data

Material sended by **JIKA BRAZIL COAL POWER AMBIENT AIR STUDY TEAM** identified like "Amostras de Cinza Leve - unidade I (40 mw) - J. Lacerda = P/P - 01/03/96".

Recieved in March, 5th, 1996.

2. Results

PARAMETER	ANALYTICAL METHOD	WEIGHT %
Pb	Atomic Absorption Spectrometry	0,091
Ni	Atomic Absorption Spectrometry	ND*
Co	Atomic Absorption Spectrometry	ND*
Cr^{+6}	Absorptiometry	ND*
As	Arsenic Hydride-Atomic Absorb Spectro.	ND*
Be	Atomic Absorption Spectrometry	ND*
F	Absorptiometry	0,147
Cl	Absorptiometry	ND*

ND* = Not Detected

Marcos dos Santos Aldos
CREA RS nº 81632 D

* Certificado na Fundação Estadual de Proteção Ambiental - FEPAM - sob nº 0001/95 - DL

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PORTO ALEGRE - RS - CEP 90620-100

Marco Antonio Dexheimer

CHARQUEADAS
DUST

PRÓ AMBIENTE
ANÁLISES QUÍMICAS E TOXICOLÓGICAS

LQ - 0541/96

March, 19th, 1996.

ANALYSIS REPORT

1. Sample Data

Material sended by JIKA BRAZIL COAL POWER AMBIENT AIR STUDY TEAM identified like "Precipitador 01 - 12h - 04/03 Charq.".

Recieved in march, 5th, 1996.

2. Results

PARAMETER	ANALYTICAL METHOD	WEIGHT %
Pb	Atomic Absorption Spectrometry	0,080
Ni	Atomic Absorption Spectrometry	ND*
Co	Atomic Absorption Spectrometry	ND*
Cr^{+6}	Absorptiometry	ND*
As	Arsenic Hydride-Atomic Absorb Spectro.	ND*
Be	Atomic Absorption Spectrometry	ND*
F	Absorptiometry	0,099
Cl	Absorptiometry	ND*

ND* = Not Detected

Marcos dos Santos Aldos
CREA RS nº 81632 D

Marco Antonio Dexheimer

CANDIOTA
DUST

PRC AMBIENTI
ANALISES QUÍMICAS E TOXICOLÓGICAS

LQ - 0591/96

March, 19th, 1996.

ANALYSIS REPORT

1. Sample Data

Material sended by JIKA BRAZIL COAL POWER AMBIENT AIR STUDY TEAM identified like "Sample 02".

Recieved in March, 12th, 1996.

2. Results

PARAMETER	ANALYTICAL METHOD	WEIGHT %
Pb	Atomic Absorption Spectrometry	0,076
Ni	Atomic Absorption Spectrometry	0,006
Co	Atomic Absorption Spectrometry	ND*
Cr^{+6}	Absorptiometry	ND*
As	Arsenic Hydride-Atomic Absorb Spectro.	ND*
Be	Atomic Absorption Spectrometry	ND*
F	Absorptiometry	0,142
Cl	Absorptiometry	0,005

ND* = Not Detected

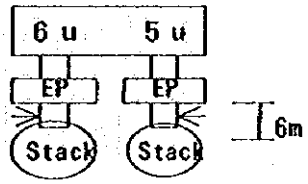
Marcos dos Santos Aldes
CREA RS nº 81631-D

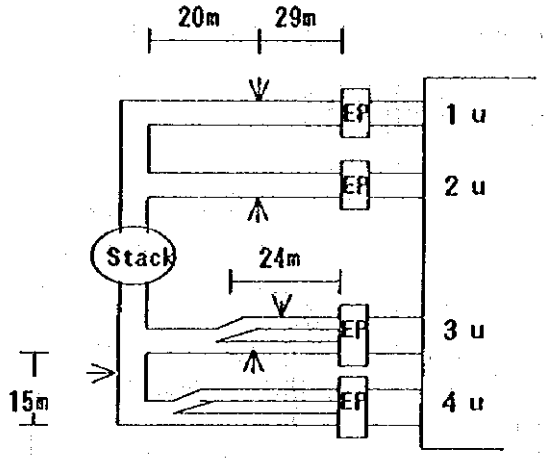
Appenidx 5-1

Stack Gas Sampling Nozzle Location

(1) Jorge Lacerda

① Plan View

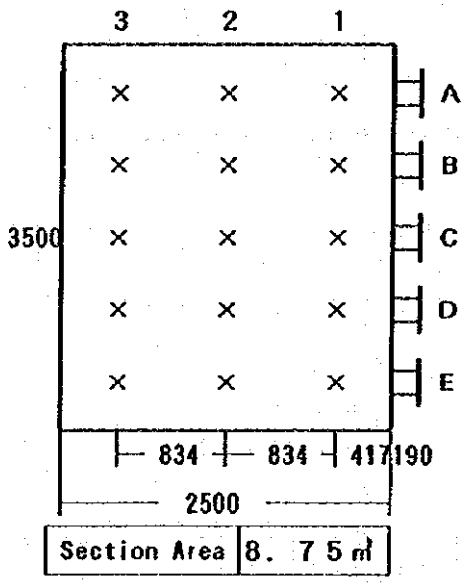




※Location of Nozzles ↑

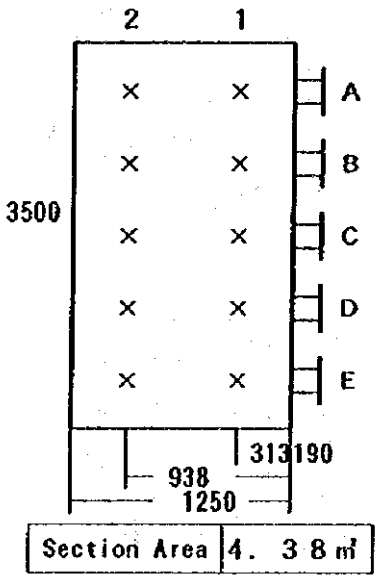
② Duct Sectional View

1, 2, 4 u



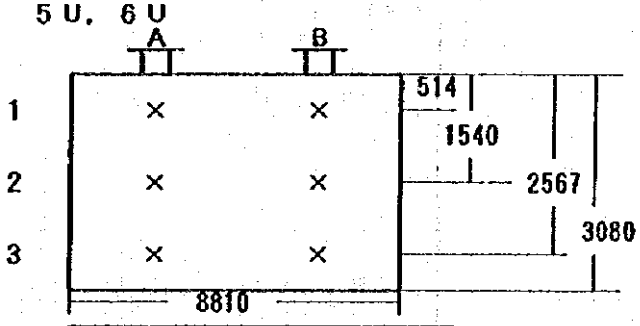
Section Area	8. 7 5 ㎡

3 u (a, b)



Section Area	4. 3 8 ㎡

5 U, 6 U

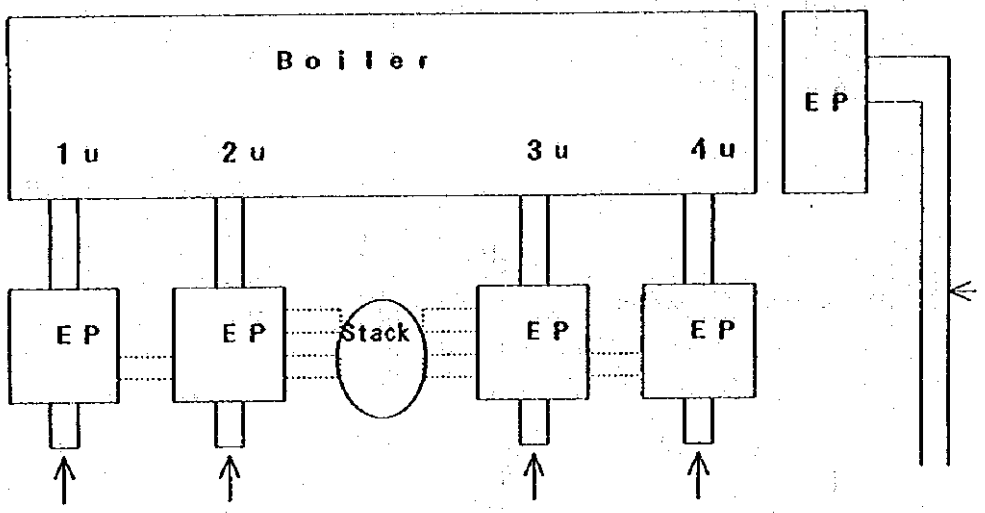


Section Area	2 7. 1 3 ㎡

× : Sampling Points

(2) Charqueadas

① Plan View

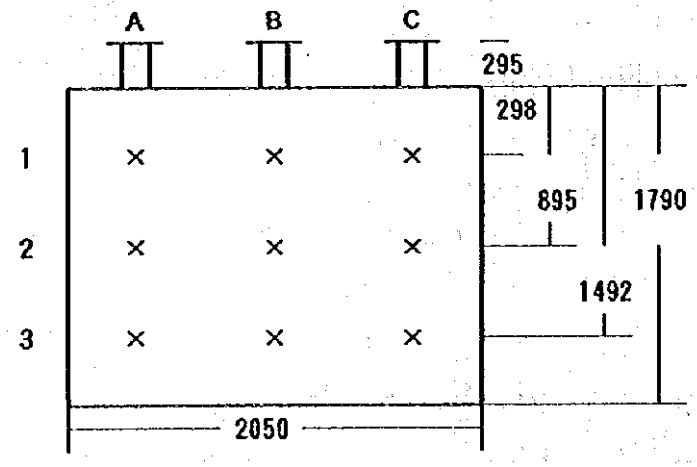


Elevation View

(Gas:Down Flow) (Gas:Down Flow) (Gas:Down Flow) (Gas:Down Flow)

※ Location of Nozzles ↑

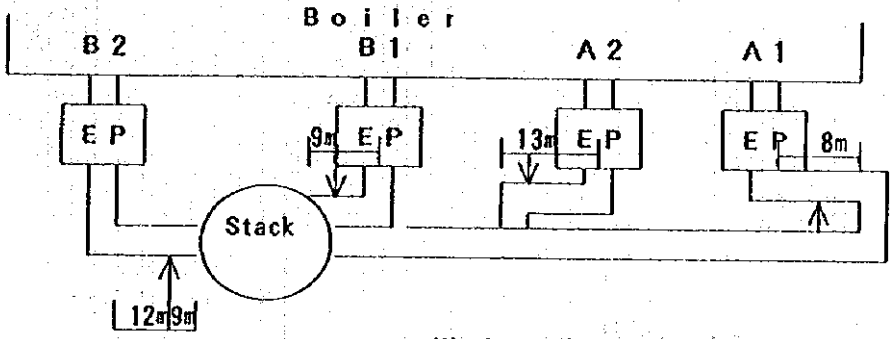
② Duct Sectional View 1u, 2u, 3u and 4u



Section Area	3. 67㎡

(3) Candiote

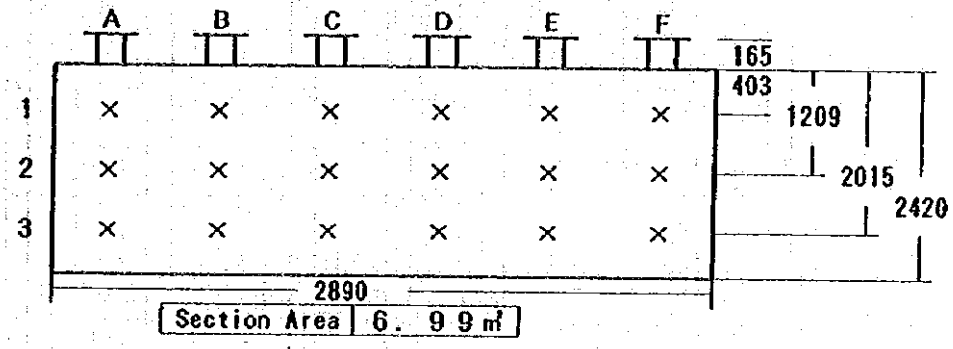
① Plan View



※ Location of Nozzles

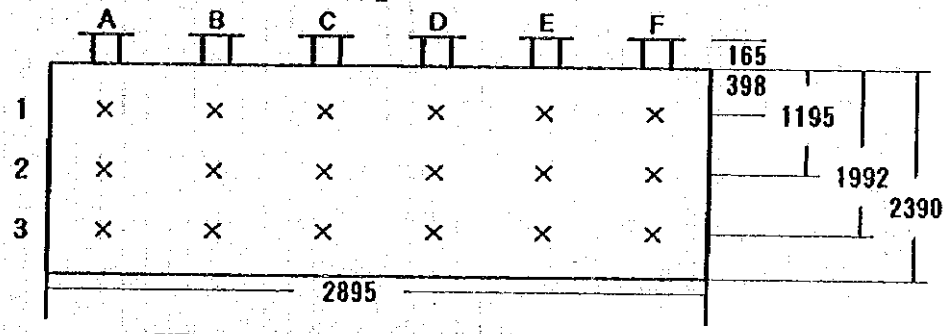
② Duct Sectional View

A 1



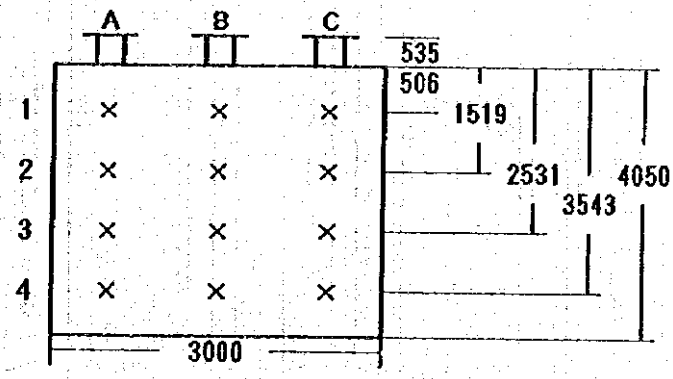
Section Area | 6. 99 ㎡

A 2



Section Area | 6. 92 ㎡

B 1 and B 2



Section Area | 12. 15 ㎡

× : Sampling Points

Appendix 5-2 : Results of Stack Gas Measurement (1-1)

Power Plant		Jorge Lacerda										
Unit (Rated Capacity)		1 (50)	1 (50)	1 (50)	2 (50)	2 (50)	3-A(66)	3-B(66)	3 (66)	3-A(66)	3-B(66)	3 (66)
Date		21.02.96	30.05.96	25.06.96	22.02.96	28.05.96	26.02.96	26.02.96	26.02.96	29.05.96	29.05.96	29.05.96
Time		11:00~ 18:15	10:00 ~ 16:30	10:00~ 16:00	11:20 ~ 18:20	10:00~ 16:00	14:00 ~ 18:00	14:00~ 18:00		10:00~ 15:00	10:45 ~ 15:00	
Out put	MW	45	42	40	28	28			56			58
Fuel Consumption	t/h	29.7	28.30	27.28	19.5	19.7			33.65			35.9
Fuel Heating Value	Kcal/kg	4,859	4,775	4,702	4,597	4,546	4,601	4,601	4,601	4,521	4,521	4,521
Ash	%	39.12	39.98	41.18	41.91	42.09	41.86	41.86	41.86	42.54	42.54	42.54
Sulfur	%	1.70	2.17	1.97	1.70	3.09	1.70	1.70	1.70	2.23	2.23	2.23
Water	%	4.40	4.60	4.60	7.19	6.40	6.65	6.65	6.65	5.90	5.90	5.90
Duct Sect. Area	m²	8.75	8.75	8.75	8.75	8.75	4.38	4.38	8.76	4.38	4.38	8.76
Stack Gas AV. Velocity	m/s	16.6	16.5	16.7	12.8	12.9	15.8	16.2		15.4	16.4	
Stack Gas Flow Rate(D)	m3N/hr	264,000	276,900	279,500	208,900	214,800	147,100	146,700	293,800	154,800	162,400	317,200
Stack Gas Flow Rate(W)	m3N/hr	290,500	297,400	298,500	225,800	230,000	163,000	163,300	326,300	165,900	172,000	337,900
Representative Point for Dust Measurement		C-2	A-2, B-2, C-2, D-2, E-2	C-2	C-2	A-2, B-2, C-2, D-2, E-2	C-2	D-2		A-2, B-2, C-2, D-2, E-2	A-2, B-2, C-2, D-2, E-2	
Dust Load	g/m3N	0.671	0.399	0.753	0.417	0.200	5.084	6.307	5.695	1.904	4.174	3.038
Dust Load (6% O2)	g/m3N	0.781	0.494	0.952	0.543	0.265			6.791			3.818
Dust FlowRate	Kg/h	177	110	211	87	43	748	925	1,673	295	678	964
Dust	Kg/h • MW	3.9	2.6	5.3	3.1	1.5			39.9			16.6
Dust	g/10⁶ Kcal	1,226	817	1,642	970	480			10,800			5,939
SO_2 Concentration(D)	%	0.180	0.227	0.178	0.159	0.221	0.181	0.172	0.177	0.161	0.184	0.172
SO_2 (5% O2)	%	0.223	0.300	0.239	0.220	0.313	0.230	0.219	0.225	0.225	0.237	0.231
SO_2 (6% O2)	%	0.209	0.281	0.224	0.207	0.293	0.216	0.205	0.211	0.211	0.222	0.216
SO_2 Flow Rate	m3N/hr	474	628	496	332	475	266	252	519	250	299	548
SO_2	Kg/hr	1,355	1,795	1,418	948	1,356	761	721	1,482	714	853	1,566
SO_2	mg/m3N	5,133	6,482	5,073	4,538	6,313			5,044			4,937
SO_2 (6% O2)	mg/m3N	5,971	8,029	6,400	5,914	8,371	6,171	5,857	6,028	6,028	6,343	6,171
SO_2	Kg/h • MW	30.12	42.76	35.45	33.87	48.42			26.48			27.01
SO_2	g/10⁶ Kcal	8,389	13,290	11,050	10,580	15,140			9,572			9,650
NO_x Concentration(D)	ppm	368.5	248.3	224.7	245.7	280.1	288.2	289.0	288.6	191.8	163.2	177.5
NO_x (5% O2)	ppm	459	327	303	341	396	366	368	367	267	210	239
NO_x (6% O2)	ppm	430	307	284	320	371	343	345	344	251	197	223
NO_x Flow Rate	m3N/hr	97.6	68.8	62.8	51	60	42	42	85	30	26	56
NO_x	Kg/hr	130	92	84	69	80	57	57	114	40	35	75
NO_x	mg/m3N	492	332	301	330	372			388			236
NO_x (6% O2)	mg/m3N	576	411	380	429	497	459	462	461	336	264	299
NO_x	Kg/h • MW	2.90	2.19	2.10	2.46	2.88			2.03			1.29
NO_x	g/10⁶ Kcal	901	681	656	770	900			736			463
O_2 Concentration(D)	%	8.12	8.88	9.13	9.48	9.70	8.41	8.43	8.42	9.52	8.60	9.06
H_2O	%	9.13	6.89	6.38	7.46	6.62	9.76	10.2	9.86	6.73	5.60	6.16
Stack Gas Temperature	℃	215	204	209	214	206	143	153	148	128	139	134

Note: Dust load data of 23.02, 26.02 and 29.05 are elimnated from further study because of abnormality (see Appendix 5-3).

Appendix 5-2 : Results of Stack Gas Measurement (1-2)

Power Plant		Jorge Lacerda									
Unit (Rated Capacity)		3-A(66)	3-B(66)	3 (66)	4 (66)	4 (66)	5 (125)	5 (125)	6 (125)	6 (125)	6 (125)
Date Time		27.06.96 10:00~ 18:00	27.06.96 14:00 ~ 19:00	27.06.96	23.02.96 14:00 ~ 18:30	03.06.96 15:00~ 20:00	27.02.96 10:00 ~ 17:00	31.05.96 15:00~ 18:00	28.02.96 09:30 ~ 16:00	04.06.96 10:00~ 14:30	28.06.96 10:00 ~ 17:00
Out put	MW			53	45	45	125	125	80	80	80
Fuel Consumption	t/h			32.31	27.36	28.0	68.75	68.8	44.8	45.8	45.04
Fuel Heating Value	-Kcal/kg	4,536	4,536	4,536	4,604	4,497	4,576	4,525	4,550	4,457	4,526
Ash	%	42.46	42.46	42.46	41.86	42.82	42.09	42.55	42.36	43.28	42.64
Sulfur	%	1.72	1.72	1.72	1.67	2.13	1.82	1.97	1.70	2.06	2.15
Water	%	6.00	6.00	6.00	7.38	5.80	7.19	5.30	6.04	10.7	6.1
Duct Sect. Area	m^2	4.38	4.38	8.76	8.75	8.75	27.14	27.14	27.14	27.14	27.14
Stack Gas AV. Velocity	m/s	14.8	15.0		14.1	12.2	12.5	13.5	8.9	9.3	10.6
Stack Gas Flow Rate(D)	m3N/hr	150,600	147,700	298,400	264,900	237,500	693,800	789,100	508,600	555,500	629,300
Stack Gas Flow Rate(W)	m3N/hr	161,200	158,900	321,100	289,400	254,300	746,500	824,600	548,400	584,100	653,600
Representative Point for Dust Measurement		A-1, B-2, C-1, D-2, E-1	A-1, B-2, C-1, D-2, E-1		C-2	A-2, B-2, C-2, D-2, E-2	A-2	A-1, B-1	B-2	A-2, B-2	A1, A2, A3, B1, B2, B3
Dust Load	g/m3N	1.327	0.210	0.768	11.33	0.232	1.116	0.400	0.067	0.195	0.123
Dust Load (6% O2)	g/m3N			0.977	94.42	0.302	1.261	0.583	0.083	0.251	0.161
Dust FlowRate	Kg/h	200	31	229	3,000	54	774	316	33.93	108	77.49
Dust	Kg/h - MW			4.3	66.7	1.2	6.2	2.5	0.4	1.4	1.0
Dust	g/10⁶ Kcal			1,564	23,820	436	2,460	1,014	166	529	380
SO_2 Concentration(D)	%	0.181	0.175	0.178	0.152	0.171	0.181	0.167	0.176	0.158	
SO_2 (5% O2)	%	0.244	0.240	0.242	0.224	0.238	0.218	0.261	0.233	0.217	
SO_2 (6% O2)	%	0.228	0.225	0.227	0.210	0.223	0.204	0.245	0.218	0.204	
SO_2 Flow Rate	m3N/hr	273	259	531	402	407	1,254	1,320	894	878	
SO_2	Kg/hr	780	739	1,519	1,149	1,163	3,584	3,774	2,555	2,510	
SO_2	mg/m3N			5,090	4,337	4,897	5,166	4,783	5,024	4,518	
SO_2 (6% O2)	mg/m3N	6,514	6,429	6,486	6,000	6,371	5,829	7,000	6,229	5,829	
SO_2	Kg/h - MW			28.66	25.54	25.85	28.68	30.19	31.94	31.38	
SO_2	g/10⁶ Kcal			10,370	9,122	9,236	11,390	12,120	12,530	12,290	
NO_x Concentration(D)	ppm	175.3	220.7	198.0	253	320	458.9	347.9	444.7	355.7	429.1
NO_x (5% O2)	ppm	236	302	269	373	444	552	543	589	489	598
NO_x (6% O2)	ppm	221	283	252	350	416	518	509	552	459	560
NO_x Flow Rate	m3N/hr	26	32	58	67	76	318	274	226	198	270
NO_x	Kg/hr	35	44	79	90	102	426	368	303	264	362
NO_x	mg/m3N			265	340	429	614	466	596	475	575
NO_x (6% O2)	mg/m3N	296	379	337	469	557	694	682	739	615	750
NO_x	Kg/h - MW			1.49	2.0	2.26	3.41	2.94	3.79	3.31	4.52
NO_x	g/10⁶ Kcal			539	714	808	1,354	1,181	1,486	1,296	1,774
O_2 Concentration(D)	%	9.11	9.32	9.21	19.2	9.47	7.72	10.7	8.82	9.36	9.51
H_2O	%	6.58	7.62	7.10	8.46	6.60	7.06	4.30	7.27	4.90	3.72
Stack Gas Temperature	℃	122	131	127	143	144	166	162	156	155	158

Appendix 5-2: Results of Stack Gas Measurement (2)

Power Plant		Charqueadas											
Unit (Rated Capacity)		1 (18)	1 (18)	1 (18)	2 (18)	2 (18)	2 (18)	3 (18)	3 (18)	3 (18)	4 (18)	4 (18)	1 (18)	2 (18)
Date		13.02.96	08.05.96	08.05.96	14.02.96	09.05.96	09.05.96	15.02.96	09.05.96	09.05.96	10.05.96	10.05.96	02.07.96	03.07.96
Time		12:00~ 16:50	09:30 ~ 14:40	15:20~ 18:15	10:20 ~ 15:20	08:50~ 12:00	13:00 ~ 16:40	12:00~ 16:10	16:40 ~ 20:20	20:10~ 23:15	10:45 ~ 14:30	14:30~ 17:30	14:00 ~ 18:50	14:00~ 17:00
Out put	MW	13.5	15.45	15.45	13.5	15.36	15.36	13.5	14.68	14.68	16.10	16.10		
Fuel Consumption	t/h	16.74	21.26	21.26	16.30	24.56	24.56	16.29	22.79	22.79	25.44	25.44		
Fuel Heating Value	Kcal/kg	3,052	3,176	3,176	3,135	3,041	3,041	3,092	3,181	3,181	3,159	3,159		
Ash	%	55.06	53.57	53.57	54.06	55.18	55.18	54.57	53.51	53.51	53.77	53.77		
Sulfur	%	0.90	0.77	0.77	1.19	0.74	0.74	0.94	0.87	0.87	0.87	0.87		
Water	%	14.57	14.07	14.07	13.29	14.20	14.20	12.41	12.58	12.58	13.68	13.68		
Duct Sect. Area	m^2	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67	3.67
Stack Gas AV. Velocity	m/s	15.0	14.4	14.2	13.2	14.2	14.3	14.5	15.2	15.4	17.1	17.0	14.7	15.5
Stack Gas Flow Rate(D)	m3N/hr	105,500	101,300	98,300	90,800	101,900	100,500	100,500	109,700	114,400	128,000	129,100	102,700	107,900
Stack Gas Flow Rate(W)	m3N/hr	117,100	111,800	109,100	101,500	112,200	111,500	111,700	120,200	122,400	138,900	136,800	115,800	120,000
Representative Point for Dust Measurement		B-2	A-1~C-3 all points	A-1, B-1 C-1	B-2	A-1, B-1 C-1	A-1, B-1 C-1	B-2	A-1, B-1 C-1,	A-1, B-1 C-1	A-1, B-1 C-1	A-1, B-1 C-1	A-1 ~C-3 all points	C-1
Dust Load	g/m3N	2.04	0.346	0.514	1.52	0.077	0.105	0.406	0.315	0.371	0.404	0.474	0.891	0.944
Dust Load (6% O2)	g/m3N	2.49	0.400	0.563	1.77	0.091	0.116	0.518	0.384	0.456	0.527	0.635		1.081
Dust FlowRate	Kg/h	215	35.1	50.5	138	7.85	10.6	40.8	34.6	42.4	51.7	61.2	91.5	101
Dust	Kg/h·MW	15.9	2.27	3.27	10.2	0.51	0.69	3.02	2.35	2.89	3.21	3.80		
Dust	g/10^6 Kcal	4,208	520	748	2,700	105	142	810	477	585	643	762		
SO_2 Concentration(D)	%	0.156	0.110	0.119	0.153	0.140	0.140	0.132	0.093	0.093	0.095	0.104		0.124
SO_2 (5% O2)	%	0.203	0.135	0.139	0.190	0.151	0.165	0.180	0.121	0.121	0.132	0.148		0.151
SO_2 (6% O2)	%	0.190	0.127	0.130	0.178	0.147	0.155	0.169	0.114	0.115	0.124	0.139		0.142
SO_2 Flow Rate	m3N/hr	164	111	117	139	143	141	133	102	105	122	134		133
SO_2	Kg/hr	470	317	336	397	408	403	380	292	305	348	384		382
SO_2	Kg/h·MW	34.8	20.5	21.7	29.4	26.6	26.2	28.1	19.9	20.8	21.6	23.8		
SO_2	mg/m3N	4,455	3,129	3,418	4,372	4,004	4,010	3,781	2,662	2,666	2,719	2,974		3,540
SO_2 (6% O2)	mg/m3N	5,429	3,629	3,714	5,086	4,200	4,429	4,829	3,257	3,286	3,543	3,971		4,057
SO_2	g/10^6 Kcal	8,199	4,694	4,976	7,769	5,463	5,396	7,544	4,928	4,212	4,330	4,778		
NO_x Concentration(D)	ppm	220	220.5	194.8	158.0	139.2	156.3	214.3	193.5	193.0	177.0	183.8		164.0
NO_x (5% O2)	ppm	285	272	227	196	156	184	293	252	253	247	262		200
NO_x (6% O2)	ppm	268	255	212	181	146	172	275	236	237	232	245		188
NO_x Flow Rate	m3N/hr	23	22	19	14	14	16	22	21	22	23	24		18
NO_x	Kg/hr	31	29	26	19	19	21	29	28	29	30	32		24
NO_x	mg/m3N	294	285	264	209	186	209	288	255	253	234	248		222
NO_x (6% O2)	mg/m3N	359	342	284	242	196	230	368	316	317	311	328		252
NO_x	Kg/h·MW	2.28	1.94	1.68	1.39	1.24	1.37	2.18	1.94	2.01	1.89	1.98		
NO_x	g/10^6 Kcal	607	429	385	372	254	282	576	382	408	378	398		
O_2 Concentration(D)	%	8.7	8.0	7.3	8.1	6.7	7.4	9.3	8.7	8.8	9.5	9.8		7.9
H_2O	%	10.0	9.37	9.9	10.5	9.19	9.91	10.0	8.69	6.61	7.79	5.64	11.3	10.0
Stack Gas Temperature	°C	186	184	192	188	180	183	188	175	176	168	171	180	187

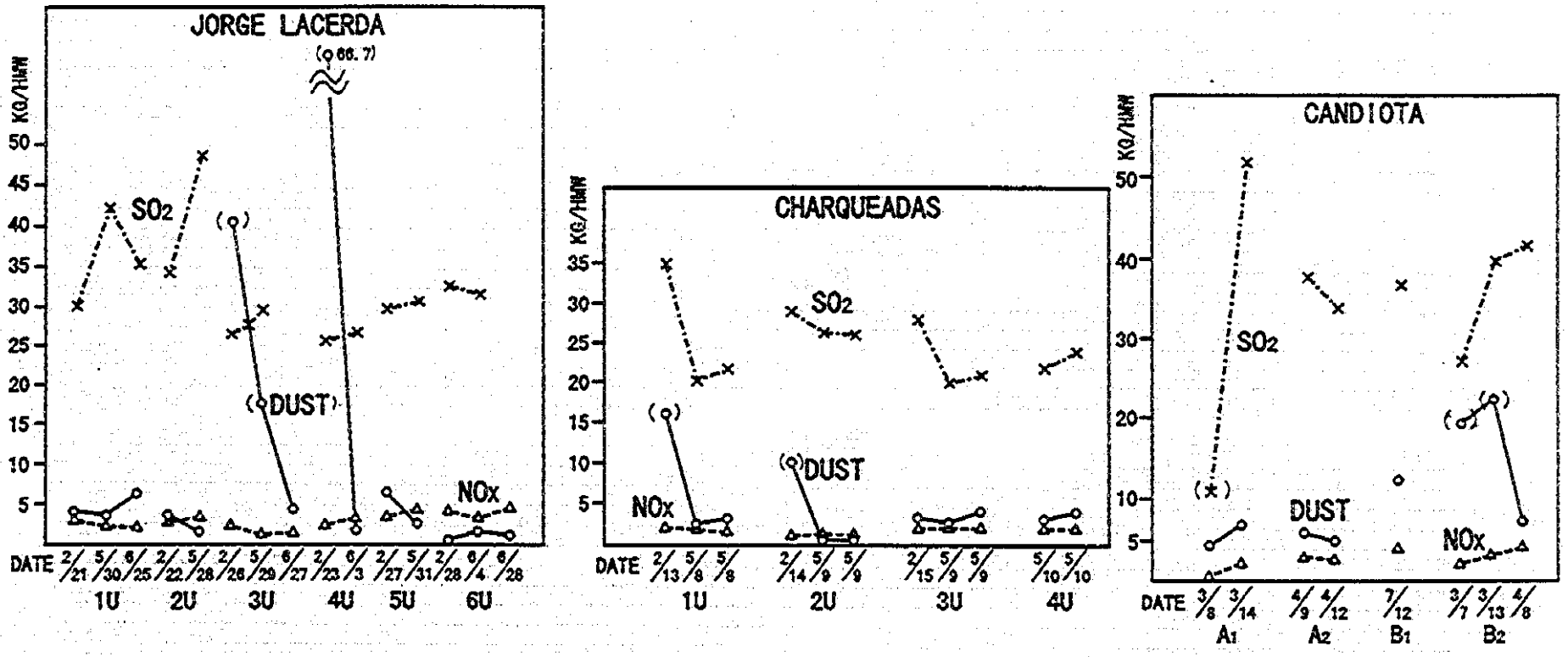
Note: Dust load data of 13.02 and 14.02 are eliminated from further study because of abnormality (see Appendix 5-3)

Appendix 5-2: Results of Stack Gas Measurement (3)

Power Plant		Candiota										
Unit (Rated Capacity)		A1 (50)	A1 (50)	A1 (50)	A2 (50)	A2(50)	B1-A(160)	B1 (160)	B2 (160)	B2 (160)	B2-A(160)	B2 (160)
Date		08.03.96	14.03.96	11.03.96	09.04.96	12.04.96	12.07.96	12.07.96	07.03.96	13.03.96	08.04.96	08.04.96
Time		9:00~17:00	9:00~17:00	13:00~15:00	10:00~16:00	10:00~16:00	10:00~16:00		9:00~17:00	9:00~14:00	10:00~16:00	
Out put	MW	25	25	25	22	25	81.7	81.7	80	81.5	83	83
Fuel Consumption Coal	t/h	27.5	27.5	27.5	(27)	(27)	112.5	112.5	88	88	(88)	(88)
Oil	t/h											
Fuel Heating Value	Kcal/kg	3,167	3,167	3,167	3,244	3,244	3,137		3,167	3,167	3,244	
Ash	%	53.65	53.65	53.65	53.77	53.77	54.01		53.65	53.65	53.77	
Sulfur	%	1.68	1.68	1.68	1.75	1.77	1.54		1.67	1.68	1.75	
Water	%	15.12	15.12	15.12	16.66	16.66	16.21		15.12	15.12	16.66	
Duct Sect. Area	m^2	6.99	6.99	6.99	6.92	6.92	12.15	24.3	12.15	12.15	12.15	24.3
Stack Gas AV. Velocity	m/s	15.0	16.5		16.1	16.6	16.3		27.7	27.1	17.7	
Stack Gas Flow Rate(D)	m3N/hr	223,000	247,000		248,000	260,000	421,000	842,000	617,000	643,000	430,000	860,000
Stack Gas Flow Rate(W)	m3N/hr	243,000	269,000		270,000	280,000	449,000	898,000	681,000	687,000	463,000	926,000
Representative Point for Dust Measurement		C-2	C-2	C-1			A-2. B-1. 2. 3 C-2		B-2	B-3	B-3	
Dust Load	g/m3N	0.49	0.66	2.63	0.52	0.50	1.204	1.204	2.46	2.76	0.70	0.70
Dust Load (6% O2)	g/m3N	1.53	1.00		0.929	0.937		2.052	4.39	3.63		1.207
Dust Flow Rate	Kg/h	109	163		128	130	507	1,013	1,518	1,775	301	602
Dust	Kg/h · MW	4.36	6.52		5.82	5.20	6.20	12.4	19.0	21.8	3.62	7.25
Dust	g/10^6 Kcal	1,251	1,871		1,461	1,484	1,436	2,870	5,446	6,368	1,054	2,108
SO_2 Concentration(D)	%	0.043	0.172		0.119	0.114	0.125	0.125	0.125	0.178	0.142	0.142
SO_2 (5% O2)	%	0.143	0.278		0.227	0.228	0.227	0.227	0.238	0.250	0.261	0.261
SO_2 (6% O2)		0.134	0.261		0.212	0.214	0.213	0.213	0.223	0.234	0.245	0.245
SO_2 Flow Rate	m3N/hr	96	459		295	296	526	1,052	771	1,144	611	1,222
SO_2	Kg/hr	274	1,311		843	846	1,503	3,006	2,203	3,268	1,745	3,490
SO_2	mg/m3N	1,229	5,308		3,399	3,254	3,570	3,570	3,571	5,082	4,058	4,058
SO_2 (6% O2)	mg/m3N	3,829	7,457		6,057	6,114	6,086	6,086	6,371	6,686	7,000	7,000
SO_2	Kg/h · MW	11.0	52.4		38.3	33.8	18.4	36.8	27.5	40.1	21.0	42.0
SO_2	g/10^6 Kcal	3,146	15,050		9,624	9,658	4,258	8,516	7,904	11,720	6,112	12,220
NO_x Concentration(D)	ppm	94.79	182.5		198.3	202.9	290.6	290.6	184.7	254.4	259.4	259.4
NO_x (5% O2)	ppm	316	295		378	406	528	528	352	357	477	477
NO_x (6% O2)	ppm	296	276		354	380	495	495	330	335	463	463
NO_x Flow Rate	m3N/hr	21	49		49	53	122	244	114	164	112	224
NO_x	Kg/hr	28	66		66	71	163	326	153	219	150	300
NO_x	mg/m3N	125	176		149	146		227	139	259		202
NO_x (6% O2)	mg/m3N	396	370		474	509	663	663	442	449	620	620
NO_x	Kg/h · MW	1.12	2.62		3.0	2.84	1.99	3.99	1.91	2.69	1.81	3.61
NO_x	g/10^6 Kcal	321	757		753	810	461	922	548	785	525	1,050
O_2 Concentration(D)	%	16.2	11.1		12.6	13.0	12.2	12.2	12.6	9.6	12.3	12.3
H_2O	%	8.2	8.0		8.3	7.2	6.1	6.1	9.4	6.4	7.2	7.2
Stack Gas Temperature	℃	131	127		111	110	148	148	189	177	158	158

Note: Dust load data of 07.03 and 13.03, and SO_2 load of 08.03 are eliminated from further study because of abnormality (see Appendix 5-3)

Appendix 5-3 Pollutant Flow Rates per MW Plotted on Measured Dates



Data with parentheses are evaluated as abnormal and eliminated from further study, because of reported mal-ESP operation or apparently unusual values.

Appendix 5-4: Distribution of Velocity, Temperature, Dust (1)

Date	30. 05. 1996
Measuring Place	Jorge Lacerda 1u
Output	42MW

Velocity, Temperature Measurement (Unit m/s, ℃)

	3	2	1
A	20.9 / 203	21.6 / 203	20.4 / 204
B	19.8 / 204	19.3 / 205	22.3 / 203
C	16.6 / 204	14.6 / 204	21.0 / 204
D	11.6 / 203	12.2 / 204	17.4 / 204
E	7.5 / 203	10.2 / 204	11.6 / 203

Average: 16.47 / 204

Dust Measurement (Unit g/m3N)

	3	2	1
A		0.4143 / 3.9	
B		0.4148 / 4.0	
C		0.3816 / -4.3	
D		0.3777 / -5.3	
E		0.4063 / 1.9	

Dust Conc. / Deviation(%)

Average: 0.3988

Date	28. 05. 1996
Measuring Place	Jorge Lacerda 2u
Output	28MW

Velocity, Temperature Measurement (Unit m/s, ℃)

	3	2	1
A	23.8 / 204	23.9 / 205	24.2 / 206
B	17.8 / 205	18.4 / 206	17.7 / 207
C	10.4 / 206	13.5 / 207	10.8 / 207
D	5.4 / 208	7.0 / 209	9.4 / 209
E	2.8 / 201	2.8 / 206	4.8 / 200

Average: 12.85 / 206

Dust Measurement (Unit g/m3N)

	3	2	1
A		0.1133 / -43.4	
B		0.0911 / -54.4	
C		0.1014 / -49.3	
D		0.0926 / -53.7	
E		0.6018 / 200	

Dust Conc. / Deviation(%)

Average: 0.2000

Appendix 5－4 : Distribution of Velocity, Temperature, Dust (2)

Date	29. 05. 1996
Measuring Place	Jorge Lacerda 3u
Out put	56MW

Velocity, Temperature Measurement (Unit m/s, ℃)

	1	2	(A)	(B)	2	1	
A	16.2 / 127	16.3 / 127			17.4 / 139	17.6 / 139	A
B	16.8 / 128	16.9 / 127			17.2 / 138	17.7 / 140	B
C	16.4 / 129	15.9 / 128			18.0 / 140	16.4 / 140	C
D	15.1 / 128	13.8 / 128			15.5 / 139	15.5 / 140	D
E	13.3 / 128	12.9 / 127	Average 15.4 / 128	Average 16.38 / 139	13.6 / 140	14.9 / 140	E

Dust Measurement (Unit g/m3N)

	1	2	(A)	(B)	2	1	
A	----	2.5307 / 37.6			5.1110 / 28.2	----	A
B	----	2.7058 / 47.1			4.9297 / 23.7	----	B
C	----	1.6759 / -8.9	Dust Conc. / Deviation(%)	Dust Conc. / Deviation(%)	6.6856 / 67.7	----	C
D	----	1.3709 / -25.5	Average	Average	1.7643 / -55.7	----	D
E	----	0.9158 / -50.2	1.8398	3.9862	1.4404 / -63.9	----	E

Date	03. 06. 1996
Measuring Place	Jorge Lacerda 4u
Output	45MW

Velocity, Temperature Measurement (Unit m/s, ℃)

	3	2	1		
A	11.2 / 143	13.2 / 144	10.2 / 144		A
B	13.9 / 144	13.1 / 144	11.5 / 144		B
C	14.3 / 143	8.8 / 144	12.6 / 144		C
D	13.6 / 145	13.6 / 145	12.0 / 145		D
E	11.0 / 143	12.7 / 143	10.8 / 142	Average 12.17 / 144	E

Dust Measurement (Unit g/m3N)

	3	2	1		
A	----	0.2169 / -8.6	----		A
B	----	0.1986 / -16.3	----		B
C	----	0.2629 / 10.8	----	Dust Conc. / Deviation(%)	C
D	----	0.2172 / -8.5	----	Average	D
E	----	0.2743 / 15.6	----	0.2373	E

Appendix 5-4: Distribution of Velocity, Temperature and Dust (3)

Date	28. 06. 1996
Measuring Place	Jorge Lacerda 6U
Out put	80 MW

Velocity Temperature Measurement (Unit m/s. ℃)

	A	B
1	11.0 / 171	10.2 / 173
2	11.5 / 146	10.5 / 155
3	10.0 / 155	10.5 / 149

Average: 10.62 / 158

Dust Measurement (Unit g/m3N)

	A	B
1	0.1241 / 1.4	0.1444 / 18.0
2	0.1716 / 40.2	0.0624 / -49.0
3	0.1550 / 26.6	0.0682 / -44.3

Dust Conc / Deviation(%)

Average: 0.1224

Date	12. 07. 1996
Measuring Place	Charqueadas 1u
Out Put	15. 45MW

Velocity, Temperature Measurement (Unit m/s , ℃)

	A	B	C
1	15.2 / 181	10.3 / 181	14.9 / 180
2	17.2 / 184	11.6 / 184	16.2 / 181
3	17.2 / 186	12.2 / 196	14.5 / 184

Average: 14.37 / 184

Dust Measurement (Unit g/m3N)

	A	B	C
1	0.289 / -17.8	0.328 / -6.7	0.579 / 64.6
2	0.247 / -29.8	0.371 / 5.5	0.345 / -1.9
3	0.228 / -35.2	0.433 / 23.1	0.345 / -1.9

Dust Conc / Deviation(%)

Average: 0.3517

Appendix 5-4:Distribution of Velocity, Temperature and Dust(4)

D a t e	02. 07. 1996
Measuring Plce	Charqueadas 1U
O u t P u t	15. 45MW

Velocity Temperature Measurment (Unit m/s . ℃)

	A	B	C
1	15.3 / 176	12.2 / 180	14.8 / 177
2	16.4 / 179	11.8 / 182	17.0 / 179
3	15.9 / 179	13.6 / 183	15.6 / 179

Average: 14.73 / 180

Dust Measurment (Unit g/m3N)

	A	B	C
1	1.286 / 44.4	1.018 / 14.3	1.022 / 14.7
2	0.758 / -14.9	0.810 / -9.1	0.842 / -5.5
3	0.749 / -15.9	0.710 / -20.3	0.823 / -7.6

Dust Conc / Deviation(%)

Average: 0.8907

D a t e	15.03.1996. 15.07.1996
Measuring Place	Candiota 1U
O u t P u t	25MW . 40MW

Velocity. Temperature Measurment (3/15. 25MW)(Unit m/s. ℃)

	A	B	C	D	E	F
1	15.2 / 132	15.5 / 130	13.9 / 128	16.1 / 130	18.2 / 125	18.7 / 125
2	16.3 / 128	16.2 / 129	16.8 / 127	17.0 / 132	18.2 / 125	19.7 / 123
3	15.2 / 126	15.2 / 127	15.2 / 126	15.7 / 132	17.4 / 125	19.2 / 120

Average: 16.52 / 127

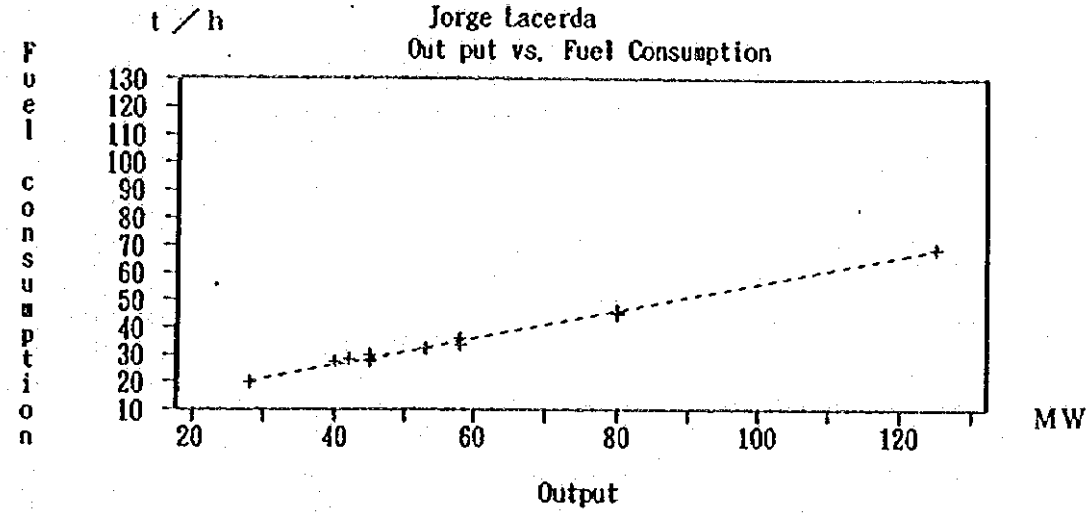
Dust Measurment (7/15. 40MW) (Unit g/m3N)

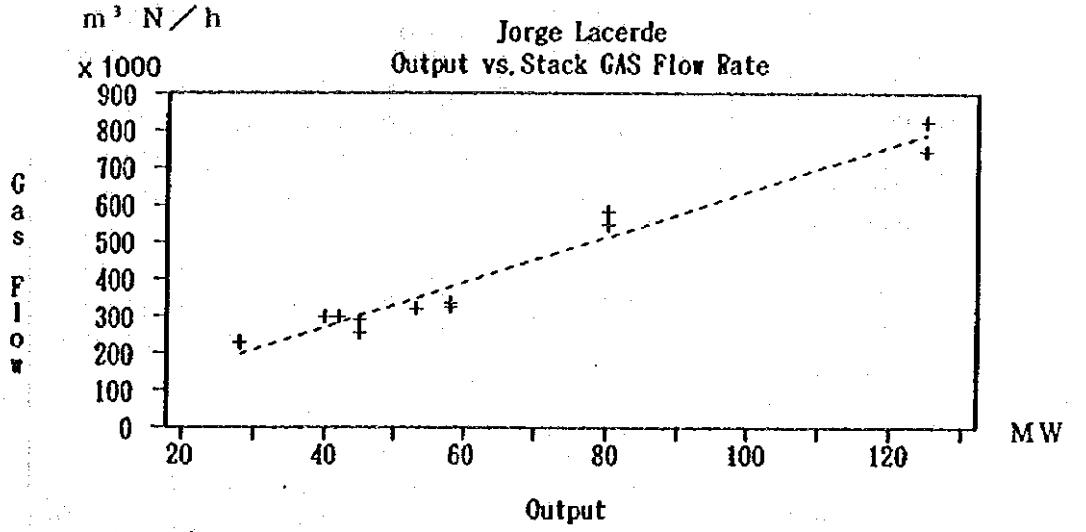
	A	B	C	D	E	F
1	...	...	1.30 / -15.7	2.36 / 52.9	...	...
2	1.31 / -15.1	1.63 / 5.6	1.15 / -25.5	2.36 / 52.9	2.16 / 39.9	1.24 / -19.6
3	...	...	0.931 / -39.7	0.989 / -35.9	...	...

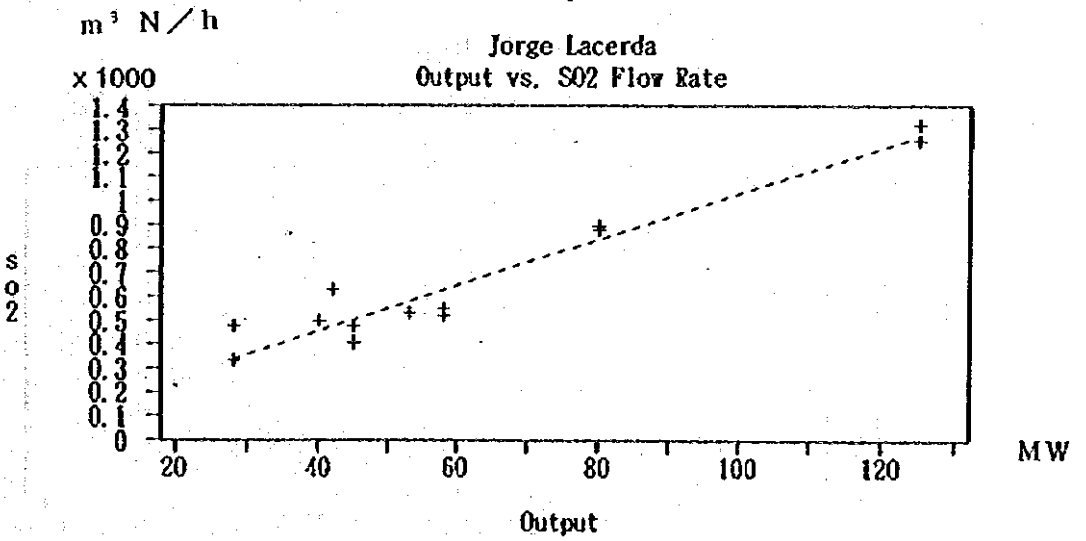
Dust Conc. / Deviation(%)

Average: 1.543

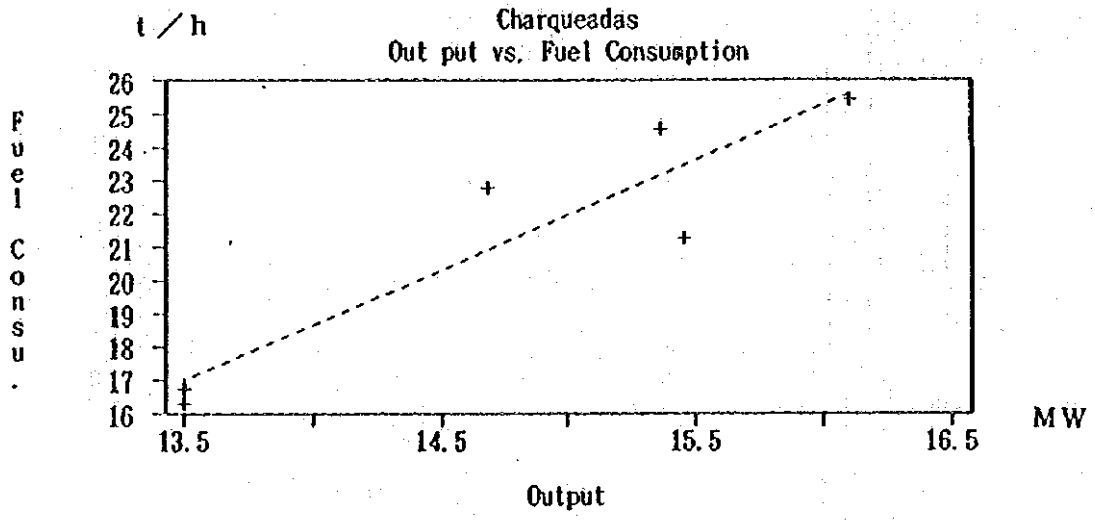
Appendix 5-5 (1) Various Correlation vs. Outputs

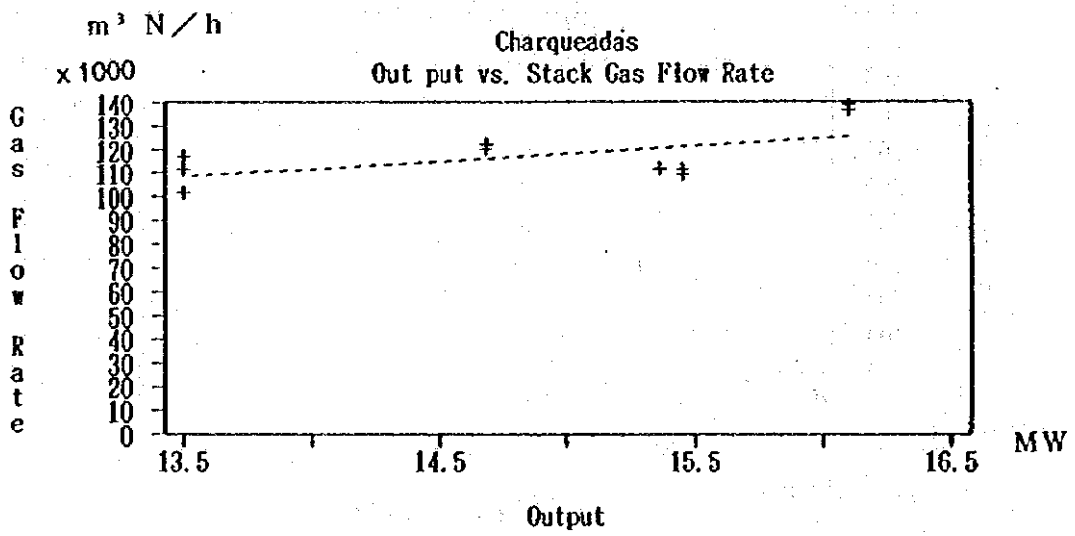


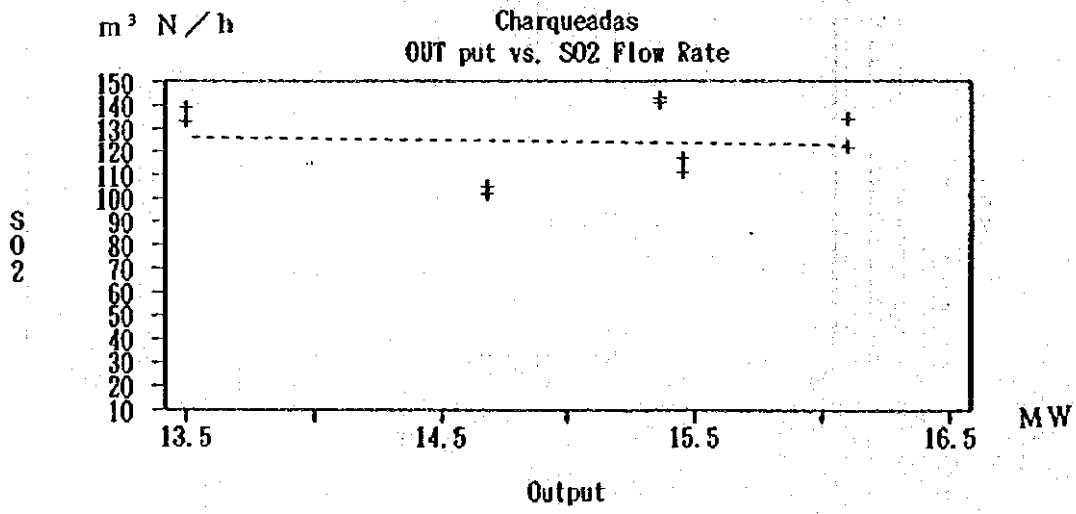




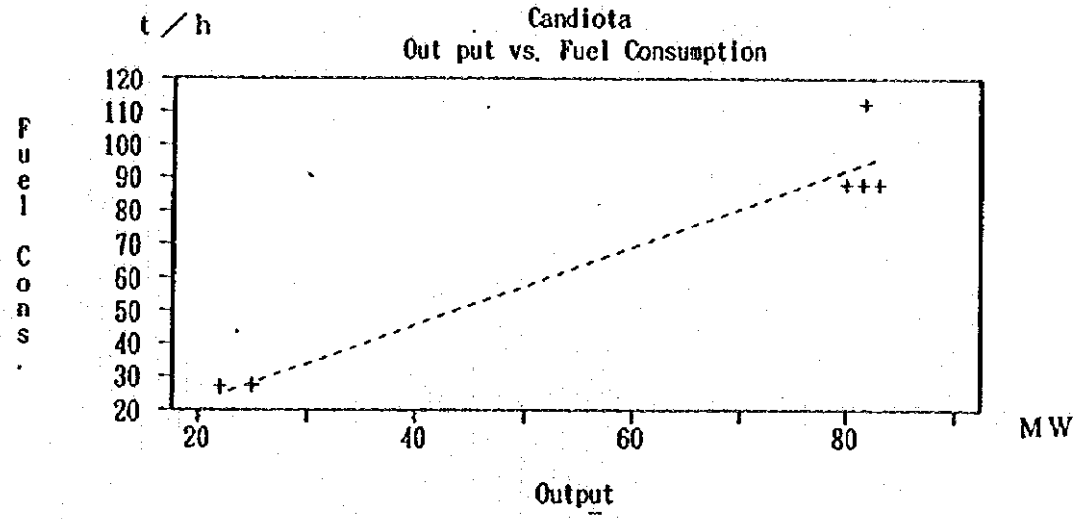
Appendix 5-5 (2) Various Correlation vs. Outputs

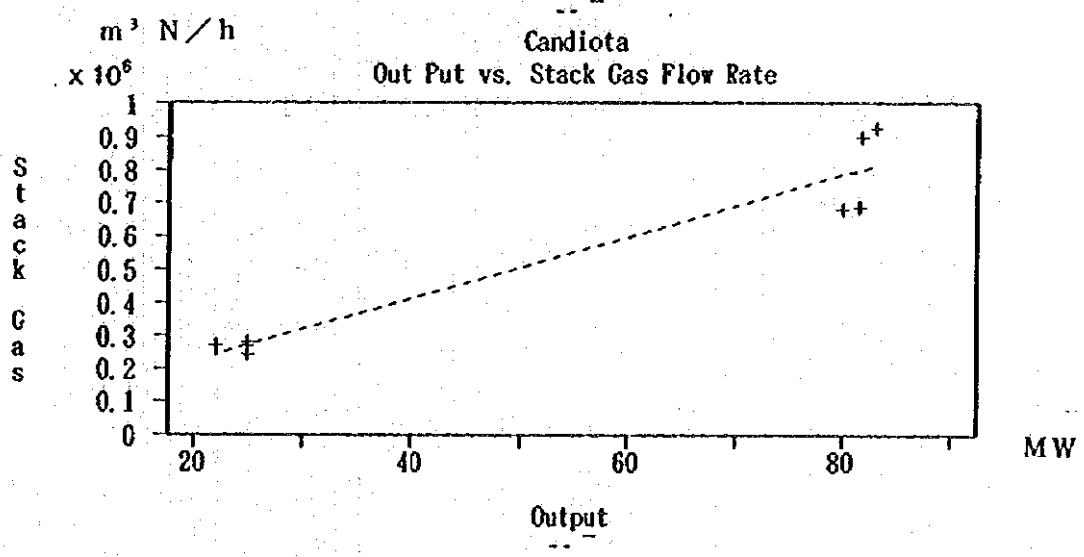


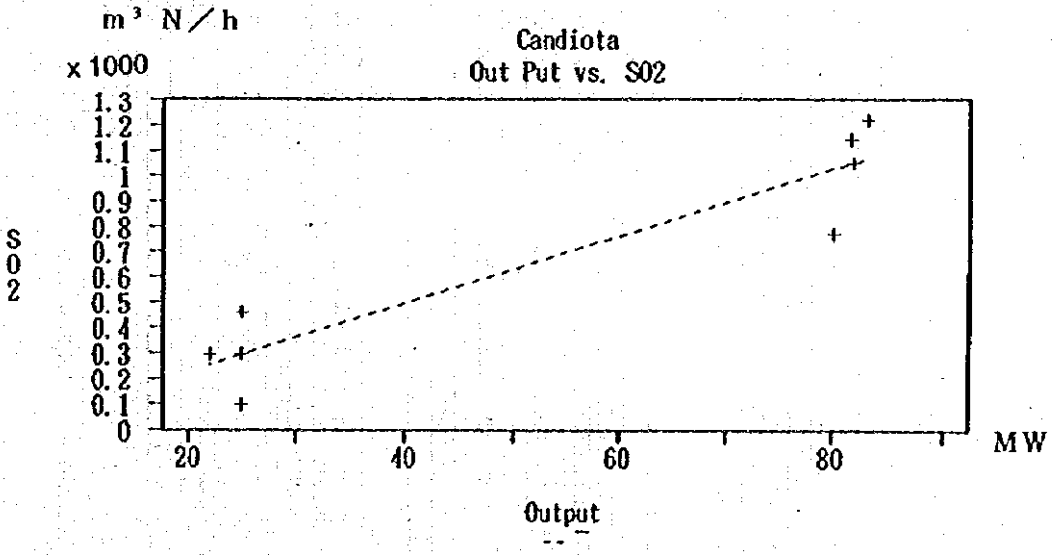




Appendix 5-5 (3) Various Correlation vs. Outputs







Appendix 5-6

Comparison of calculated and Measured Flow Rates

Jorge Lacerda																
Items	Unit		1U 21.2	1U 30.5	1U 25.6	2U 22.2	2U 28.5	3U 26.2	3U 29.5	3U 27.6	4U 23.2	4U 03.6	5U 27.2	5U 31.5	6U 04.6	6U 04.6	Average
Stack Gas	Fuel Heating Value		4,859	4,775	4,702	4,597	4,546	4,601	4,521	4,536	4,604	4,497	4,576	4,525	4,550	4,457	
	Calculated	m^3N/hr	279,700	263,000	250,500	176,000	176,300	304,000	320,000	288,700	247,300	248,600	618,400	613,600	401,300	403,800	
	Measured	m^3N/hr	290,500	297,400	298,500	225,800	230,000	326,300	337,900	321,100	289,400	254,300	746,500	824,600	548,400	584,100	
	Agreement	%	96.3	88.4	83.9	77.9	76.6	93.2	94.7	89.9	85.4	97.7	82.8	74.4	73.2	69.1	84.5
SO2	Fuel Consumption	kg/hr	29,700	28,300	27,280	19,500	19,700	33,650	35,900	32,310	27,360	28,000	68,750	68,800	44,800	45,800	
	Sulfur	%	1.7	2.17	1.97	1.7	3.09	1.7	2.23	1.72	1.67	2.13	1.82	1.97	1.7	2.06	
	Calculated	m^3N/hr	353	429	376	232	426	400	560	389	320	417	876	949	533	660	
	Measured	m^3N/hr	474	628	496	332	475	519	548	531	402	407	1,254	1,320	894	878	
	Agreement	%	74.5	68.3	75.8	69.9	89.7	77.1	102	73.2	79.6	102	59.8	71.9	59.6	75.2	77.6

Charqueadas													
Items	Unit		1U 13.2	1U 08.5	1U 08.5	2U 14.2	2U 09.5	2U 09.5	3U 16.2	3U 04.5	3U 07.5	4U 10.5	4U 10.5	Average
Stack Gas	Fuel Heating Value		3,052	3,176	3,176	3,135	3,041	3,041	3,092	3,181	3,181	3,159	3,159	
	Calculated	m^3N/hr	112,400	146,700	146,700	111,500	164,500	164,500	110,400	157,400	157,400	174,900	174,900	
	Measured	m^3N/hr	117,100	111,800	109,100	101,500	112,200	111,500	111,700	120,200	122,400	138,900	136,800	
	Agreement	%	96.0	131	134	110	147	147	98.8	131	128	126	128	125
SO2	Fuel Consumption	kg/hr	16,740	21,260	21,260	16,300	24,560	24,560	16,290	22,790	22,790	25,440	25,440	
	Sulfur	%	0.9	0.77	0.77	1.19	0.74	0.74	0.94	0.87	0.87	0.87	0.87	
	Calculated	m^3N/hr	—	114	144	136	127	127	107	139	139	155	155	
	Measured	m^3N/hr	—	111	116	139	143	141	133	102	106	122	137	
	Agreement	%	—	103	97.4	97.8	89.0	90.1	80.4	136	130	127	115	107

Candiota											
Items	Unit		A1 08.3	A1 14.3	A2 09.4	A2 12.2	B1 12.7	B2 07.3	B2 13.3	B2 10.5	Average
Stack Gas	Fuel Heating Value		3,167	3,167	3,244	3,244	3,137	3,167	3,167	3,244	
	Calculated	m^3N/hr	189,400	189,400	189,100	189,100	769,800	606,100	606,100	616,300	
	Measured	m^3N/hr	243,000	269,000	270,000	280,000	898,000	681,000	687,000	926,000	
	Agreement	%	77.9	70.4	70.0	67.5	85.7	89.0	88.2	66.6	76.9
SO2	Fuel Consumption	kg/hr	27,500	27,500	27,000	27,000	112,500	88,000	88,000	88,000	
	Sulfur	%	1.68	1.68	1.75	1.77	1.54	1.67	1.67	1.75	
	Calculated	m^3N/hr	—	323	334	334	1,213	1,028	1,028	1,078	
	Measured	m^3N/hr	—	459	295	296	1,052	771	1,144	1,222	
	Agreement	%	—	70.4	113	113	115	133	89.9	88.2	103

・Agreement (%) =Calculated /Measured ×100　　・Calculation SO_2 = Fuel Consumption × (S/100) ×22.4/32　　m^3N/hr

Calculated stack Gas Flow Rate : $G=G_o+(m-1)A_o=(0.89\times H/1000)+1.65+(m-1)\times 1.01\times(H/1000)+0.5=0.001496\times H+2.15$　　m^3N/kg

G_o : Calculated stack Gas Rate at A_o $=(0.89\times H/1000)+1.65$

H : Fuel Low Heating Value Kcal/kg

A_o : Approximate Stoichiometric Air Rate $=1.01\times(H/1000)+0.5$

m : Air Ratio =1.6

Calculated Stack Gas Flow Rate = G× Fuel Consumption　　m^3N/hr

Appendix 5-7 : Heat Loss due to Excess Combustion Air

As O_2 in exhaust gas increases in the boiler operation, the overall boiler thermal efficiency decreases due to heat loss accompanied with the exhaust gas. By assuming other factors are not changed, the degree of the efficiency drop will be illustrated here.

By taking as the standard operation to be 6% O_2 in exhaust gas, the boiler thermal efficiency will be changed depending on the increment of O_2 (due to excess air for combustion) in the exhaust gas as below.

The formula used : $L = CpgG(Tg - Ta)$

where;

L	:Heat loss of dry gas	kcal/kg fuel
Cpg	:Specific heat of dry gas	0.33Kcal/m^{3}NdegC
G	:Volume of dry gas	m^{3}N/Kg fuel
Tg	:Temperature of exhaust gas	℃
Ta	:Atmospheric Temperature	℃

First of all, the theoretical air volume, Ao, for the combustion is calculated as follows:

$Ao = 8.89 \times C + 26.7 (h - O/8) + 3.33 \times S$ m^{3}N/kg.

Where C = carbon, h = hydrogen, and S = sulfur, all in weight %

Using the average values at Jorge Lacerda Plant shown in Table 5.1.2,

C = 47%, h = 2.9%, O = 6%, and S = 1.8%

$Ao = 8.89 \times 0.47 + 26.7 \times (0.029 - 0.06/8) + 3.33 \times 0.018 = 4.81$

Next, the theoretical volume of dry gas (Go) is calculated as follows:

$Go = 8.89 \times C + 21.1 (h - O/8) + 3.33 \times S + 0.8n$ m^{3}N/kg

Where n = nitrogen in weight % and n= 1.6% as taken from Table 5.1.2,

$Go = 8.89 \times 0.47 + 21.1 \times (0.029 - 0.06/8) + 3.33 \times 0.018 + 0.8 \times 0.016$

$= 4.70$

Then, the actual volume of the exhaust gas, G, in the both cases of 6% O_2 and 8% of exhaust gas is calculated with the following formula:

$G = Go + (m - 1)Ao$

The combustion air ratio (m) is obtained from the following simple formula:

$m = 21/(21 - O_2)$

Where O_2 is the volume % of oxygen remaining the exhaust gas

In the case of "O_2 = 6%" : $m_6 = 21 \div 15 = 1.4$.

$G_6 = 4.70 + (1.4 - 1) \times 4.81 = 6.62$ m^3N/kg

In the case of "O_2 = 8%" : $m_8 = 21 \div 13 = 1.62$.

$G_8 = 4.70 + (1.62 - 1) \times 4.81 = 7.68$ m^3N/kg

Heat loss of dry gas is calculated with the following formula:

$L = CpgG(Tg - Ta)$

Where,

$Cpg = 0.33$,

$Tg = 120℃$ and

$Ta = 12℃$

In the case of "O_2 = 6%",

$L_6 = 0.33 \cdot 6.62 \times (120 - 12) = 235.9$ kcal/kg.

In the case of "O_2 = 8% ",

$L_8 = 0.33 \times 7.68 \times (120 - 12) = 273.7$ kcal/kg.

L_6 and L_8 are converted to boiler efficiency.

On the assumption that the high calorific value of coal is 3,000kcal/kg,

in the case of "O_2 = 6%", the heat loss of dry gas is:

$L_6 = (235.9 + 3000) \times 100 = 7.86\%$, and

in the case of "O_2 = 8%", the heat loss of dry gas is:

$L_8 = (273.7 + 3000) \times 100 = 9.12\%$.

Therefore, if O_2 in the exhaust gas increases by 2%, from 6% to 8%, the decrease of the boiler thermal efficiency is:

$(9.12 - 7.86) = 1.26\%$.

Similar calculation is done for 10% O_2. If the percentage of O_2 in the exhaust gas increases from 6% to 10%, the decrease of the boiler thermal efficiency is:

$(10.78 - 7.86) = 2.92\%$.

Appendix 5-8

Ratio of Emissions from Existing Units / National Standard - Pseudo-situation

		TSP		SO_2	
Power Plant	Unit	W	Ratio	W	Ratio
Jorge Lacerda	A1	1,226	0.82	9,389	1.88
		817	0.55	13,290	2.66
		1,642	1.09	11,050	2.21
	A2	970	0.65	10,580	2.12
		480	0.32	15,140	3.03
	A3	-	-	9,572	1.91
		-	-	9,650	1.93
		1,564	1.04	10,370	2.07
	A4	-	-	9,122	1.82
		436	0.29	9,230	1.85
	B5	2,460	3.08	11,390	5.70
		1,014	1.27	12,120	6.06
	B6	166	0.21	12,530	6.27
		529	0.66	12,290	6.15
Charqueadas	1	-	-	9,199	1.84
		520	0.35	4,694	0.94
		748	0.50	4,976	1.00
	2	-	-	7,769	1.55
		105	0.07	5,463	1.09
		142	0.09	5,396	1.08
	3	810	0.54	7,544	1.51
		477	0.32	4,028	0.81
		585	0.39	4,212	0.84
	4	643	0.43	4,330	0.87
		762	0.51	4,778	0.96
Candiota	A1	1,251	0.83	-	-
		1,871	1.25	15,050	3.01
	A2	1,461	0.97	9,624	1.92
		1,484	0.99	9,658	1.93
	B1	2,870	3.59	8,516	4.26
	B2	-	-	7,904	3.95
		-	-	11,720	5.86
		2,108	2.64	12,220	6.11

Note: W = Measured emission rate ($g/10^6$ kcal)

Ratio = W / (CONAMA #008)

CONAMA #008 = Emission rate allowed in CONAMA #008

= 1,500 $g/10^6$ kcal for TSP $<$ 70 MW

= 800 $g/10^6$ kcal for TSP $>$ 70 MW

= 5,000 $g/10^6$ kcal for SO_2 $<$ 70 MW

= 2,000 $g/10^6$ kcal for SO_2 $>$ 70 MW

Emission Conditions
Jorge Lacerda

		UNIT-1			UNIT-2		UNIT-3			UNIT-4		UNIT-5		UNIT-6		
Capacity	(MW)	50	50	50	50	50	66	66	66	66	66	125	125	125	125	125
Electricity	(MW)	45	42	40	28	28	56	58	53	45	45	125	125	80	80	80
Gas Dry	(m3N/h)	264000	276900	279500	208900	214800	293800	317200	298400	264900	237500	693800	789100	508600	555500	629300
Gas Wet	(m3N/h)	290500	297400	298500	225800	230000	326300	337900	321100	289400	254300	746500	824600	548400	584100	653600
Dust	(mg/m3N)	671.0	399.0	753.0	417.0	200.0	5695.0	3039.0	768.0	11330.0	232.0	1116.0	400.0	67.0	195.0	123.0
	(Kg/h)	177.1	110.5	210.5	87.1	43.0	1673.2	964.0	229.2	4401.9	80.8	774.3	315.6	53.2	169.3	120.9
SOx	(ppm)	1800.0	2270.0	1780.0	1590.0	2210.0	1770.0	1720.0	1780.0	1520.0	1710.0	1810.0	1670.0	1760.0	1580.0	
	(m3N/h)	475.2	628.6	497.5	332.2	474.7	520.0	545.6	531.2	590.6	595.7	1255.8	1317.8	1398.7	1371.4	
NOx	(ppm)	369.5	248.3	224.7	245.7	280.1	288.6	177.5	198.0	253.0	320.0	458.9	347.9	444.7	355.7	429.1
	(m3N/h)	97.5	68.8	62.8	51.3	60.2	84.8	56.3	59.1	98.3	111.5	318.4	274.5	353.4	308.7	421.9
Temperature	(C.deg.)	215	204	209	214	206	148	134	127	143	144	166	162	156	155	158
Loading Factor		0.900	0.840	0.800	0.560	0.560	0.848	0.879	0.803	0.682	0.682	1.000	1.000	0.640	0.640	0.640
							X	X		X	O2	7.72	10.7			Y

Concentrations and Dry/Wet ratio from Unit-5

Averaging by Units & Summation by Stacks

		UNIT-1	UNIT-2	UNIT-3	UNIT-4	UNIT-5	UNIT-6	Unit 1-4	Unit-5	Unit-6		Unit-7	
Capacity	(MW)	50.0	50.0	66.0	66.0	125.0	125.0	232.0	125.0	125.0		350.0	
Electricity	(MW)	42.3	28.0	53.0	45.0	125.0	80.0	168.3	125.0	80.0		350.0	
Gas Dry	(m3N/h)	273466.7	211850.0	298400.0	237500.0	741450.0	532050.0	1021216.7	741450.0	532050.0		1062981.9	
Gas Wet	(m3N/h)	295466.7	227900.0	321100.0	254300.0	785550.0	566250.0	1098766.7	785550.0	566250.0	Wet	1126206.0	
Dust	(mg/m3N)	607.7	308.5	768.0	232.0	758.0	131.0					964.4	
	(Kg/h)	166.2	65.4	229.2	55.1	562.0	69.7	515.8	562.0	69.7	Dust	1025.1	
SOx	(ppm)	1950.0	1900.0	1780.0	1710.0	1740.0	1670.0					2213.7	
	(m3N/h)	533.3	402.5	531.2	595.7	1290.1	888.5	2062.6	1290.1	888.5	SOx	2353.2	
NOx	(ppm)	280.8	262.9	198.0	320.0	403.4	400.2					513.2	
	(m3N/h)	76.8	55.7	59.1	111.5	299.1	212.9	303.0	299.1	212.9	NOx	545.6	
Temperature	(C.deg.)	209.3	210.0	127.0	144.0	164.0	155.5	170.3	164.0	155.5		192.0	
Loading Factor		0.847	0.560	0.803	0.682	1.000	0.640	0.726	1.000	0.640		1.000	
					O2	9.21		150	100	100		200	Operated with 6% O2

Emission Conditions
Charqueadas

		UNIT-1				UNIT-2				UNIT-3			UNIT-4	
Capacity	(MW)	18	18	18	18	18	18	18	18	18	18	18	18	18
Electricity	(MW)	13.5	15.45	15.45		13.5	15.36	15.36		13.5	14.68	14.68	16.1	16.1
Gas Dry	(m3N/h)	105500	101300	98300	102700	90800	101900	100500	107900	100500	109700	114400	128000	129100
Gas Wet	(m3N/h)	117100	111800	109100	115800	101500	112200	111500	120000	111700	120200	122400	138900	136800
Dust	(mg/m3N)	2040.0	346.0	514.0	891.0	1520.0	77.0	105.0	944.0	406.0	315.0	371.0	404.0	474.0
	(Kg/h)	215.2	35.0	50.5	91.5	138.0	7.8	10.6	101.9	40.8	34.6	42.4	51.7	61.2
SOx	(ppm)	1560.0	1100.0	1190.0		1530.0	1400.0	1400.0	1240.0	1320.0	930.0	930.0	950.0	1040.0
	(m3N/h)	164.6	111.4	117.0		138.9	142.7	140.7	133.8	132.7	102.0	106.4	121.6	134.3
NOx	(ppm)	220.0	220.5	194.8		158.0	139.2	156.3	164.0	214.3	193.5	193.0	177.0	183.8
	(m3N/h)	23.2	22.3	19.1		14.3	14.2	15.7	17.7	21.5	21.2	22.1	22.7	23.7
Temperature	(C.deg.)	186	184	192	180	188	180	183	187	188	175	176	168	171
Loading Factor		0.750	0.858	0.858		0.750	0.853	0.853		0.750	0.816	0.816	0.894	0.894
		X	8.0	7.3	Y	X	6.7	7.4	Y	9.3	8.7	8.8	9.5	9.8 O2

Averaging by Units & Summation by Stacks

		UNIT-1	UNIT-2	UNIT-3	UNIT-4	Unit 1-4	
Capacity	(MW)	18.0	18.0	18.0	18.0	72.0	
Electricity	(MW)	15.5	15.4	14.3	16.1	61.2	
Gas Dry	(m3N/h)	99800.0	101200.0	108200.0	128550.0	437750.0	
Gas Wet	(m3N/h)	110450.0	111850.0	118100.0	137850.0	478250.0	Wet
Dust	(mg/m3N)	430.0	91.0	364.0	439.0		
	(Kg/h)	42.9	9.2	39.4	56.4	147.9	Dust
SOx	(ppm)	1145.0	1400.0	1060.0	995.0		
	(m3N/h)	114.3	141.7	114.7	127.9	498.6	SOx
NOx	(ppm)	207.7	147.8	200.3	180.4		
	(m3N/h)	20.7	15.0	21.7	23.2	80.5	NOx
Temperature	(C.deg.)	188.0	181.5	179.7	169.5	179.1	
Loading Factor		0.858	0.853	0.794	0.894	0.850	
O2		7.7	7.1	8.9	9.7	62	

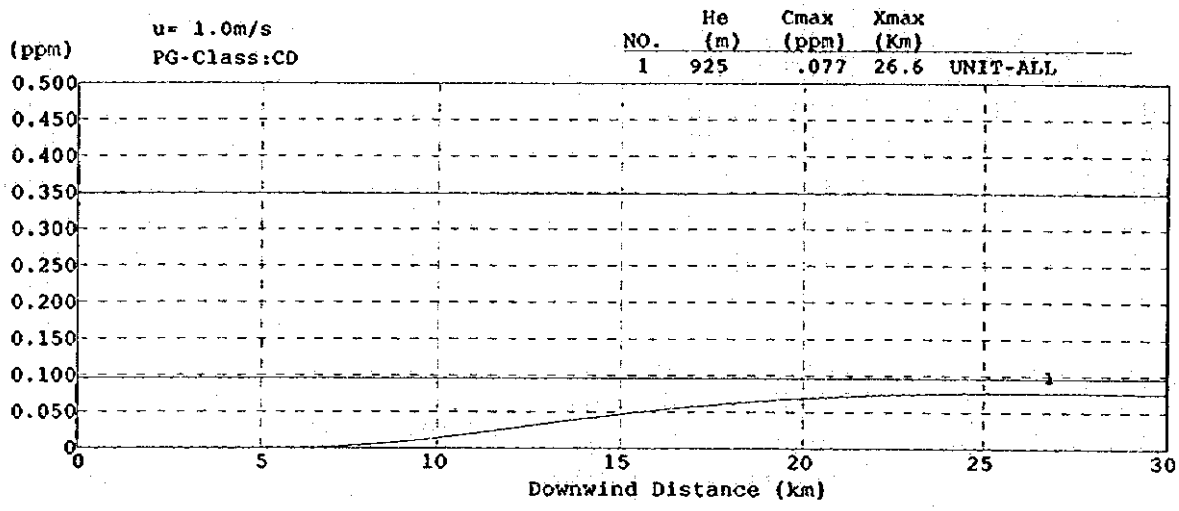
Emission Conditions
Candiota

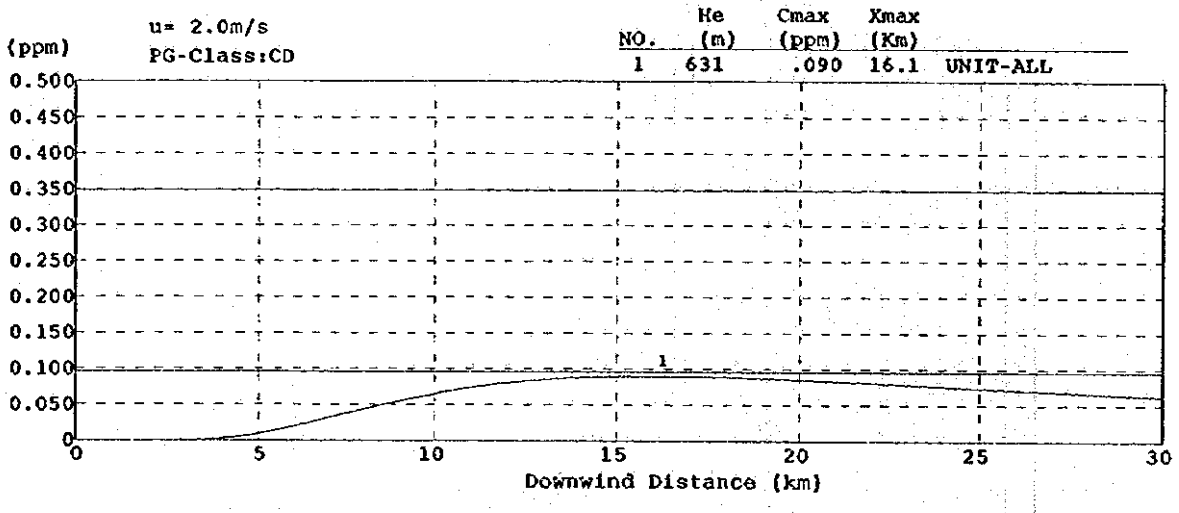
		UNIT-A1			UNIT-A2		UNIT-B1	UNIT-B2		
Capacity	(MW)	63	63	63	63	63	160	160	160	160
Electricity	(MW)	25	25	25	22	25	81.7	80	81.5	88
Gas Dry	(m3N/h)	223000	247000		248000	260000	842000	617000	643000	860000
Gas Wet	(m3N/h)	243000	269000		270000	280000	898000	681000	687000	926000
Dust	(mg/m3N)	490.0	660.0	2630.0	520	500	1204.0	2460.0	2760	700
	(Kg/h)	109.3	163.0		129.0	130.0	1013.8	1517.8	1774.7	602.0
SOx	(ppm)	430.0	1720.0		1190	1140	1250.0	1250.0	1780	1420
	(m3N/h)	95.9	424.8		295.1	296.4	1052.5	771.3	1144.5	1221.2
NOx	(ppm)	94.8	182.5		198.3	202.9	290.6	184.7	254.4	259.4
	(m3N/h)	21.1	45.1		49.2	52.8	244.7	114.0	163.6	223.1
Temperature	(C.deg.)	131	127		111	110	148	189.0	177	158
Loading Factor		0.397	0.397		0.349	0.397	0.511	0.500	0.509	0.550
		X	11.1	X	12.6	13.0	12.2	X	X	12.3

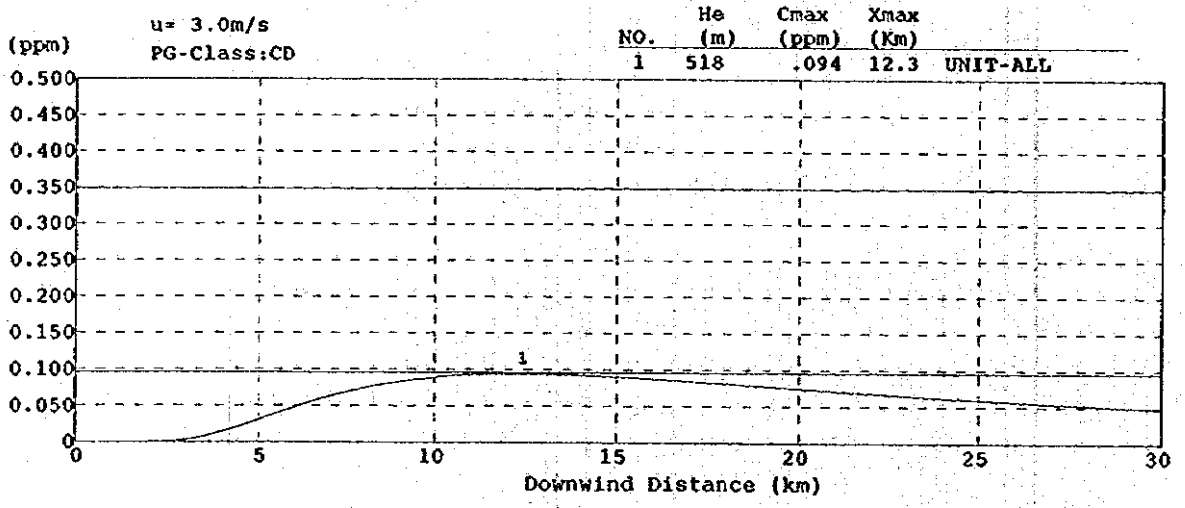
Averaging by Units & Summation by Stacks

		UNIT-A1	UNIT-A2	UNIT-B1	UNIT-B2	UNIT all
Capacity	(MW)	63.0	63.0	160.0	160.0	446.0
Electricity	(MW)	25.0	23.5	81.7	88.0	**218.2**
Gas Dry	(m3N/h)	**247000.0**	254000.0	842000.0	**860000.0**	2203000.0
Gas Wet	(m3N/h)	**269000.0**	275000.0	898000.0	**926000.0**	2368000.0
Dust	(mg/m3N)	**660.0**	510.0	1204.0	**700.0**	
	(Kg/h)	**163.0**	129.5	1013.8	**602.0**	**1908.3**
SOx	(ppm)	**1720.0**	1165.0	1250.0	**1420.0**	
	(m3N/h)	**424.8**	295.9	1052.5	**1221.2**	**2994.5**
NOx	(ppm)	**182.5**	200.6	290.6	**259.4**	
	(m3N/h)	**45.1**	51.0	244.7	**223.1**	**563.8**
Temperature	(C.deg.)	**127.0**	110.5	**148.0**	**158.0**	**145.2**
Loading Factor		0.397	0.373	0.511	0.550	**0.489**
		11.1	12.8	12.2	12. 3	150

Appendix 6-2 Hourly Concentration Profile under the Current Condition

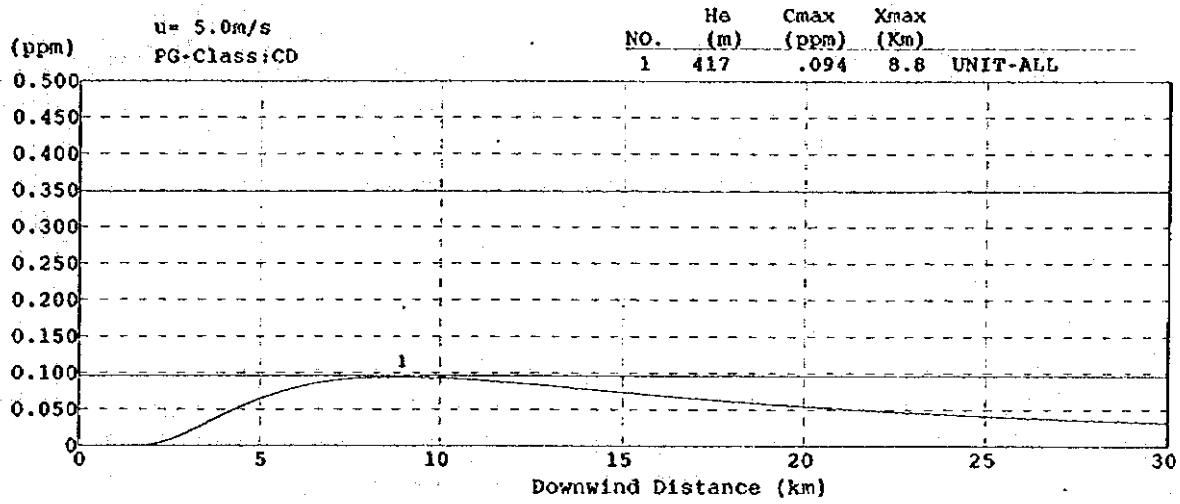


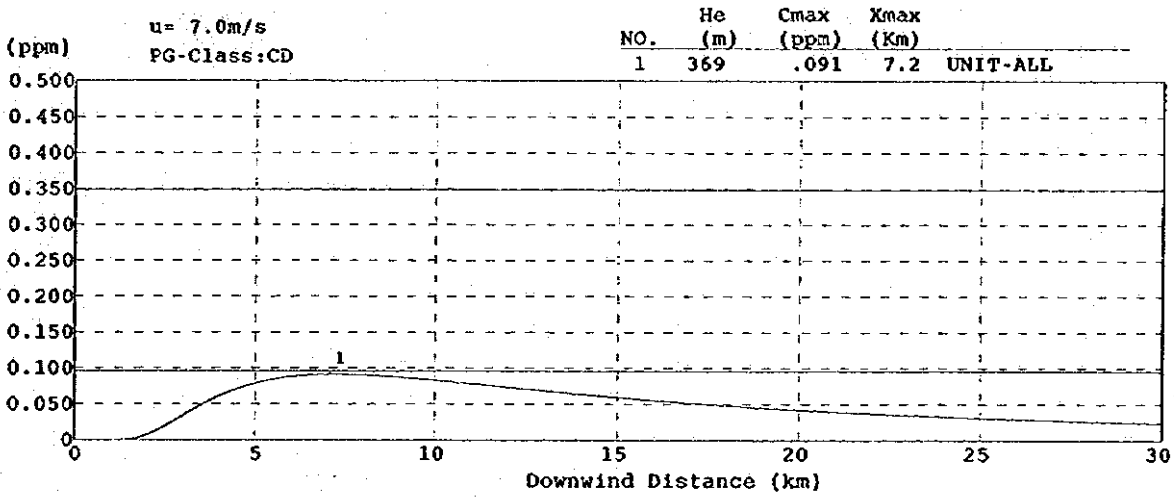


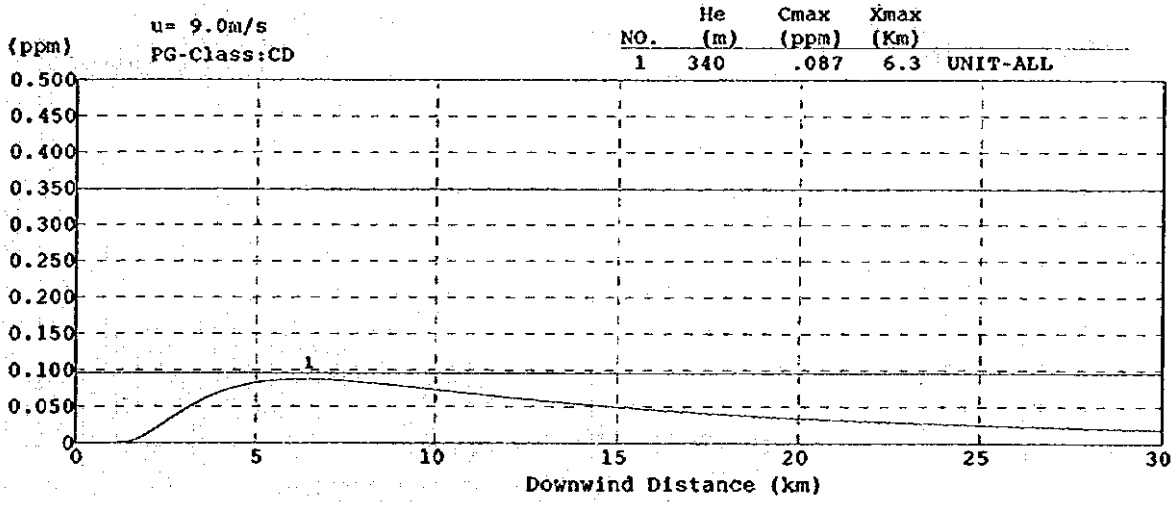


CONCAWE & Plume (SO2)

Jorge Lacerda Power Station

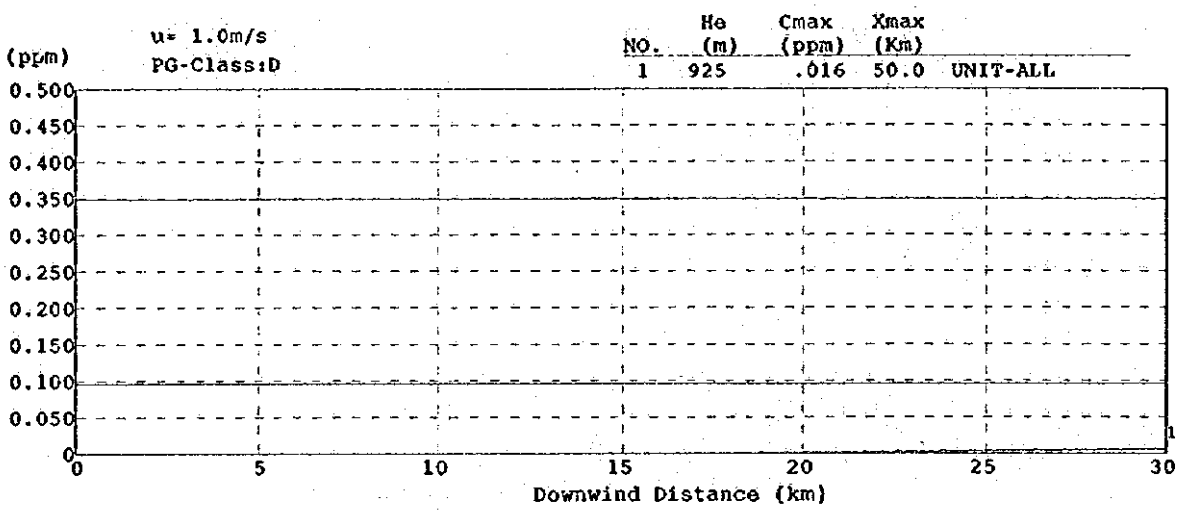


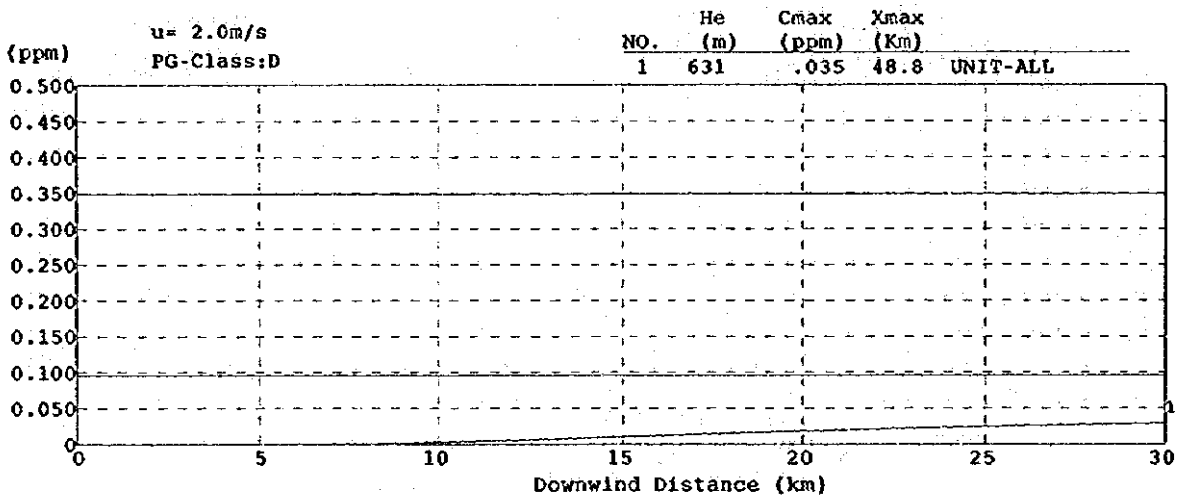


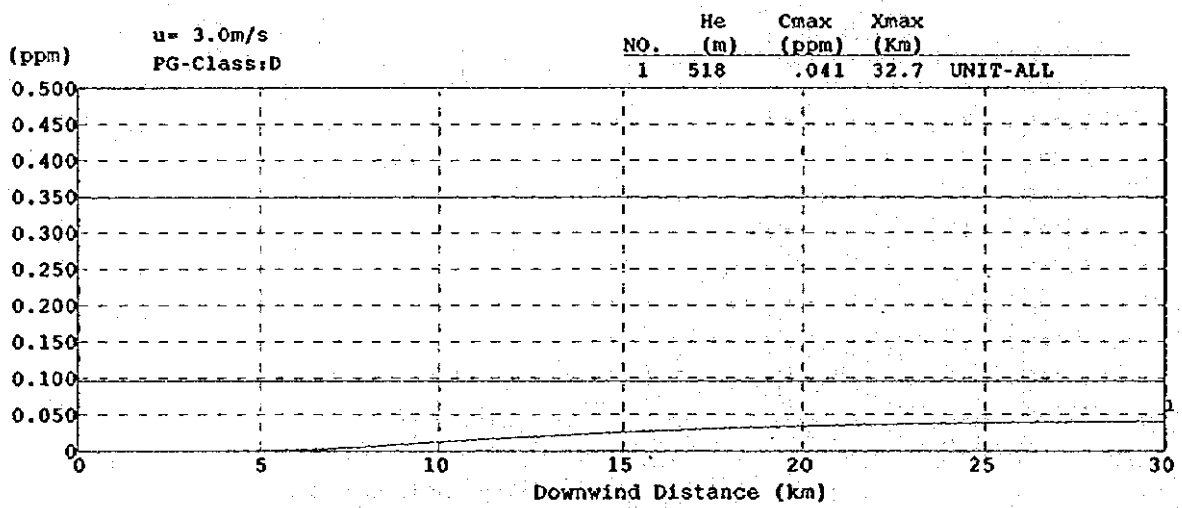


CONCAWE & Plume (SO2)

Jorge Lacerda Power Station

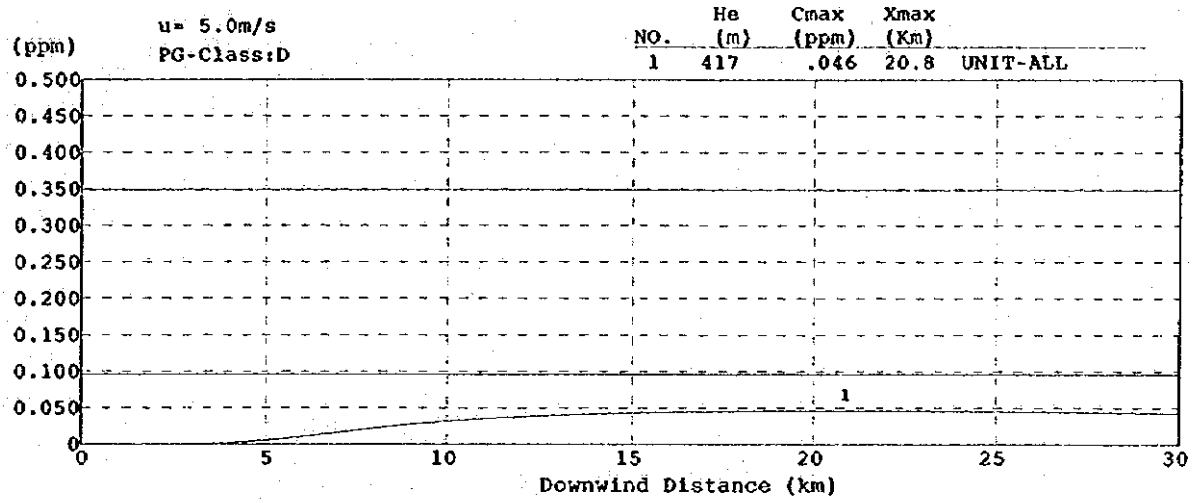


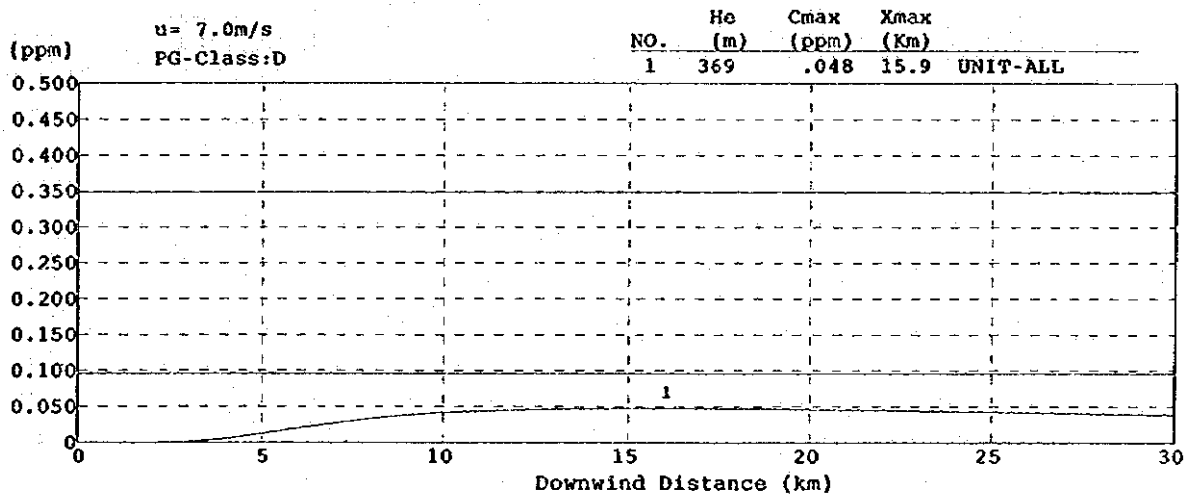


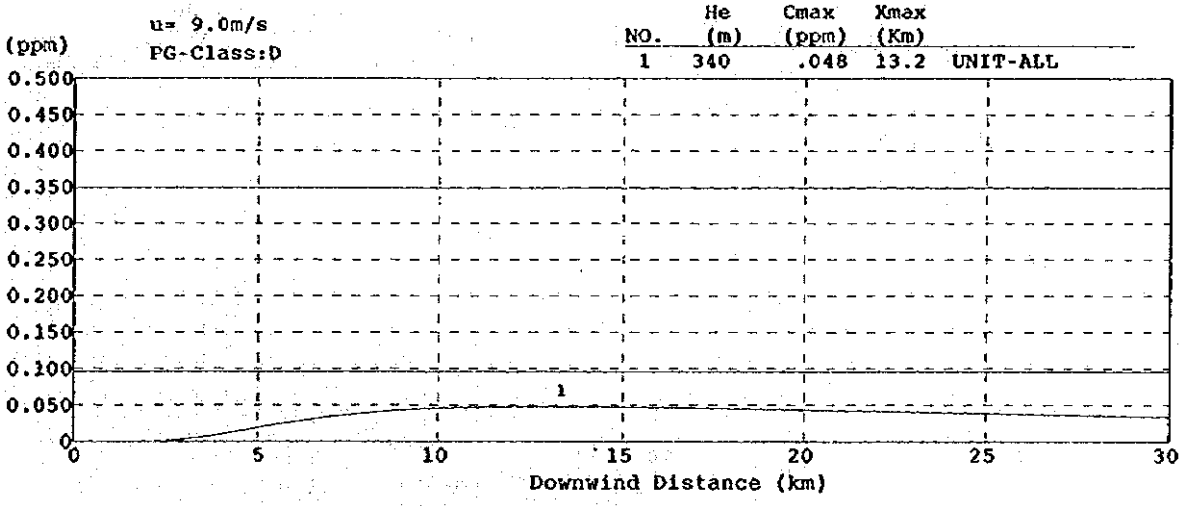


CONCAWE & Plume (SO2)

Jorge Lacerda Power Station

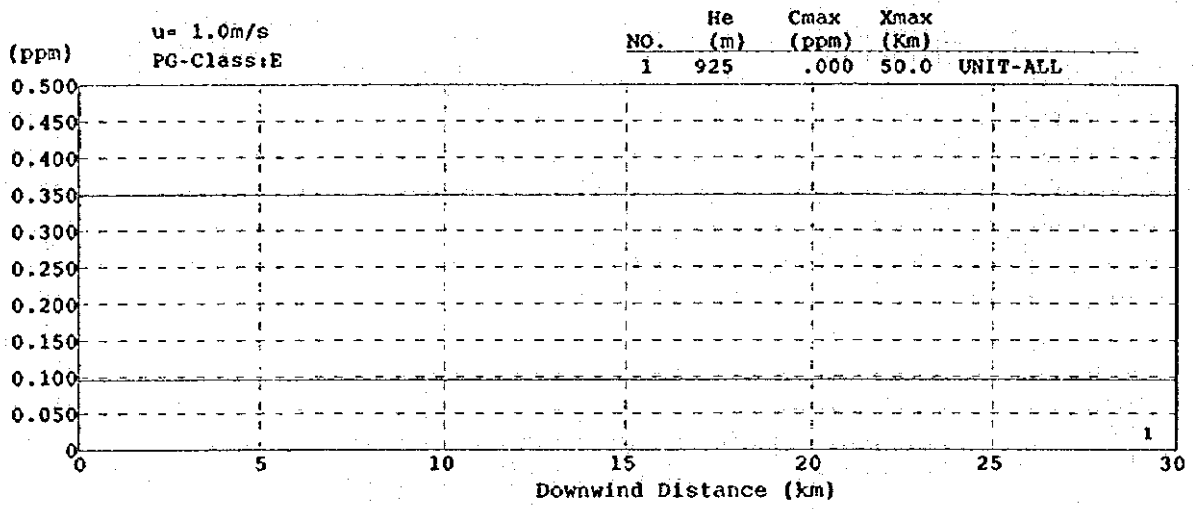


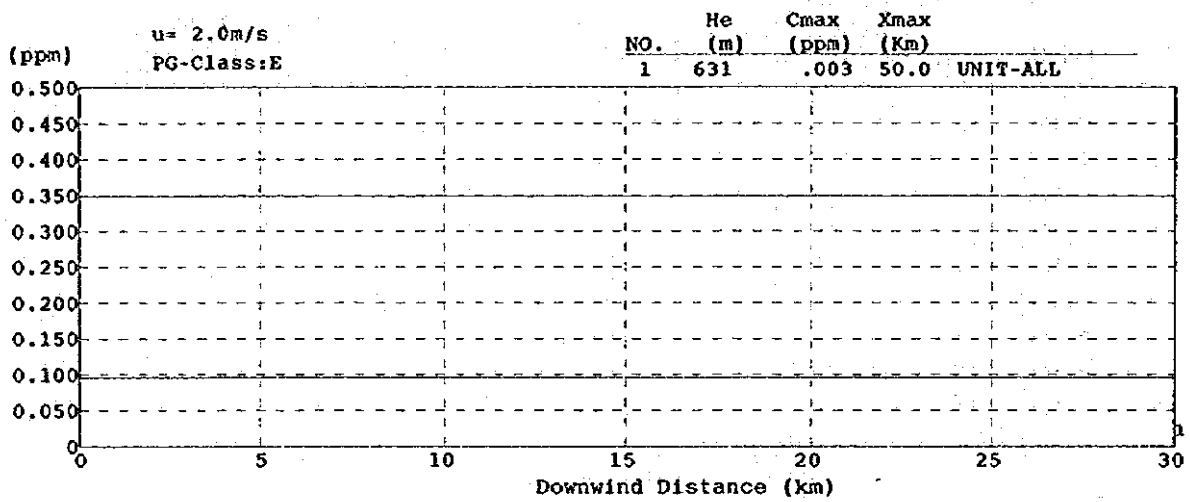


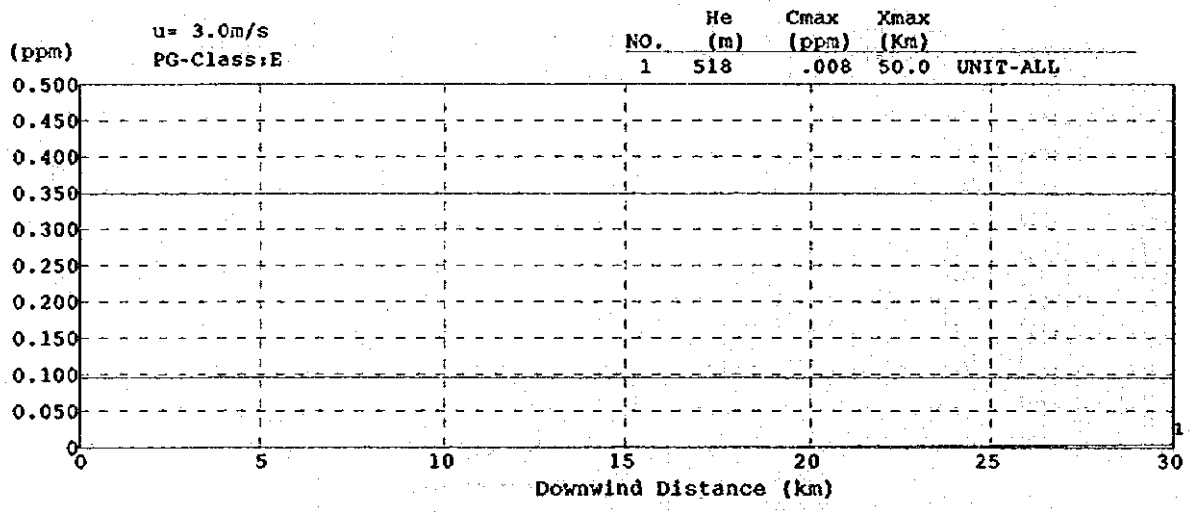


CONCAWE & Plume (SO2)

Jorge Lacerda Power Station

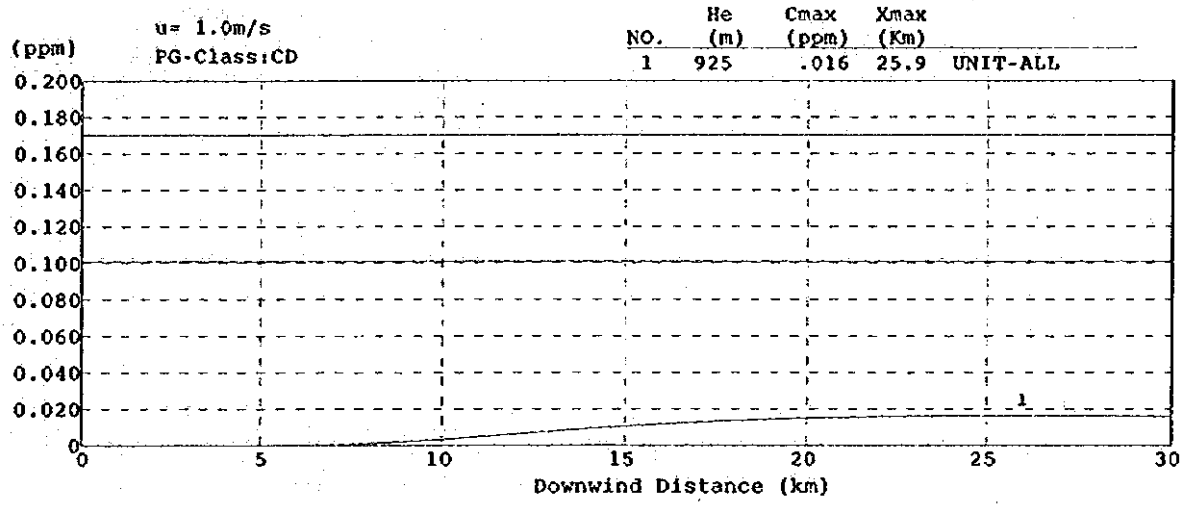


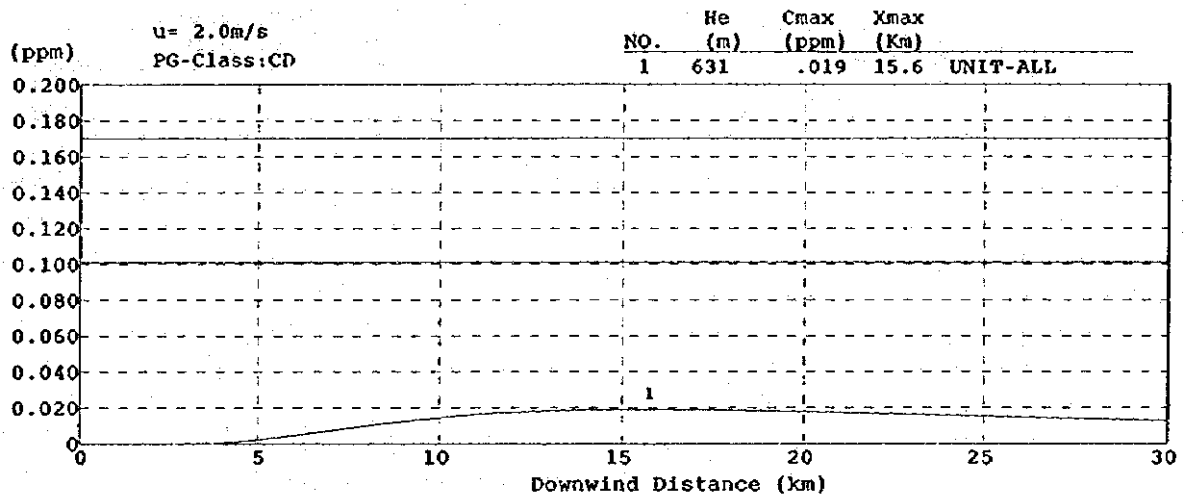


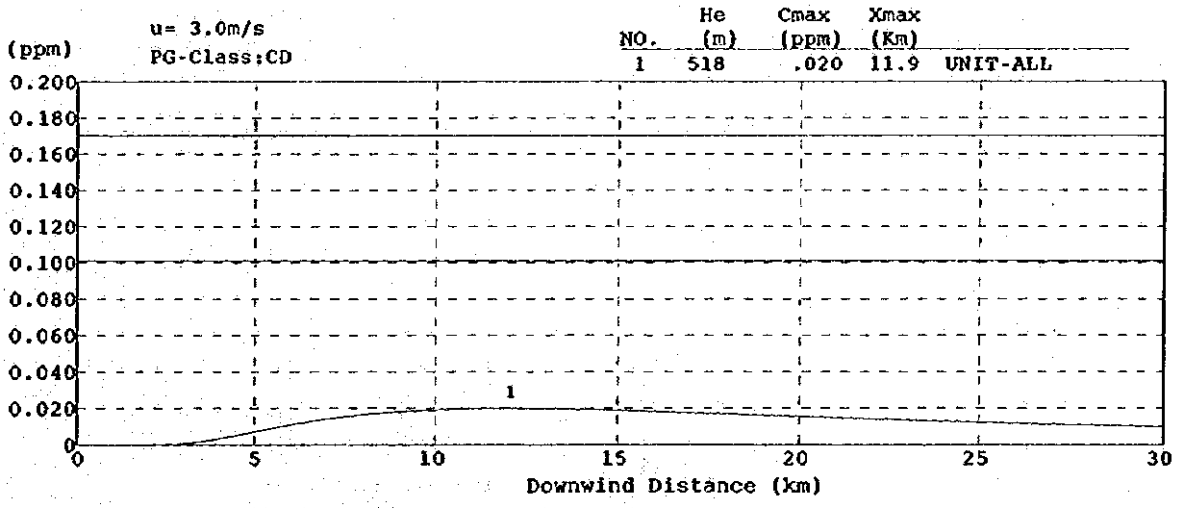


CONCAWE & Plume (SO2)

Jorge Lacerda Power Station

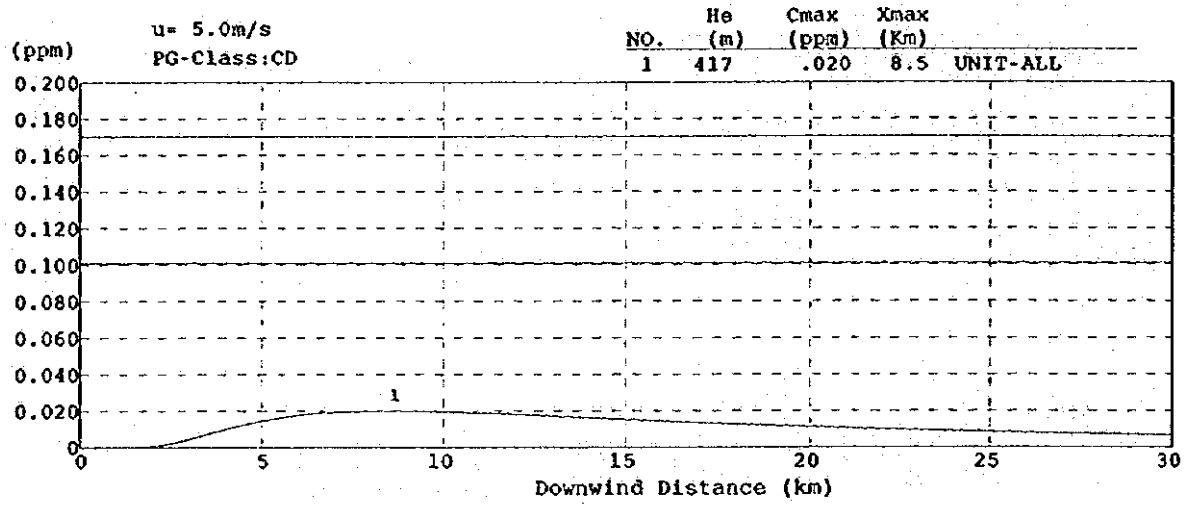


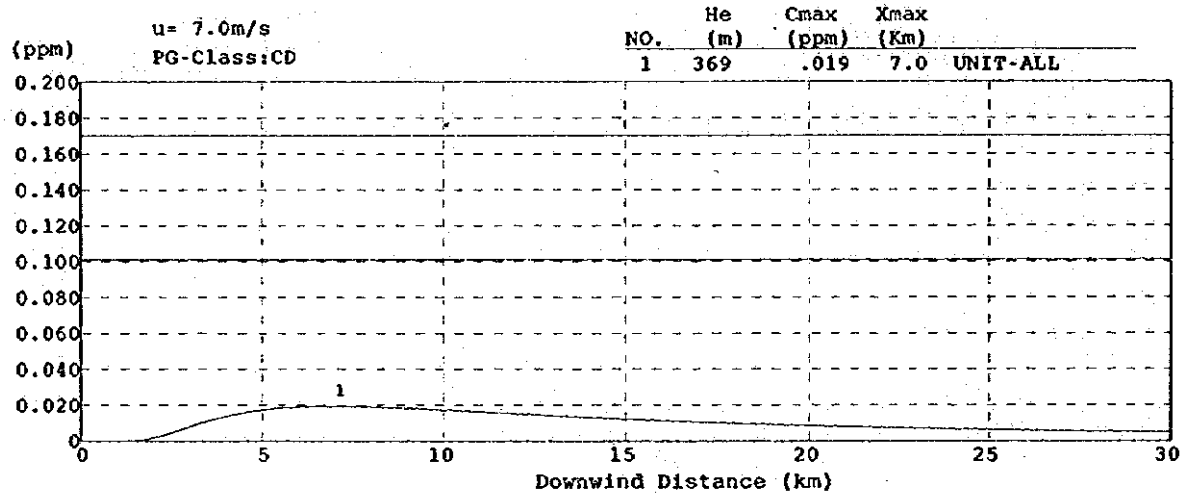


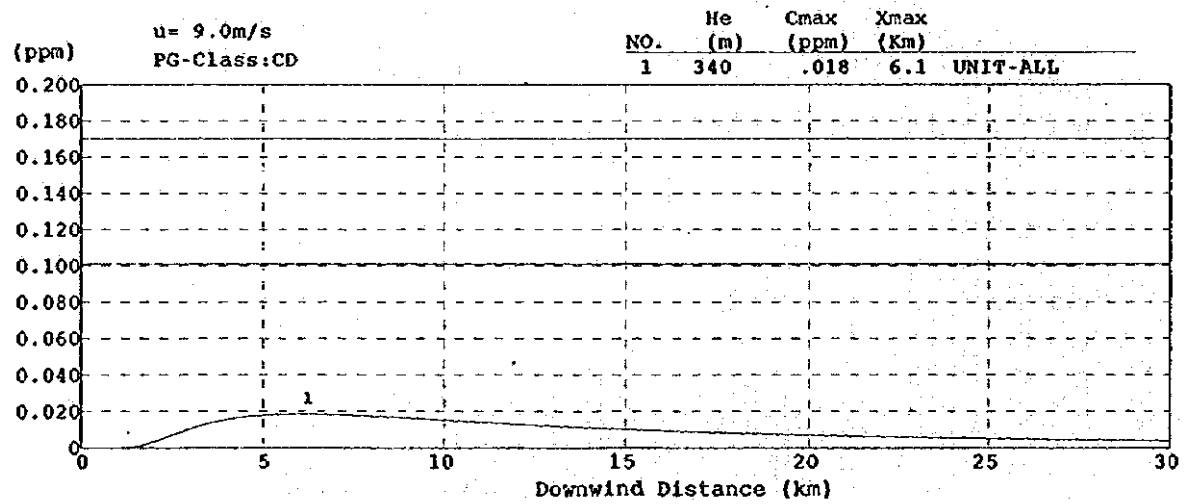


CONCAWE & Plume (NO2)

Jorge Lacerda Power Station

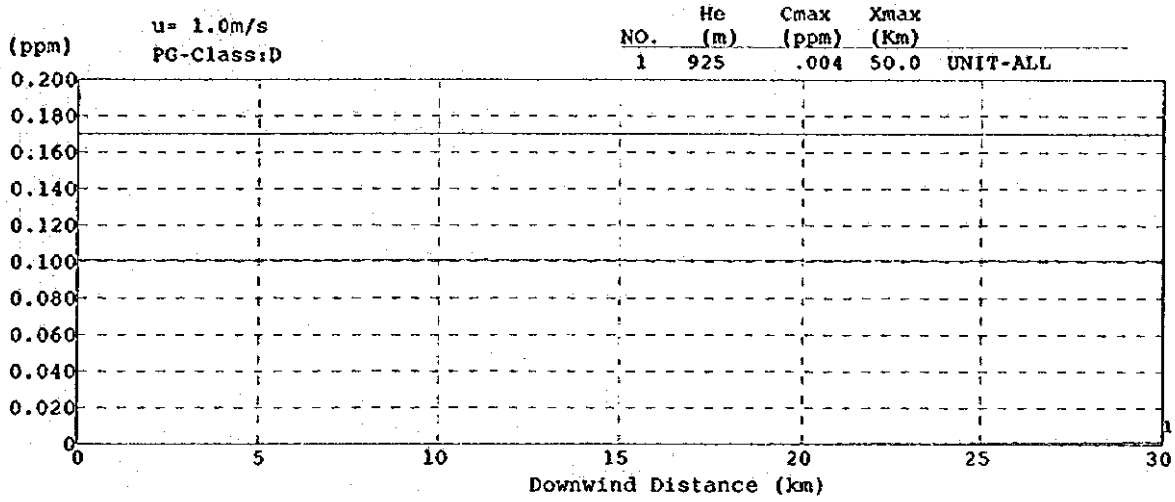


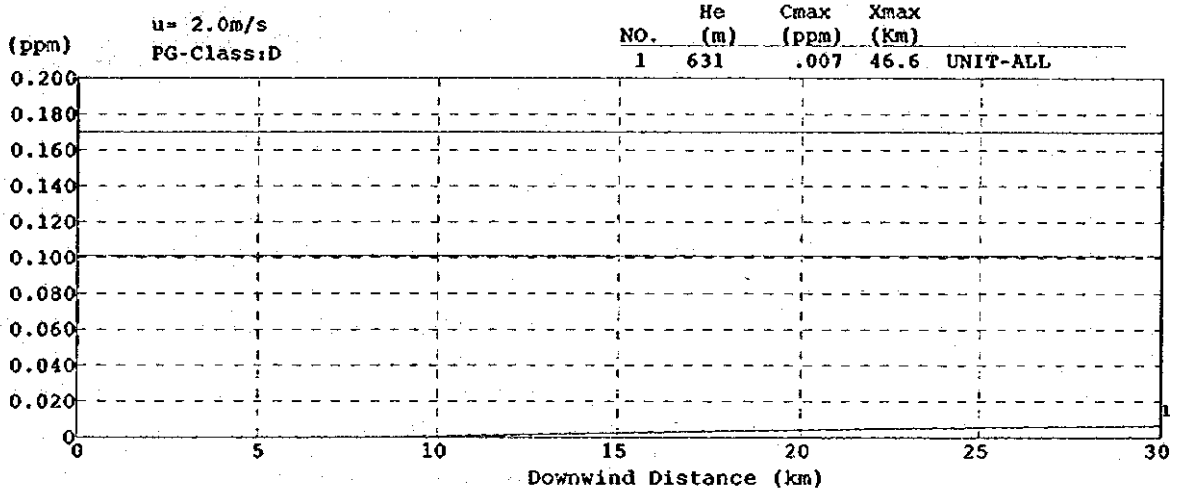


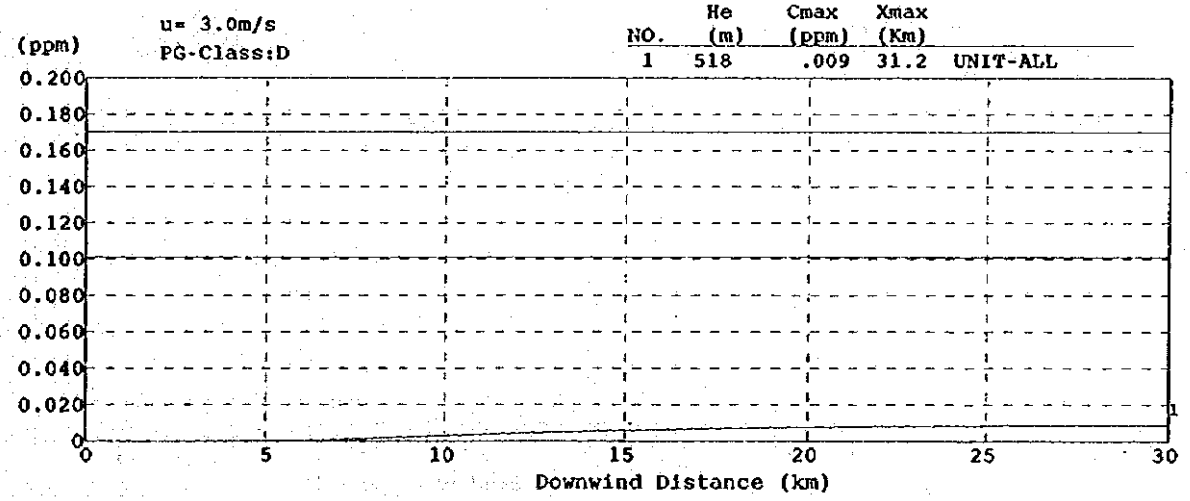


CONCAWE & Plume (NO2)

Jorge Lacerda Power Station

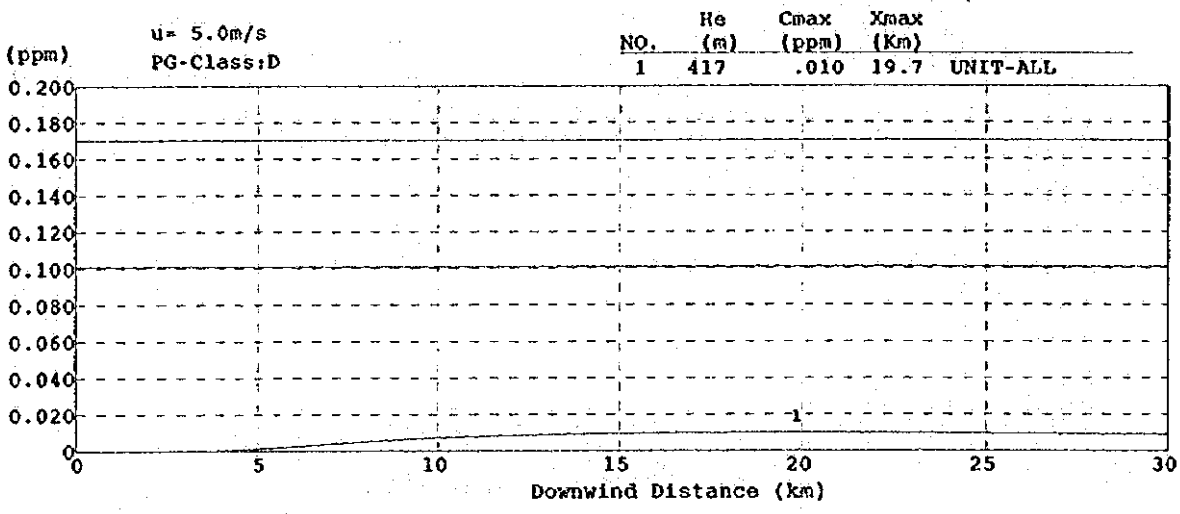


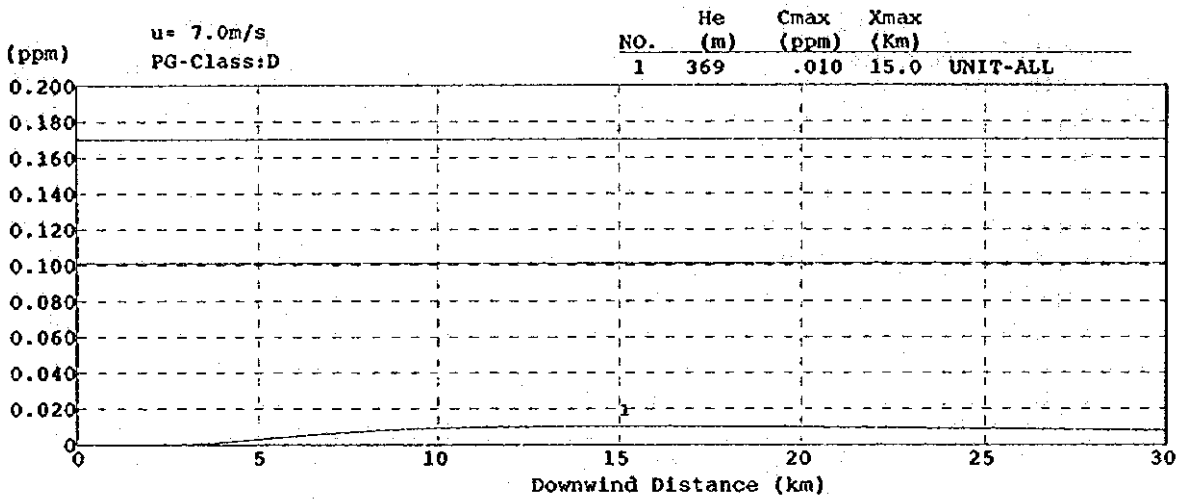


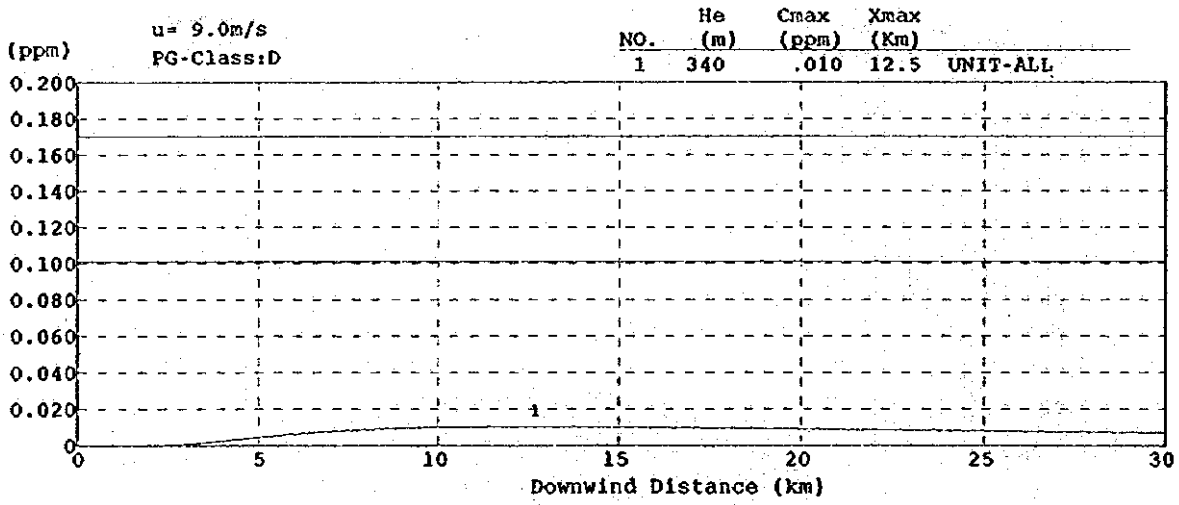


CONCAWE & Plume (NO2)

Jorge Lacerda Power Station

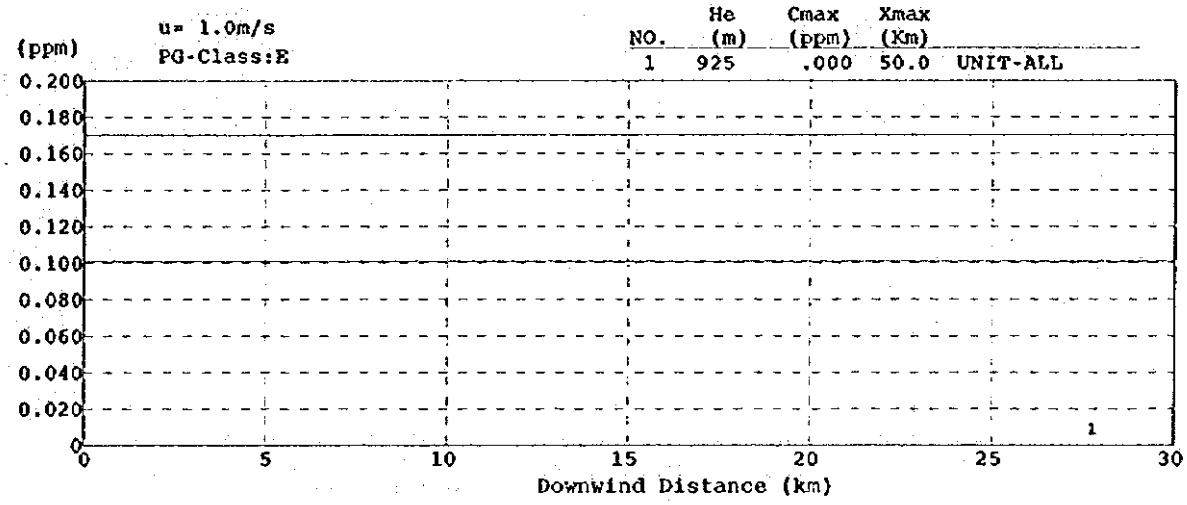


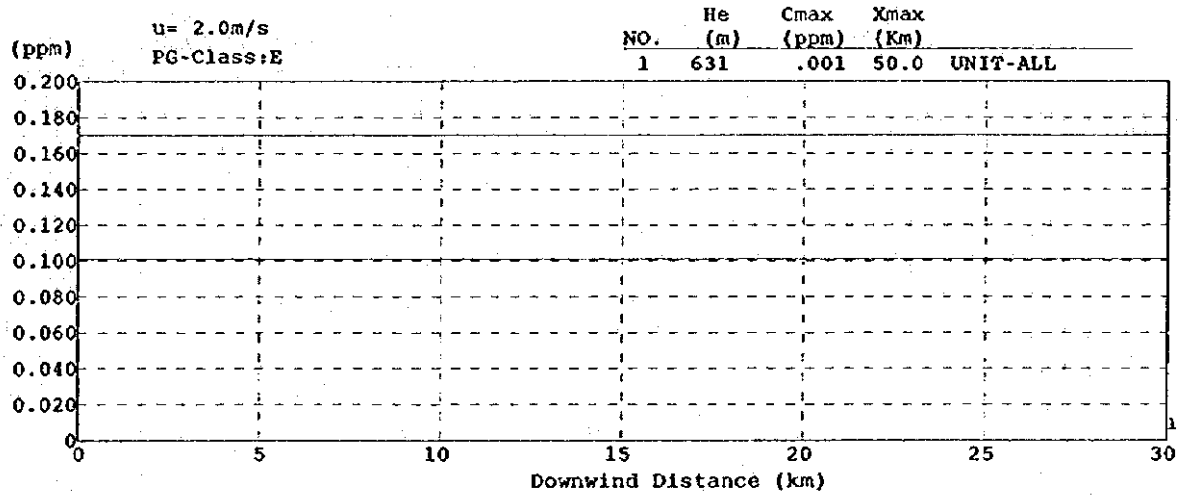


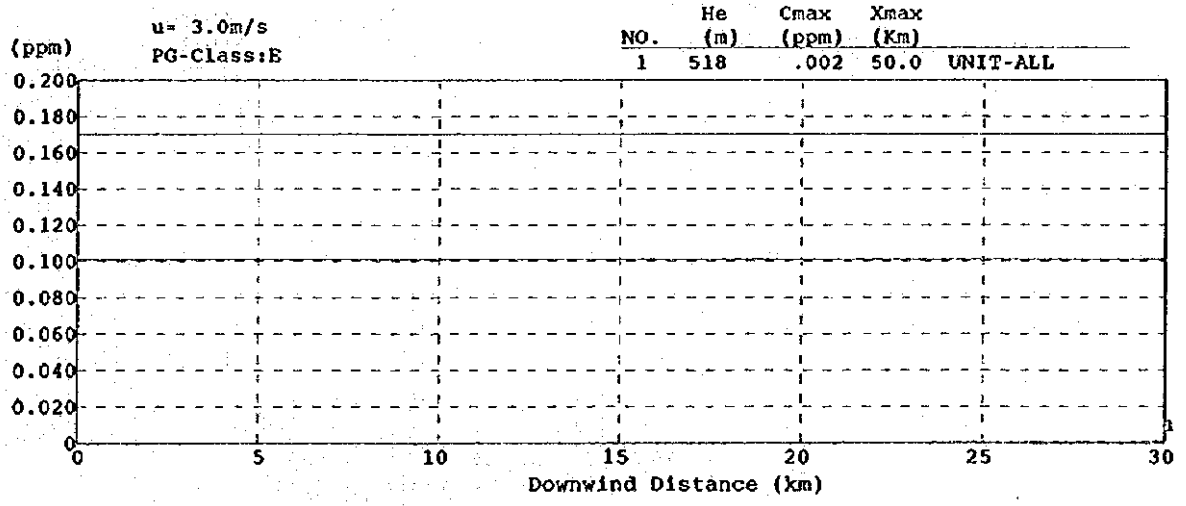


CONCAWE & Plume (NO2)

Jorge Lacerda Power Station

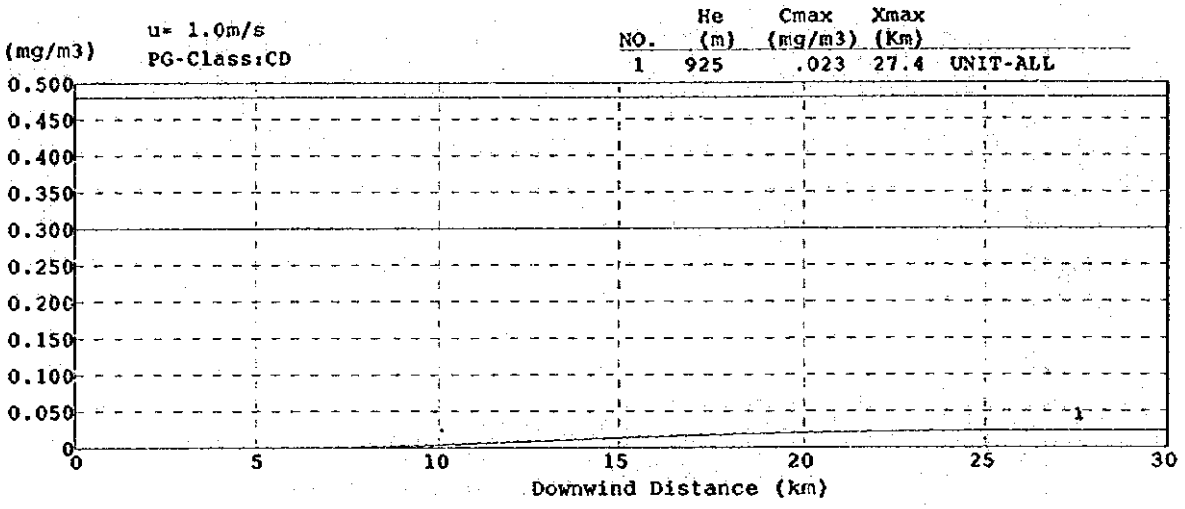


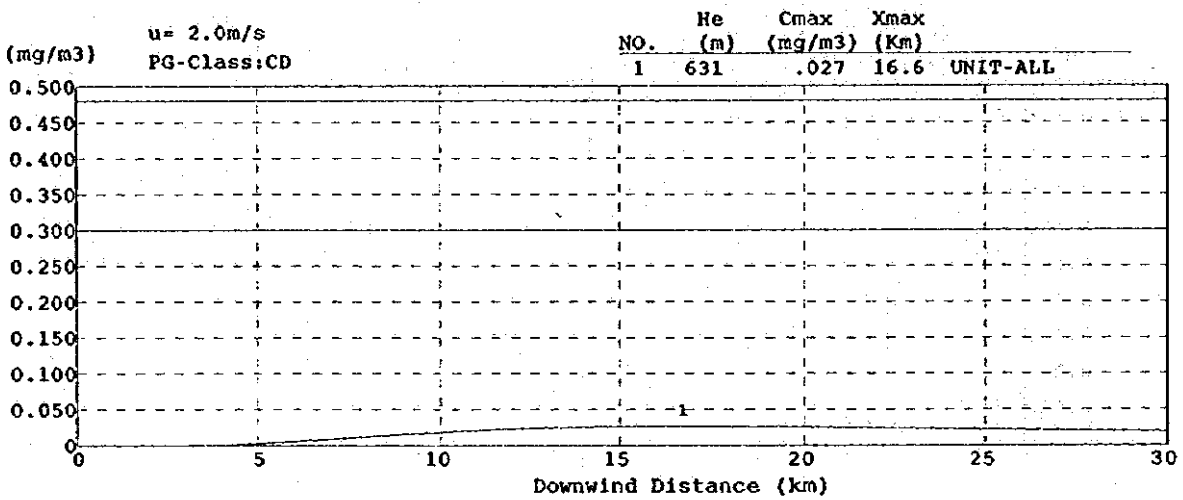


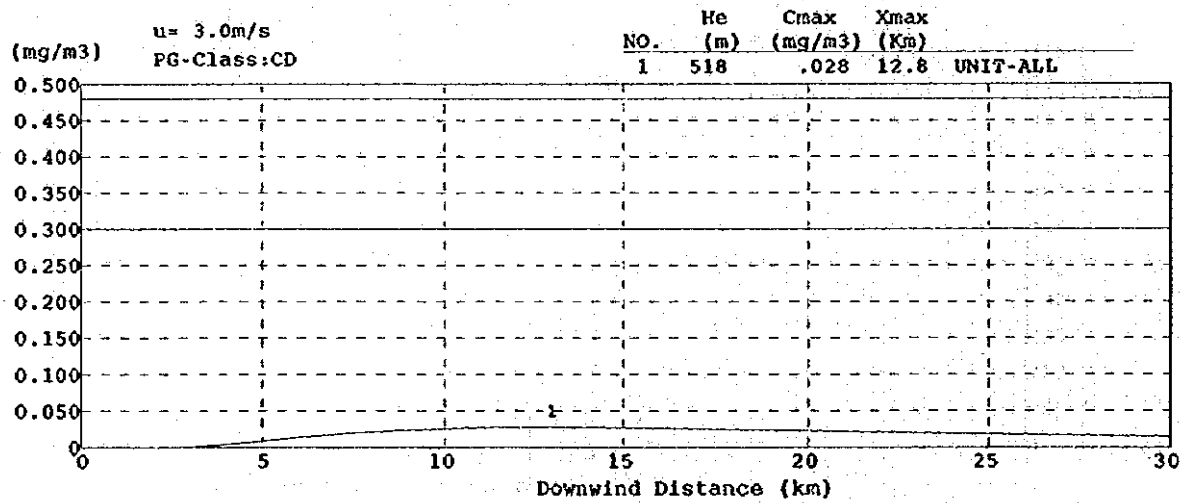


CONCAWE & Plume (NO2)

Jorge Lacerda Power Station

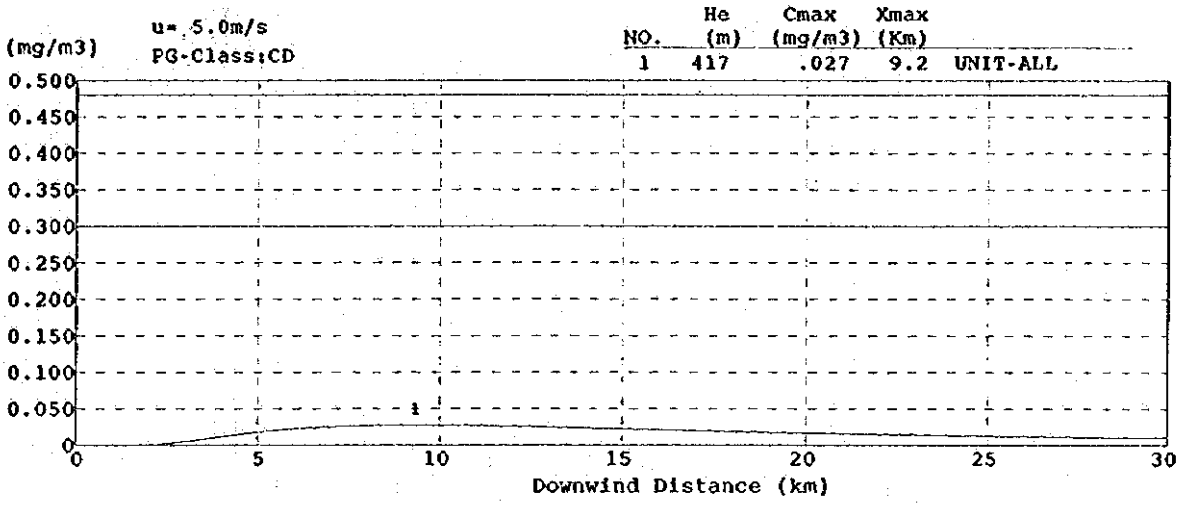


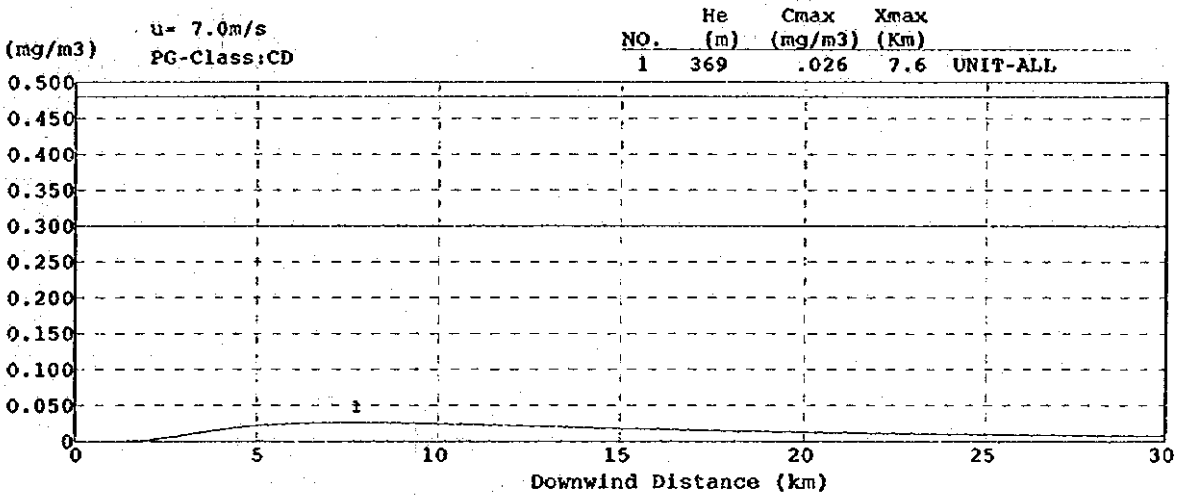


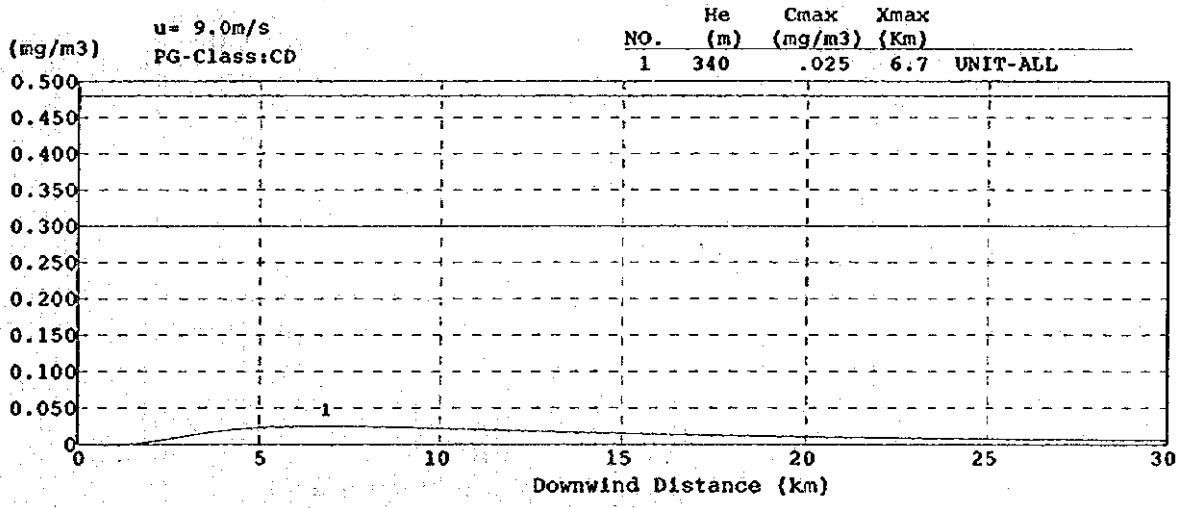


CONCAWE & Plume (Dust)

Jorge Lacerda Power Station

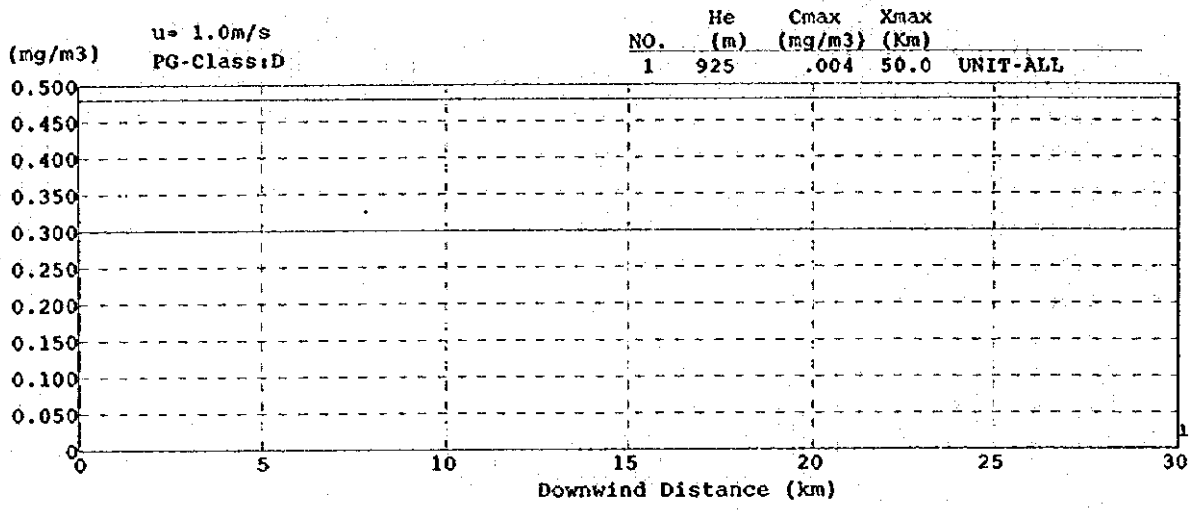


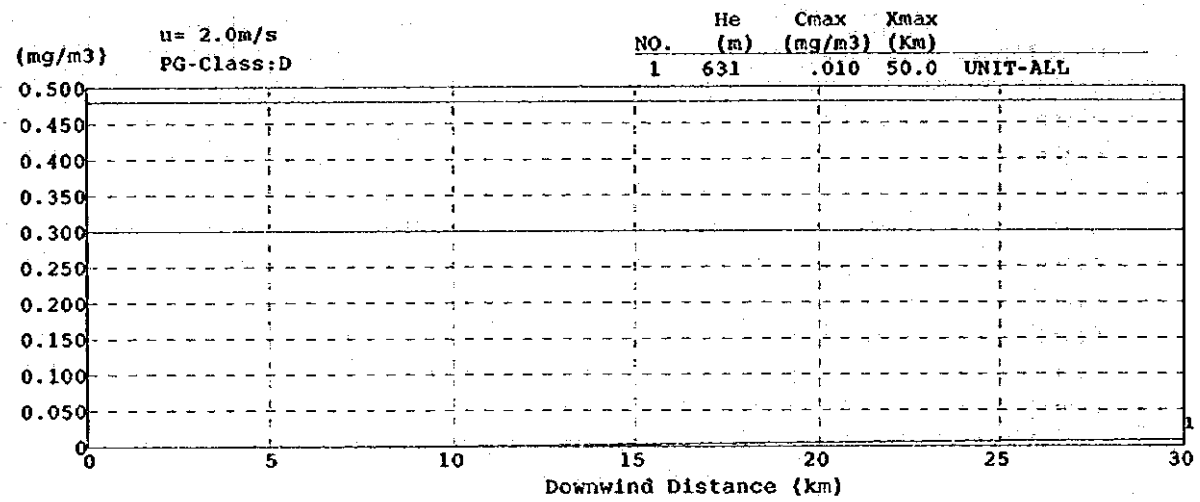


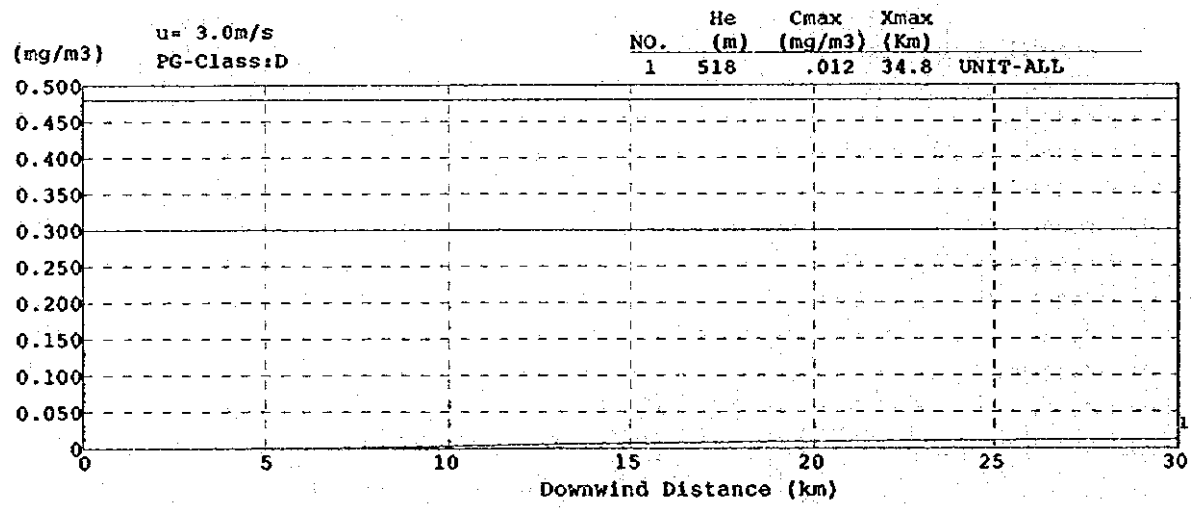


CONCAWE & Plume (Dust)

Jorge Lacerda Power Station

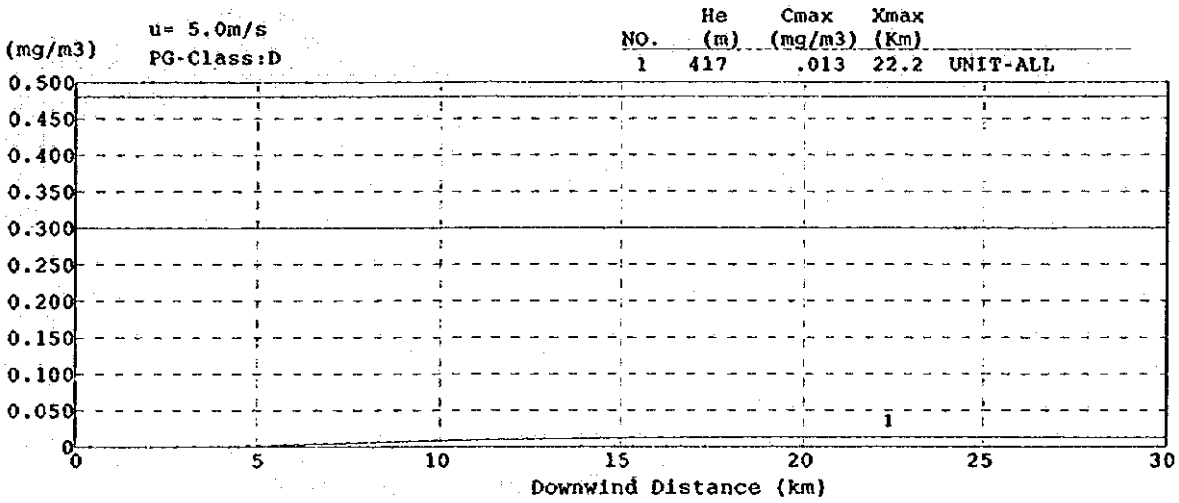


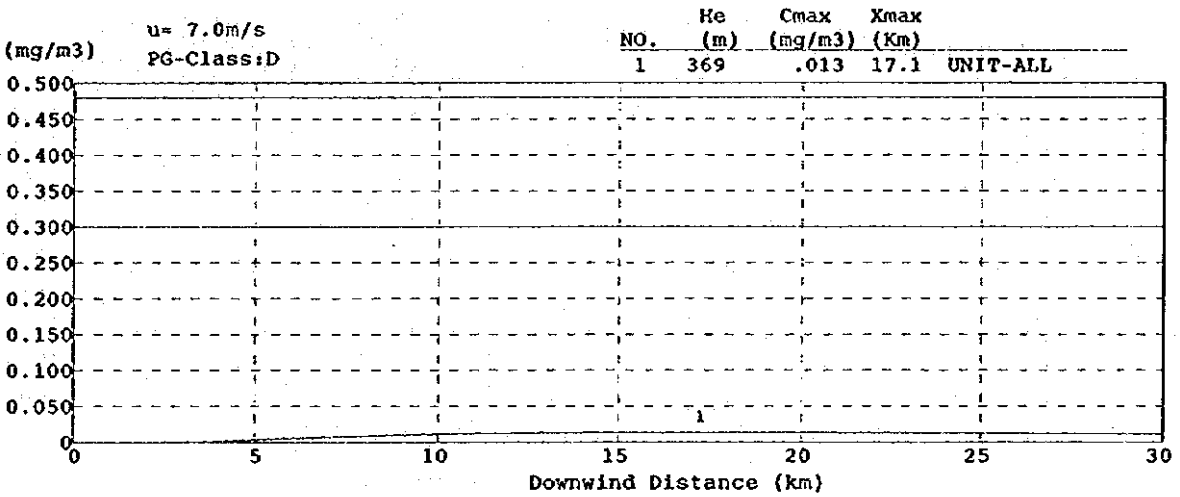


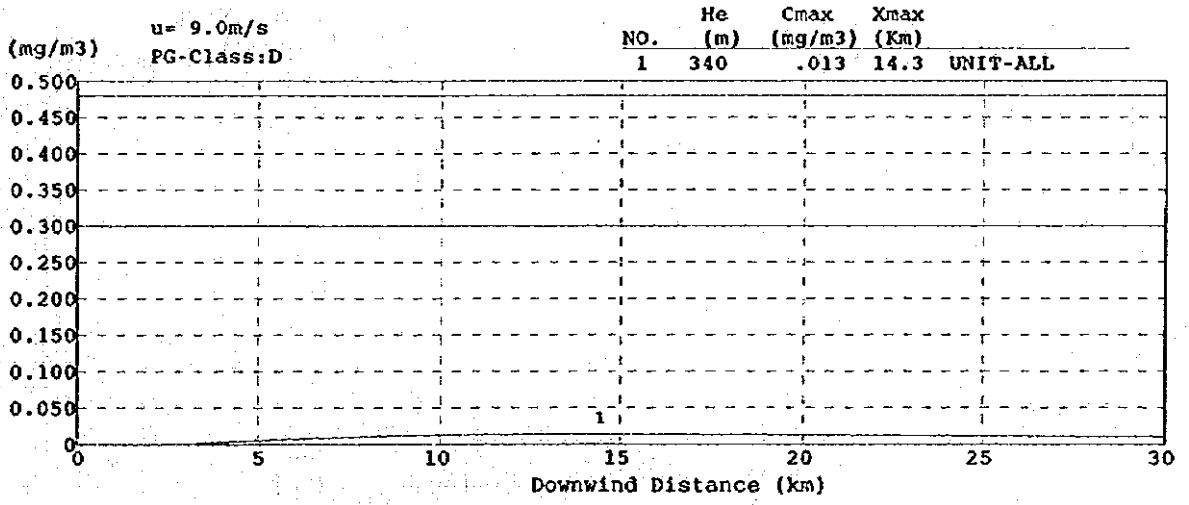


CONCAWE & Plume (Dust)

Jorge Lacerda Power Station

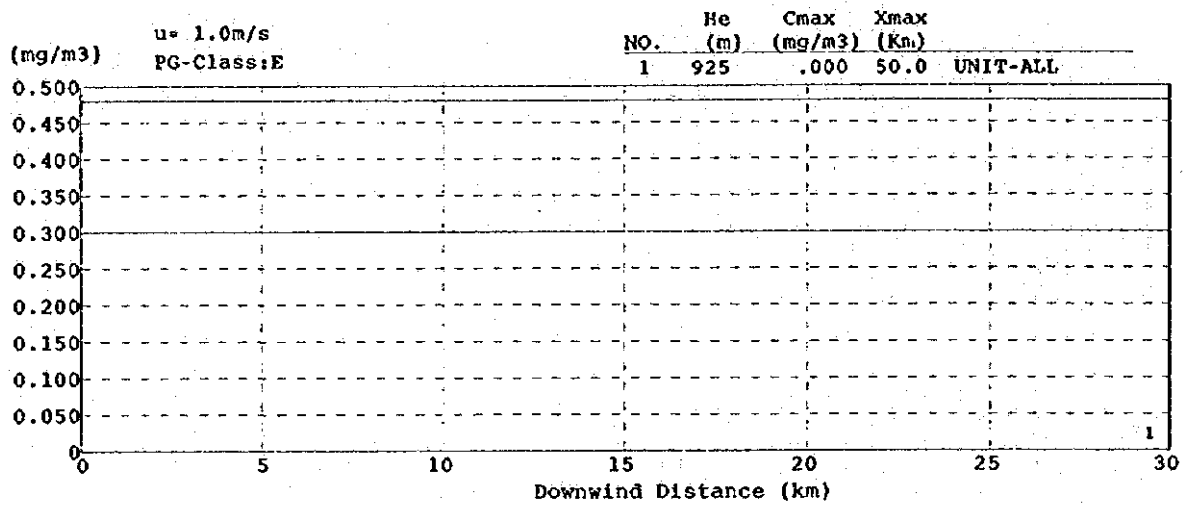


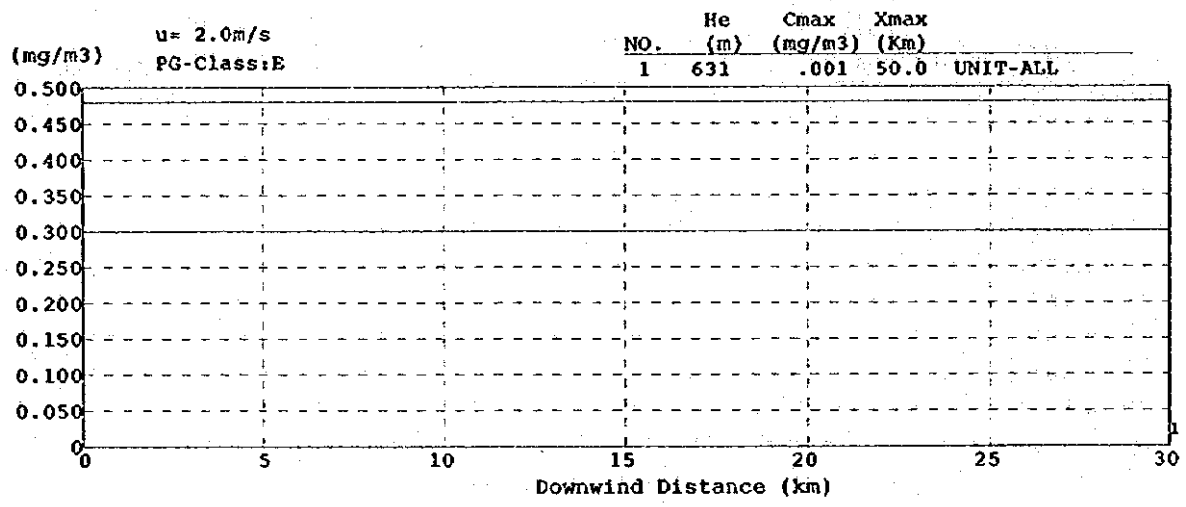


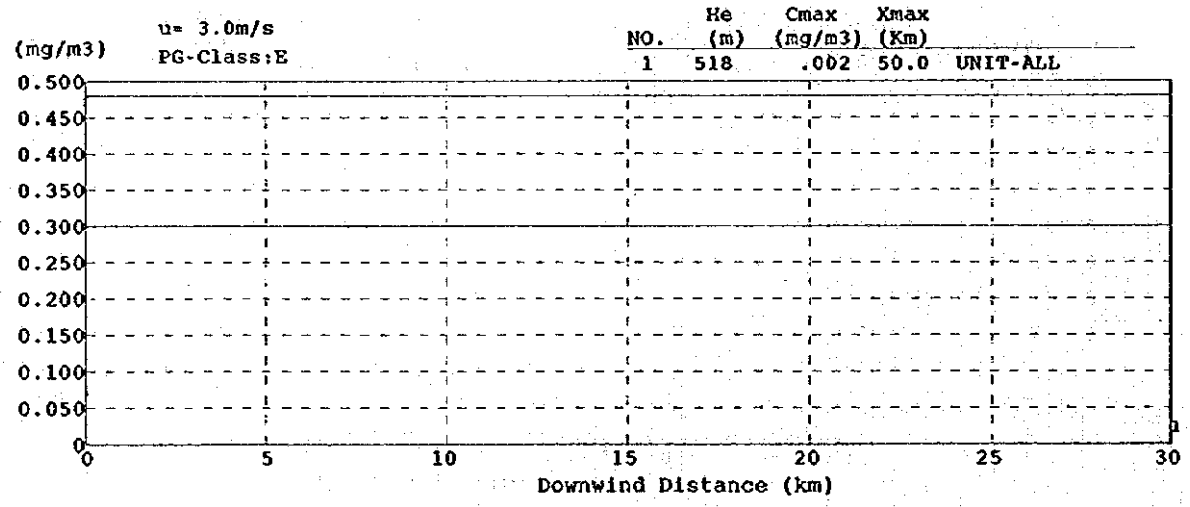


CONCAWE & Plume (Dust)

Jorge Lacerda Power Station

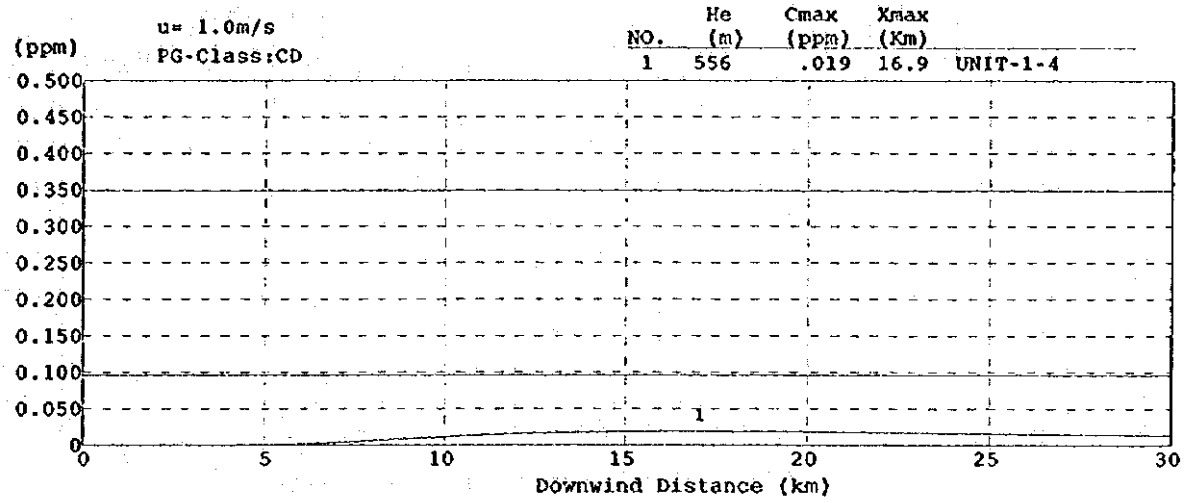


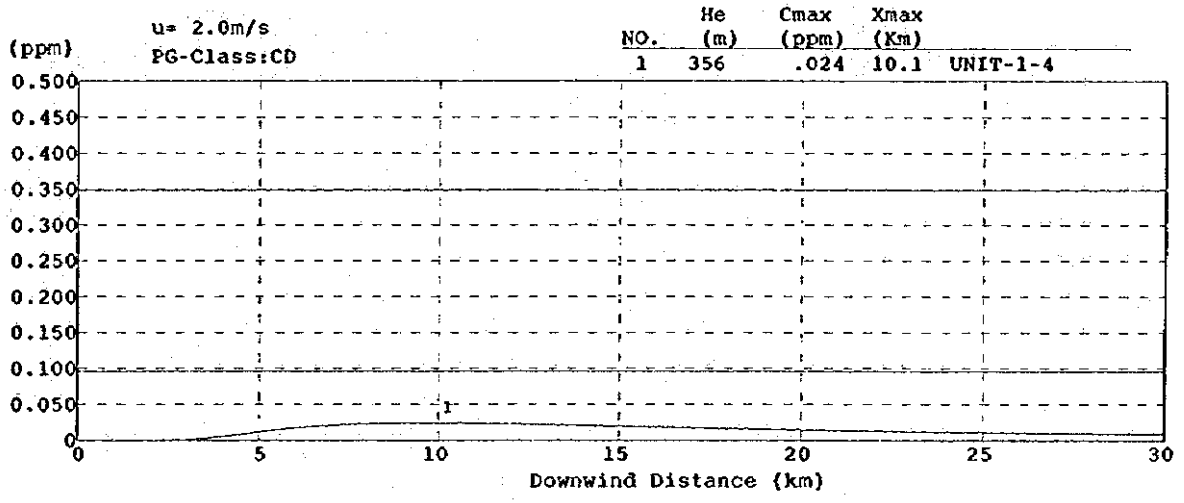


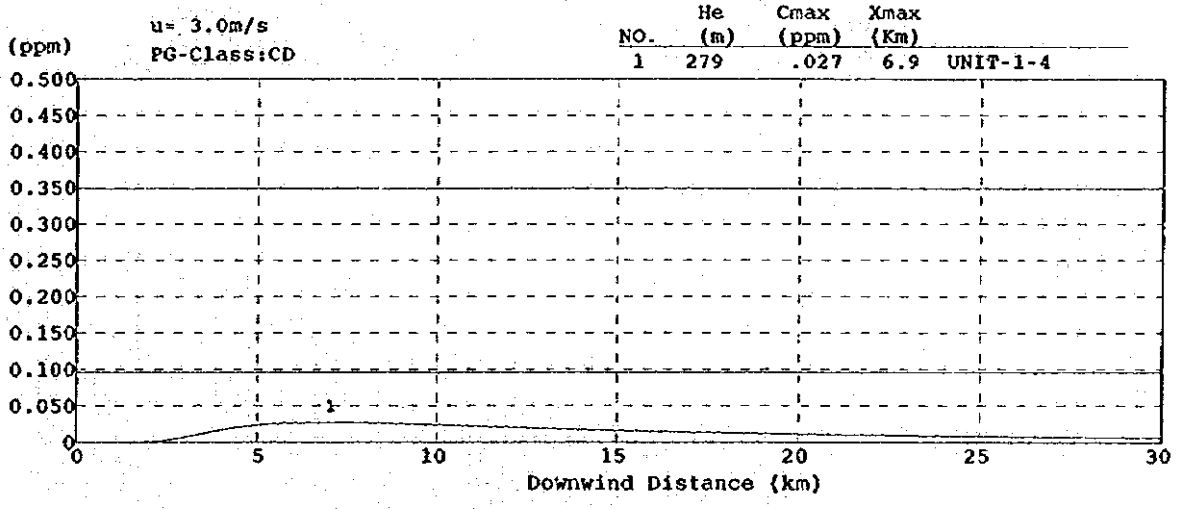


CONCAWE & Plume (Dust)

Jorge Lacerda Power Station

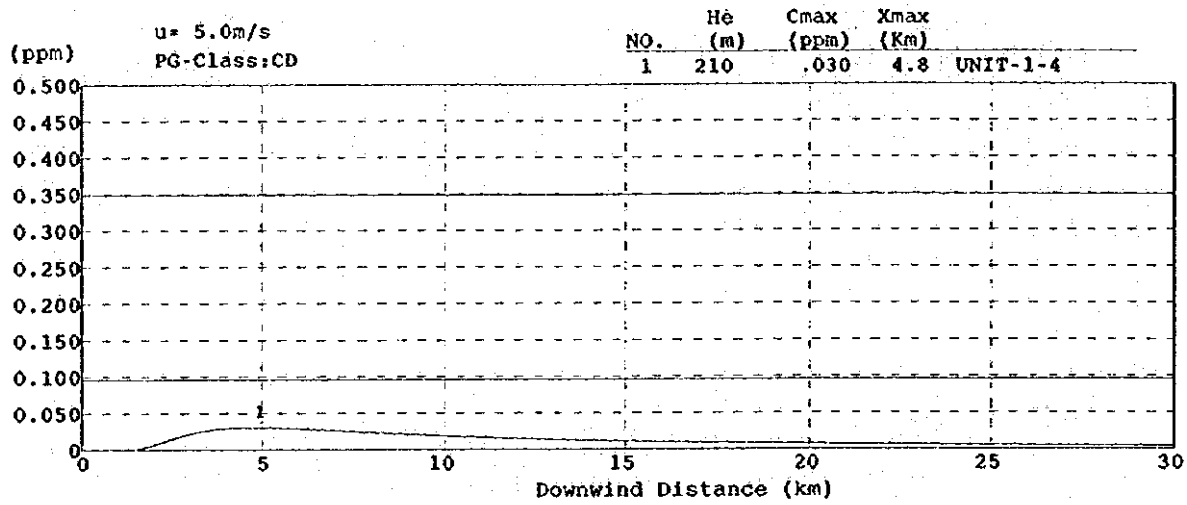


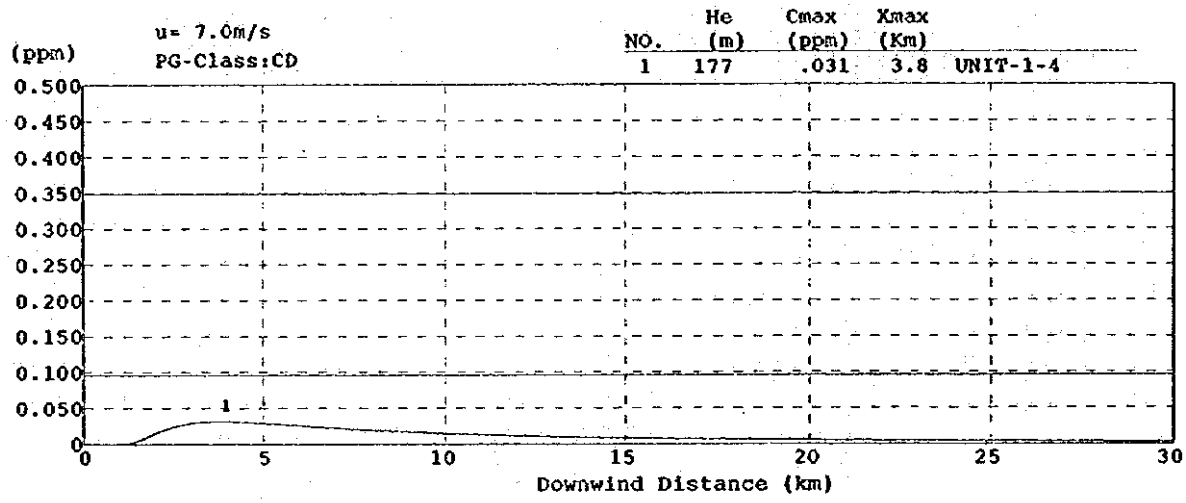


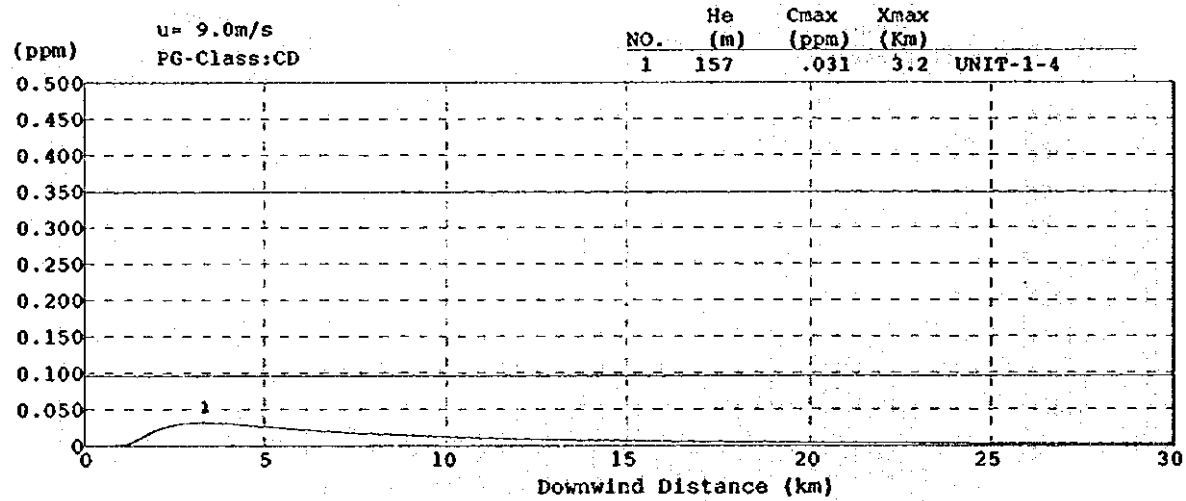


CONCAWE & Plume (SO2)

Charqueadas Power Station (Present)

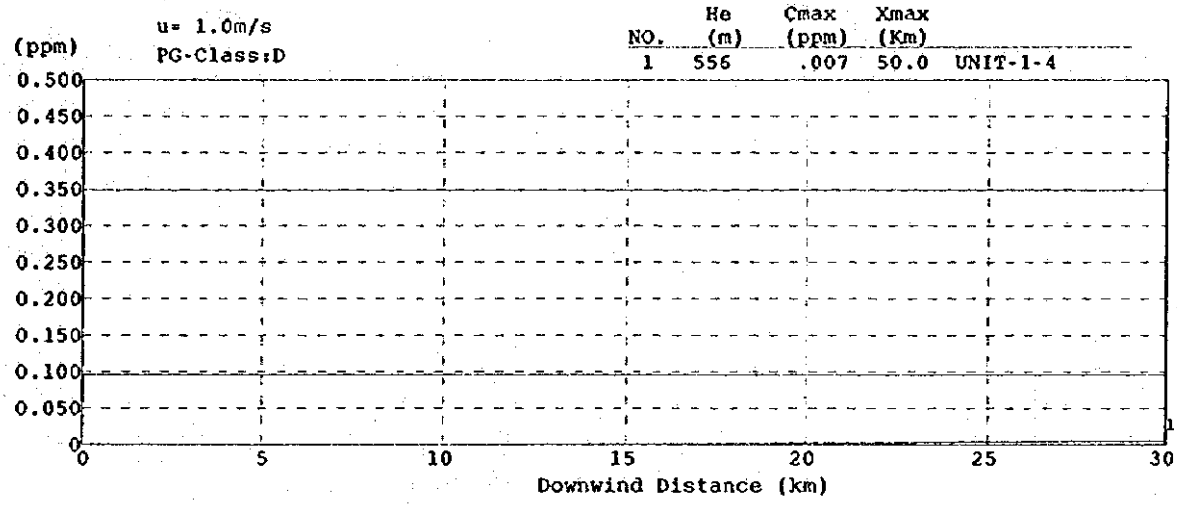


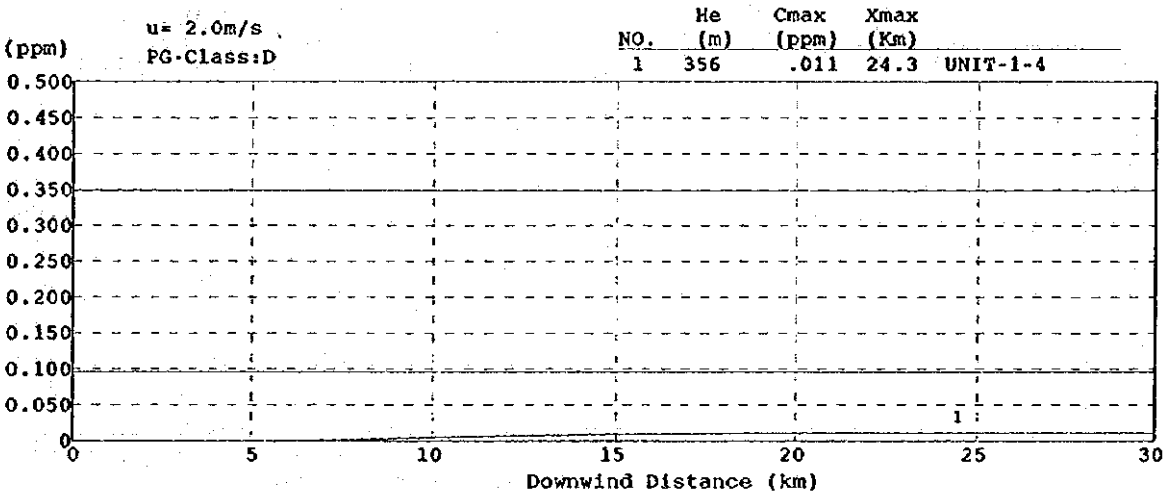


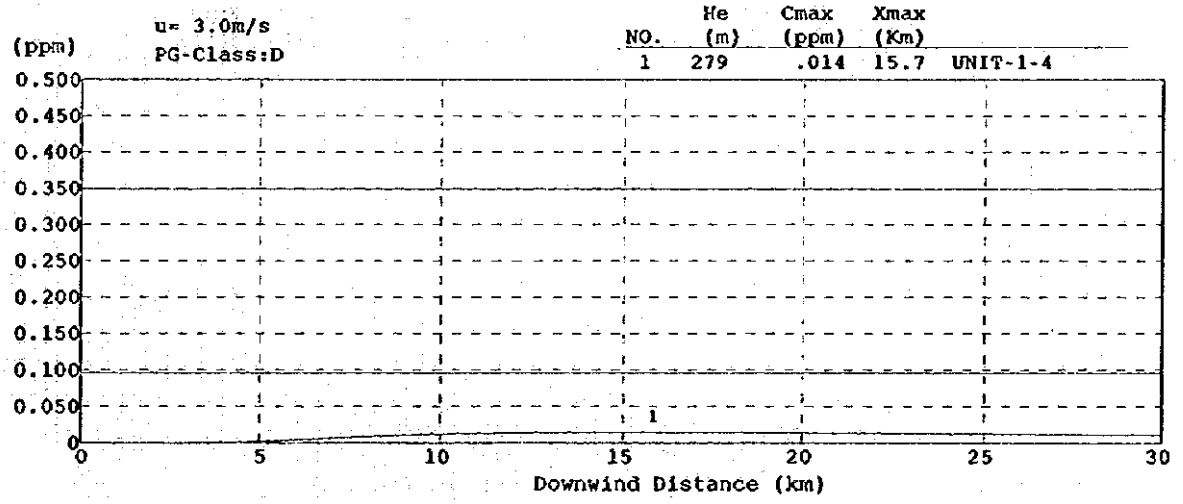


CONCAWE & Plume (SO2)

Charqueadas Power Station (Present)

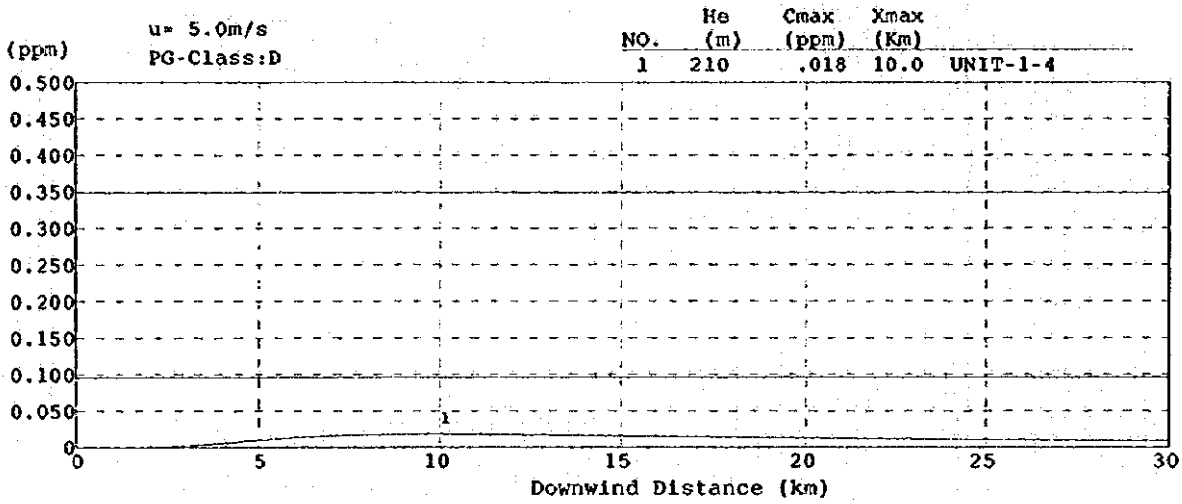


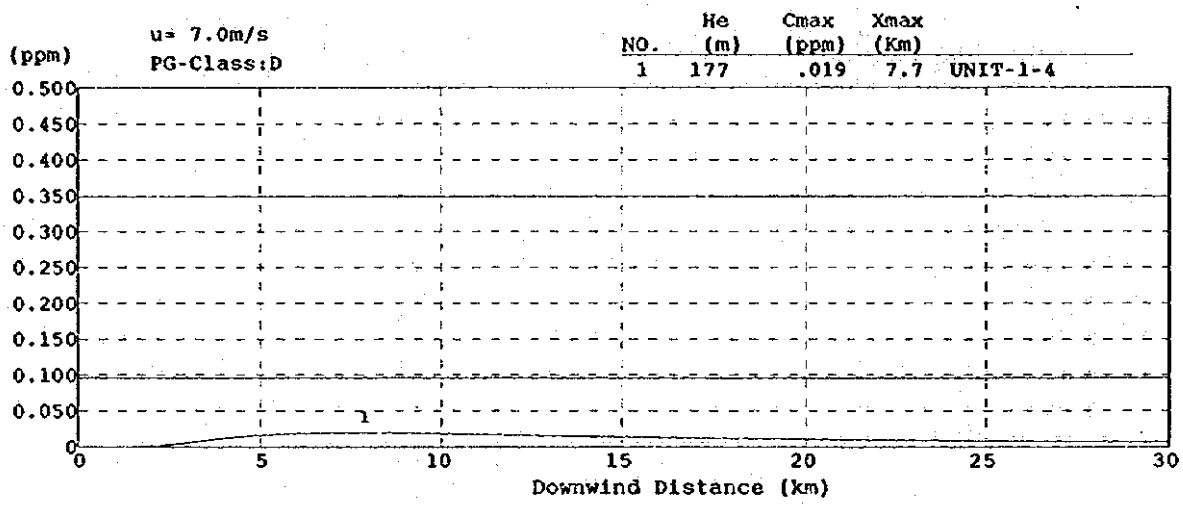


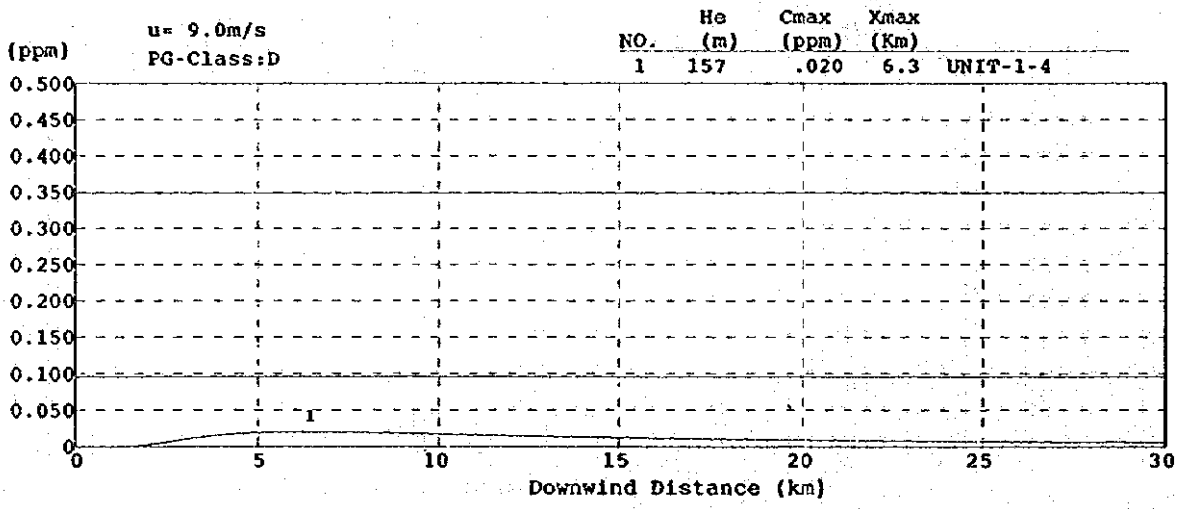


CONCAWE & Plume (SO2)

Charqueadas Power Station (Present)

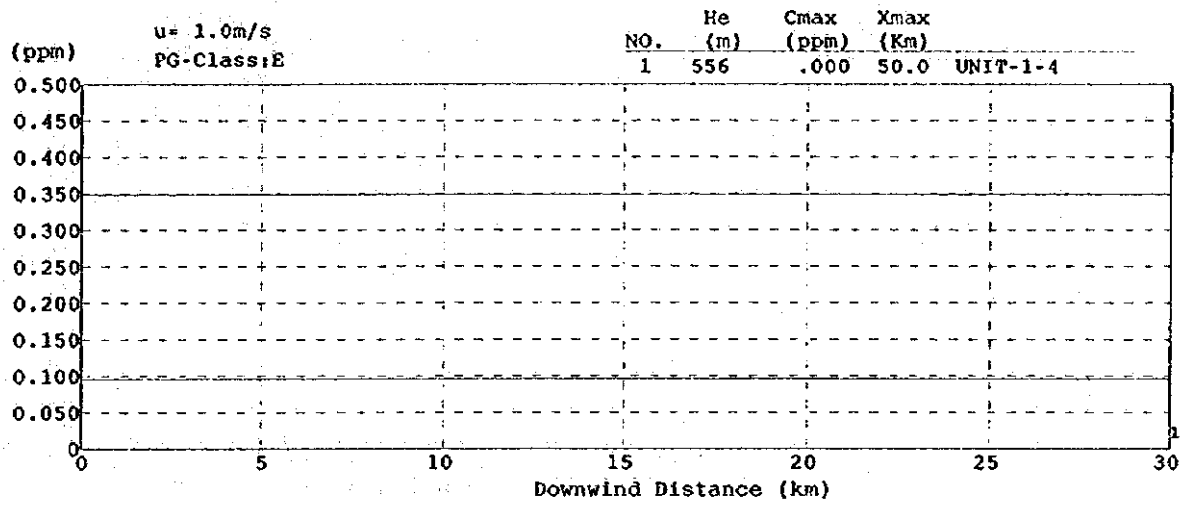


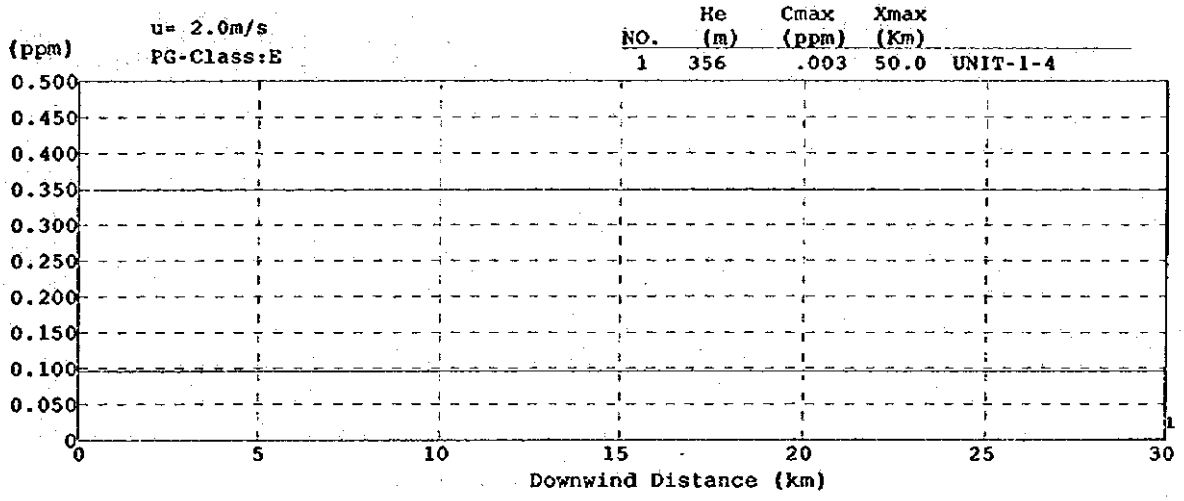


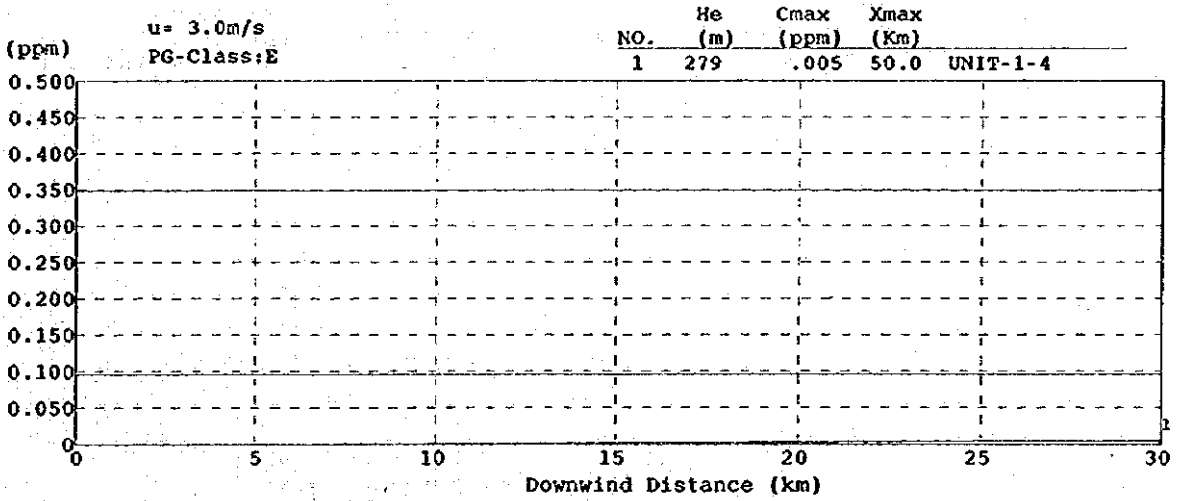


CONCAWE & Plume (SO2)

Charqueadas Power Station (Present)

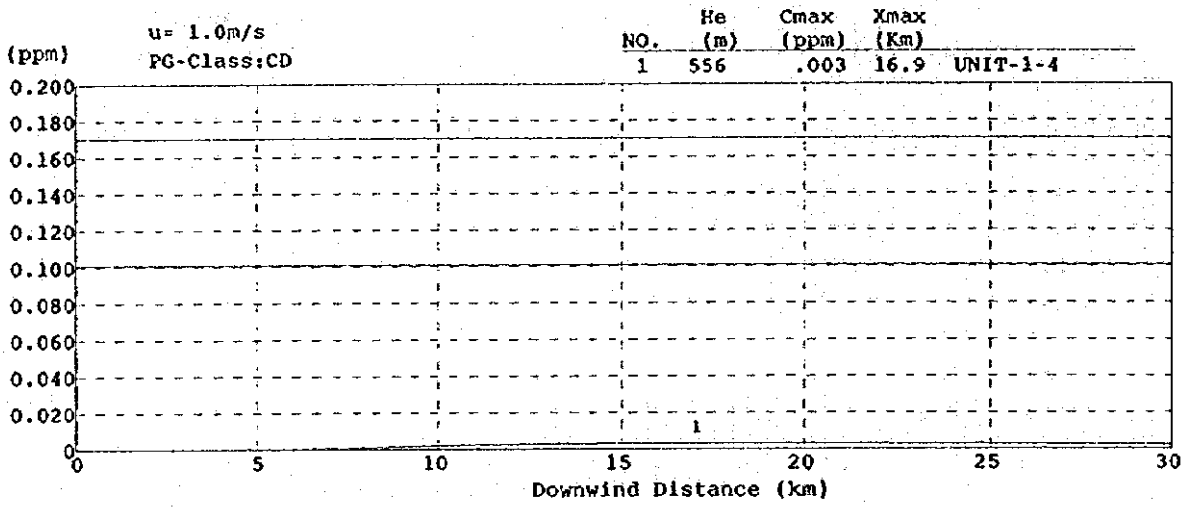


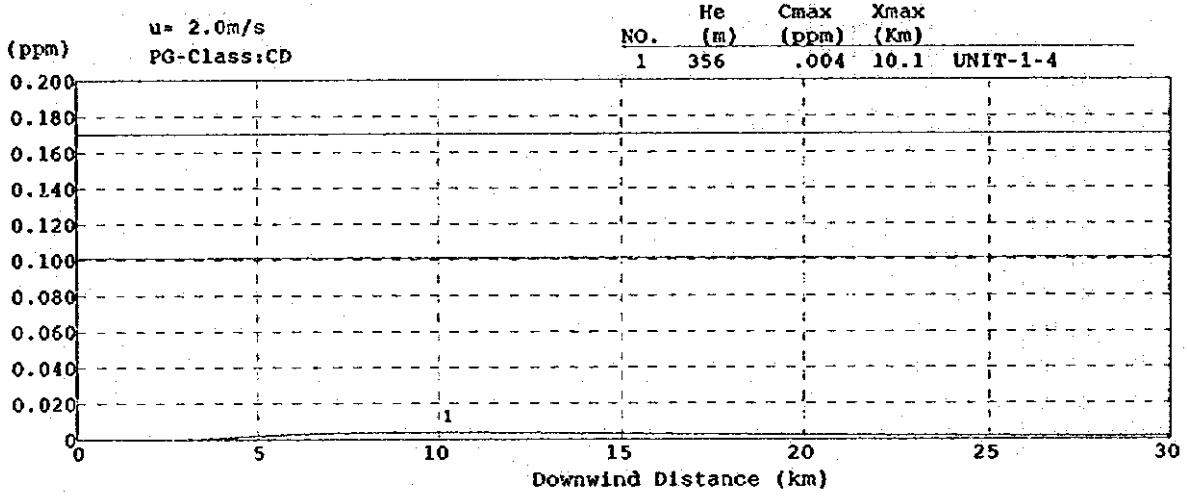


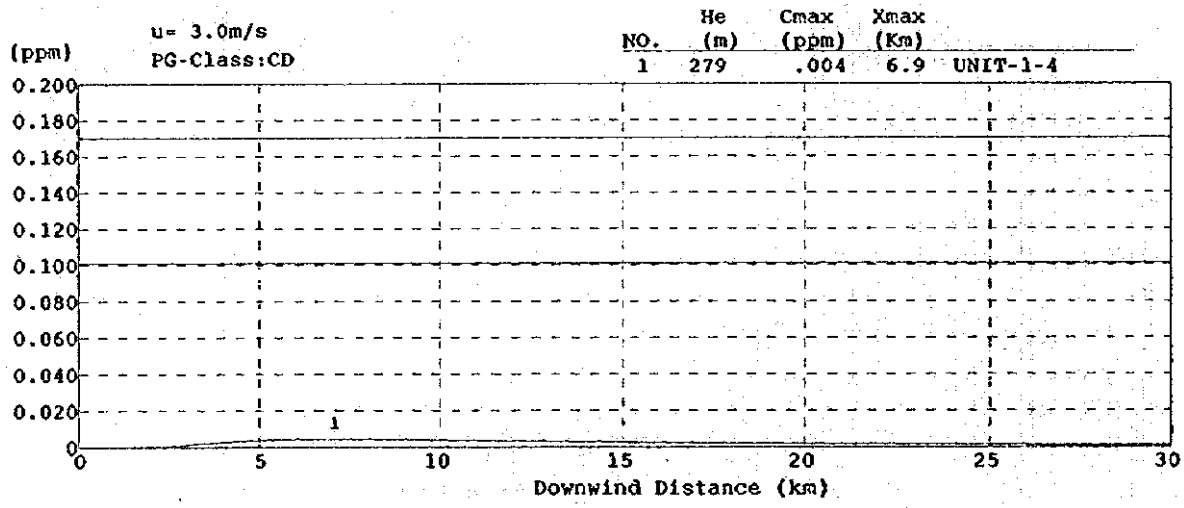


CONCAWE & Plume (SO2)

Charqueadas Power Station (Present)

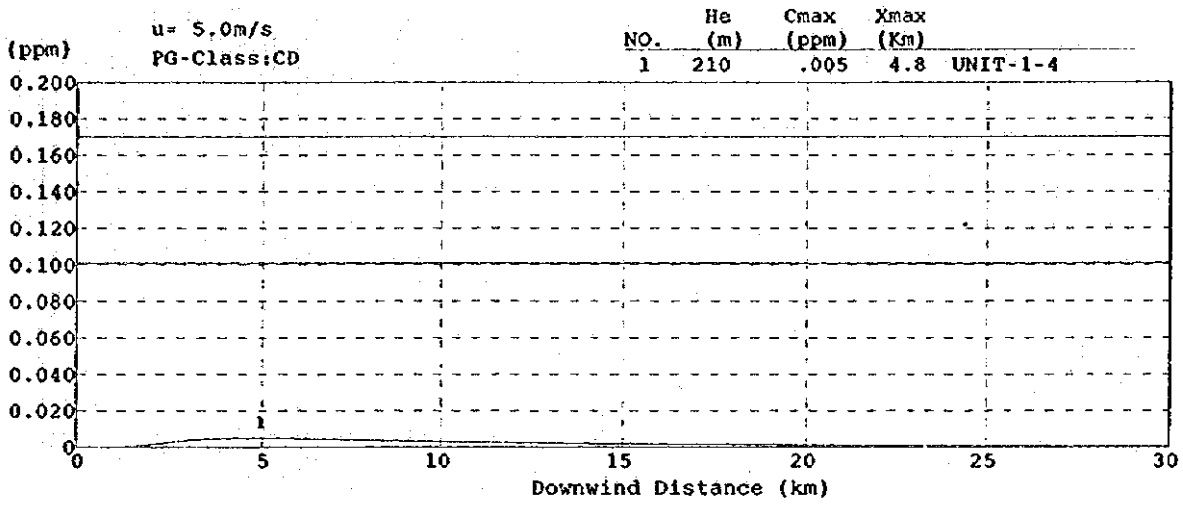


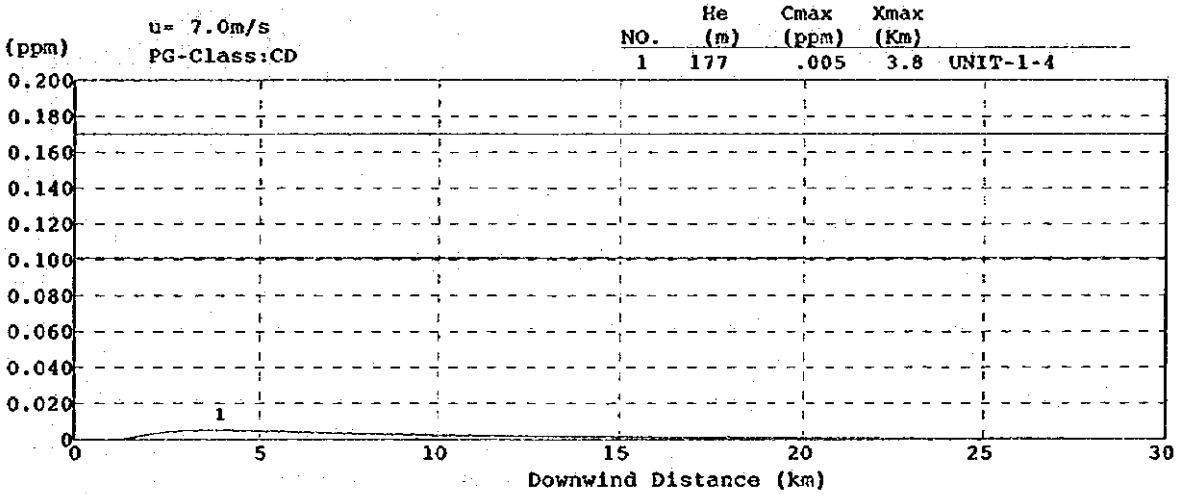


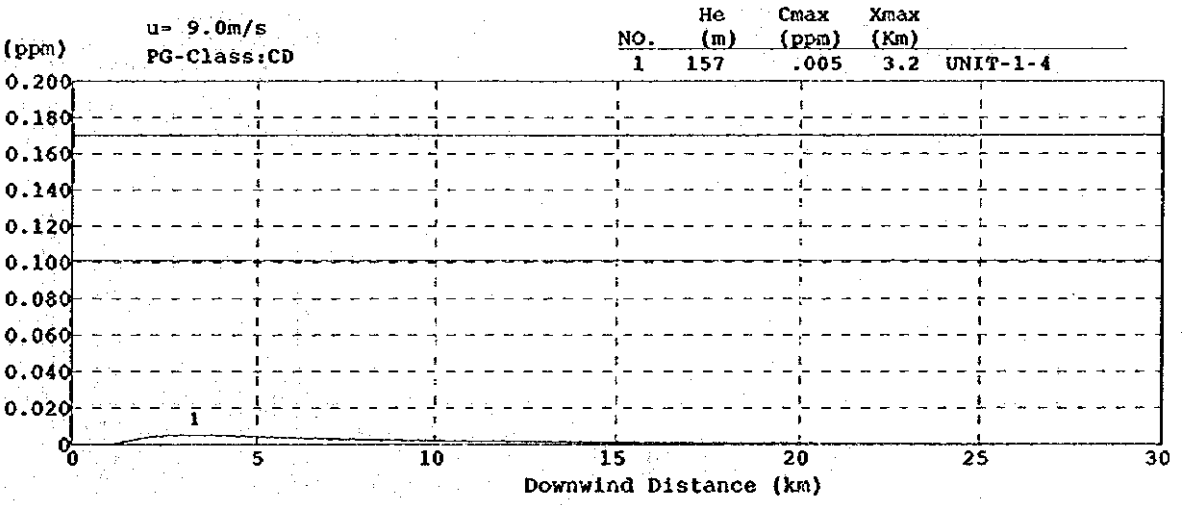


CONCAWE & Plume (NO2)

Charqueadas Power Station (Present)

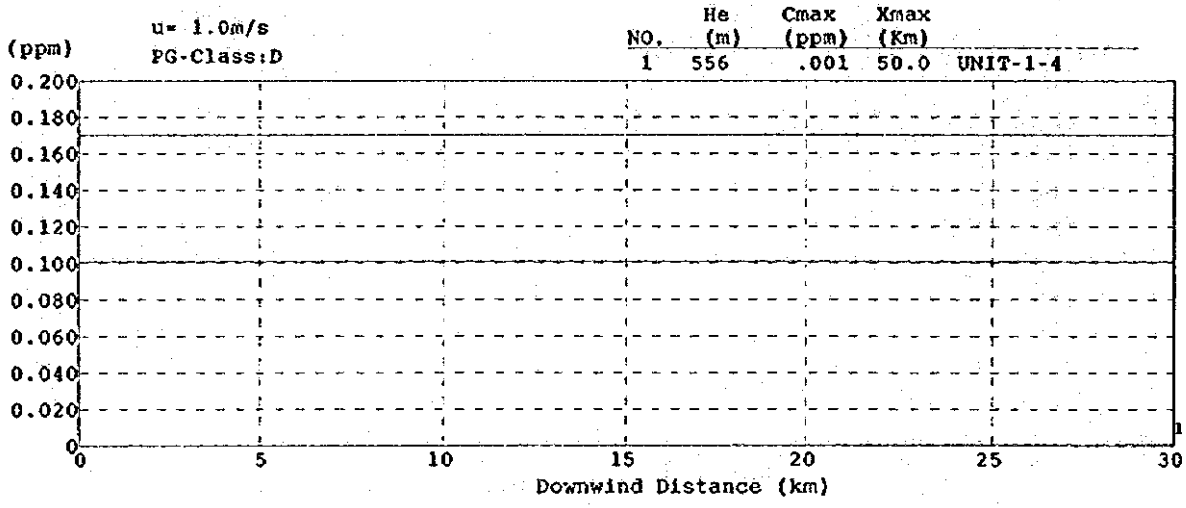


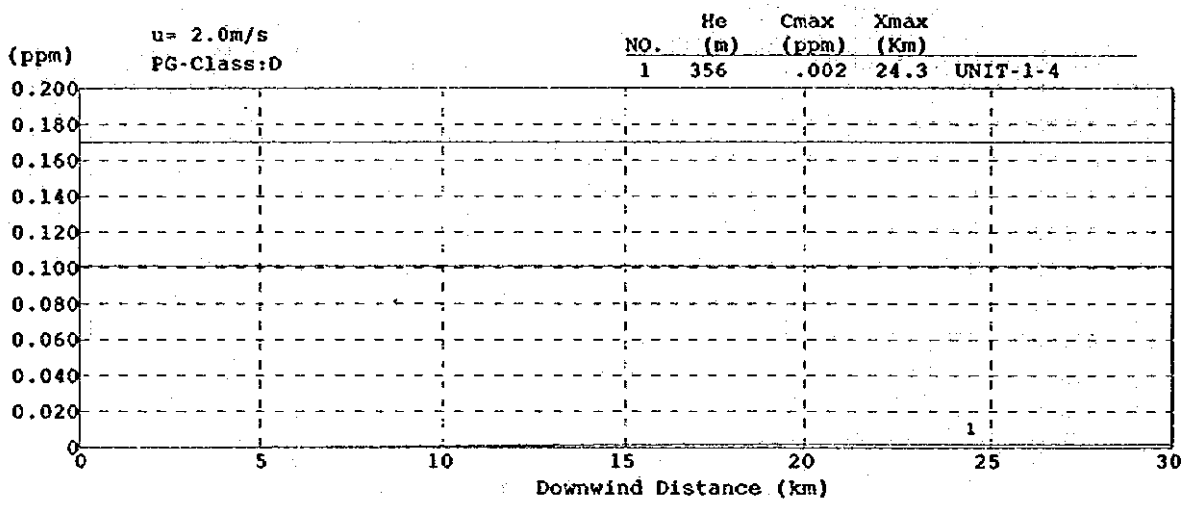


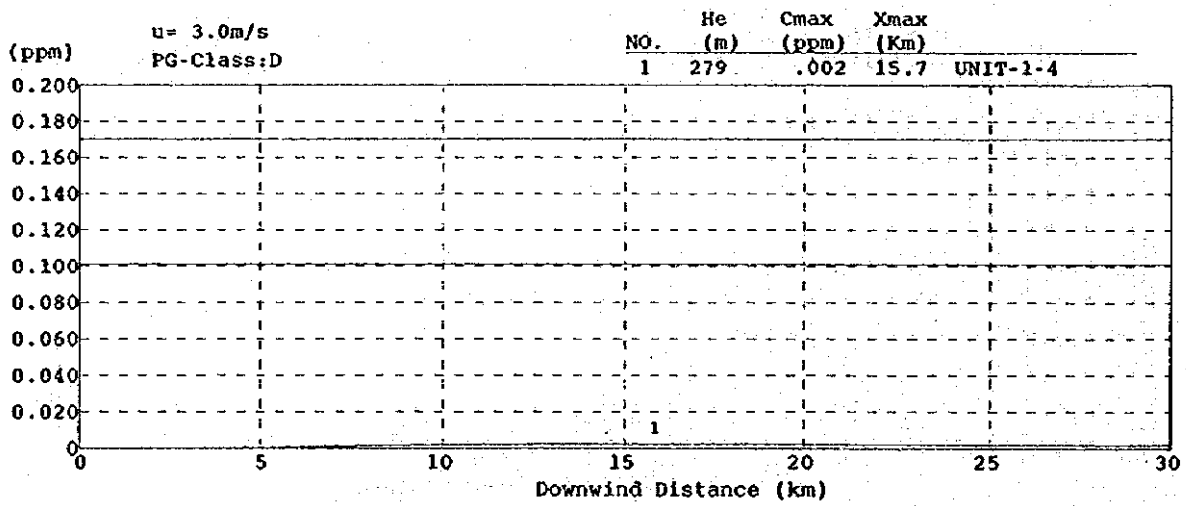


CONCAWE & Plume (NO2)

Charqueadas Power Station (Present)

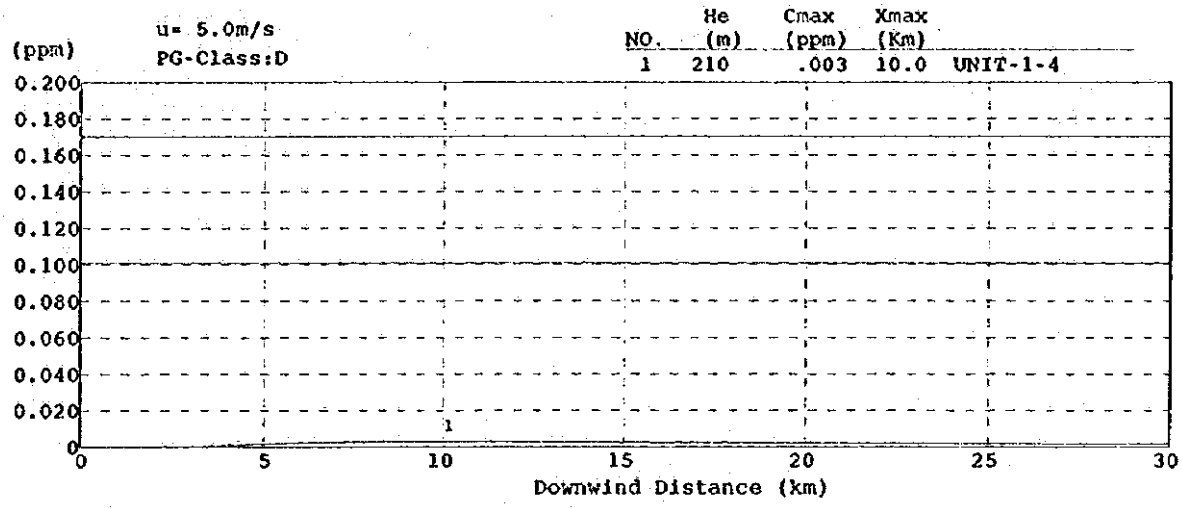


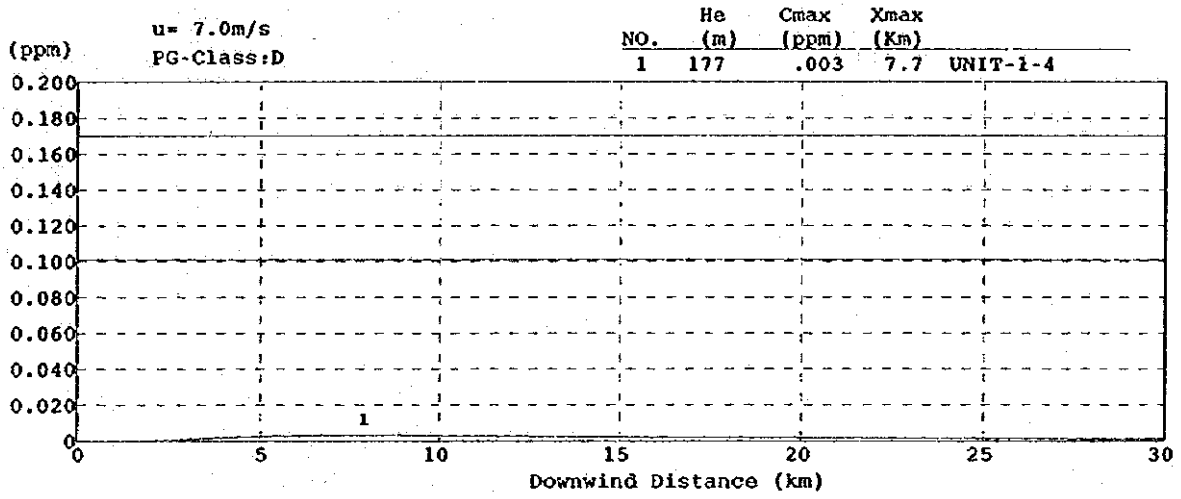


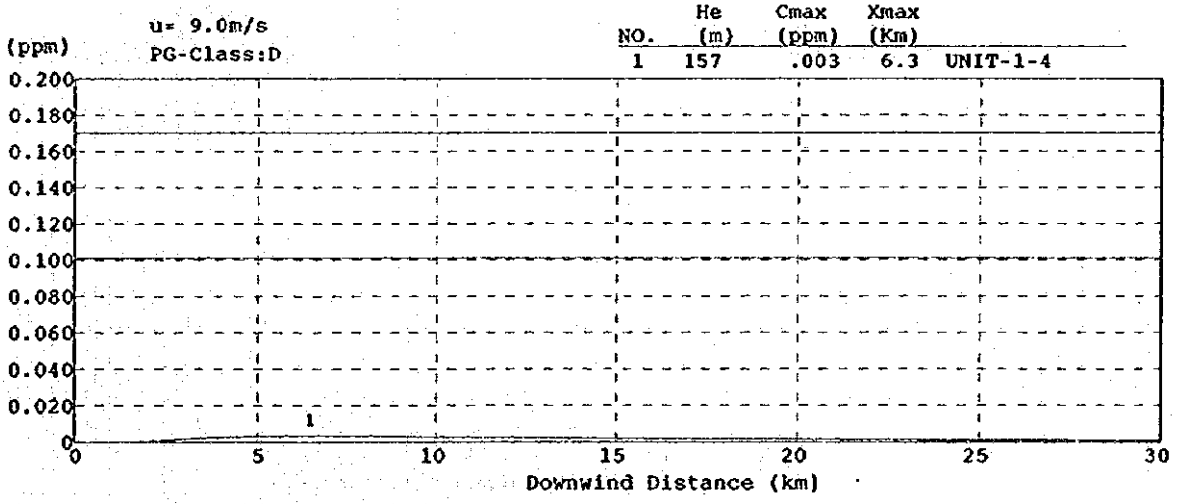


CONCAWE & Plume (NO2)

Charqueadas Power Station (Present)

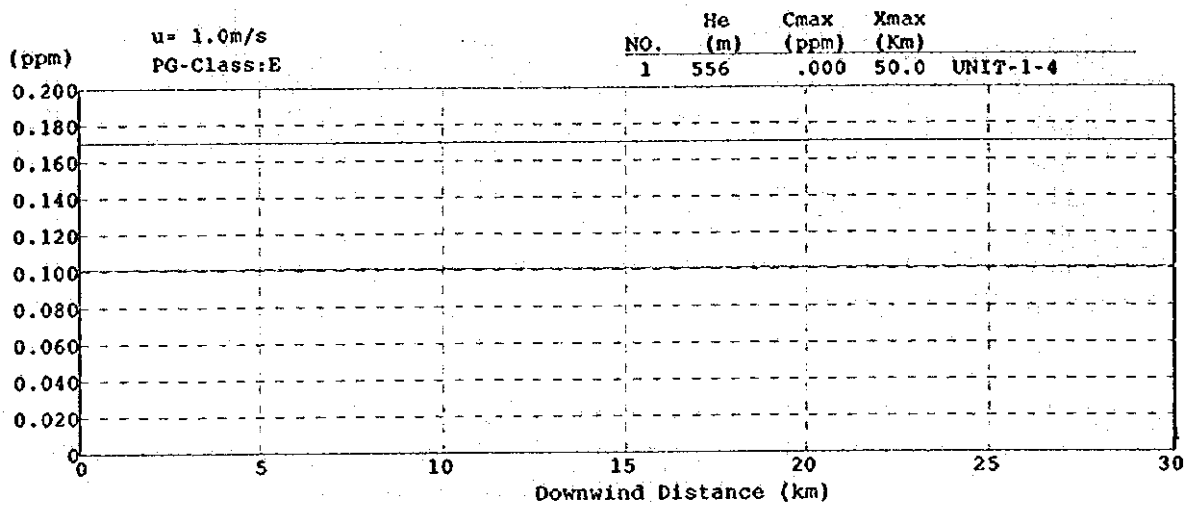


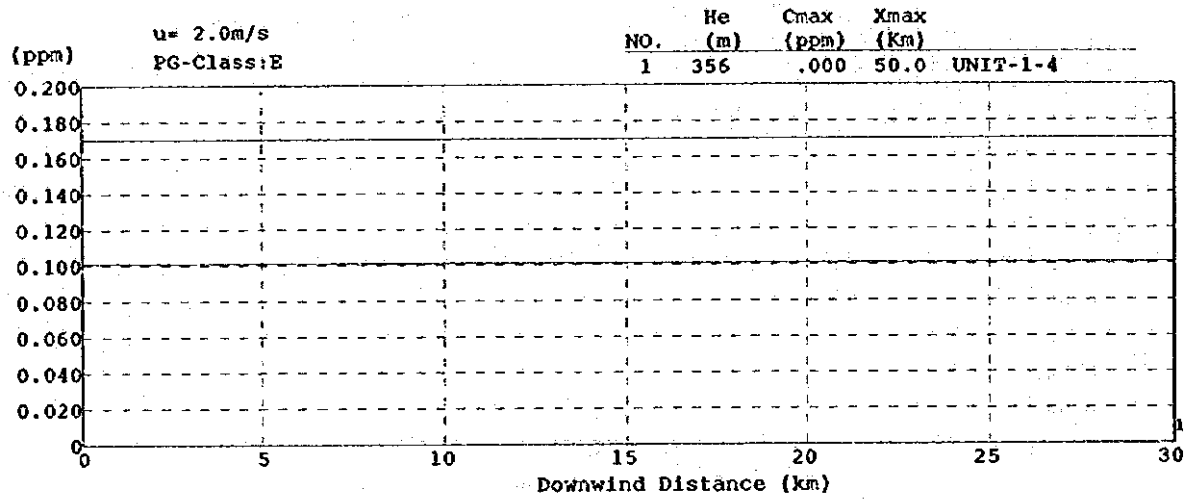


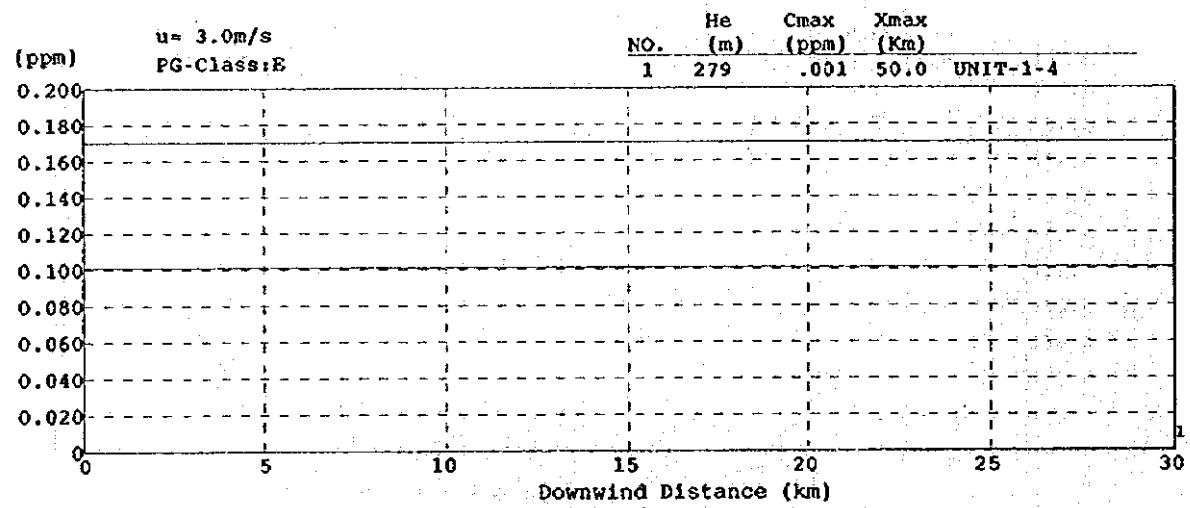


CONCAWE & Plume (NO2)

Charqueadas Power Station (Present)

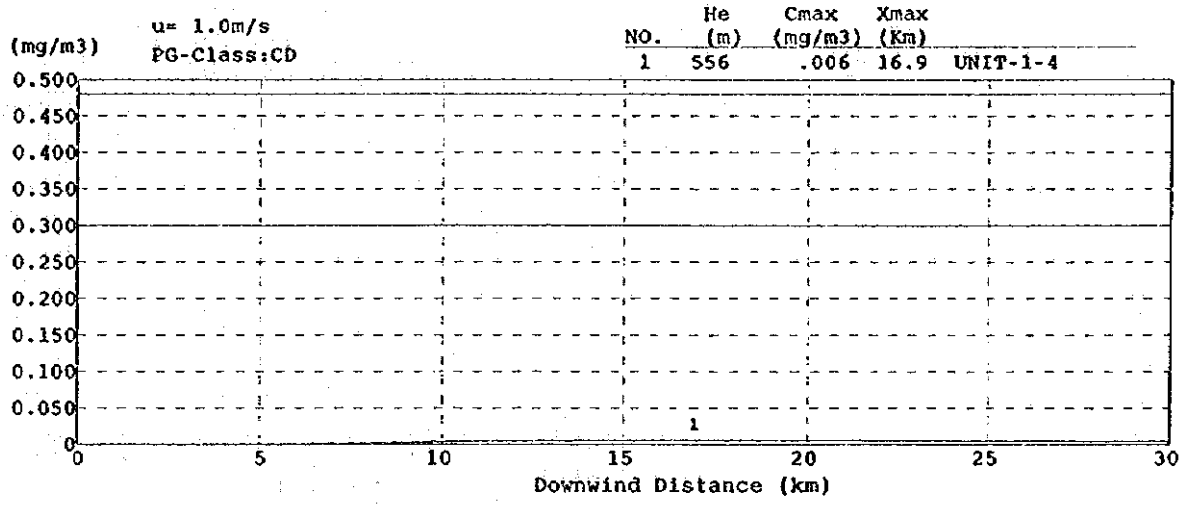


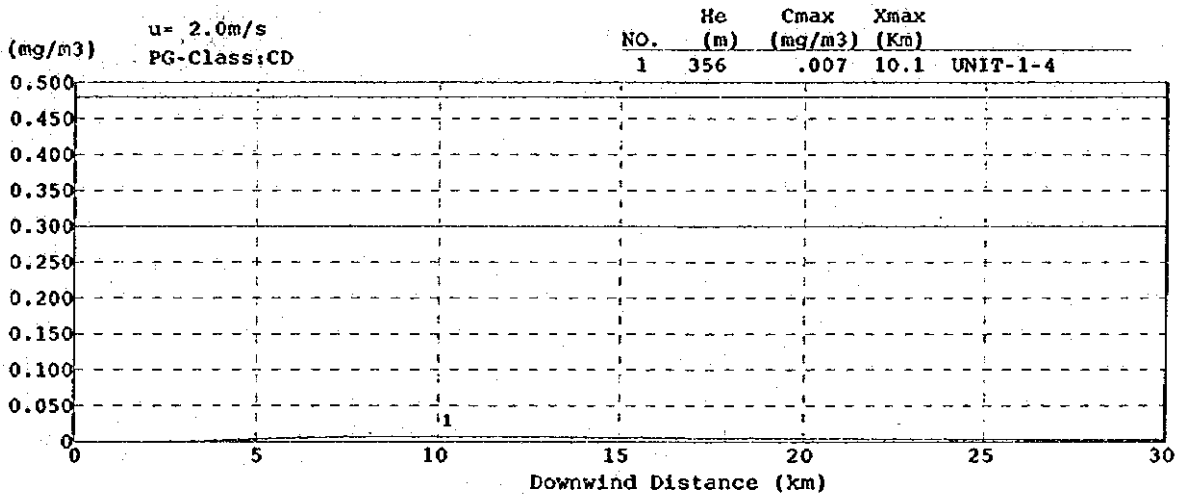


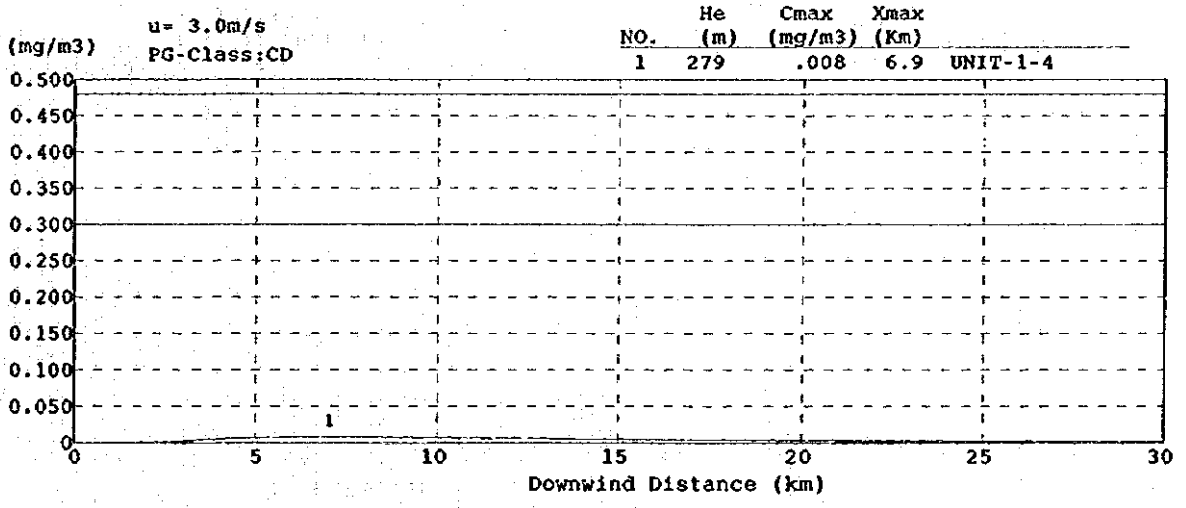


CONCAWE & Plume (NO2)

Charqueadas Power Station (Present)

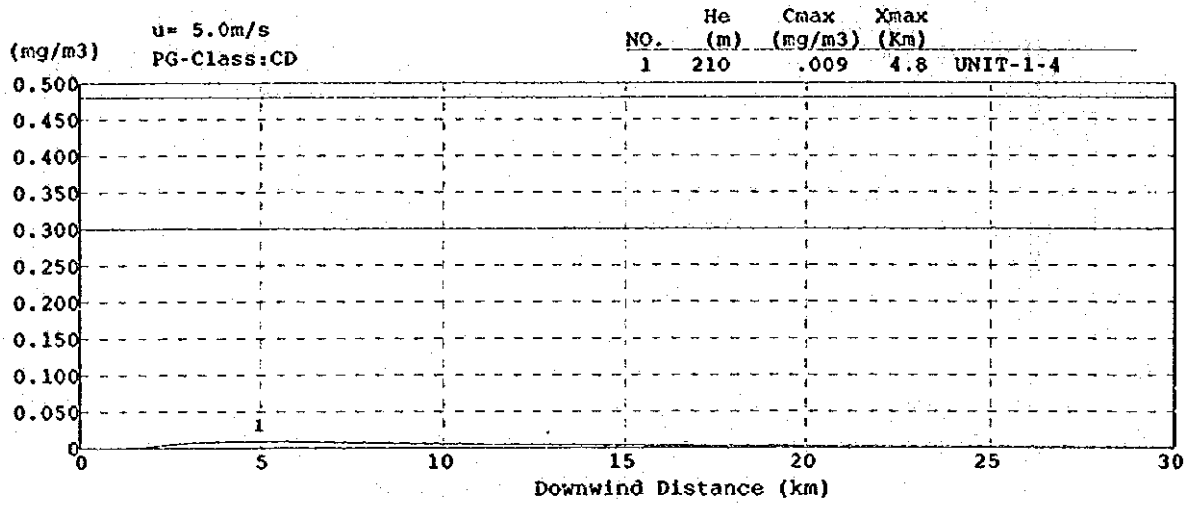


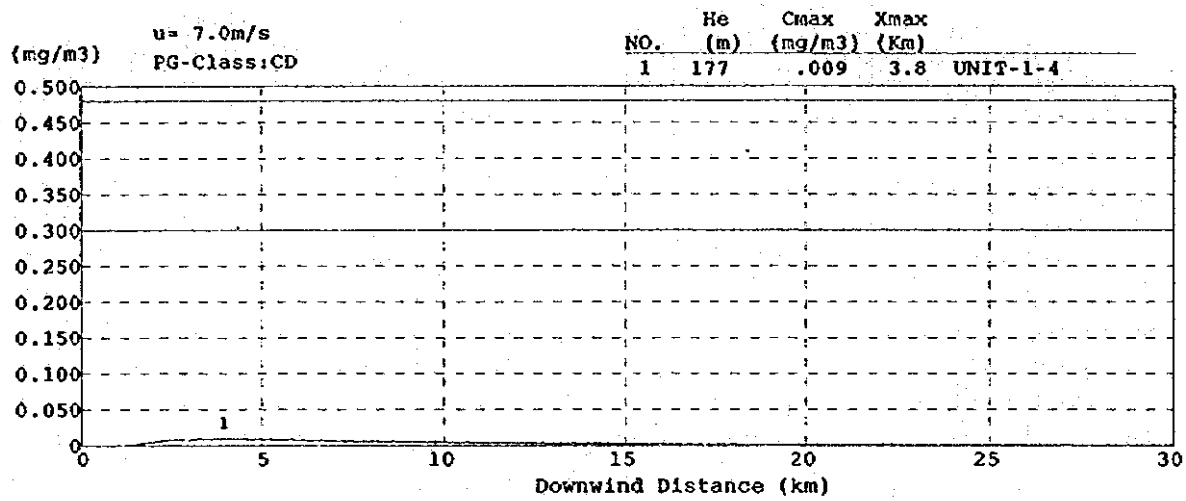


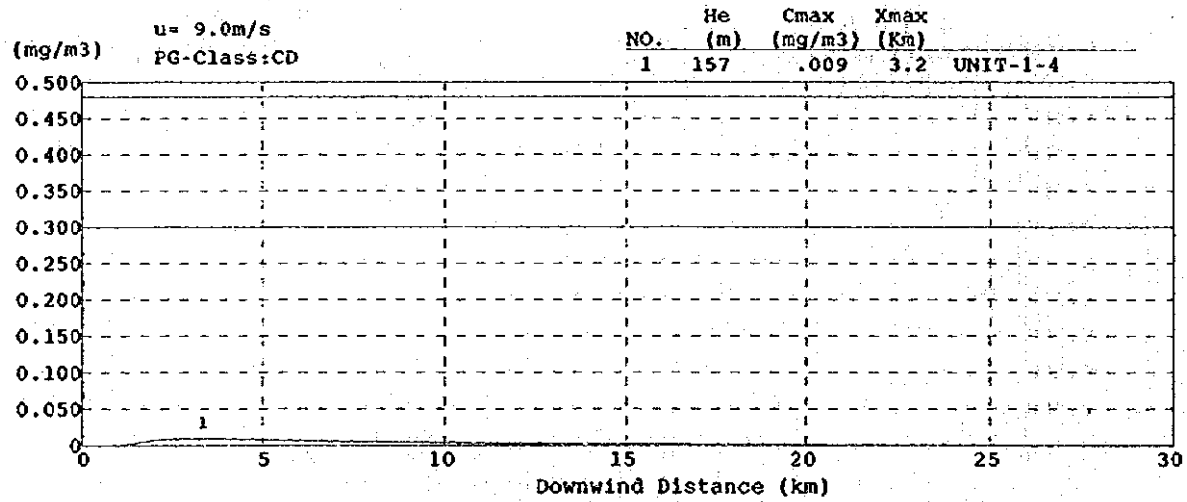


CONCAWE & Plume (Dust)

Charqueadas Power Station (Present)







CONCAWE & Plume (Dust)

Charqueadas Power Station (Present)