V INTERNATIONAL CLEAN AIR CONGRESS

INFLUENCE OF AMMONIA ON THE DETERMINATION OF SULFUR DIOXIDE USING THE HYDROGEN PEROXIDE METHOD

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ABSTRACT

Ammonia was detected in the Great São Paulo region at levels that cannot be neglected. The Method of analysis used for getting sulfur dioxide data in this region, in the hydrogen peroxide method, which is utilized in many countries.

Considering that ammonia is an interference in this method, it was decided to introduce the ammonia correction in the hydrogen peroxide method as suggested by the World Health Organization. This procedure was used for analysing the 24 hour samples collected in the Great São Paulo Region Network, composed of 14 sampling sites. For each sample, the concentration of sulfur dioxide is presented with and without the ammonia interference correction. Those pair of values were generated during one year, daily for each station, and they were used to do a statistical analysis and it was possible to observe an increase in the sulfur dioxide concentration caused by the ammonia correction.

This increase is variable and is characteristic of each sampling site.

1. INTRODUCTION

1.1 Background

The hydrogen peroxide method for the determination of sulfur dioxide in the atmosphere is still used in the São Paulo state Network. This network is composed of 40 sampling sites. All over the world this method for measuring sulfur dioxide is intensively used as can be observed on table I.

This table shows the methodology used in 26 countries or areas that are involved in the Global Environment Monitoring System GEMS-AIR Network. Although this network is only a small part of the totality of the sampling sites operating all over the world, it shows the importance of the method.

Table I

Methodoly used in 26 countries that constitute the GEMS-AIR network

METHOD	NUMBER OF SITES
Acidimetric	53
Amperometric	23
Pararosaniline	15
Condumetric	11
Gas Chromatographic	02
Flame Photometric	01

The Aforesaid World Health Organization (WHO) report (1) demonstrates that SO_2 is an air pollution problem in several countries based on data gathered by using the H_2O_2 method. Several countries are developing countries and we can point out some reasons for the utilization of the method: low cost analysis, low initial investment for equipment and very limited operator skills.

On the other hand Pararosaniline method is indicated as the WHO Comparison Method (2) mainly because its specificity for SO_2. This method, however, presents some dificulties: cost of analysis is higher, the initial investment in equipment is high and a well trained technician is required. The sample presents some stability problems (3,4,5), resulting in the requirement of special equipments for sampling and additional devices for transport and storage of the samples at low temperature, increasing the operational cost.

When considering the use of the hydrogen peroxide method we have to take into account its lack of specificity. After sampling, net acidity is measured and then any acid or alkaline gas or vapor can interfere. In ordinary urban air, these interferences are present at concentrations that don't constitute a very important problem, but in industrial areas where we can find specific sources near the sampling site, these interferences may constitute a serious problem.

1.2 Objective

CETESB made a study on two methods for measuring SO_2, pararosaniline method and hydrogen peroxide method, by taking samples simultaneously on the field using the two methods (6). The data shows that SO_2 concentrations when measured with the Pararosaniline method are predominantly higher than SO_2 concentrations measured by the H_2O_2 method. This fact suggested that the main interference in H_2O_2 method should be an alkaline gas or vapor (solids like CaO are removed on the pre-filter). Ammonia was thought to be the main interference. Then this possibility was studied (7) and the NH_3 levels found in all sites in the São Paulo Metropolitan Area could not be neglected.

The present study is an attempt to demonstrate the negative interference of NH_3 on SO_2 measurements when using the H_2O_2 method in the São Paulo Metropolitan Area.

2. METHODOLOGY

2.1 Sampling and Chemical Analysis

The sampling train is shown on figure (I)

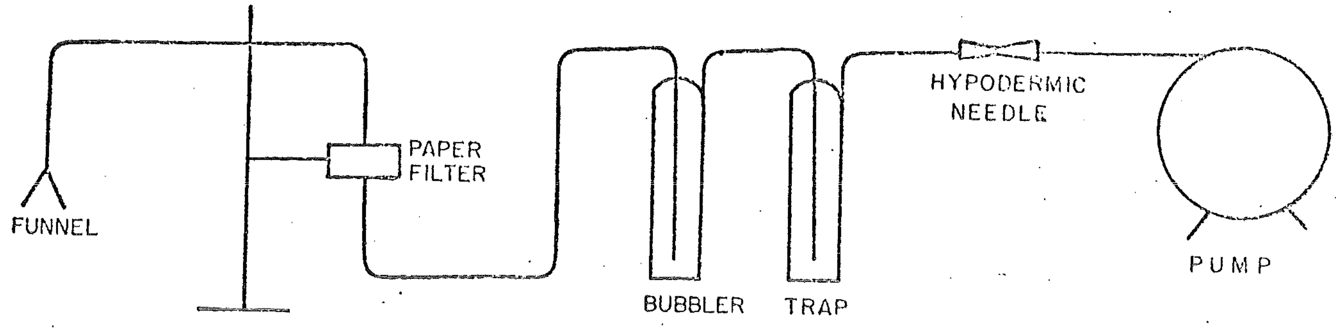

FIGURE I — THE SAMPLING TRAIN

The filter holder contains a clean filter paper to remove the particulates from the airstream. The air is aspirated through the bubbler at a flow rate of 2 liters/minute for a 24 hour-period. Sulfur dioxide in the air sample is absorbed in the hydrogen peroxide reagent adjusted to pH 4.5. The stable and non volatile sulfuric acid formed in the process is titrated with standard sodium tetraborate solution, 0.004 N and the end point (pH 4.5) is detected with a mixed indicator.

The non-corrected concentration of SO_2 in the air is given by

$$S_N = \frac{32,000 \times N \times v}{V \times 0,9} \qquad \text{Eq. I}$$

Where - S_N = concentration of SO_2, ug/m^3 - non-corrected for NH_3 concentration

N = normality of sodium tetraborate (0.004 N)

v = volume used in titration (ml)

V = volume of air sampled (m^3)

0,9 = factor

The volume of liquid in the sample solution is completed to 100 ml before adding indicator and titrating and 10 ml is saved for the determination of dissolved NH_3. The concentration of NH_3 in the absorbing solution is then determined by adding 1 ml of Nessler's reagent to 10 ml of the solution and measuring the color intensity in a spectrophotometer at 440 nm wavelenght After correcting this measurement for the blank reading, the concentration of NH_3 per 1 ml is read from a calibration graph. The concentration of NH_3 is given by

$$C_{NH_3}\ (ug/m^3) = \frac{c \times 100}{V} \qquad \text{Eq. II}$$

Where C = concentration of NH_3 per 1 ml of sample (ug/ml)
V = volume of air sampled (m^3)
100 = factor

The corrected concentration of SO_2 is given by the following formula

$$\text{Corrected } SO_2\ (ug/m^3) = S_N + 1.88\ C_{NH_3}$$

S_N =non-corrected SO_2 concentration Eq. I
C_{NH_3} = NH_3 concentration Eq. II
1,88 = stoichiometric factor

2.2 Data analysis

The two SO_2 data series, corrected and non-corrected for NH_3 interference, are paired samples because one SO_2 corrected concentration is related to one SO_2 non-corrected concentration only.

The difference (di) for each pair of SO_2 values was calculated resulting in a sample of n differences.

In order to test the hypothesis that there is no difference between the two series we worked with an equivalent hypothesis that the difference average is equal to zero.

As an alternative hypothesis it was tested if the NH_3 corrected series is composed of higher values when compared with the non-corrected series, or in other words if the differences average is greater than zero.

Then $H_0 \quad = 0$

$H_1 \quad\quad 0$

When working with the differences di the problem was reduced to the test of only one average and the test was perfomed by comparing the experimental student t with the critical value obtained as a function of α with n-1 degrees of freedom. Then, it was calculated

$$t = \frac{\bar{d}}{\frac{S_d}{\sqrt{n}}}$$

Where $\bar{d}$ = differences (di) sample average

Sd = differences (di) sample standard deviation

n = differences (di) sample size

3. DATA DISCUSSION

The data considered in this study was gathered during one year, from july 1978 to june 1979, at the 14 sampling sites in the São Paulo Metropolitan Area. The network operates on a daily basis and then for each sampling site a pair of values was generated daily.

The ammonia correction in the H_2O_2 method was first made on june 19, 1978. It was decided to use in this study an one year cycle starting on July 1, 1978.

The sampling sites and their main characteristics are shown on figure II.

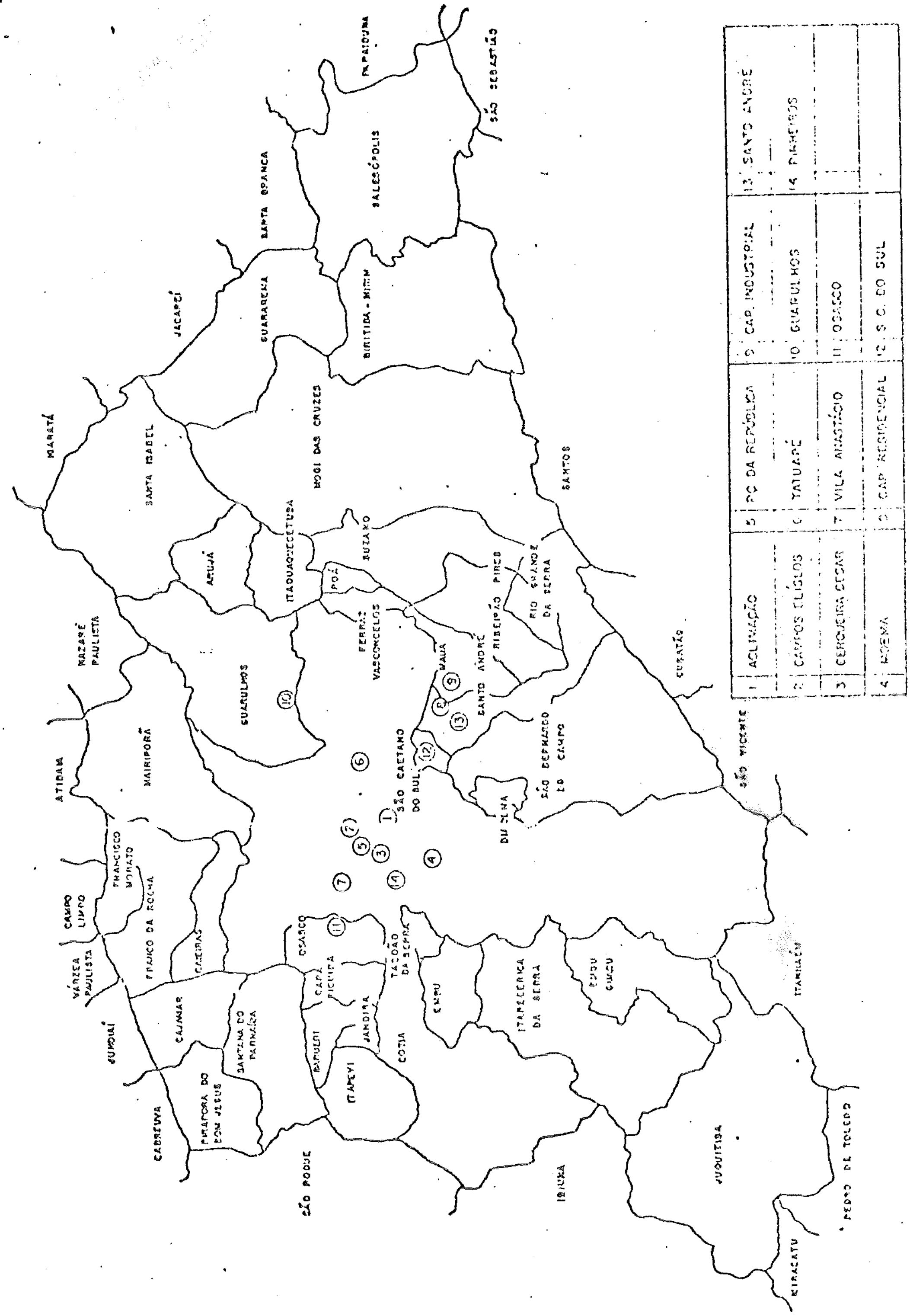

FIGURE II - Sampling Sites Location

In the region considered it is difficult to characterize a sampling site because São Paulo Metropolitan Area is a typical example of lack of of planning, where the land use is predominantly mixed.

Table II

Sampling sites characterization according to land use

SAMPLING SITE	TYPE
Capuava Industrial	industrial
Guarulhos	industrial
Capuava Residencial	industrial/residential
São Caetano do Sul	industrial/residential
Osasco	industrial/residential
Santo André	industrial/residential
Tatuapé	Commercial
Praça da República	Commercial
Campos Elíseos	Commercial
Aclimação	residential
Cerqueira CesaR	residential
Moema	residential
Vila Anastacio	residential
Pinheiros	residential

With the characterization presented on Table II we intend to show that ammonia interference is not a local problem but instead is generalized and present at every sampling site at a distinct level.

Appendix shows the data used in this study. The two SO_2 series, corrected and non-corrected for NH_3, are presented for each sampling site. The listed values include monthly averages for the two series for the entire period and the calculated t paired values.

Table III and Figure III, summarizes the results.

The two SO_2 series, corrected and non-corrected for NH_3, are always different and the corrected values are always higher than the non-corrected values, indicating that the ammonia interference is not negligible.

TABLE- III

SUMMARY OF SO_2 DATA SERIES

SAMPLING SITE	n	to	AVERAGES		PERCENT DIFFERENCE
			$\bar{C}$	$\bar{N}$	
ACLIMAÇÃO	365	33,51	149,70	124,65	20%
C. ELÍSEOS	363	30,43	165,74	138,46	20%
C. CÉSAR	362	29,07	107,60	88,07	22%
MOEMA	363	18,87	95,05	76,05	25%
P. REPÚBLICA	361	34,21	132,54	111,12	19%
TATUAPÉ	357	32,49	143,68	119,41	20%
V. ANASTÁCIO	363	33,25	108,22	91,38	18%
CAPUAVA RES.	362	28,37	165,35	152,92	8%
CAPUAVA IND.	328	10,18	164,07	137,67	19%
GUARULHOS	365	33,01	147,63	132,25	12%
OSASCO	361	36,37	98,16	81,47	20%
S. C. DO SUL	362	6,91	131,86	115,50	14%
S. ANDRÉ	360	32,38	119,35	104,14	15%
PINHEIROS	363	30,30	76,19	59,91	27%

n = Sample Size

to = Calculated t paired statistic

$\bar{C}$ = Annual corrected average

$\bar{N}$ = Annual non corrected average

CETESB

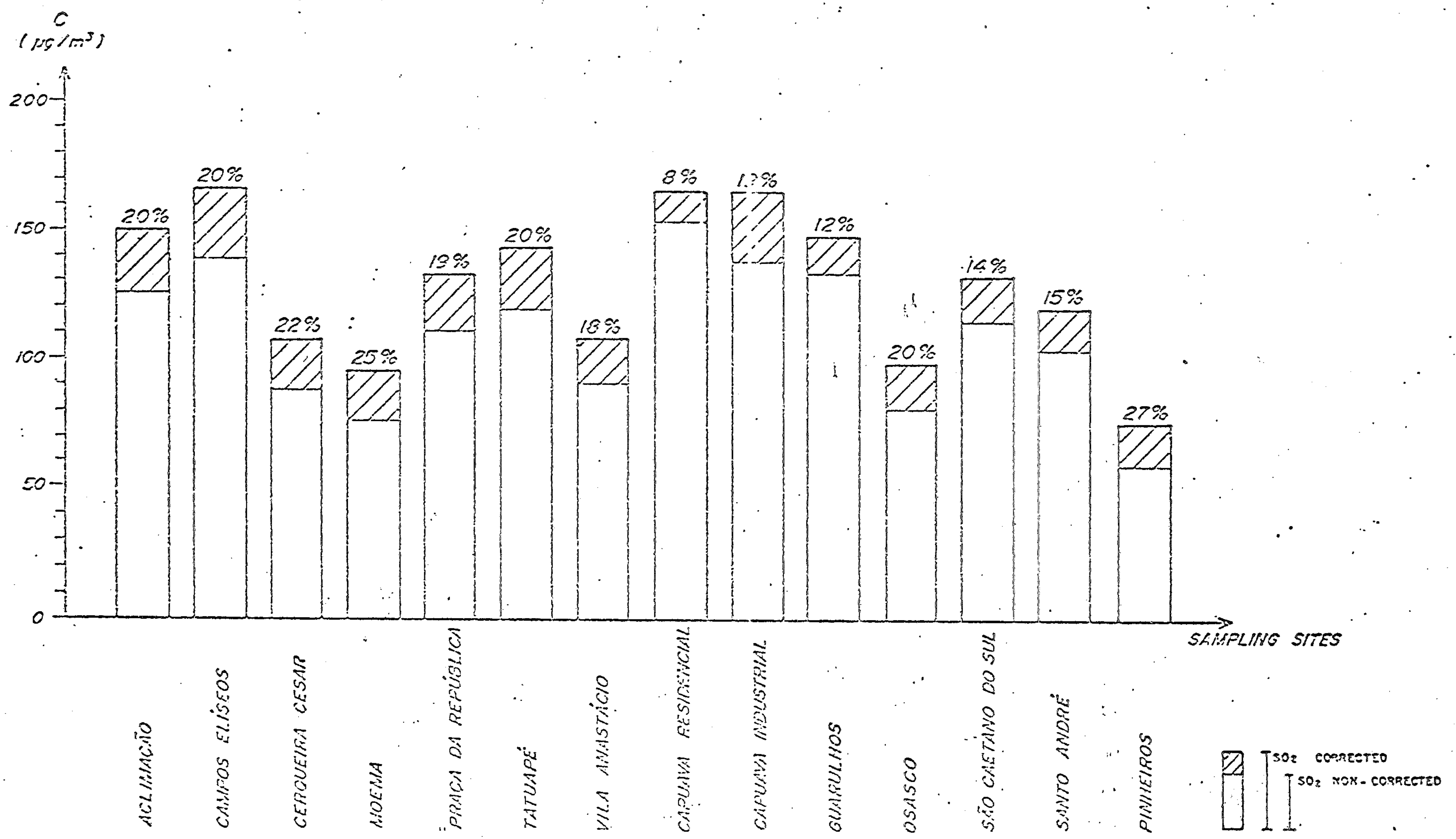

FIGURE III — ANNUAL AVERAGE CONCENTRATIONS OF TWO SO_2 SERIES SHOWING THE PERCENT DIFFERENCE BETWEEN THE SERIES

PERIOD: JULY/1978 — JUNE/1979

It was determined the percent difference between the two series. It was possible to observe that the increase in the SO_2 concentration when the NH_3 interference correction is made is variable and characteristic of each sampling site. The average percent increase due to ammonia interference correction is about 19%, when the whole São Paulo Metropolitan Area is considered.

4. CONCLUSIONS

This study shows that there is a 19% increase on the SO_2 concentrations when the NH_3 interference is corrected and therefore this interference can not be neglected.

Due to this fact the hydrogen peroxide method with NH_3 interference correction is definetely in use for the determination of the SO_2 concentration in the São Paulo Metropolitan Area.

This Study intended to show the importance of the characterization of the sampling sites because the interferences behavior can depending on the sampling site. Therefore it is important that when the H_2O_2 method for measuring SO_2 is used one should have the knowledge of the extent of interferences on the method in the areas to be studied.

5. APPENDIX

SO_2 SERIES - CORRECTED (C) AND NON - CORRECTED (N) FOR NH_3 INTERFERENCE

SAMPLING SITE- ACLIMAÇAO
JULY/78 TO JUNE/79

DAYS	JUL C	JUL N	AUG C	AUG N	SEP C	SEP N	OCT C	OCT N	NOV C	NOV N	DEC C	DEC N	JAN C	JAN N	FEB C	FEB N	MAR C	MAR N	APR C	APR N	MAI C	MAI N	JUN C	JUN N
1	263.	233.	143.	128.	54.	29.	96.	74.	163.	127.	152.	133.	66.	53.	109.	92.	205.	169.	114.	91.	69.	56.	223.	206.
2	95.	72.	170.	153.	118.	56.	165.	139.	76.	57.	199.	180.	72.	55.	132.	115.	180.	150.	268.	234.	104.	93.	222.	199.
3	72.	63.	179.	141.	80.	39.	235.	199.	67.	54.	121.	83.	35.	7.	118.	103.	109.	88.	363.	335.	407.	369.	242.	214.
4	190.	164.	180.	129.	56.	34.	164.	164.	126.	104.	128.	111.	74.	65.	52.	37.	87.	87.	121.	97.	116.	94.	243.	174.
5	170.	96.	171.	143.	77.	43.	294.	241.	51.	32.	118.	99.	111.	87.	100.	77.	123.	104.	148.	127.	95.	76.	298.	224.
6	155.	146.	152.	132.	97.	44.	225.	176.	100.	73.	81.	64.	147.	119.	95.	74.	124.	107.	89.	68.	91.	76.	128.	105.
7	211.	195.	258.	213.	211.	166.	92.	77.	292.	248.	80.	63.	65.	46.	251.	212.	183.	136.	87.	63.	184.	163.	158.	136.
8	115.	102.	310.	255.	102.	89.	104.	97.	148.	126.	121.	108.	94.	81.	361.	350.	263.	210.	103.	79.	271.	247.	180.	161.
9	104.	91.	283.	224.	43.	32.	60.	47.	159.	146.	169.	154.	114.	95.	184.	126.	276.	227.	111.	94.	192.	169.	102.	83.
10	171.	134.	287.	227.	124.	111.	188.	152.	106.	156.	119.	102.	87.	74.	157.	108.	212.	184.	169.	149.	197.	169.	143.	113.
11	259.	228.	351.	276.	100.	95.	171.	139.	98.	85.	83.	72	91.	76.	160.	136.	96.	73.	320.	265.	186.	169.	126.	102.
12	260.	234.	168.	100.	136.	127.	154.	137.	92.	73.	83.	83	117.	96.	111.	73.	103.	77.	413.	364.	201.	184.	370.	295.
13	87.	72.	59.	38.	91.	74.	125.	111.	125.	116.	100.	85.	114.	95.	67.	35.	222.	169.	148.	126.	153.	134.	299.	248.
14	124.	110.	77.	47.	94.	65.	138.	117.	113.	94.	174.	152.	97.	70.	121.	89.	135.	105.	77.	58.	109.	100.	80.	59.
15	245.	231.	92.	58.	195.	176.	64.	49.	99.	66.	216.	182.	119.	100.	145.	100.	145.	115.	100.	85.	92.	73.	60.	45.
16	54.	45.	94.	33.	247.	217.	78.	69.	102.	80.	129.	110.	159.	142.	115.	98.	208.	172.	224.	200.	138.	119.	143.	119.
17	221.	222.	125.	65.	104.	39.	172.	146.	184.	165.	115.	100.	83.	68.	91.	78.	137.	111.	466.	428.	151.	136.	204.	176.
18	151.	100.	102.	61.	124.	102.	111.	98.	148.	125.	46.	33.	101.	90.	114.	86.	123.	87.	280.	254.	296.	270.	115.	85.
19	325.	304.	142.	76.	122.	117.	82.	76.	94.	72.	79.	60.	119.	104.	128.	90.	72.	58.	140.	114.	368.	298.	151.	121.
20	77.	77.	113.	70.	178.	154.	48.	37.	142.	123.	154.	131.	62.	51.	74.	50.	137.	111.	191.	144.	234.	206.	433.	382.
21	80.	69.	99.	55.	273.	255.	130.	117.	228.	220.	246.	223.	75.	66.	120.	103.	169.	145.	177.	134.	134.	121.	456.	395.
22	93.	78.	123.	97.	165.	144.	52.	37.	159.	121.	216.	193.	158.	145.	287.	276.	239.	199.	124.	90.	234.	219.	230.	196.
23	116.	109.	94.	40.	157.	140.	61.	50.	235.	195.	34.	71.	106.	91.	115.	96.	334.	300.	87.	66.	152.	122.	354.	316.
24	127.	115.	89.	37.	109.	37.	269.	243.	107.	79.	71.	54.	135.	109.	164.	132.	171.	126.	97.	63.	115.	99.	304.	261.
25	123.	110.	62.	27.	103.	113.	219.	191.	83.	64.	52.	41.	154.	131.	145.	124.	78.	59.	104.	78.	142.	127.	106.	106.
26	329.	270.	86.	50.	120.	111.	136.	114.	149.	117.	58.	39.	94.	73.	168.	147.	72.	59.	155.	134.	150.	133.	126.	113.
27	245.	270.	53.	25.	126.	107.	213.	191.	43.	26.	73.	72.	206.	182.	198.	170.	119.	90.	112.	94.	101.	86.	147.	123.
28	249.	243.	80.	34.	141.	128.	93.	82.	95.	65.	95.	86.	85.	53.	284.	260.	165.	150.	130.	111.	237.	228.	139.	116.
29	176.	141.	129.	65.	109.	142.	98.	69.	99.	78.	122.	111.	58.	39.	0.	0.	288.	235.	134.	119.	184.	163.	103.	89.
30	203.	187.	171.	76.	124.	101.	103.	75.	108.	91.	142.	121.	160.	136.	0.	0.	212.	169.	121.	108.	86.	71.	223.	199.
31	127.	133.	97.	44.	0.	0.	165.	129.	0.	0.	87.	72.	170.	142.	0.	0.	190.	155.	0.	0.	63.	59.	0.	0.
AVERAGE	166.	149.	147.	107.	131.	107.	139.	118.	129.	106.	120.	103.	107.	89.	149.	123.	166.	127.	172.	146.	170.	149.	203.	172.

PAIRED t STATISTIC = 33.51
DEGREES OF FREEDOM = 364.

ANNUAL AVERAGES

$\bar{C}$ =149.70

$\bar{N}$ =124.45

**** = NO DATA

SO_2 SERIES - CORRECTED (C) AND NON - CORRECTED (N) FOR NH_3 INTERFERENCE

SAMPLING SITE - CERQUEIRA CESAR

JULY/78 TO JUNE/79

DAYS	JUL C	JUL N	AUG C	AUG N	SEP C	SEP N	OCT C	OCT N	NOV C	NOV N	DEC C	DEC N
1	175.	145.	102.	93.	46.	23.	35.	29.	103.	79.	103.	88.
2	71.	59.	130.	115.	89.	50.	123.	109.	47.	38.	136.	112.
3	71.	62.	144.	122.	62.	32.	195.	159.	67.	54.	115.	85.
4	161.	142.	150.	117.	45.	28.	122.	122.	73.	50.	77.	60.
5	114.	90.	156.	117.	58.	34.	140.	139.	40.	29.	80.	65.
6	127.	118.	133.	107.	34.	25.	129.	105.	80.	69.	73.	58.
7	156.	141.	171.	128.	125.	106.	55.	44.	210.	164.	65.	56.
8	119.	90.	144.	126.	61.	40.	62.	54.	121.	104.	113.	104.
9	77.	62.	227.	169.	36.	25.	51.	42.	95.	84.	127.	116.
10	89.	72.	194.	134.	83.	74.	123.	101.	92.	70.	87.	74.
11	146.	127.	201.	141.	105.	94.	103.	84.	67.	58.	67.	58.
12	136.	130.	147.	87.	106.	97.	103.	88.	42.	27.	84.	84.
13	63.	55.	52.	35.	70.	62.	105.	94.	112.	93.	97.	92.
14	102.	79.	31.	20.	74.	66.	87.	68.	89.	72.	121.	97.
15	145.	130.	67.	47.	90.	69.	54.	41.	63.	48.	109.	88.
16	41.	30.	66.	42.	175.	158.	64.	58.	81.	62.	100.	83.
17	65.	47.	55.	25.	92.	81.	105.	89.	120.	97.	59.	44.
18	96.	73.	94.	43.	83.	75.	84.	73.	103.	82.	29.	18.
19	234.	219.	91.	48.	107.	94.	46.	40.	51.	36.	49.	46.
20	72.	72.	56.	33.	129.	106.	39.	30.	75.	64.	99.	81.
21	46.	40.	68.	40.	199.	178.	102.	91.	118.	97.	163.	161.
22	52.	45.	89.	40.	147.	128.	43.	34.	101.	67.	138.	131.
23	70.	70.	99.	33.	112.	97.	****	****	143.	113.	71.	54.
24	93.	92.	51.	21.	59.	50.	219.	187.	83.	49.	43.	20.
25	113.	104.	38.	21.	81.	70.	****	****	64.	42.	47.	34.
26	167.	172.	64.	45.	102.	89.	****	****	97.	69.	45.	31.
27	193.	133.	32.	25.	121.	104.	130.	98.	46.	37.	52.	[illegible]
28	193.	162.	66.	23.	91.	82.	48.	39.	56.	54.	53.	53.
29	131.	118.	175.	79.	120.	101.	50.	35.	98.	68.	60.	61.
30	139.	110.	156.	79.	97.	72.	72.	53.	91.	67.	79.	64.
31	114.	99.	70.	34.	0.	0.	110.	86.	0.	0.	61.	41.
AVERAGE	114.	102.	103.	70.	93.	77.	94.	78.	89.	69.	84.	71.

DAYS	JAN C	JAN N	FEB C	FEB N	MAR C	MAR N	APR C	APR N	MAI C	MAI N	JUN C	JUN N
1	47.	36.	72.	59.	134.	106.	101.	86.	44.	35.	157.	146.
2	92.	75.	108.	91.	122.	88.	136.	110.	56.	47.	225.	199.
3	72.	42.	105.	88.	84.	69.	190.	151.	210.	172.	225.	204.
4	65.	50.	44.	29.	92.	92.	69.	58.	106.	91.	167.	124.
5	61.	43.	73.	60.	127.	106.	123.	110.	45.	45.	159.	144.
6	116.	103.	87.	70.	134.	112.	75.	58.	92.	77.	110.	91.
7	59.	40.	130.	102.	143.	109.	57.	44.	110.	95.	142.	123.
8	90.	75.	94.	66.	109.	146.	66.	55.	151.	134.	152.	139.
9	172.	161.	155.	121.	233.	186.	118.	103.	157.	133.	87.	78.
10	87.	78.	104.	81.	130.	102.	131.	110.	121.	104.	129.	114.
11	94.	79.	111.	94.	91.	72.	203.	173.	152.	129.	108.	76.
12	123.	107.	79.	51.	100.	83.	266.	227.	176.	150.	188.	147.
13	108.	85.	60.	38.	177.	122.	114.	95.	67.	48.	169.	143.
14	76.	61.	129.	118.	132.	104.	57.	44.	76.	68.	79.	70.
15	84.	69.	153.	134.	115.	91.	86.	64.	66.	59.	32.	32.
16	135.	123.	129.	112.	160.	132.	154.	128.	107.	98.	97.	86.
17	88.	79.	93.	74.	137.	105.	316.	241.	131.	114.	155.	136.
18	63.	60.	136.	100.	85.	64.	191.	148.	214.	186.	130.	106.
19	94.	86.	84.	62.	99.	70.	103.	90.	195.	176.	111.	98.
20	53.	53.	64.	47.	108.	96.	113.	94.	146.	127.	214.	190.
21	65.	68.	103.	79.	149.	134.	150.	120.	112.	99.	210.	182.
22	84.	75.	69.	58.	127.	153.	103.	75.	122.	111.	186.	164.
23	69.	60.	116.	90.	205.	171.	47.	28.	103.	92.	259.	206.
24	105.	92.	116.	84.	101.	82.	61.	52.	72.	63.	206.	148.
25	126.	103.	123.	93.	57.	42.	77.	66.	118.	109.	117.	93.
26	87.	68.	126.	92.	77.	66.	146.	120.	131.	119.	101.	92.
27	89.	70.	162.	111.	84.	73.	136.	112.	77.	68.	113.	98.
28	47.	30.	122.	94.	156.	146.	123.	99.	76.	76.	117.	98.
29	42.	29.	0.	0.	195.	150.	98.	83.	75.	60.	105.	92.
30	137.	116.	0.	0.	132.	154.	80.	72.	39.	39.	158.	143.
31	115.	106.	0.	0.	104.	141.	0.	0.	35.	35.	0.	0.
AVERAGE	89.	75.	105.	83.	135.	109.	123.	101.	109.	95.	147.	125.

PAIRED t STATISTIC = 29.07
DEGREES OF FREEDOM = 361.

ANNUAL AVERAGES

$\bar{C}$ = 107.60

$\bar{N}$ = 88.07

**** - NO DATA

SO_2 SERIES - CORRECTED (C) AND NON - CORRECTED (N) FOR NH_3 INTERFERENCE

SAMPLING SITE- CAMPOS ELISEOS
JULY/78 TO JUNE/79

DAYS	JUL C	JUL N	AUG C	AUG N	SEP C	SEP N	OCT C	OCT N	NOV C	NOV N	DEC C	DEC N
1	299.	259.	135.	118.	74.	31.	63.	50.	200.	159.	128.	113.
2	112.	95.	156.	135.	75.	75.	216.	161.	152.	122.	187.	168.
3	122.	111.	174.	135.	64.	64.	256.	201.	89.	74.	89.	68.
4	209.	188.	233.	160.	102.	57.	176.	176.	112.	89.	132.	111.
5	143.	111.	196.	160.	96.	55.	262.	206.	59.	44.	101.	86.
6	153.	127.	180.	150.	73.	45.	235.	175.	126.	111.	91.	74.
7	235.	216.	245.	185.	205.	181.	166.	111.	256.	230.	100.	83.
8	160.	146.	295.	224.	94.	83.	95.	67.	151.	130.	150.	133.
9	142.	116.	263.	201.	72.	65.	155.	67.	137.	120.	201.	180.
10	176.	115.	267.	184.	153.	142.	200.	151.	118.	99.	150.	135.
11	233.	197.	230.	200.	145.	117.	152.	107.	140.	123.	87.	74.
12	197.	165.	233.	194.	158.	135.	160.	126.	118.	97.	84.	84.
13	97.	73.	92.	54.	145.	111.	169.	128.	186.	156.	112.	93.
14	174.	125.	87.	40.	120.	89.	146.	110.	156.	126.	160.	132.
15	203.	159.	93.	54.	164.	111.	122.	92.	136.	113.	151.	130.
16	71.	56.	93.	54.	243.	190.	101.	86.	103.	90.	143.	122.
17	181.	162.	116.	54.	150.	114.	165.	127.	112.	99.	103.	84.
18	142.	123.	158.	89.	155.	127.	140.	112.	124.	103.	88.	69.
19	333.	322.	162.	120.	157.	123.	78.	59.	97.	82.	172.	115.
20	151.	151.	****	****	132.	144.	64.	45.	115.	100.	210.	165.
21	72.	65.	152.	62.	300.	262.	167.	139.	143.	124.	254.	215.
22	103.	92.	190.	66.	199.	152.	92.	60.	135.	109.	293.	257.
23	112.	104.	159.	74.	185.	146.	110.	72.	201.	175.	162.	136.
24	137.	122.	120.	52.	144.	106.	313.	242.	166.	126.	100.	83.
25	132.	119.	115.	40.	141.	110.	261.	208.	143.	113.	75.	64.
26	247.	240.	73.	73.	153.	121.	200.	146.	125.	95.	53.	38.
27	238.	227.	153.	97.	173.	143.	233.	171.	39.	26.	106.	82.
28	240.	239.	96.	96.	143.	124.	89.	74.	124.	100.	122.	122.
29	141.	120.	114.	114.	200.	151.	93.	76.	109.	90.	75.	75.
30	203.	162.	200.	121.	****	****	126.	104.	115.	94.	131.	114.
31	154.	132.	124.	95.	0.	0.	187.	143.	0.	0.	95.	80.
AVERAGE	172.	152.	164.	112.	147.	117.	159.	122.	133.	111.	132.	113.

DAYS	JAN C	JAN N	FEB C	FEB N	MAR C	MAR N	APR C	APR N	MAI C	MAI N	JUN C	JUN N
1	67.	54.	149.	130.	153.	132.	140.	110.	92.	81.	230.	215.
2	102.	85.	190.	171.	123.	123.	187.	168.	118.	107.	321.	283.
3	208.	189.	174.	151.	195.	176.	276.	246.	364.	332.	215.	196.
4	106.	85.	95.	78.	105.	105.	119.	104.	112.	90.	206.	144.
5	125.	91.	170.	146.	129.	108.	272.	257.	105.	105.	322.	271.
6	196.	179.	170.	125.	151.	130.	272.	255.	155.	129.	176.	153.
7	96.	67.	182.	150.	177.	136.	122.	96.	164.	147.	155.	140.
8	143.	124.	178.	161.	190.	154.	224.	198.	240.	218.	259.	242.
9	151.	132.	227.	180.	340.	308.	114.	92.	214.	186.	171.	154.
10	130.	122.	174.	138.	163.	139.	177.	143.	218.	192.	199.	182.
11	128.	109.	147.	130.	119.	106.	302.	244.	208.	182.	99.	82.
12	157.	133.	188.	64.	134.	119.	391.	333.	167.	154.	331.	271.
13	160.	132.	65.	50.	184.	165.	208.	161.	135.	120.	302.	268.
14	88.	69.	136.	117.	140.	140.	94.	71.	104.	93.	113.	94.
15	164.	145.	156.	107.	195.	171.	120.	99.	197.	176.	91.	76.
16	191.	172.	236.	206.	332.	276.	198.	177.	137.	120.	141.	120.
17	134.	119.	162.	140.	197.	144.	426.	362.	124.	111.	212.	186.
18	169.	152.	155.	136.	118.	96.	282.	224.	232.	215.	216.	190.
19	191.	172.	99.	75.	109.	90.	184.	161.	248.	233.	162.	136.
20	143.	124.	85.	66.	139.	126.	237.	194.	226.	204.	295.	270.
21	151.	136.	176.	161.	198.	164.	188.	147.	155.	140.	401.	369.
22	178.	156.	147.	134.	246.	212.	165.	126.	268.	257.	196.	174.
23	163.	146.	139.	124.	335.	309.	120.	84.	165.	144.	318.	286.
24	152.	133.	156.	118.	220.	196.	151.	112.	135.	118.	257.	216.
25	192.	164.	123.	102.	87.	70.	122.	122.	162.	145.	149.	119.
26	152.	128.	170.	157.	114.	99.	255.	204.	152.	137.	152.	133.
27	142.	125.	160.	141.	150.	122.	251.	225.	167.	156.	207.	179.
28	64.	47.	162.	153.	234.	213.	182.	146.	210.	203.	143.	122.
29	88.	71.	0.	0.	264.	204.	158.	134.	115.	102.	155.	131.
30	229.	197.	0.	0.	375.	322.	116.	103.	100.	91.	210.	186.
31	233.	212.	0.	0.	337.	271.	0.	0.	120.	112.	0.	0.
AVERAGE	148.	128.	154.	130.	192.	165.	202.	170.	171.	155.	214.	186.

PAIRED t STATISTIC = 30.43
DEGREES OF FREEDOM = 362.

ANNUAL AVERAGES

$\bar{C}$ = 165.74

$\bar{N}$ = 139.46

**** - NO DATA

SO_2 SERIES - CORRECTED (C) AND NON - CORRECTED (N) FOR NH_3 INTERFERENCE

SAMPLING SITE= MGEMA

JULY/78 TO JUNE/79

DAYS	JUL C	JUL N	AUG C	AUG N	SEP C	SEP N	OCT C	OCT N	NOV C	NOV N	DEC C	DEC N	JAN C	JAN N	FEB C	FEB N	MAR C	MAR N	APR C	APR N	MAI C	MAI N	JUN C	JUN N
1	187.	157.	76.	61.	172.	20.	52.	37.	106.	83.	99.	84.	44.	29.	65.	56.	109.	85.	97.	70.	47.	34.	73.	64.
2	51.	36.	105.	90.	86.	51.	85.	68.	23.	14.	157.	131.	43.	37.	78.	61.	95.	45.	189.	161.	75.	66.	60.	45.
3	72.	61.	121.	95.	65.	20.	144.	112.	47.	36.	138.	104.	74.	48.	62.	47.	46.	35.	278.	239.	156.	126.	38.	29.
4	115.	100.	132.	74.	81.	24.	91.	91.	91.	76.	94.	75.	56.	41.	37.	20.	73.	73.	121.	91.	101.	62.	53.	42.
5	112.	96.	124.	98.	95.	39.	157.	133.	50.	33.	103.	88.	47.	36.	45.	30.	82.	65.	130.	117.	76.	76.	107.	83.
6	123.	117.	112.	84.	150.	35.	115.	66.	93.	80.	127.	112.	81.	62.	53.	36.	104.	81.	120.	103.	61.	50.	77.	60.
7	111.	94.	125.	93.	76.	100.	21.	10.	135.	110.	91.	74.	76.	53.	178.	154.	102.	81.	61.	46.	130.	109.	94.	83.
8	69.	53.	174.	127.	89.	68.	51.	45.	118.	101.	32.	24.	72.	59.	106.	106.	171.	135.	35.	22.	114.	95.	133.	107.
9	64.	47.	220.	150.	73.	35.	50.	42.	132.	132.	131.	114.	54.	46.	112.	82.	202.	174.	60.	52.	126.	103.	25.	16.
10	71.	60.	227.	167.	50.	64.	101.	82.	173.	145.	95.	80.	59.	50.	128.	83.	109.	151.	104.	91.	130.	109.	66.	55.
11	161.	146.	241.	170.	93.	74.	162.	136.	77.	66.	35.	35.	88.	73.	109.	81.	103.	86.	158.	130.	77.	58.	112.	99.
12	179.	151.	115.	72.	73.	63.	69.	50.	43.	34.	59.	59.	78.	56.	32.	25.	93.	78.	211.	179.	161.	144.	258.	200.
13	27.	14.	42.	34.	66.	39.	82.	73.	91.	78.	89.	78.	87.	68.	62.	45.	136.	104.	61.	50.	97.	69.	259.	220.
14	55.	34.	11.	****	79.	55.	86.	71.	60.	54.	124.	105.	64.	47.	81.	70.	119.	87.	53.	42.	65.	52.	53.	40.
15	133.	126.	64.	40.	59.	114.	60.	47.	66.	58.	147.	128.	67.	48.	55.	40.	42.	35.	74.	61.	59.	48.	16.	7.
16	57.	44.	78.	40.	37.	153.	65.	59.	87.	72.	106.	85.	67.	52.	46.	35.	124.	96.	136.	123.	60.	53.	72.	59.
17	70.	49.	43.	24.	102.	73.	125.	108.	144.	121.	42.	29.	66.	51.	93.	80.	79.	60.	262.	204.	100.	85.	133.	114.
18	****	****	56.	30.	48.	55.	63.	52.	119.	98.	23.	10.	50.	42.	92.	62.	75.	56.	112.	91.	168.	144.	67.	48.
19	172.	155.	92.	41.	35.	70.	50.	44.	116.	94.	26.	15.	44.	36.	109.	81.	64.	53.	53.	36.	272.	221.	99.	80.
20	200.	200.	51.	32.	62.	73.	32.	25.	89.	74.	63.	54.	41.	41.	106.	85.	86.	73.	66.	57.	103.	82.	197.	165.
21	91.	92.	59.	40.	54.	124.	80.	69.	173.	152.	133.	117.	40.	40.	55.	40.	104.	85.	130.	116.	100.	89.	223.	132.
22	137.	96.	88.	35.	119.	69.	35.	24.	107.	83.	138.	115.	65.	56.	64.	56.	185.	155.	60.	37.	164.	149.	175.	154.
23	71.	62.	73.	39.	76.	74.	46.	39.	157.	133.	52.	37.	68.	61.	77.	66.	255.	212.	25.	8.	99.	82.	262.	193.
24	84.	71.	60.	21.	42.	60.	170.	131.	43.	17.	61.	48.	76.	53.	104.	80.	117.	102.	26.	15.	42.	42.	236.	159.
25	95.	82.	21.	10.	73.	43.	225.	195.	78.	55.	30.	21.	114.	86.	100.	70.	45.	30.	25.	16.	64.	55.	105.	82.
26	175.	150.	60.	30.	80.	32.	92.	68.	125.	89.	44.	29.	105.	66.	146.	118.	24.	15.	107.	88.	120.	109.	49.	30.
27	177.	162.	32.	19.	73.	70.	153.	123.	61.	50.	75.	66.	144.	123.	93.	74.	42.	25.	118.	109.	72.	63.	103.	90.
28	165.	145.	53.	21.	39.	58.	78.	67.	79.	64.	64.	64.	94.	62.	194.	177.	80.	80.	100.	85.	78.	71.	60.	45.
29	103.	92.	139.	71.	42.	61.	77.	53.	79.	58.	104.	97.	31.	10.	0.	0.	141.	117.	86.	71.	102.	87.	95.	74.
30	114.	73.	153.	68.	131.	49.	85.	59.	68.	49.	121.	100.	89.	72.	0.	0.	118.	80.	66.	55.	72.	61.	154.	135.
31	71.	52.	82.	39.	0.	0.	68.	45.	0.	0.	71.	54.	66.	51.	0.	0.	66.	53.	0.	0.	42.	35.	0.	0.
AVERAGE	110.	94.	97.	64.	78.	64.	89.	72.	93.	76.	86.	72.	70.	53.	89.	70.	106.	84.	104.	86.	101.	85.	115.	92.

PAIRED t STATISTIC = 18.87
DEGREES OF FREEDOM = 362.

ANNUAL AVERAGES

$\bar{C}$ = 95.05

$\bar{N}$ = 76.03

**** = NO DATA

SO_2 SERIES - CORRECTED (C) AND NON - CORRECTED (N) FOR NH_3 INTERFERENCE

SAMPLING SITE= PRAÇA DA REPUBLICA

JULY/78 TO JUNE/79

DAYS	JUL C	JUL N	AUG C	AUG N	SEP C	SEP N	OCT C	OCT N	NOV C	NOV N	DEC C	DEC N	JAN C	JAN N	FEB C	FEB N	MAR C	MAR N	APR C	APR N	MAI C	MAI N	JUN C	JUN N
1	243.	213.	108.	93.	57.	33.	64.	49.	186.	158.	134.	119.	62.	45.	82.	74.	141.	113.	121.	95.	104.	85.	231.	214.
2	78.	61.	144.	127.	120.	69.	142.	123.	60.	49.	192.	164.	74.	59.	141.	122.	125.	125.	167.	143.	156.	132.	298.	269.
3	107.	90.	162.	124.	68.	34.	216.	126.	68.	53.	54.	63.	157.	131.	116.	94.	128.	109.	276.	250.	429.	393.	246.	218.
4	194.	173.	172.	140.	59.	40.	136.	136.	94.	81.	103.	88.	83.	72.	82.	59.	84.	54.	100.	83.	101.	82.	270.	227.
5	103.	77.	149.	121.	57.	31.	237.	211.	72.	48.	106.	87.	100.	89.	94.	67.	83.	64.	137.	124.	94.	67.	253.	221.
6	118.	107.	164.	138.	71.	37.	197.	169.	112.	93.	79.	60.	172.	161.	90.	58.	138.	115.	133.	116.	126.	111.	125.	104.
7	235.	214.	199.	154.	177.	147.	90.	73.	237.	207.	71.	52.	82.	61.	199.	157.	132.	106.	81.	64.	152.	135.	138.	121.
8	122.	103.	272.	219.	69.	52.	53.	42.	147.	126.	109.	96.	111.	94.	159.	150.	191.	174.	84.	63.	226.	203.	196.	179.
9	112.	95.	241.	195.	44.	36.	58.	49.	130.	111.	153.	142.	116.	103.	183.	144.	263.	237.	88.	73.	197.	167.	104.	91.
10	122.	107.	254.	194.	122.	115.	176.	150.	139.	109.	127.	112.	100.	90.	126.	107.	142.	125.	156.	134.	170.	149.	155.	134.
11	229.	203.	254.	179.	83.	73.	134.	115.	90.	75.	65.	54.	107.	86.	158.	126.	99.	80.	****	****	195.	164.	112.	86.
12	149.	123.	154.	97.	123.	114.	141.	124.	92.	70.	88.	80.	127.	106.	82.	59.	105.	90.	377.	351.	191.	172.	229.	205.
13	65.	55.	30.	21.	83.	74.	116.	103.	118.	90.	96.	83.	113.	99.	69.	52.	191.	150.	128.	111.	137.	116.	240.	218.
14	137.	124.	25.	19.	95.	82.	112.	89.	102.	82.	145.	121.	52.	33.	96.	70.	139.	101.	59.	42.	69.	58.	61.	50.
15	195.	170.	67.	46.	136.	117.	83.	66.	84.	71.	122.	102.	117.	98.	132.	100.	126.	115.	102.	81.	96.	81.	56.	45.
16	63.	49.	66.	38.	232.	210.	79.	70.	93.	76.	135.	109.	119.	100.	157.	133.	126.	92.	213.	187.	198.	183.	120.	97.
17	134.	119.	69.	47.	94.	81.	133.	111.	129.	114.	61.	46.	100.	87.	88.	73.	****	****	436.	380.	126.	126.	182.	157.
18	106.	97.	70.	36.	104.	87.	114.	102.	139.	115.	56.	43.	107.	94.	116.	97.	86.	65.	245.	207.	281.	250.	133.	107.
19	266.	247.	129.	60.	113.	100.	49.	40.	61.	48.	84.	67.	113.	100.	82.	65.	72.	53.	122.	107.	267.	243.	128.	96.
20	216.	203.	61.	35.	135.	118.	43.	32.	114.	95.	145.	132.	85.	76.	63.	44.	95.	78.	154.	128.	239.	209.	339.	286.
21	75.	62.	74.	42.	253.	234.	154.	139.	142.	118.	239.	246.	112.	104.	116.	101.	****	****	173.	137.	147.	132.	416.	355.
22	57.	42.	99.	40.	145.	132.	43.	30.	125.	95.	256.	227.	140.	127.	109.	98.	****	****	114.	91.	160.	145.	193.	178.
23	103.	94.	82.	31.	103.	85.	49.	38.	211.	179.	72.	50.	101.	86.	105.	94.	225.	204.	57.	39.	132.	110.	318.	282.
24	112.	95.	62.	24.	85.	70.	267.	237.	99.	75.	70.	49.	109.	92.	155.	116.	175.	148.	72.	53.	83.	68.	233.	186.
25	156.	145.	41.	20.	89.	74.	205.	179.	92.	73.	48.	37.	122.	110.	109.	96.	71.	52.	66.	55.	139.	124.	122.	84.
26	274.	256.	32.	32.	113.	100.	161.	135.	115.	85.	54.	35.	112.	93.	153.	134.	45.	30.	156.	139.	157.	130.	106.	95.
27	260.	245.	42.	27.	133.	116.	208.	180.	57.	38.	67.	52.	162.	139.	140.	118.	73.	56.	149.	130.	110.	97.	149.	130.
28	254.	230.	61.	26.	126.	117.	77.	64.	90.	69.	63.	63.	69.	48.	139.	126.	152.	141.	142.	121.	177.	165.	111.	96.
29	119.	103.	146.	93.	151.	134.	77.	58.	97.	80.	89.	78.	52.	35.	0.	0.	226.	175.	146.	135.	151.	132.	115.	100.
30	191.	172.	197.	89.	116.	93.	88.	64.	101.	84.	105.	86.	164.	145.	0.	0.	191.	146.	101.	86.	86.	73.	195.	174.
31	125.	100.	92.	36.	0.	0.	150.	124.	0.	0.	78.	61.	162.	145.	0.	0.	181.	142.	0.	0.	78.	69.	0.	0.
AVERAGE	152.	134.	121.	91.	112.	94.	124.	106.	113.	92.	108.	90.	110.	94.	119.	98.	136.	113.	150.	128.	160.	142.	156.	160.

PAIRED t STATISTIC = 34.21
DEGREES OF FREEDOM = 360.

ANNUAL AVERAGES

$\bar{C}$ = 132.54

$\bar{N}$ = 111.12

**** = NO DATA

SO_2 SERIES - CORRECTED (C) AND NON - CORRECTED (N) FOR NH_3 INTERFERENCE

SAMPLING SITE- VILA ANASTACIO

JULY/78 TO JUNE/79

DAYS	JUL C	JUL N	AUG C	AUG N	SEP C	SEP N	OCT C	OCT N	NOV C	NOV N	DEC C	DEC N	JAN C	JAN N	FEB C	FEB N	MAR C	MAR N	APR C	APR N	MAI C	MAI N	JUN C	JUN N
1	200.	177.	85.	74.	50.	31.	77.	60.	158.	136.	125.	112.	23.	8.	85.	66.	105.	96.	107.	86.	100.	91.	169.	158.
2	70.	51.	131.	112.	60.	37.	105.	86.	43.	34.	175.	143.	53.	40.	90.	73.	90.	54.	159.	140.	94.	83.	208.	139.
3	94.	97.	147.	115.	55.	23.	175.	143.	59.	50.	112.	89.	142.	123.	97.	69.	63.	50.	175.	160.	210.	191.	146.	112.
4	144.	127.	173.	141.	40.	29.	161.	161.	100.	94.	120.	105.	60.	41.	28.	15.	98.	98.	133.	118.	98.	85.	139.	115.
5	125.	91.	163.	135.	45.	30.	217.	193.	82.	71.	119.	104.	60.	49.	62.	149.	112.	97.	108.	97.	78.	78.	223.	208.
6	103.	84.	123.	97.	35.	35.	87.	68.	74.	74.	130.	117.	152.	135.	98.	79.	141.	117.	102.	93.	101.	82.	122.	103.
7	111.	93.	203.	164.	106.	97.	58.	45.	217.	204.	117.	106.	85.	66.	141.	122.	123.	99.	50.	42.	116.	105.	129.	114.
8	76.	65.	247.	213.	52.	37.	39.	30.	125.	110.	80.	69.	86.	71.	128.	123.	165.	153.	29.	18.	140.	129.	130.	117.
9	94.	70.	243.	198.	82.	75.	38.	38.	125.	119.	123.	110.	74.	66.	110.	89.	231.	212.	59.	50.	153.	129.	65.	52.
10	85.	74.	223.	172.	129.	112.	158.	134.	103.	88.	77.	62.	103.	94.	120.	83.	123.	108.	128.	111.	136.	122.	107.	92.
11	163.	143.	137.	149.	90.	71.	156.	143.	90.	82.	58.	50.	80.	65.	131.	116.	91.	78.	222.	194.	135.	120.	114.	82.
12	190.	158.	115.	81.	85.	85.	92.	77.	61.	52.	59.	59.	118.	94.	55.	44.	90.	85.	302.	285.	131.	120.	232.	211.
13	38.	30.	37.	20.	62.	53.	135.	124.	135.	122.	105.	92.	101.	75.	117.	104.	122.	105.	90.	79.	72.	57.	249.	232.
14	79.	55.	14.	5.	89.	89.	****	****	97.	82.	114.	88.	46.	23.	74.	66.	135.	124.	66.	53.	39.	39.	53.	40.
15	147.	152.	53.	44.	105.	88.	97.	84.	89.	80.	81.	66.	81.	60.	61.	46.	84.	76.	111.	94.	84.	75.	28.	20.
16	40.	36.	61.	40.	153.	134.	90.	83.	113.	94.	142.	110.	146.	127.	103.	84.	126.	111.	148.	131.	116.	107.	112.	99.
17	135.	114.	47.	30.	82.	73.	131.	114.	147.	126.	80.	63.	54.	41.	99.	84.	89.	74.	267.	218.	130.	108.	121.	104.
18	101.	84.	62.	32.	91.	76.	73.	64.	124.	107.	29.	14.	80.	72.	126.	100.	65.	46.	168.	146.	233.	212.	61.	44.
19	177.	160.	76.	38.	124.	109.	55.	55.	114.	101.	32.	25.	56.	49.	80.	59.	74.	55.	66.	55.	205.	168.	94.	79.
20	105.	105.	47.	26.	152.	139.	44.	37.	94.	83.	93.	75.	54.	46.	72.	59.	87.	72.	98.	77.	127.	110.	241.	222.
21	104.	95.	64.	40.	253.	231.	93.	78.	165.	148.	185.	166.	55.	55.	98.	85.	126.	111.	134.	102.	114.	103.	230.	207.
22	67.	56.	90.	51.	103.	92.	****	****	122.	100.	195.	180.	83.	72.	62.	55.	164.	132.	53.	36.	102.	89.	173.	154.
23	94.	85.	70.	31.	100.	87.	76.	65.	140.	124.	64.	47.	64.	56.	121.	106.	227.	210.	33.	22.	121.	106.	267.	222.
24	81.	70.	40.	16.	77.	66.	266.	205.	61.	35.	61.	48.	98.	87.	108.	72.	158.	136.	33.	24.	68.	55.	142.	106.
25	97.	86.	22.	11.	73.	50.	190.	167.	86.	67.	32.	21.	108.	85.	101.	75.	59.	48.	38.	25.	89.	78.	86.	60.
26	170.	153.	53.	34.	119.	104.	142.	120.	115.	89.	58.	47.	98.	79.	136.	117.	29.	20.	164.	142.	133.	122.	60.	51.
27	155.	142.	33.	20.	124.	111.	152.	126.	101.	85.	65.	59.	117.	96.	119.	110.	33.	20.	150.	135.	94.	86.	77.	66.
28	192.	174.	52.	22.	132.	124.	82.	71.	119.	98.	86.	86.	62.	41.	94.	84.	117.	117.	134.	112.	71.	71.	81.	64.
29	113.	100.	143.	66.	112.	78.	71.	52.	112.	97.	56.	39.	83.	68.	0.	0.	163.	151.	115.	102.	114.	101.	92.	81.
30	109.	89.	124.	60.	94.	71.	91.	50.	110.	87.	109.	70.	115.	100.	0.	0.	127.	103.	92.	79.	116.	106.	115.	106.
31	84.	67.	62.	30.	0.	0.	135.	114.	0.	0.	67.	54.	104.	93.	0.	0.	128.	105.	0.	0.	117.	104.	0.	0.
AVERAGE	114.	99.	103.	73.	95.	82.	113.	96.	110.	95.	95.	80.	95.	70.	97.	80.	115.	99.	117.	101.	117.	105.	136.	117.

PAIRED t STATISTIC = 33.25
DEGREES OF FREEDOM = 362.

ANNUAL AVERAGES

$\bar{C}$ = 108.22

$\bar{N}$ = 91.38

**** - NO DATA

CETESB

SO_2 SERIES - CORRECTED (C) AND NON - CORRECTED (N) FOR NH_3 INTERFERENCE

SAMPLING SITE= CAPUAVA RESIDENCIAL
JULY/78 TO JUNE/79

	JUL		AUG		SEP		OCT		NOV		DEC		JAN		FEB		MAR		APR		MAI		JUN	
DAYS	C	N	C	N	C	N	C	N	C	N	C	N	C	N	C	N	C	N	C	N	C	N	C	N
1	245.	226.	347.	334.	43.	23.	98.	89.	235.	220.	132.	123.	23.	10.	****	****	111.	102.	149.	134.	42.	33.	133.	122.
2	166.	153.	341.	326.	40.	21.	130.	119.	[illegible]	174.	147.	130.	72.	57.	499.	478.	110.	110.	90.	79.	89.	70.	315.	300.
3	85.	76.	146.	123.	57.	36.	286.	275.	215.	204.	224.	200.	33.	22.	309.	298.	1350	1350	115.	104.	221.	204.	252.	245.
4	134.	115.	198.	176.	54.	45.	104.	104.	120.	111.	88.	77.	123.	112.	392.	373.	697.	697.	127.	114.	64.	49.	218.	192.
5	131.	93.	152.	158.	41.	30.	208.	193.	31.	16.	67.	58.	204.	196.	241.	232.	352.	343.	62.	53.	99.	99.	124.	113.
6	113.	74.	106.	97.	34.	26.	323.	304.	70.	70.	37.	26.	302.	291.	726.	713.	200.	201.	147.	138.	178.	170.	359.	348.
7	483.	475.	112.	91.	64.	51.	158.	145.	230.	222.	47.	36.	179.	160.	712.	693.	177.	168.	100.	91.	112.	104.	400.	331.
8	169.	156.	90.	69.	50.	31.	92.	85.	120.	105.	178.	165.	252.	235.	146.	146.	135.	120.	64.	55.	114.	103.	326.	319.
9	195.	178.	127.	101.	44.	36.	113.	113.	80.	71.	164.	157.	318.	318.	334.	321.	538.	525.	134.	127.	156.	141.	473.	473.
10	159.	151.	65.	41.	84.	73.	60.	65.	62.	43.	160.	147.	226.	217.	219.	208.	127.	114.	378.	367.	111.	98.	352.	352.
11	123.	112.	76.	46.	102.	102.	91.	76.	42.	42.	176.	176.	205.	184.	163.	150.	69.	76.	254.	246.	194.	187.	162.	151.
12	111.	73.	105.	75.	121.	121.	85.	70.	68.	59.	232.	232.	166.	143.	40.	29.	310.	310.	475.	458.	91.	80.	77.	64.
13	32.	19.	78.	61.	112.	112.	93.	86.	135.	122.	137.	126.	206.	193.	25.	8.	205.	205.	252.	241.	38.	23.	132.	113.
14	106.	85.	25.	14.	82.	73.	87.	70.	96.	89.	113.	94.	253.	236.	49.	40.	153.	132.	173.	164.	107.	107.	95.	84.
15	83.	74.	76.	69.	24.	13.	88.	75.	98.	91.	94.	77.	334.	315.	213.	204.	1006	1006	151.	140.	142.	135.	344.	344.
16	31.	16.	64.	41.	89.	76.	76.	76.	95.	86.	140.	104.	227.	210.	356.	345.	295.	263.	90.	90.	347.	347.	189.	189.
17	66.	51.	35.	20.	171.	160.	61.	49.	47.	38.	136.	128.	193.	180.	220.	203.	361.	346.	180.	165.	253.	244.	161.	146.
18	33.	20.	43.	22.	251.	236.	124.	116.	94.	71.	63.	54.	246.	246.	213.	204.	547.	547.	352.	314.	43.	34.	303.	279.
19	99.	80.	100.	57.	124.	115.	106.	100.	49.	32.	126.	113.	236.	236.	102.	94.	437.	426.	182.	175.	64.	57.	196.	188.
20	21.	21.	66.	34.	86.	75.	24.	24.	84.	69.	103.	103.	336.	336.	35.	24.	514.	514.	188.	177.	167.	152.	137.	124.
21	32.	21.	42.	31.	120.	107.	128.	117.	52.	37.	158.	139.	414.	414.	530.	519.	170.	161.	258.	241.	254.	254.	240.	216.
22	42.	31.	89.	51.	200.	193.	111.	102.	103.	77.	181.	160.	321.	312.	760.	760.	40.	29.	201.	186.	40.	40.	46.	****
23	20.	12.	45.	21.	260.	251.	158.	158.	107.	79.	193.	176.	351.	342.	173.	173.	69.	50.	61.	50.	172.	157.	68.	51.
24	34.	25.	70.	51.	162.	143.	236.	215.	115.	68.	293.	280.	148.	133.	167.	152.	85.	64.	169.	160.	86.	79.	101.	71.
25	****	****	24.	15.	124.	117.	75.	58.	100.	89.	84.	75.	134.	119.	177.	164.	145.	134.	192.	177.	186.	178.	88.	64.
26	42.	27.	55.	46.	184.	177.	192.	169.	56.	37.	38.	25.	118.	85.	273.	256.	68.	68.	286.	275.	129.	120.	258.	250.
27	254.	247.	47.	36.	170.	157.	145.	126.	34.	21.	71.	71.	89.	72.	172.	163.	162.	154.	226.	226.	108.	101.	356.	348.
28	434.	412.	38.	8.	61.	61.	70.	63.	63.	48.	75.	75.	57.	38.	95.	84.	167.	167.	181.	170.	254.	254.	153.	142.
29	154.	145.	56.	37.	194.	185.	105.	88.	69.	52.	58.	58.	65.	50.	0.	0.	75.	60.	144.	135.	66.	53.	156.	147.
30	85.	69.	68.	32.	158.	151.	92.	64.	90.	77.	46.	37.	311.	300.	0.	0.	228.	200.	110.	101.	35.	35.	160.	149.
31	199.	186.	55.	10.	0.	0.	185.	170.	0.	0.	93.	80.	480.	471.	0.	0.	286.	264.	0.	0.	50.	50.	0.	0.
AVERAGE	129.	114.	95.	74.	110.	100.	127.	115.	98.	84.	124.	113.	214.	201.	272.	261.	297.	287.	183.	172.	129.	121.	212.	206.

PAIRED t STATISTIC = 28.37
DEGREES OF FREEDOM = 361.

ANNUAL AVERAGES

$\bar{C}$ =165.35

$\bar{N}$ =152.92

**** = NO DATA

SO_2 SERIES - CORRECTED (C) AND NON - CORRECTED (N) FOR NH_3 INTERFERENCE

SAMPLING SITE= CAPUAVA INDUSTRIAL
JULY/78 TO JUNE/79

DAYS	JUL C	JUL N	AUG C	AUG N	SEP C	SEP N	OCT C	OCT N	NOV C	NOV N	DEC C	DEC N
1	238.	155.	234.	223.	171.	****	143.	128.	142.	125.	177.	166.
2	133.	118.	219.	204.	118.	****	99.	84.	57.	40.	190.	171.
3	145.	134.	264.	238.	122.	****	169.	152.	113.	96.	211.	181.
4	126.	117.	280.	256.	53.	25.	137.	137.	149.	132.	169.	150.
5	190.	****	219.	209.	131.	32.	201.	182.	32.	15.	199.	180.
6	307.	****	179.	164.	50.	31.	128.	98.	82.	73.	77.	58.
7	162.	****	224.	205.	113.	105.	56.	****	166.	157.	112.	93.
8	90.	****	186.	160.	56.	49.	38.	****	187.	168.	86.	69.
9	204.	155.	227.	176.	30.	23.	149.	16.	138.	127.	89.	76.
10	33.	****	190.	149.	110.	99.	68.	15.	171.	152.	92.	73.
11	****	****	190.	135.	97.	26.	102.	57.	148.	139.	113.	102.
12	508.	6.	190.	****	155.	117.	117.	91.	71.	60.	150.	128.
13	43.	****	58.	****	147.	134.	126.	113.	150.	133.	152.	133.
14	81.	****	26.	7.	92.	****	121.	100.	105.	96.	134.	115.
15	118.	****	61.	46.	65.	5.	83.	73.	183.	171.	192.	173.
16	99.	37.	68.	42.	121.	68.	170.	170.	180.	172.	138.	116.
17	65.	31.	50.	31.	116.	82.	156.	141.	123.	108.	87.	72.
18	95.	61.	112.	5.	139.	115.	83.	57.	173.	152.	72.	63.
19	179.	158.	197.	****	182.	163.	112.	95.	106.	87.	73.	60.
20	178.	150.	124.	****	163.	144.	67.	58.	120.	101.	186.	177.
21	52.	16.	98.	****	194.	166.	123.	108.	149.	132.	193.	174.
22	164.	140.	134.	31.	****	****	91.	80.	112.	46.	186.	169.
23	85.	72.	103.	24.	73.	****	501.	501.	123.	37.	133.	107.
24	141.	122.	62.	****	62.	****	240.	218.	140.	85.	87.	59.
25	111.	98.	35.	22.	104.	42.	****	****	330.	313.	43.	24.
26	207.	188.	60.	47.	88.	****	****	****	130.	109.	166.	149.
27	239.	226.	102.	****	147.	21.	****	****	42.	21.	94.	86.
28	243.	224.	101.	86.	152.	120.	161.	146.	101.	54.	144.	137.
29	197.	189.	115.	32.	136.	113.	128.	109.	230.	224.	178.	178.
30	181.	164.	220.	2.	****	****	127.	106.	228.	211.	133.	120.
31	146.	133.	114.	20.	0.	0.	124.	105.	0.	0.	124.	111.
AVERAGE	158.	124.	143.	105.	114.	83.	137.	121.	140.	118.	135.	118.

DAYS	JAN C	JAN N	FEB C	FEB N	MAR C	MAR N	APR C	APR N	MAI C	MAI N	JUN C	JUN N
1	50.	33.	****	****	257.	242.	157.	142.	58.	43.	245.	236.
2	94.	79.	184.	165.	253.	253.	173.	158.	120.	101.	258.	243.
3	229.	220.	164.	151.	160.	149.	282.	267.	177.	156.	173.	158.
4	83.	71.	114.	97.	163.	163.	151.	136.	175.	154.	98.	75.
5	130.	122.	119.	102.	149.	130.	200.	187.	62.	62.	174.	151.
6	138.	112.	237.	224.	291.	276.	255.	214.	136.	121.	117.	93.
7	153.	127.	81.	****	311.	296.	116.	105.	105.	90.	191.	180.
8	85.	53.	1024	468.	316.	303.	111.	93.	231.	214.	152.	139.
9	138.	121.	156.	****	334.	306.	148.	140.	202.	180.	151.	136.
10	228.	209.	151.	106.	358.	334.	****	****	232.	215.	146.	135.
11	202.	172.	149.	117.	217.	200.	220.	205.	146.	133.	187.	166.
12	188.	174.	114.	92.	160.	147.	251.	236.	206.	189.	197.	184.
13	160.	134.	135.	120.	239.	228.	104.	91.	136.	113.	274.	246.
14	153.	132.	69.	52.	168.	169.	101.	90.	130.	115.	153.	138.
15	92.	62.	124.	109.	152.	152.	145.	134.	100.	89.	159.	159.
16	258.	191.	200.	185.	278.	254.	209.	198.	175.	164.	186.	178.
17	141.	126.	136.	125.	212.	199.	215.	187.	216.	205.	135.	120.
18	134.	123.	107.	80.	196.	185.	215.	200.	325.	312.	211.	172.
19	122.	109.	113.	98.	181.	170.	108.	95.	383.	368.	214.	201.
20	174.	163.	155.	136.	515.	515.	155.	142.	265.	227.	204.	180.
21	82.	82.	119.	102.	462.	453.	101.	86.	160.	138.	266.	54.
22	124.	113.	356.	348.	300.	279.	102.	87.	510.	491.	****	****
23	157.	144.	174.	174.	243.	228.	84.	71.	170.	148.	228.	106.
24	159.	142.	176.	153.	184.	158.	144.	136.	123.	112.	228.	181.
25	151.	134.	146.	91.	167.	151.	135.	120.	160.	149.	96.	57.
26	197.	176.	138.	99.	122.	113.	152.	139.	174.	163.	167.	143.
27	160.	132.	153.	112.	157.	146.	192.	184.	102.	87.	151.	38.
28	97.	78.	185.	164.	251.	251.	195.	180.	140.	127.	245.	102.
29	43.	26.	0.	0.	212.	194.	164.	153.	268.	247.	179.	****
30	156.	147.	0.	0.	250.	216.	181.	172.	103.	90.	144.	27.
31	****	****	0.	0.	207.	192.	0.	0.	43.	43.	0.	0.
AVERAGE	141.	124.	184.	147.	242.	227.	164.	150.	178.	163.	184.	143.

PAIRED t STATISTIC = 10.18
DEGREES OF FREEDOM = 327.

ANNUAL AVERAGES

$\bar{C}$ = 164.07

$\bar{N}$ = 137.67

**** = NO DATA

CETESB

SO_2 SERIES - CORRECTED (C) AND NON - CORRECTED (N) FOR NH_3 INTERFERENCE

SAMPLING SITE- GUARULHOS

JULY/78 TO JUNE/79

DAYS	JUL C.	JUL N	AUG C	AUG N	SEP C	SEP N	OCT C	OCT N	NOV C	NOV N	DEC C	DEC N	JAN C	JAN N	FEB C	FEB N	MAR C	MAR N	APR C	APR N	MAI C	MAI N	JUN C	JUN N
1	121.	100.	263.	252.	100.	53.	181.	172.	182.	159.	174.	163.	27.	16.	230.	221.	133.	122.	92.	81.	31.	22.	132.	125.
2	26.	67.	257.	244.	132.	73.	145.	130.	93.	97.	213.	194.	89.	78.	210.	176.	138.	138.	92.	81.	61.	50.	277.	262.
3	62.	45.	189.	142.	64.	41.	213.	189.	67.	56.	139.	120.	116.	103.	218.	203.	148.	137.	168.	155.	195.	178.	274.	259.
4	137.	122.	259.	225.	57.	46.	183.	189.	107.	96.	82.	69.	85.	72.	139.	120.	116.	116.	88.	77.	126.	113.	186.	169.
5	237.	235.	270.	244.	66.	45.	173.	154.	23.	10.	127.	118.	194.	179.	87.	72.	157.	142.	115.	104.	83.	83.	220.	205.
6	121.	104.	180.	161.	34.	26.	170.	144.	41.	30.	33.	20.	222.	217.	126.	107.	313.	296.	59.	49.	165.	159.	189.	174.
7	186.	169.	156.	132.	117.	90.	109.	94.	153.	142.	41.	30.	124.	98.	125.	99.	185.	174.	73.	64.	97.	86.	220.	211.
8	194.	149.	158.	136.	72.	55.	109.	103.	300.	285.	108.	91.	97.	86.	159.	159.	196.	169.	95.	80.	217.	206.	274.	261.
9	132.	121.	149.	113.	32.	22.	78.	69.	174.	165.	119.	108.	176.	129.	106.	91.	221.	208.	145.	134.	197.	182.	142.	131.
10	57.	46.	128.	98.	111.	102.	136.	117.	129.	112.	96.	79.	188.	180.	140.	123.	148.	133.	289.	268.	100.	89.	134.	125.
11	161.	148.	142.	97.	143.	143.	105.	174.	99.	93.	124.	[illegible]	266.	253.	120.	107.	97.	86.	198.	177.	209.	194.	71.	60.
12	152.	124.	129.	72.	258.	250.	141.	128.	131.	88.	210.	[illegible]	257.	221.	42.	35.	132.	117.	230.	204.	292.	279.	215.	206.
13	83.	72.	55.	44.	247.	247.	228.	219.	94.	79.	233.	191.	316.	301.	37.	18.	156.	143.	168.	157.	92.	77.	144.	129.
14	146.	123.	47.	32.	327.	314.	116.	95.	204.	193.	206.	187.	205.	188.	67.	56.	186.	160.	169.	174.	94.	65.	58.	51.
15	135.	124.	99.	72.	225.	210.	67.	52.	202.	195.	198.	173.	110.	89.	130.	108.	144.	136.	136.	123.	105.	96.	47.	47.
16	50.	22.	61.	35.	224.	199.	139.	100.	133.	120.	151.	130.	164.	141.	123.	108.	180.	154.	122.	123.	202.	195.	199.	186.
17	123.	105.	75.	49.	151.	140.	137.	124.	150.	139.	83.	70.	187.	170.	193.	178.	201.	177.	174.	157.	151.	142.	136.	123.
18	95.	82.	74.	52.	116.	105.	204.	196.	85.	68.	61.	43.	96.	39.	121.	108.	156.	133.	154.	141.	229.	216.	173.	154.
19	273.	257.	97.	43.	191.	179.	65.	59.	103.	84.	102.	87.	108.	99.	69.	60.	173.	144.	149.	138.	218.	205.	167.	146.
20	252.	252.	79.	55.	180.	174.	129.	118.	77.	66.	158.	145.	202.	194.	73.	58.	258.	239.	230.	213.	138.	121.	131.	116.
21	34.	25.	77.	37.	243.	224.	103.	94.	127.	112.	161.	142.	156.	156.	36.	75.	217.	198.	153.	136.	123.	112.	259.	240.
22	46.	35.	91.	46.	183.	151.	176.	115.	85.	59.	196.	177.	170.	161.	219.	211.	179.	142.	130.	115.	222.	215.	236.	223.
23	68.	65.	97.	55.	229.	216.	70.	61.	176.	144.	124.	105.	193.	184.	459.	446.	180.	165.	78.	59.	180.	180.	399.	378.
24	92.	83.	59.	31.	126.	125.	208.	185.	107.	81.	118.	103.	220.	203.	192.	169.	178.	163.	86.	75.	127.	114.	161.	120.
25	113.	93.	33.	22.	109.	101.	140.	134.	263.	248.	27.	13.	172.	157.	44.	25.	94.	75.	102.	94.	153.	144.	97.	69.
26	293.	286.	106.	89.	255.	244.	162.	141.	111.	92.	35.	20.	119.	104.	71.	52.	65.	65.	233.	220.	217.	208.	95.	77.
27	160.	149.	43.	26.	295.	284.	170.	144.	28.	15.	55.	50.	103.	88.	130.	125.	87.	76.	321.	312.	132.	124.	221.	208.
28	221.	222.	62.	19.	226.	219.	83.	64.	123.	97.	83.	83.	83.	68.	147.	138.	202.	193.	366.	351.	199.	199.	238.	219.
29	196.	185.	104.	43.	172.	161.	77.	60.	262.	245.	88.	88.	67.	50.	0.	0.	193.	174.	201.	184.	141.	128.	345.	332.
30	279.	222.	114.	65.	155.	146.	90.	66.	251.	236.	137.	126.	195.	179.	0.	0.	258.	222.	88.	79.	58.	50.	161.	148.
31	142.	127.	84.	46.	0.	0.	127.	106.	0.	0.	67.	56.	171.	158.	0.	0.	197.	173.	0.	0.	40.	46.	0.	0.
AVERAGE	142.	127.	120.	91.	161.	146.	137.	122.	135.	120.	120.	107.	156.	143.	138.	123.	171.	154.	158.	144.	148.	139.	187.	172.

PAIRED t STATISTIC = 33.01
DEGREES OF FREEDOM = 364.

ANNUAL AVERAGES

$\bar{C}$ = 147.63

$\bar{N}$ = 132.25

**** = NO DATA

CETESB

SO_2 SERIES - CORRECTED (C) AND NON - CORRECTED (N) FOR NH_3 INTERFERENCE

SAMPLING SITE= CSASCO

JULY/78 TO JUNE/79

DAYS	JUL C	JUL N	AUG C	AUG N	SEP C	SEP N	OCT C	OCT N	NOV C	NOV N	DEC C	DEC N
1	112.	90.	100.	25.	56.	32.	61.	48.	70.	51.	116.	103.
2	57.	36.	110.	88.	65.	41.	50.	35.	18.	11.	107.	83.
3	55.	44.	156.	115.	57.	25.	153.	136.	72.	53.	93.	69.
4	87.	66.	143.	111.	36.	21.	120.	129.	61.	46.	101.	84.
5	107.	77.	160.	124.	41.	22.	124.	105.	6.	****	127.	110.
6	125.	110.	141.	111.	52.	45.	92.	69.	67.	67.	177.	164.
7	73.	53.	127.	73.	66.	55.	40.	23.	119.	108.	122.	107.
8	68.	55.	110.	76.	64.	47.	42.	35.	132.	111.	60.	49.
9	81.	51.	154.	111.	90.	77.	48.	33.	117.	106.	111.	103.
10	77.	59.	118.	79.	50.	35.	121.	104.	****	****	80.	68.
11	137.	120.	105.	69.	123.	123.	120.	97.	56.	48.	67.	58.
12	108.	84.	118.	67.	105.	105.	74.	57.	56.	41.	91.	82.
13	40.	25.	37.	22.	69.	60.	110.	107.	67.	46.	86.	75.
14	82.	57.	16.	5.	153.	142.	80.	66.	77.	59.	156.	137.
15	133.	39.	55.	42.	96.	79.	80.	65.	81.	64.	105.	86.
16	59.	44.	43.	27.	152.	135.	59.	46.	99.	84.	105.	79.
17	62.	43.	73.	44.	85.	62.	107.	90.	128.	113.	52.	30.
18	132.	117.	80.	41.	75.	53.	58.	45.	133.	119.	21.	10.
19	94.	91.	92.	51.	99.	86.	44.	36.	137.	118.	30.	21
20	102.	100.	63.	37.	119.	102.	43.	34.	82.	67.	78.	67.
21	116.	97.	50.	22.	164.	163.	67.	46.	114.	95.	155.	140.
22	137.	124.	79.	34.	82.	69.	41.	28.	102.	78.	81.	66
23	88.	81.	90.	34.	101.	85.	55.	44.	80.	54.	78.	55.
24	53.	34.	42.	19.	74.	59.	118.	95.	46.	23.	77.	58.
25	92.	77.	21.	6.	64.	55.	106.	87.	82.	58.	24.	11.
26	144.	125.	63.	44.	122.	111.	107.	83.	86.	60.	83.	68.
27	93.	82.	34.	17.	105.	88.	106.	84.	126.	109.	118.	110.
28	132.	109.	56.	24.	94.	35.	115.	106.	118.	103.	82.	82.
29	142.	129.	131.	58.	74.	59.	59.	40.	91.	70.	86.	86.
30	95.	74.	151.	78.	81.	70.	90.	28.	104.	80.	69.	50.
31	81.	60.	71.	33.	0.	0.	86.	63.	0.	0.	52.	37.
AVERAGE	95.	73.	89.	56.	88.	72.	83.	67.	87.	73.	90.	76.

DAYS	JAN C	JAN N	FEB C	FEB N	MAR C	MAR N	APR C	APR N	MAI C	MAI N	JUN C	JUN N
1	39.	24.	111.	100.	91.	80.	98.	81.	40.	29.	124.	113.
2	57.	42.	91.	72.	87.	62.	111.	96.	98.	91.	193.	174.
3	214.	197.	91.	76.	53.	38.	173.	158.	179.	162.	****	****
4	85.	74.	60.	41.	89.	89.	125.	112.	149.	136.	100.	83.
5	70.	61.	43.	30.	74.	61.	129.	116.	178.	178.	149.	138.
6	114.	103.	51.	34.	117.	100.	205.	194.	90.	77.	142.	121.
7	83.	68.	142.	127.	122.	109.	99.	88.	100.	85.	136.	119.
8	65.	50.	112.	103.	157.	142.	50.	37.	118.	105.	107.	92.
9	77.	68.	115.	99.	155.	145.	84.	75.	159.	134.	62.	49.
10	113.	102.	88.	69.	129.	114.	131.	120.	147.	132.	103.	85.
11	90.	73.	83.	68.	104.	89.	139.	126.	108.	89.	113.	96.
12	106.	83.	84.	71.	80.	69.	219.	193.	203.	182.	141.	124.
13	160.	139.	181.	166.	130.	115.	77.	62.	108.	91.	157.	138.
14	86.	69.	154.	145.	99.	88.	51.	38.	74.	66.	41.	28.
15	89.	72.	62.	47.	80.	80.	67.	54.	80.	72.	26.	15.
16	66.	51.	70.	57.	101.	86.	110.	95.	111.	102.	120.	103.
17	98.	79.	100.	87.	89.	76.	131.	110.	131.	114.	148.	129.
18	41.	32.	123.	93.	82.	67.	107.	90.	193.	174.	120.	98.
19	51.	40.	59.	46.	77.	47.	79.	68.	130.	111.	123.	104.
20	66.	57.	122.	111.	115.	102.	87.	74.	117.	100.	127.	108.
21	72.	72.	93.	78.	107.	88.	144.	112.	101.	88.	190.	168.
22	61.	50.	76.	68.	142.	127.	40.	21.	189.	160.	190.	163.
23	114.	101.	109.	100.	181.	160.	18.	7.	133.	116.	216.	196.
24	110.	99.	118.	97.	94.	75.	37.	26.	66.	53.	185.	149.
25	97.	78.	93.	78.	43.	34.	48.	37.	79.	68.	102.	79.
26	84.	62.	88.	71.	****	****	132.	117.	141.	128.	84.	69.
27	117.	98.	80.	63.	44.	31.	172.	164.	83.	74.	43.	30.
28	89.	74.	83.	72.	124.	127.	151.	132.	74.	74.	137.	116.
29	51.	36.	0.	0.	115.	100.	89.	76.	227.	212.	112.	99.
30	102.	85.	0.	0.	81.	64.	59.	48.	113.	104.	172.	157.
31	92.	81.	0.	0.	89.	76.	0.	0.	118.	109.	0.	0.
AVERAGE	89.	75.	96.	81.	132.	88.	105.	91.	124.	111.	127.	108.

PAIRED t STATISTIC = 36.37
DEGREES OF FREEDOM = 360.

ANNUAL AVERAGES

$\bar{C}$ = 98.16

$\bar{N}$ = 81.47

**** - NO DATA

SO_2 SERIES - CORRECTED (C) AND NON - CORRECTED (N) FOR NH_3 INTERFERENCE

SAMPLING SITE- SANTO ANDRE

JULY/78 TO JUNE/79

DAYS	JUL C	JUL N	AUG C	AUG N	SEP C	SEP N	OCT C	OCT N	NOV C	NOV N	DEC C	DEC N	JAN C	JAN N	FEB C	FEB N	MAR C	MAR N	APR C	APR N	MAI C	MAI N	JUN C	JUN N
1	216.	193.	129.	116.	34.	18.	95.	84.	121.	106.	82.	69.	25.	22.	226.	219.	219.	208.	108.	93.	123.	110.	170.	161.
2	144.	149.	97.	82.	60.	36.	92.	79.	56.	48.	117.	98.	50.	35.	231.	212.	172.	172.	97.	84.	157.	142.	218.	197.
3	35.	26.	83.	54.	46.	25.	131.	118.	75.	58.	172.	148.	191.	155.	197.	180.	168.	180.	215.	202.	279.	264.	114.	99.
4	136.	113.	93.	63.	25.	25.	98.	98.	104.	91.	84.	67.	64.	53.	137.	120.	156.	156.	191.	167.	164.	149.	139.	115.
5	79.	71.	113.	98.	65.	45.	209.	192.	94.	81.	198.	185.	94.	94.	89.	74.	164.	151.	140.	127.	152.	152.	342.	321.
6	31.	13.	67.	48.	67.	72.	164.	145.	62.	55.	183.	170.	98.	89.	251.	234.	153.	138.	248.	235.	81.	81.	105.	90.
7	112.	93.	144.	120.	132.	111.	105.	90.	193.	182.	160.	147.	82.	63.	277.	256.	109.	100.	56.	45.	66.	55.	77.	58.
8	74.	74.	104.	72.	51.	38.	98.	90.	174.	157.	71.	58.	122.	94.	342.	342.	119.	98.	51.	36.	142.	127.	124.	124.
9	95.	76.	126.	85.	67.	56.	61.	52.	77.	77.	76.	61.	137.	137.	162.	143.	194.	181.	92.	84.	156.	139.	80.	73.
10	73.	62.	127.	99.	78.	73.	89.	72.	160.	145.	154.	137.	150.	139.	117.	104.	154.	135.	145.	136.	193.	181.	125.	114.
11	136.	123.	195.	144.	42.	42.	147.	136.	50.	50.	89.	80.	143.	121.	180.	165.	131.	116.	100.	92.	152.	139.	52.	41.
12	172.	148.	110.	84.	125.	125.	87.	70.	108.	95.	139.	130.	83.	62.	101.	86.	150.	133.	267.	250.	75.	62.	217.	199.
13	71.	8.	30.	17.	116.	125.	67.	58.	113.	100.	79.	64.	175.	160.	243.	224.	99.	67.	169.	152.	68.	47.	253.	227.
14	42.	16.	19.	****	57.	42.	100.	79.	144.	144.	110.	93.	124.	105.	132.	121.	85.	88.	111.	96.	89.	80.	91.	72.
15	101.	86.	82.	59.	31.	10.	79.	64.	142.	134.	130.	121.	140.	136.	****	****	82.	82.	101.	86.	145.	134.	35.	20.
16	94.	79.	53.	34.	111.	96.	72.	61.	126.	117.	130.	108.	201.	186.	142.	129.	124.	105.	70.	62.	119.	110.	97.	84.
17	93.	76.	37.	20.	90.	75.	75.	60.	125.	116.	63.	54.	164.	153.	166.	134.	104.	91.	178.	161.	70.	59.	133.	116.
18	110.	93.	33.	12.	99.	82.	162.	151.	188.	173.	31.	18.	183.	183.	93.	80.	139.	128.	215.	191.	55.	42.	139.	118.
19	361.	346.	91.	50.	117.	106.	70.	64.	118.	101.	71.	54.	166.	166.	62.	53.	128.	117.	128.	119.	94.	83.	94.	79.
20	319.	319.	52.	24.	58.	45.	37.	28.	105.	88.	60.	52.	****	****	178.	163.	142.	135.	90.	77.	****	****	157.	138.
21	153.	142.	31.	10.	105.	86.	109.	89.	175.	158.	123.	107.	145.	136.	150.	137.	143.	130.	110.	93.	66.	59.	171.	145.
22	231.	218.	65.	41.	100.	92.	65.	57.	201.	173.	174.	152.	175.	164.	248.	241.	87.	72.	73.	60.	66.	59.	68.	53.
23	70.	62.	50.	20.	193.	172.	62.	49.	156.	126.	136.	113.	228.	209.	105.	105.	177.	162.	28.	17.	150.	133.	99.	82.
24	85.	77.	42.	23.	65.	44.	130.	109.	102.	83.	82.	59.	97.	83.	119.	95.	169.	170.	58.	51.	54.	46.	120.	92.
25	95.	84.	23.	10.	76.	61.	129.	110.	155.	108.	37.	24.	126.	107.	91.	72.	66.	55.	56.	41.	51.	42.	96.	72.
26	67.	52.	92.	41.	176.	163.	189.	163.	108.	86.	128.	111.	183.	162.	****	****	5.	5.	173.	158.	61.	52.	85.	64.
27	119.	106.	34.	21.	163.	148.	206.	184.	71.	52.	74.	74.	122.	103.	202.	185.	50.	41.	184.	176.	141.	132.	82.	67.
28	166.	143.	33.	11.	74.	66.	125.	114.	155.	123.	124.	124.	119.	100.	116.	107.	108.	108.	142.	133.	293.	281.	67.	72.
29	76.	63.	66.	36.	100.	97.	93.	74.	120.	105.	112.	103.	44.	31.	0.	0.	115.	104.	92.	83.	189.	174.	123.	106.
30	128.	107.	115.	40.	115.	106.	100.	77.	108.	93.	67.	58.	153.	142.	0.	0.	164.	162.	105.	90.	116.	103.	93.	54.
31	77.	56.	60.	20.	0.	0.	100.	81.	0.	0.	132.	110.	215.	196.	0.	0.	124.	124.	0.	0.	78.	78.	0.	0.
AVERAGE	122.	106.	78.	51.	93.	76.	108.	94.	123.	108.	110.	95.	134.	120.	168.	153.	131.	120.	126.	113.	122.	111.	126.	109.

PAIRED t STATISTIC = 32.38
DEGREES OF FREEDOM = 359.

ANNUAL AVERAGES

$\bar{C}$ = 117.35

$\bar{N}$ = 104.14

**** - NO DATA

CETESB

SO_2 SERIES - CORRECTED (C) AND NON - CORRECTED (N) FOR NH_3 INTERFERENCE

SAMPLING SITE= PINHEIROS
JULY/78 TO JUNE/79

	JUL		AUG		SEP		OCT		NOV		DEC		JAN		FEB		MAR		APR		MAI		JUN	
DAYS	C	N	C	N	C	N	C	N	C	N	C	N	C	N	C	N	C	N	C	N	C	N	C	N
1	132.	139.	78.	65.	36.	15.	****	****	83.	64.	71.	56.	21.	10.	66.	51.	82.	67.	61.	48.	39.	30.	139.	128.
2	44.	29.	97.	77.	68.	32.	73.	60.	27.	18.	114.	95.	51.	38.	53.	64.	57.	46.	115.	96.	58.	50.	140.	114.
3	63.	52.	123.	86.	40.	24.	144.	118.	44.	31.	91.	70.	116.	84.	51.	30.	84.	37.	171.	152.	154.	137.	154.	135.
4	77.	53.	114.	76.	43.	28.	91.	91.	41.	30.	71.	56.	29.	13.	36.	13.	55.	55.	69.	54.	69.	54.	103.	89.
5	134.	76.	111.	85.	53.	28.	134.	115.	18.	7.	73.	58.	41.	32.	43.	32.	65.	50.	71.	58.	29.	23.	164.	149.
6	75.	73.	84.	56.	35.	24.	90.	71.	33.	18.	68.	51.	83.	74.	42.	27.	84.	69.	58.	47.	60.	49.	73.	52.
7	87.	74.	112.	74.	93.	78.	37.	24.	119.	110.	46.	33.	46.	35.	99.	78.	93.	74.	28.	19.	91.	75.	91.	76.
8	73.	59.	153.	111.	36.	28.	40.	34.	118.	116.	43.	32.	42.	27.	56.	56.	95.	78.	28.	17.	82.	73.	123.	113.
9	53.	50.	219.	157.	24.	16.	45.	36.	86.	75.	102.	89.	51.	42.	79.	64.	133.	118.	46.	38.	111.	90.	53.	37.
10	56.	43.	231.	141.	42.	31.	88.	69.	102.	87.	51.	36.	49.	36.	86.	64.	83.	59.	93.	79.	82.	70.	60.	47.
11	103.	63.	211.	155.	71.	71.	124.	105.	58.	50.	56.	47.	63.	46.	64.	51.	52.	39.	26.	73.	88.	73.	74.	61.
12	153.	126.	93.	76.	89.	76.	70.	55.	45.	30.	67.	60.	76.	55.	54.	43.	73.	58.	210.	186.	119.	102.	189.	172.
13	25.	14.	32.	25.	53.	76.	88.	77.	108.	93.	72.	59.	76.	57.	39.	22.	103.	86.	59.	44.	51.	36.	164.	143.
14	53.	23.	16.	7.	59.	50.	76.	55.	63.	52.	60.	43.	58.	41.	54.	46.	60.	51.	59.	42.	45.	36.	39.	26.
15	117.	122.	43.	32.	54.	37.	43.	32.	51.	36.	82.	65.	60.	43.	56.	41.	****	****	51.	33.	36.	28.	42.	16.
16	37.	24.	53.	29.	99.	84.	40.	29.	58.	45.	81.	60.	75.	60.	68.	55.	103.	88.	82.	69.	75.	66.	66.	55.
17	81.	64.	45.	24.	67.	54.	60.	63.	97.	82.	44.	33.	51.	36.	71.	56.	75.	64.	211.	164.	80.	65.	98.	83.
18	91.	76.	64.	34.	74.	59.	61.	52.	80.	65.	24.	13.	64.	53.	99.	61.	57.	44.	107.	92.	131.	112.	82.	63.
19	118.	101.	95.	45.	76.	63.	32.	24.	59.	42.	39.	28.	43.	32.	40.	32.	53.	35.	52.	41.	165.	146.	77.	60.
20	61.	69.	46.	23.	86.	71.	28.	20.	75.	56.	58.	49.	45.	36.	42.	27.	89.	76.	57.	46.	72.	57.	161.	137.
21	33.	24.	92.	70.	142.	120.	93.	64.	91.	74.	105.	96.	36.	36.	59.	46.	97.	82.	107.	86.	72.	59.	177.	149.
22	50.	39.	91.	46.	100.	57.	31.	20.	83.	55.	89.	80.	65.	54.	50.	41.	99.	82.	52.	35.	103.	92.	140.	119.
23	49.	40.	63.	22.	67.	52.	40.	29.	103.	77.	50.	29.	75.	64.	64.	51.	156.	133.	20.	11.	93.	72.	228.	192.
24	56.	43.	49.	21.	50.	39.	146.	120.	58.	36.	41.	24.	65.	52.	76.	55.	84.	67.	33.	22.	49.	39.	142.	93.
25	93.	72.	26.	15.	61.	61.	122.	84.	55.	36.	32.	19.	80.	63.	31.	15.	42.	35.	28.	19.	51.	42.	85.	57.
26	150.	131.	56.	32.	95.	84.	80.	52.	82.	60.	30.	17.	90.	73.	77.	58.	14.	14.	95.	82.	97.	86.	50.	39.
27	154.	135.	27.	14.	107.	92.	138.	108.	26.	13.	18.	18.	63.	46.	74.	61.	31.	18.	88.	73.	60.	52.	71.	56.
28	154.	135.	46.	22.	84.	76.	41.	30.	34.	23.	54.	54.	36.	21.	80.	72.	77.	77.	96.	83.	62.	54.	83.	64.
29	111.	98.	127.	59.	86.	69.	55.	36.	56.	41.	46.	39.	15.	4.	0.	0.	111.	96.	62.	51.	87.	70.	83.	68.
30	75.	54.	169.	77.	124.	113.	69.	45.	73.	56.	50.	35.	68.	55.	0.	0.	102.	81.	57.	46.	38.	31.	125.	104.
31	70.	47.	58.	24.	0.	0.	76.	55.	0.	0.	35.	22.	80.	69.	0.	0.	67.	56.	0.	0.	49.	49.	0.	0.
AVERAGE	94.	69.	91.	58.	71.	58.	76.	59.	68.	52.	60.	47.	58.	45.	62.	47.	79.	65.	78.	64.	78.	65.	109.	93.

PAIRED t STATISTIC = 30.33
DEGREES OF FREEDOM = 362.

ANNUAL AVERAGES

$\bar{C}$ = 76.19

$\bar{N}$ = 59.91

**** = NO DATA

6. REFERENCES

1. Air Quality in selected urban areas 1975-1976 - Global Environmental Monitoring System - Who Offset Publication No 41 World Health Organization - Geneva 1978.

2. Selected Methods of Measuring Air Pollutants - Who Offset Publication No 24 - World Health Organization - Geneva 1976.

3. Effect of temperature on stability of SO_2 samples collected by the Federal Reference Method - Fuerst, R.G., F.P. Scaringelli, and J.H. Margeson. Environmental Monitoring Series EPA-600/4-76-024 U.S. Environmental Protection Agency, May 1976.

4. Sulfur Dioxide Bubbler Temperature Study - Martin B.E. - Environmental Monitoring Series EPA-600/4-77-040 U.S. Environmental Protection Agency, August 1977.

5. Improved Temperature Stability of Sulfur Dioxide Samples Collected by the Federal Reference Method - Fuerst R.G., Environmental Monitoring Series EPA-600/4-78-018 U.S. Environmental Protection Agency April 1978.

6. Estudo Comparativo entre os métodos da Pararosanilina e do Peróxido de Hifrogênio - CETESB - PJ.29/76 - Relatório Interno.

7. Estudo da interferência de NH_3 na análise de SO_2 pelo método do Peróxido de hidrogênio - Relatório de Dados - STAR/DTSA - PJ5.3/78 CETESB - Relatório Interno.