CETESB
QUIM. MICHÉAS BUENO GODOY
Chefe da Div. de Amostragem e
Análise do Ar

RELATÓRIO SOBRE PROGRAMA DE CONTROLE DE QUALIDADE DE MÉTODOS DE ANÁLISE DO AR PROMOVIDO PELA EPA - USA

Período : Julho de 1979 a Dezembro de 1980

CETESB - CIA. DE TECNOLOGIA DE SANEAMENTO AMBIENTAL
BIBLIOTECA
Av. Prof. Frederico Hermann Jr., 345 - 05459 - Pinheiros
SÃO PAULO - BRASIL

DAMAR / GQAR

Superintendência de Engenharia do Ar
Diretoria de Engenharia do Ar e Ação Metropolitana

Fevereiro / 1981

CLASS	8300
AUTH	C338r
TOMBO	16783

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CETESB

Ficha de Relatório Técnico

TÍTULO	ASSUNTO	Nº DE PÁ
Relatório sobre o Programa de Controle de Qualidade de Métodos de Análise do Ar Promvido pela EPA - USA	Qualidade do Ar	89

DATA DO RELATÓRIO	PROGRAMA	PROJETO	UNIDADE
Fevereiro/80	PG 07	-	DAMAR

UNIDADE ONDE O RELATÓRIO SE ENCONTRA DISPONÍVEL PARA CONSULTA
Divisão de Amostragem e Análise do Ar - DAMAR

INFORMAÇÕES COMPLEMENTARES

RESUMO:

A Environmental Protection Agency (EPA) desenvolve desde 1972, um programa de auditoria junto a vários laboratórios que fazem monitoramento da qualidade do ar nos Estados Unidos e em outros países. Através dos Testes Interlaboratoriais, é possível identificar quais laboratórios possuem erros sistemáticos e estimar a reprodutibilidade dos métodos de medidas entre laboratórios. Aos laboratórios que participam deste programa, são fornecidos normalmente as amostras de referência e as instruções para análise.. A EPA como laboratório de coordenação, prepara as amostras de referência. A frequência é semestral, com o envio das seguintes amostras de referência e seus respectivos meses:

Poluentes ou medidas a realizar	Tipo de Amostra	1º Semestre	2º Semestre
Chumbo (Pb)	tiras de filtros de fibras de vidro correspondente a 1/12 do filtro, impregnadas com $Pb(NO_3)_2$	Janeiro	Julho
Sulfato-Nitrato ($SO_4^=$, NO_3^-)	tiras de filtros de fibra de vidro impregnados com K_2SO_4 e $Pb(NO_3)_2$	Fevereiro	Agosto
Monóxido de Carbono (CO)	Cilindros contendo monóxido de carbono (CO)	Março	Setembro
Dióxido de Enxofre (SO_2)	Ampolas contendo Sulfito - TCM liofilizado	Abril	Outubro
Vazão de "Hi-Vol"	"Kit de calibração do Hi-Vol"	Maio	——
Dióxido de Nitrogênio (NO_2^-)	Ampolas contendo solução aquosa de $NaNO_2$	Junho	Dezembro

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BIBLIOTECA

O programa entre EPA e CETESB foi iniciado em julho de 1979 e tem-se mantido até os dias atuais.

- COMENTÁRIOS SOBRE OS RESULTADOS DAS AUDITORIAS

Após o recebimento da resposta enviada pela EPA (valor EPA, porcentagem de diferença e distribuição percentílica) o laboratório participante faz uma análise dos resultados em função do método utilizado. Assim, pudemos constatar nossa performance e quando necessário, alterar as condições de análise de modo a melhorar os resultados. Citaremos alguns exemplos deste procedimento:

1. CHUMBO (Pb) - Na auditoria de outubro de 1979 referente ao chumbo, nossos resultados localizaram-se acima do percentil 60%. Através de mudança da técnica analítica (Voltametria de Redis. - solução Anódica para Absorção Atômica), pudemos melhorar nossos dados, os quais ficaram evidenciados na auditoria seguinte para Chumbo (janeiro de 1980), quando nossos resultados localizaram-se em geral no percentil 30 a 70%. Na 3ª auditoria (setembro de 1980), a performance foi melhorada ainda mais, com nossos resultados localizando-se em geral abaixo do percentil 10%.

2. SULFATO - NITRATO ($SO_4^=$, NO_3^-) - O procedimento adotado para sulfato foi idêntico para as auditorias (outubro de 1979 e setembro de 1980) em vista da boa performance relativa obtida, muito embora na Auditoria de setembro de 1980 uma das amostras tenha ficado fora da faixa da distribuição da frequência (percentil), que foi considerada por nos como decorrência de uma possível contaminação de material (vidraria) utilizado.
Não houve análise de nitrato por ausência de método a ser desenvolvido no laboratório.

3. MONÓXIDO DE CARBONO (CO) - Através da auditoria de monóxido de carbono, constatou-se uma boa performance dos monitores. Além disso, foi possível verificar as concentrações nominais dos cilindros contendo gás padrão que são utilizados na calibração dos monitores tanto da Rede Telemétrica quanto do Correio, conforme tabela abaixo:

Estação	Nº do Cilindro	Concentração anterior (ppm)	Concentração atual corrigida (ppm)
Correio	28	36,0	36,7
Móoca	CO - 13	68	65
Pque.D.PedroII	CO - 04	65	65
Cerqueira César	CO - 10	58	56
Congonhas	CO - 02	66	63
Cubatão	CO - 08	67	67
Juquitiba	CO - 01	67	68
Caçapava (LV 01)	18 - 584	21	21
Monitor Reserva	CO - 12	61	60

4. DIÓXIDO DE ENXOFRE (SO_2) - Nas auditorias referentes ao SO_2 pudemos melhorar nossa performance conforme pudemos constatar através do percentil 30 a 50% (dezembro de 1979) e percentil 20 a 40% (maio de 1980) por meio de alteração na forma de cálculo da concentração de SO_2.

5. VAZÃO DE "HI-VOL" - Na primeira e única auditoria foi realizada em setembro de 1980, verificando-se uma performance insatisfatória (em geral) com percentil entre 90% e máximo. Na próxima auditoria alterações deverão ser efetuadas no procedimento de calibração, visando melhorar os resultados.

6. DIÓXIDO DE NITROGÊNIO (NO_2) - O procedimento adotado para estas análises foi o mesmo para todas auditorias referentes ao NO_2 devido a boa performance relativa obtida.

CETESB - CIA. DE TECNOLOGIA DE SANEAMENTO AMBIENTAL
BIBLIOTECA

INTRODUÇÃO

1. Início do Programa entre EPA e CETESB

2. Frequência de Inspeção

3. Resultados das Auditorias

4. Comentários

5. Bibliografia

INTRODUÇÃO

Desde 1972 a Environmental Protection Agency (EPA) desenvolve um programa de auditoria junto a vários laboratórios que fazem monitoramento da qualidade do ar nos Estados Unidos e em outros países. O programa de auditoria, é somente uma parte de um programa maior de garantia de qualidade; embora os resultados não devam se constituir em um indicador absoluto da qualidade dos dados. Entretanto, se usados juntamente com as informações obtidas de um programa de controle de qualidade interno , as conclusões podem ser de maior significado.

São dois os propósitos do programa de auditoria :

a. Dotar a agência participante de um meio de auto-avaliação em relação a operação específica sob auditoria.
b. Fornecer à EPA um índice contínuo da qualidade dos dados de qualidade do Ar.

Através dos Testes Interlaboratoriais é possível identificar os laboratórios (e/ou analistas) que possuam erros sistemáticos e estimar a reprodutibilidade dos métodos de medidas entre laboratórios. Aos laboratórios que participam deste programa, são fornecidos normalmente as amostras de referência e instruções para análise. A EPA, que é o laboratório de coordenação, prepara as amostras de referência e avalia os resultados.

Este programa é recomendado para projetos de medidas em fontes de emissão e ar ambiente, sendo o programa particularmente útil para o caso de projetos independentes com objetivos semelhantes.

Neste caso, sempre que dois ou mais laboratórios trabalhem independentes no mesmo país ou então em países diferentes e conduzem projetos dirigidos para os mesmos objetivos, o programa dos testes interlaboratoriais deve ser iniciado entre estes laboratórios. O projeto monitoramento internacional do ar ambiente é um exemplo típico, onde através da Organização Mundial da Saúde (OMS), estão sendo estabelecidas as redes de monitoramento do ar ambiente e juntamente a esta rede, foram iniciados os programas de testes interlaboratoriais. Programas envolvendo

dois ou mais países são particularmente importantes para sistemas de medidas de poluição do ar nos quais os dados de um país poderão ser utilizados por outro em um processo de decisão, assim como estabelecer critérios de concentrações de poluentes específicos e efeitos sobre a saúde.

1. Início do Programa entre EPA e CETESB

O programa dos testes interlaboratoriais foi iniciado junto a EPA em julho de 1979, a partir dos contactos entre CETESB - EPA. Desde então o programa tem se desenvolvido sem interrupção.

2. Frequência de Inspeção.

A frequência é semestral, com o envio das seguintes amostras de referência e seus respectivos meses :

Poluente ou medidas a realizar	tipo de Amostra	1º Semestre	2º Semestre
Chumbo (Pb)	tiras de filtros de fibras de vidro correspondente a 1/12 do filtro, impregnadas com $Pb(NO_3)_2$	Janeiro	Julho
Sulfato-Nitrato ($SO_4^=$-NO_3^-)	tiras de filtros de fibra de vidro impregnados com K_2SO_4 e $Pb(NO_3)_2$	Fevereiro	Agosto
Monóxido de Carbono (CO)	Cilindros contendo monóxido de carbono (CO)	Março	Setembro
Dióxido de Enxofre (SO_2)	Ampolas contendo sulfito-TCM liofilizado	Abril	Outubro
Vazão de Hi-Vol	"Kit de calibração do Hi-Vol"	Maio	---
Dióxido de Nitrogênio (NO_2)	Ampolas contendo solução aquosa de $NaNO_2$	Junho	Dezembro

As amostras são analisadas no laboratório, sendo seus resultados enviados em seguida à EPA em formulário apropriado, no qual é citado ou descrito o método analítico utilizado, para comparação :

a. Com resultados dos outros participantes.

b. Com os valores verdadeiros.

Após a comparação dos resultados, a EPA, remete 2 formulários -resposta da auditoria. No primeiro, são fornecidos o valor encontrado, o valor EPA e também a porcentagem de diferença respectiva, bem como um gráfico com a regressão linear dos valores enviados por todos laboratórios que participaram da auditoria, e os valores da EPA e a localização do participante no gráfico. O segundo formulário fornece a distribuição percentílica dos resultados enviados até aquele momento e então o participante pode avaliar sua performance relativa.

3. Resultados das Auditorias:

Período: Julho de 1979 a Dezembro de 1980

CETESB
QUIM. MICHÉAS BUCHO GODOY
Chefe da Div. de Amostragem e
Análise do Ar

C H U M B O - Pb

January 2, 1980

Instructions for Inter-Lab Analysis

1. Check to make sure all samples arrived in good condition. If any samples were damaged in shipment, note on proper line under COMMENTS on Data Card.

2. Record date samples were received in your laboratory on the Data Card.

3. Insert units code in proper blanks. See Note in Step 5b.

4. Insert method code in proper blanks.

5. Instructions for mixing unknown samples.

   a. The code used to identify each sample is the 4-digit number appearing on the envelope containing each filter strip. (i.e., 2021, 3121)

   b. Extract the lead fraction from filter strips using your normal procedures.

      NOTE: For computational purposes, assume the total air volume sampled was 2000 m^3 and that the filter strip was 1/12 of the total filter. Report results in $\mu g/m^3$.

6. Process unknown samples during a routine analysis before February 25, 1980. Use your normal procedures for lead extraction/analysis. Give brief description of method on back of Data Card and record method code in space provided. Please return copy of analytical procedure with Data Cards.

7. Record date samples analyzed on Data Card.

8. Record analytical results on proper Data Cards.

9. Return completed Data Card and analytical procedures to this office using enclosed envelope.

10. Thank you very much for your cooperation. A tabulation of all data will be sent to you as soon as all results have been received.

CETESB

O U T U B R O / 1979

5.

FORM APPROVED
OMB NO. 158-R0038

Pb
INTER-LABORATORY TEST

0 · 7 7 9 (col 4-7)

7 7 0 0 0 1 (col 8 - 13)

770001

O DARWIN ALONSO
NHIA DE TECNOLOGIA DE
AMENTO AMBIENTAL
. OF. FREDERICO HERMANN JR.
CEP 05450-PAOX 210-1100
PAULO, BRAZIL

*Method Code 9 9 (col 17 - 18)

*Units Code 0 1 (col 19 - 20)

*See back of card

Number	col	Results	col	Comments
6	21 - 24	3.9.0	25 - 29	
6	31 - 34	1.4.5.6	35 - 39	
6	41 - 44	6.9.7	45 - 49	
6	51 - 54	1.2.6.3	55 - 59	
6	61 - 64	8.3.4	65 - 69	
6	71 - 74	1 3 0	75 - 79	

Date Samples Received	0 1 Mo	1 5 Day	8 0 Yr
Date Samples Analyzed	0 2 Mo	1 2 Day	8 0 Yr

Method Codes

- Colorimetric
- AA
- XRF
- Other

Extraction Method
(Check as many as appropriate)

- X Hot acid extraction
- ____ Cold acid extraction
- ____ Ultrasonication
- ____ Other (please specify) ____

Unit Codes

- 01 Micrograms per cubic meter ($\mu g/m^3$)
- 99 Other (please specify) ____

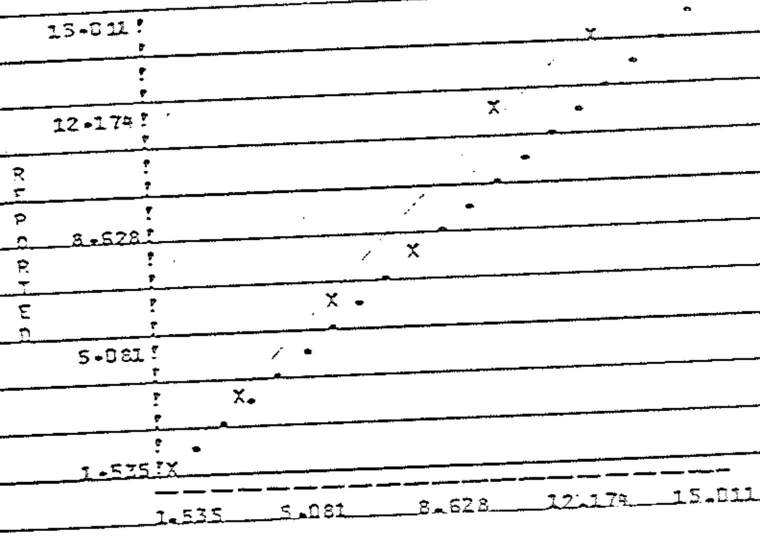
JULY 1978

POLLUTANT - PB

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-CAIX 210-1100
SAO PAULO, BRAZIL

UNITS — MICROGRAMS-PER-CUBIC-METER

SAMPLE NUMBER	REPORTED VALUE	Absorção atômica	EPA VALUE	PERCENT DIFFERENCE	% ≠ ca Abs. Atom.
0146	3.900	—	3.530	10.48	
1146	14.560	14,40	12.860	13.22	11,98%
2146	6.970	6,36	5.850	19.15	8,72%
3146	12.630	10,80	10.390	21.56	3,95
4146	8.340	8,04	7.930	5.17	1,39
5146	1.300	1,320	1.180	10.17	11,86



EPA RESULTS

Y = 1.153X -0.112

QUIM. INÊS BUENO GODOY
Chefe da D... Monitoragem e
Análise do Ar

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
UNITED STATES ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed lead study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "True Values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA True value equal to 5.85, 50% of the results had an absolute percent difference of 4.64% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

Lead Frequency Distribution

EPA Value	Percentile											
	No.	Min.	10	20	30	40	50	60	70	80	90	Max.
1.18	230	.00	.67	1.96	2.74	3.33	4.44	5.56	7.33	8.90	12.00	18.89
3.53	119	.00	.57	1.14	1.99	2.47	3.95	6.17	6.82	9.66	13.07	20.00
5.85	128	.00	.61	1.82	2.78	3.34	4.64	5.45	6.49	7.98	11.32	15.40
7.93	62	.00	.24	1.19	2.02	3.33	4.64	5.71	7.14	8.21	11.07	16.07
10.39	186	.00	.84	1.47	2.22	3.15	4.65	5.88	7.88	9.09	12.16	18.59
12.86	247	.00	.78	1.27	2.70	3.57	4.44	5.50	7.02	9.47	12.63	20.00

If there are any questions or comments about these results please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

Pb 0779

CETESB - CIA. DE TECNOLOGIA DE SANEAMENTO AMBIENTAL
BIBLIOTECA

J A N E I R O / 1980

Pb
INTER-LABORATORY TEST
0 1 8 0 (col 4-7)

7 7 0 0 0 1 (col 8 - 13)

FORM APPROVED
OMB NO. 153 A0088

(col 1-3)

770001

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PADX 210-1100
SAO PAULO, BRAZIL

*Method Code 2 6 (col 17 - 18)

*Units Code 0 1 (col 19 - 20)

*See back of card

Sample Number	col	Results	col	Comments
0 1 0	21 - 24	9 6 8	25 - 29	
0 1 0	31 - 34	5 9 4	35 - 39	
0 1 0	41 - 44	7 5 5	45 - 49	
0 1 0	51 - 54	4 6 0	55 - 59	
0 1 0	61 - 64	2 9 9	65 - 69	
0 1 0	71 - 74	0 8 5	75 - 79	

	Mo	Day	Yr
Date Samples Received	0 1	1 8	8 0
Date Samples Analyzed	0 2	1 2	8 0

Method Codes

Iorimetric

AA

ARF

Other

Extraction Method
(Check as many as appropriate)

X Hot acid extraction

___ Cold acid extraction

___ Ultrasonication

___ Other (please specify) _____

Unit Codes

01 Micrograms per cubic meter ($\mu g/m^3$)

99 Other (please specify)

_____

INTER-LABORATORY STUDY RESULTS DATE PRINTED: 02/20/80

(JANUARY 1980)

POLLUTANT - PB

770001
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SANEAMENTO AMBIENTAL
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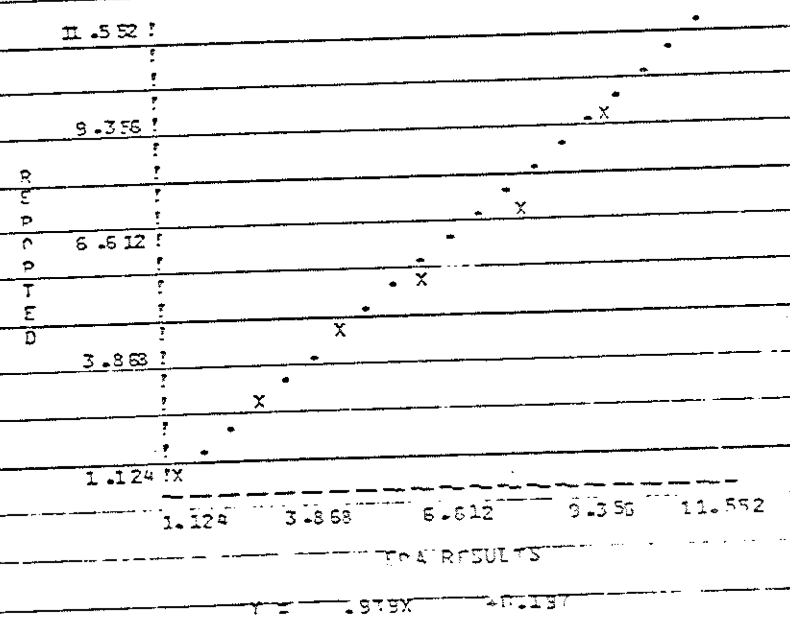
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL

UNITS - MICROGRAMS PER CUBIC METER

SAMPLE NUMBER	REPORTED VALUE Absorção Atômica	Voltametria de redissolução anódica	EPA VALUE	PERCENT DIFFERENCE (A.A)	% diferença (VRA)
0010	9.680	9,79	9.900	-2.22	1,11
1010	5.940	6,97	6.300	-5.71	-10,63 ([illegible])
2010	7.550	8,86	8.100	-6.79	9,38 ([illegible])
3010	4.600	4,61	4.500	2.22	2,44 ([illegible])
4010	2.990	3,25	2.700	10.74	20,37 ([illegible])
5010	.850	0,84	.900	-5.56	-6,67 ([illegible])

5.100

9.90 — 100



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Research Triangle Park, North Carolina 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed lead study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "True Values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA True value equal to 4.5, 50% of the results had an absolute percent difference of 3.97% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

Lead Frequency Distribution

EPA Value	Percentile											
	No.	Min.	10	20	30	40	50	60	70	80	90	Max.
0.9	264	.00	.68	1.69	2.67	2.94	4.11	5.48	6.85	8.90	12.71	18.64
2.7	264	.00	.68	1.69	2.67	2.94	4.11	5.48	6.85	8.90	12.71	18.64
4.5	155	.00	.57	1.14	1.98	2.84	3.97	5.67	6.52	8.81	13.88	19.32
6.3	127	.00	.80	1.52	2.67	3.64	4.01	5.08	7.09	8.03	13.03	18.45
8.1	77	.00	.63	1.26	1.89	2.77	3.91	4.54	5.17	6.43	8.70	9.33
9.9	263	.00	.78	1.35	2.21	2.98	3.95	5.36	7.03	8.66	11.76	17.98

If there are any questions or comments about these results please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

Pb 0180

CETESB

S E T E M B R O / 1980

Pb
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0088

(col 1-3) 7 9 (col 4-7) 7 7 0 3 0 1 (col 8-13)

770301

77-031

CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1166
SAO PAULO, BRAZIL

*Method Code 26 (col 17-18)

*Units Code 01 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
1 4 4	21-24	0 6 0	25-29	
1 4 4	31-34	6 6 0	35-39	
1 4 4	41-44	1 8 0	45-49	
1 4 4	51-54	5 4 0	55-59	
1 4 4	61-64	2 8 8	65-69	
1 4 4	71-74	4 2 0	75-79	

Date Samples Received: 0 3 (Mo) 1 2 (Day) 8 0 (Yr)

Date Samples Analyzed: 0 8 (Mo) 2 2 (Day) 8 0 (Yr)

Method Codes

Colorimetric

26 AA

XRF

99 Other

Unit Codes

01 Micrograms per cubic meter ($\mu g/m^3$)

99 Other (please specify) _____

Extraction Method
(Check as many as appropriate)

X Hot acid extraction

_____ Cold acid extraction

_____ Ultrasonication

_____ Other (please specify) _____

CETESB - CIA. DE TECNOLOGIA DE SANEAMENTO AMBIENTAL
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INTER-LABORATORY STUDY RESULTS

DATE PRINTED: 09/08/80

(JULY 1980)

POLLUTANT - PB

UNITS - MICROGRAMS PER CUBIC METER

78R001
CLAUDIO DARWIN ALONSO
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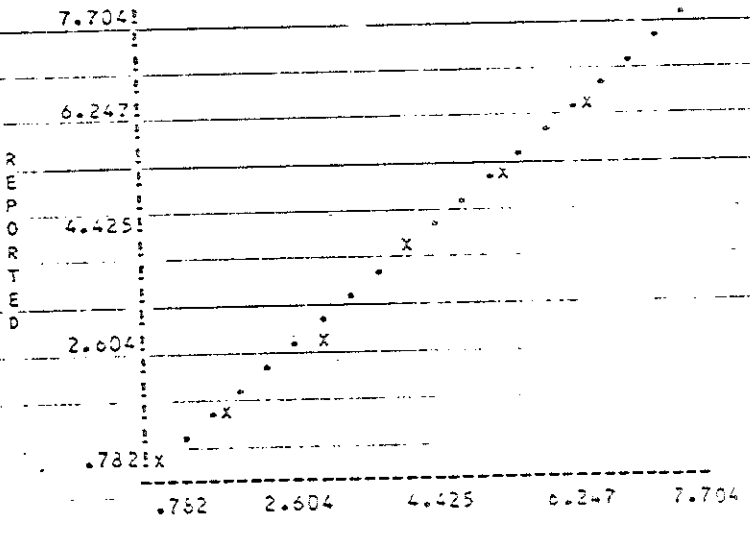
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
0144	.600	.600	.00
1144	6.600	6.600	.00
2144	1.800	1.800	.00
3144	5.400	5.400	.00
4144	2.880	3.000	-4.00
5144	4.200	4.200	.00



Y = 1.002X -0.030

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed lead study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "True Values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA True value equal to 4.2, 50% of the results had an absolute percent difference of 3.56% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

Lead Frequency Distribution

EPA Value	Percentile											
	No.	Min.	10	20	30	40	50	60	70	80	90	Max.
0.6	54	.00	.00	.00	2.38	4.76	4.76	4.76	7.14	9.52	14.29	16.67
1.8	360	.00	.00	1.11	2.00	2.74	3.70	5.08	6.30	7.41	10.74	16.10
3.0	360	.00	.00	1.11	2.00	2.74	3.70	5.08	6.30	7.41	10.74	16.10
4.2	229	.00	.57	1.14	2.00	2.67	3.56	4.44	5.95	7.08	10.48	15.91
5.4	207	.00	.61	1.54	2.41	3.03	3.64	4.79	5.94	7.69	10.20	15.40
6.6	143	.00	.16	.79	1.59	2.38	2.94	3.81	4.76	6.42	8.29	13.10

If there are any questions or comments about these results please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

Pb 0780

S U L F A T O - $SO_4^{=}$

August 1979

Instructions for Inter-Lab Analysis

1. Check to make sure all samples arrived in good condition. If any samples were damaged in shipment, note on proper line under COMMENTS on Data Card.

2. Record date samples were received in your laboratory on the Data Card.

3. Insert units code in proper blanks. See Note in Step 5b.

4. Insert method code in proper blanks.

5. Instructions for mixing unknown samples.

   a. The code used to identify each sample is the 4-digit number appearing on the envelope containing each filter strip. (i.e., 2021, 3121)

   b. Extract sulfate and nitrate fractions from filter strips using your normal procedures.

      NOTE: For computational purposes, assume the total air volume sampled was 2000 m^3 and that the filter strip was 1/12 of the total filter. Report results in $\mu g/m^3$.

6. Process unknown samples during a routine analysis before September 17, 1979. Use your normal procedures for sulfate-nitrate extraction/analysis. Give brief description of method on back of Data Card and record method code in space provided.

7. Record date samples analyzed on Data Card.

8. Record analytical results on proper Data Cards.

9. Return completed Data Card and analytical procedures to this office using enclosed envelope.

10. Thank you very much for your cooperation. A tabulation of all data will be sent to you as soon as all results have been received.

CETESB

O U T U B R O - 1979

CETESB - CIA. DE TECNOLOGIA DE SANEAMENTO AMBIENTAL
BIBLIOTECA

SO4
INTER-LABORATORY TEST
0979 (col 4-7) 770001 16. (col 8-13)

FORM APPROVED
OMB NO. 158 R0055

(col 1-3)

*Method Code 17 (col 17-18)

*Units Code 01 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
170	21-24	888.	25-29	
170	31-34	2848	35-39	
170	41-44	2440	45-49	
170	51-54	1304	55-59	
170	61-64	800	65-69	
	71-74		75-79	

Date Samples Received 10 05 79 (Mo Day Yr)

Date Samples Analyzed 10 15 79 (Mo Day Yr)

Method Codes

15 Methylthymol blue - manual

16 Methylthymol blue - automated (please specify)

17 Barium chloride - manual

18 Barium chloride - automated (please specify)

19 Sulfa-ver - manual

20 Sulfa-ver - automated (please specify)

21 Barium chloranilate - manual

22 Barium chloranilate - automated (please specify)

99 Other (please specify)

Unit Codes

01 Micrograms per cubic meter ($\mu g/m^3$)

99 Other (please specify)

Method Description: The strip was extracted by refluxing for 30 minutes and the final volume of extract was 200 ml. - A 10 ml aliquot was analysed by standard addition. The Sample w. allowd to stay for 30 minutes before reading absorbance at 500 mμ against to blank. The results were calculated by using linear regression.

INTER-LABORATORY STUDY RESULTS

DATE PRINTED: 10/24/79

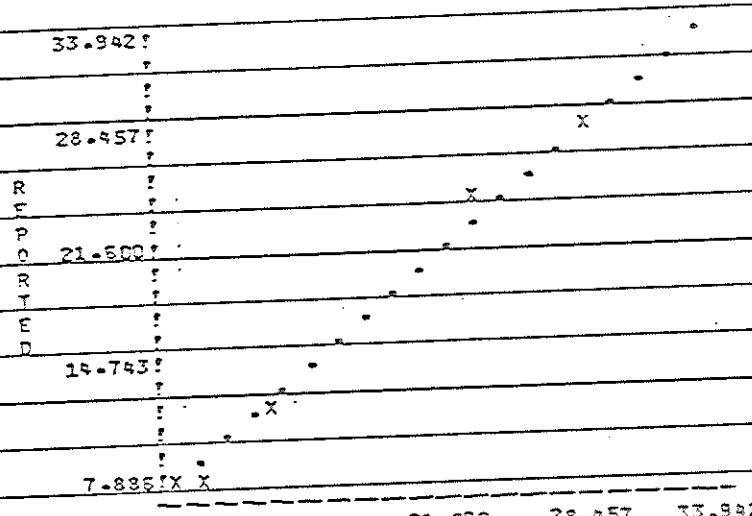
(SEPTEMBER 1979)

POLLUTANT - SO4

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO-BRAZIL

UNITS - MICROGRAMS-PER-CUBIC METER

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
0170	8.880	9.100	-2.42
2170	28.480	28.800	-1.11
3170	24.400	23.700	2.95
4170	13.080	13.100	-.16
5170	8.000	7.200	11.11



EPA RESULTS

Y = .987X +0.382

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed sulfate study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "True Values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA True value equal to 13.10, 50% of the results had an absolute percent difference of 6.58% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

Sulfate Frequency Distribution

EPA Value	Percentile											
	No.	Min.	10	20	30	40	50	60	70	80	90	Max.
7.20	53	.00	1.67	3.50	5.00	7.50	8.83	12.17	16.67	25.00	35.00	52.50
9.10	53	.00	1.67	3.50	5.00	7.50	8.83	12.17	16.67	25.00	35.00	52.50
13.10	373	.00	.92	2.22	3.14	4.76	6.58	8.65	11.08	14.30	21.33	33.33
23.70	107	.00	.88	1.88	3.41	3.96	4.96	6.50	8.56	11.93	14.37	23.50
28.80*												

*There is no past history on a value in this range. We suggest using the frequency distribution for the 23.70 $\mu g/m^3$ level.

If there are any questions or comments about these results please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

SO_4 0879

CETESB

S E T E M B R O - 1980

FORM APPROVED
OMB NO. 158-R0030

SO_4
INTER-LABORATORY TEST

040 (col 1-3) 0 8 8 (col 4-7) 7 8 R 0 0 1 (col 8-13)

7BR001 7BR001

7BR001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 212-11[illegible]
SAO PAULO,BRAZIL

*Method Code 1 7 (col 17-18)

*Units Code 0 1 (col 19-20)

*See back of car

Sample Number	col	Results	col	Comments
0 0 3 0	21-24	1 2.7 7	25-29	
1 0 0 9	31-34	2 4 0 3	35-39	
2 0 8 1	41-44	3 7 8	45-49	
3 2 1 1	51-54	8 0 0	55-59	
4 2 2 8	61-64	1 7 6 8	65-69	
5 1 8 2	71-74	2 6 0 4	75-79	

DATE PRINTED= 10/23/80

INTER-LABORATORY STUDY RESULTS

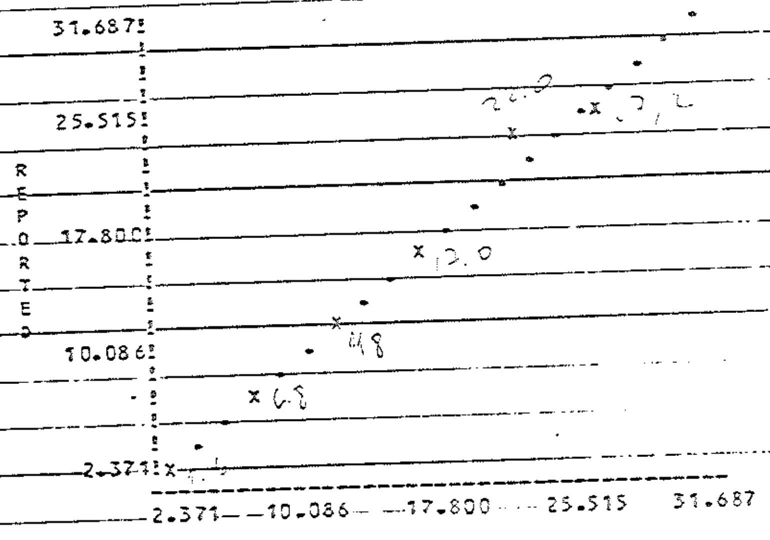
(AUGUST 1980)

POLLUTANT - SO4

75R001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX-210-1100
SAO PAULO,BRAZIL

UNITS--MICROGRAMS-PER-CUBIC-METER

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
0030	12.770	11.800	8.22
1009	24.030	22.000	9.23
2081	3.780 *	1.600	136.25
3211	8.000	6.800	17.65
4226	17.680	17.000	4.00
5182	26.040	27.200	-4.26



Y = .918X + 2.156

QUIM. [illegible] GODOY
Chefe da [illegible] de [illegible] e
Análise do Ar

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed sulfate study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "True Values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA True value equal to 11.8, 50% of the results had an absolute percent difference of 6.22% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

Sulfate Frequency Distribution

EPA alue			Percentile									
	No.	Min.	10	20	30	40	50	60	70	80	90	Max.
1.6	230	.00	4.00	6.67	13.00	20.67	30.00	40.00	60.00	80.00	100.00	167.69
6.8	219	.00	1.25	2.83	4.67	6.50	7.83	10.67	13.47	16.67	23.17	39.00
11.8	278	.00	1.33	2.52	3.60	4.75	6.22	8.11	10.81	14.50	20.00	30.48
17.0	110	.00	.67	1.39	2.80	4.00	6.00	7.00	8.00	10.33	15.20	22.22
22.0	58	.05	.62	1.85	2.56	3.59	4.31	5.74	7.69	8.97	12.82	17.38
27.2	227	.00	1.14	2.38	3.21	4.17	5.00	6.75	9.20	11.65	15.61	24.92

If there are any questions or comments about these results please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

SO_4 0880

MONÓXIDO DE CARBONO - CO

September 1979

INSTRUCTIONS FOR INTERLAB ANALYSIS

1. Insert units code in proper blanks.

2. Instruction for using cylinders:

   (a) Transport cylinders to site. Let cylinders equilibrate at room temperature for 24 hours prior to using. Slightly open main valve on tank to blow any foreign material from opening. Attach the regulator used for span gas (or other suitable regulator) to sample cylinder. (NOTE: CGA 350 connector must be used.) Check for leaks.

   (b) Record site number on Data Card. Use one Data Card per site.

   NOTE: Lab I.D. (6-digit number found in top right hand corner of data card) and Study I.D. (4-digit number found under study name at top of card) must appear on each data card.

   (c) Record cylinder number on Data Card. (This is the 4-digit number on tag attached to cylinder neck.)

   (d) Sample gas and record value on Data Card.

   (e) Repeat steps (c) and (d) for each cylinder for each instrument.

3. Record date samples analyzed on Data Card.

4. All analyses should be completed and cylinders returned as soon as possible after completing the tests. To return cylinders, use enclosed mailing labels and ship collect for conversion to GBL.

   CAUTION: DO NOT LET CYLINDER PRESSURE DROP BELOW 150 PSIG.

5. Return completed Data Card to this office using enclosed envelope.

Thank you very much for your cooperation. A tabulation of your data will be sent to you as soon as the results have been received. A summary report including the data from all participants will follow in the future.

O U T U B R O - 1979

CO
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0068

0 9 7 5 (col 4-7) (7 7 0 0 0 1 (col 8-13)

(col 1-3)

770001

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL

Site No. 0 0 1 (col 14-16)

*Method Code 0 9 (col 17-18)

*Units Code 0 2 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
1 7 6	21-24	0 0 3 0 0	25-25	
6 9 5	31-34	0 1 5 0 0	35-39	
7 2 1	41-44	0 3 5 0 0	45-46	
	51-54		55-59	

ESTAÇÃO CORREIO - Monitor Lira
- Calibração com gás "span"

CETESB - CIA. DE TECNOLOGIA DE SANEAMENTO AMBIENTAL
BIBLIOTECA

CO
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0038

0 9 7 9 (col 4-7) (7 7 0 0 0 1) (col 8-13)

J (col 1-3)

770001

Site No. 0 0 2 (col 14 - 16)

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345 - CEP 05459 - PABX 210-1100
SÃO PAULO, BRAZIL

*Method Code 0 9 (col 17 - 18)

*Units Code 0 2 (col 19 - 20)

*See back of card

Sample Number	col	Results	col	Comments
1 1 7 6	21 - 24	0 0 3 . 5 0	25 - 29	
2 6 9 5	31 - 34	0 1 6 . 5 0	35 - 39	
3 7 2 1	41 - 44	0 3 7 . 5 0	45 - 49	
	51 - 54		55 - 59	

Estação CORREIO - Monitor Lira

Calibração efetuada por ajuste eletrônico

CO
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0088

030 (col 1-3) 0 9 7 9 (col 4-7) (7 7 0 0 0 1) (col 8-13)

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345 - CEP 05459 - PABX 210-1100
SÃO PAULO - BRAZIL

770001

Site No. 0 0 3 (col 14-16)

*Method Code 0 9 (col 17-18)

*Units Code 0 2 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
1 1 7 6	21-24	0 0 3 . 5 0	25-29	
2 6 9 5	31-34	0 1 5 . 5 0	35-39	
3 7 2 1	41-44	0 3 5 . 0 0	45-49	
	51-54		55-59	

ESTAÇÃO CORREIO - Monitor Bendix

CO
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0088

C30 (col 1-3) 0 9 7 9 (col 4-7) (7 7 0 0 0 1) (col 8-13)

770001

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345 - CEP 05459 - PABX 210-1100
SÃO PAULO, BRAZIL

Site No. 0 0 4 (col 14-16)

*Method Code 0 9 (col 17-18)

*Units Code 0 2 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
1 1 7 6	21-24	0 0 2 5 0	25-29	
2 6 9 5	31-34	0 1 5 0 0	35-39	
3 7 2 1	41-44	0 3 5 0 0	45-49	
	51-54		55-59	

ESTAÇÃO CERQUEIRA CESAR

CO
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0088

030 (col 1-3) 0 9 7 9 (col 4-7) (7 7 0 0 0 1) (col 8-13)

770001

770001
Claudio Darwin Alonso
Compahia de Tecnologia de
Saneamento Ambiental
Av. Prof. Frederico Hermann Jr.
345 - CEP 05459-PABX 210-1100
São Paulo - BRAZIL

Site No. 0 0 5 (col 14-16)

*Method Code 9 9 (col 17-18)

*Units Code 0 2 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
1 1 7 6	21-24	0 0 2 . 1 0	25-29	
2 6 9 5	31-34	0 1 4 . 0 0	35-39	
3 7 2 1	41-44	0 3 5 . 0 0	45-49	
	51-54	.	55-59	

ESTAÇÃO LABORATÓRIO VOLANTE- (LV-1)

INTER-LABORATORY STUDY RESULTS

DATE PRINTED: 11/06/79

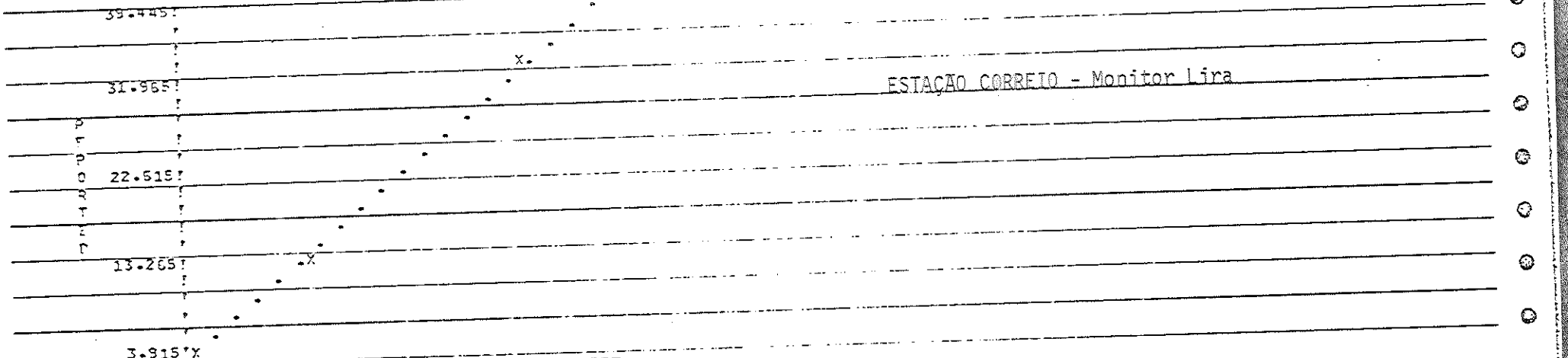
(SEPTEMBER 1979)

POLLUTANT - CO

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
745-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL
STATE = 001

UNITS - PARTS PER MILLION

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1176	3.000	2.950	.67
2695	15.000	14.800	1.35
3721	35.000	33.800	3.55



28.

INTER-LABORATORY STUDY RESULTS — DATE PRINTED: 11/06/79

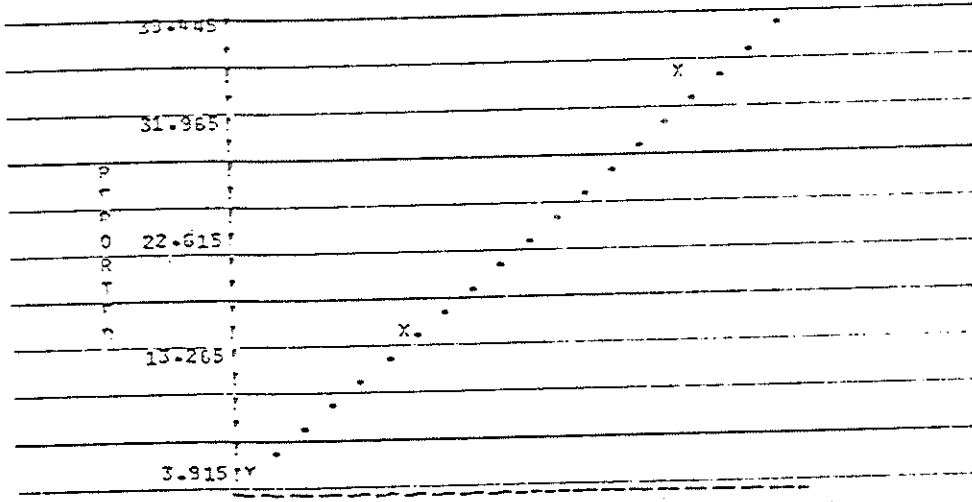
(SEPTEMBER 1979)

POLLUTANT - CO

770001
CLAUDIO TARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
348-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL
STE = 002

UNITS - PARTS PER MILLION

SAMPLE NUMBER	RECORDED VALUE	EPA VALUE	PERCENT DIFFERENCE
1175	3.500	2.980	17.45
2695	15.500	14.800	11.49
3721	37.500	33.800	10.95



ESTAÇÃO CORREIO - Monitor Lira

Y = 1.103X +0.196

INTER-LABORATORY STUDY RESULTS — DATE PRINTED: 11/06/79

(SEPTEMBER 1979)

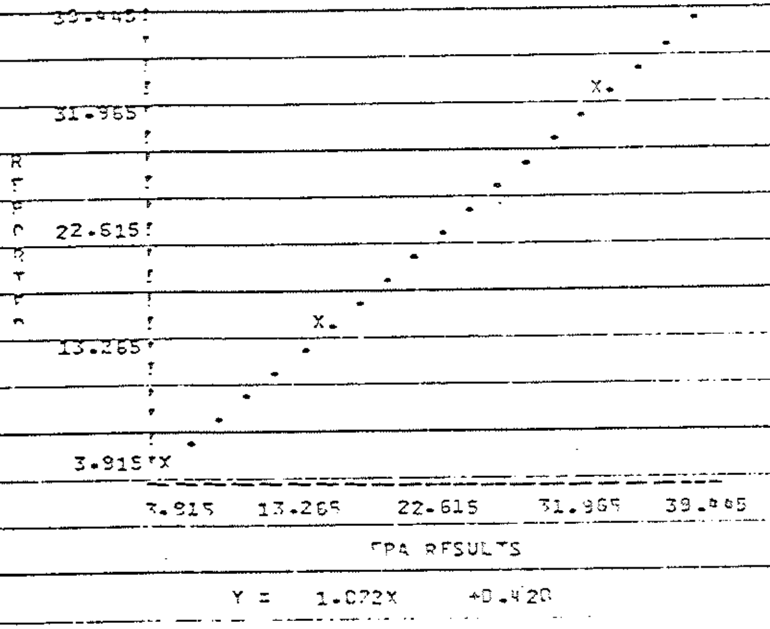
POLLUTANT - CO

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-CAIX 210-1100
SAO PAULO, BRAZIL
SITE - 003

UNITS - PARTS PER MILLION

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1176	3.500	2.980	17.45
2695	15.500	14.800	4.73
3721	35.000	33.800	3.55

ESTAÇÃO CORREIO - Monitor Bendix



INTER-LABORATORY STUDY RESULTS — DATE PRINTED: 11/06/79

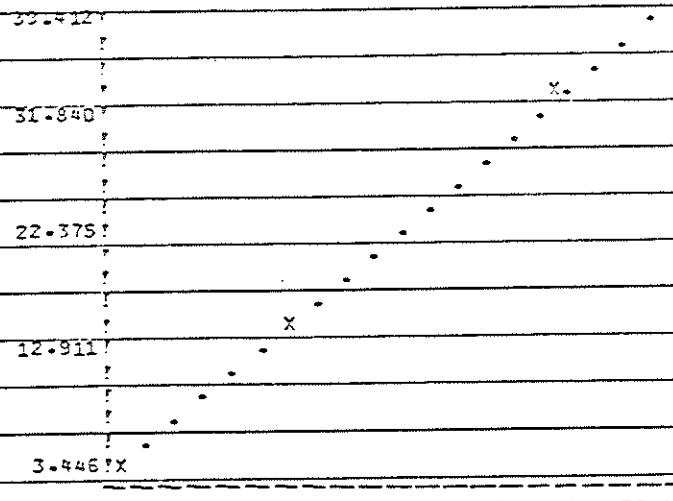
(SEPTEMBER 1979)

POLLUTANT - CO

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
Av. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL
STE - 004

UNITS - PARTS PER MILLION

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1176	2.500	2.900	-16.11
2695	15.000	14.800	+ 1.35
3721	35.000	33.800	+ 3.55



Estação CERQUEIRA CESAR

EPA RESULTS

Y = 1.054X -0.623

INTER-LABORATORY STUDY RESULTS — DATE PRINTED: 11/06/79

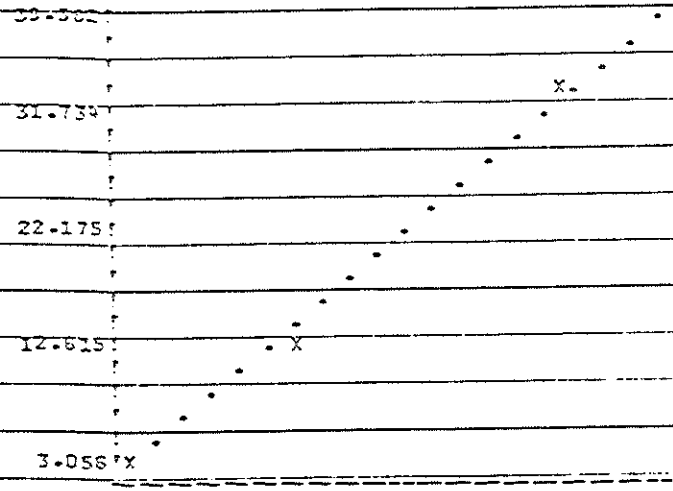
(SEPTEMBER 1979)

POLLUTANT - CO

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-TEL 210-1100
SAO PAULO, BRAZIL
STE - 006

UNITS - PARTS PER MILLION

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1176	2.100	2.980	-29.53
2695	14.000	14.800	-5.41
3721	35.000	33.800	3.55



ESTAÇÃO LABORATÓRIO VOLANTE - LV-1

3.056 12.615 22.175 31.734 39.392

EPA RESULTS

Y = 1.071X -1.381

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed CO study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "True Values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA True value equal to 3.43 mg/m^3, 50% of the results had an absolute percent difference of 5.76% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

CO Frequency Distribution

EPA Value			Percentile									
mg/m^3	ppm	No.	Min.	10	20	30	40	50	60	70	80	90	Max.
3.43	2.98	1511	.00	.89	2.10	3.14	4.40	5.76	7.28	9.04	11.89	16.49	27.35
17.14	14.9	1511	.00	.89	2.10	3.14	4.40	5.76	7.28	9.04	11.89	16.49	27.35
38.9	33.8	1205	.00	.25	.62	.96	1.38	1.71	2.40	3.04	4.17	5.83	9.84

If there are any questions or comments about these results, please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

CO 0979

CETESB

N O V E M B R O - 1980

Chefe da Div. de Amostragem e Análise do Ar

CORREIO - LIRA

FORM APPROVED
OMB NO. 158-R0088

CO
INTER-LABORATORY TEST

0980 (col 4-7) (77BR01) 34. (col 8-13)

(col 1-3)

Site No. 001 (col 14-16)

*Method Code 09 (col 17-18)

*Units Code 02 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
1551	21-24	010.20	25-29	
2636	31-34	020.50	35-39	
3680	41-44	039.00	45-49	
	51-54	___.__	55-59	

MOÓCA

CO
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0088

0980 (col 4-7) (77BR01) (col 8-13)

030 (col 1-3)

Site No. 002 (col 14-16)

*Method Code 09 (col 17-18)

*Units Code 02 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
1551	21-24	009.40	25-29	
2636	31-34	020.40	35-39	
3680	41-44	039.60	45-49	
	51-54	___.__	55-59	

P.Q. D. PEDRO

CO
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0088

(col 1-3) 0980 (col 4-7) (17BB01) 35. (col 8-13)

Site No. 003 (col 14-16)

*Method Code 09 (col 17-18)

*Units Code 02 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
1551	21-24	0100.00	25-29	
2636	31-34	0210.00	35-39	
3680	41-44	0395.0	45-49	
	51-54		55-59	

C. CESAR

CO
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0088

(col 1-3) 0980 (col 4-7) (17BB01) (col 8-13)

Site No. 004 (col 14-16)

*Method Code 09 (col 17-18)

*Units Code 02 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
1551	21-24	0100.00	25-29	
2636	31-34	0205.0	35-39	
3680	41-44	0410.00	45-49	
	51-54		55-59	

CONGONHAS

CO
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0038

0980 (col 4-7) 177B001 36 (col 8-13)

(col 1-3)

Site No. 005 (col 14-16)

*Method Code 09 (col 17-18)

*Units Code 02 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
1551	21-24	0106.0	25-29	
2636	31-34	0215.0	35-39	
3680	41-44	041.50	45-49	
	51-54		55-59	

CUBATÃO

CO
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0038

0980 (col 4-7) 177B001 (col 8-13)

(col 1-3)

Site No. 006 (col 14-16)

*Method Code 09 (col 17-18)

*Units Code 02 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
1551	21-24	0094.0	25-29	
2636	31-34	020.40	35-39	
3680	41-44	039.20	45-49	
	51-54		55-59	

CETESB - CIA. DE TECNOLOGIA DE SANEAMENTO AMBIENTAL
BIBLIOTECA

TUQUITIBA

CO
INTER-LABORATORY TEST
0980 (col 4-7)

FORM APPROVED
OMB NO. 158-R0088

(col 1-3) (17BD01) 37. (col 8-13)

Site No. 007 (col 14 - 16)

*Method Code 09 (col 17 - 18)

*Units Code 02 (col 19 - 20)

*See back of card

Sample Number	col	Results	col	Comments
1551	21 - 24	009.90	25 - 29	
2636	31 - 34	020.40	35 - 39	
3680	41 - 44	038.80	45 - 49	
	51 - 54		55 - 59	

LV-1 (CAÇAPAVA)

CO
INTER-LABORATORY TEST
0980 (col 4-7)

FORM APPROVED
OMB NO. 158-R0088

(col 1-3) (17BR01) (col 8-13)

Site No. 008 (col 14 - 16)

*Method Code 09 (col 17 - 18)

*Units Code 02 (col 19 - 20)

*See back of card

Sample Number	col	Results	col	Comments
1551	21 - 24	010.40	25 - 29	
2636	31 - 34	021.60	35 - 39	
3680	41 - 44	040.20	45 - 49	
	51 - 54		55 - 59	

MONITOR RESERVA

CO
INTER-LABORATORY TEST

(col 1-3) 0980 (col 4-7) 77BB06 38. (col 8-13)

FORM APPROVED
OMB NO. 158-R0098

Site No. 009 (col 14-16)

*Method Code 09 (col 17-18)

*Units Code 02 (col 19-20)

*See back of card

Sample Number	col	Results	col	Comments
1551	21-24	009.50	25-29	
6316	31-34	040.00	35-39	
3680	41-44	020.00	45-49	
	51-54		55-59	

INTER-LABORATORY STUDY RESULTS DATE PRINTED= 12/02/80

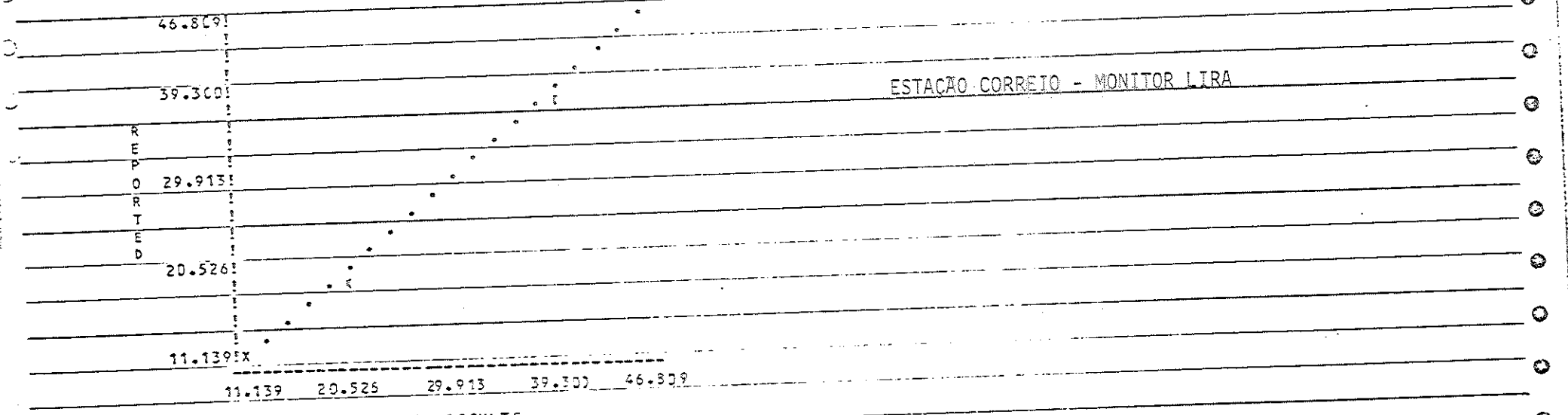
(SEPTEMBER 1980)

POLLUTANT = CO

7BR001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL
SITE - 001 CORREIO

UNITS = PARTS PER MILLION

SAMPLE NUMBER	REPORTER VALUE	EPA VALUE	PERCENT DIFFERENCE
1551	10.200	10.500	-2.85
2636	20.500	21.100	-2.84
3680	39.000	39.700	-1.76



EPA RESULTS

Y = .987X -0.430

INTER-LABORATORY STUDY RESULTS

DATE PRINTED- 12/03/80

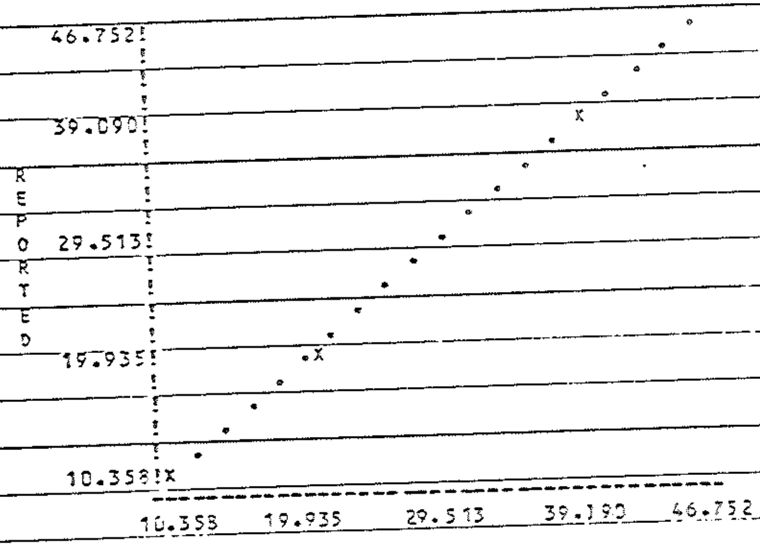
(SEPTEMBER 1980)

POLLUTANT - CO

783001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL
SITE - 002 MOOCA

UNITS - PARTS PER MILLION

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1551	9.400	10.500	-10.48
2636	20.400	21.100	-3.32
3680	39.600	39.700	-.25



Y = 1.034X -1.442

ESTAÇÃO MOÓCA

40..

INTER-LABORATORY STUDY RESULTS

DATE PRINTED: 12/02/80

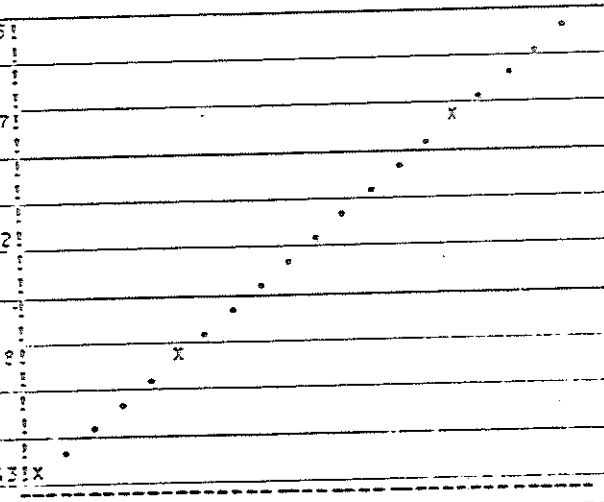
(SEPTEMBER 1980)

POLLUTANT = CO

7BR001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL
SITE - 003 CENTRO

UNITS = PARTS PER MILLION

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1551	10.000	10.500	-4.76
2636	21.000	21.100	-.47
3680	39.500	39.700	-.50



ESTAÇÃO CENTRO - Parque D.Pedro

EPA RESULTS

Y = 1.008X -0.469

Cópia Oficial
Chefe da Divisão
Análise do Ar

INTER-LABORATORY STUDY RESULTS

DATE PRINTED- 12/22/80

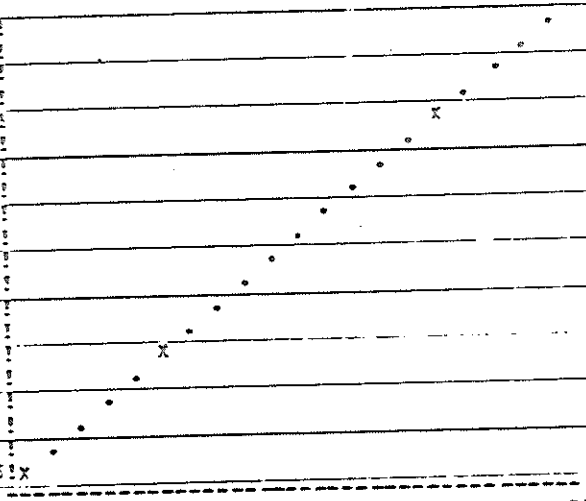
(SEPTEMBER 1980)

POLLUTANT - CO

79R001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL
SITE - 004 ESTACAO CEROUEIRA CESAR

UNITS - PARTS PER MILLION

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1551	10.000	10.500	-4.75
2636	20.500	21.100	-2.84
3630	41.000	39.700	3.27



EPA RESULTS

Y = 1.066X -1.508

INTER-LABORATORY STUDY RESULTS

DATE PRINTED - 12/02/80

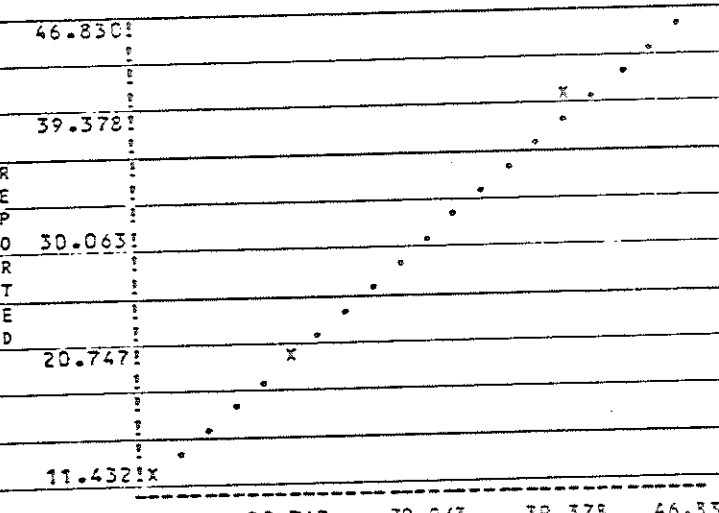
(SEPTEMBER 1980)

POLLUTANT - CO

UNITS - PARTS PER MILLION

7BR001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL
SITE - 005 CONGONHAS

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1551	10.600	10.500	.95
2636	21.500	21.100	1.90
3680	41.500	39.700	4.53



Y = 1.060X -0.663

INTER-LABORATORY STUDY RESULTS

DATE PRINTED: 12/02/80

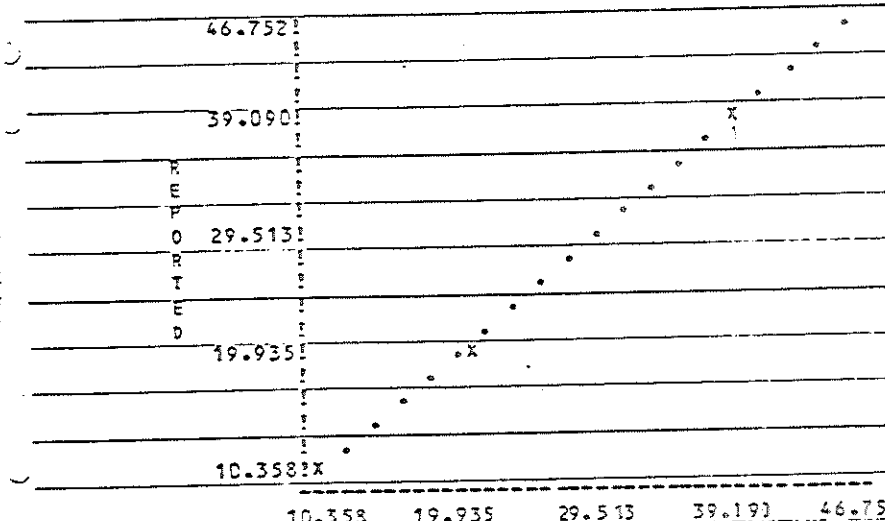
(SEPTEMBER 1980)

POLLUTANT - CO

7BRCOT
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL
SITE - 006 CUBATAO

UNITS - PARTS PER MILLION

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1551	9.400	10.500	-10.48
2636	20.400	21.100	-3.32
3680	39.200	39.700	-1.26



EPA RESULTS

Y = 1.019X -1.229

INTER-LABORATORY STUDY RESULTS

DATE PRINTED - 12/02/80

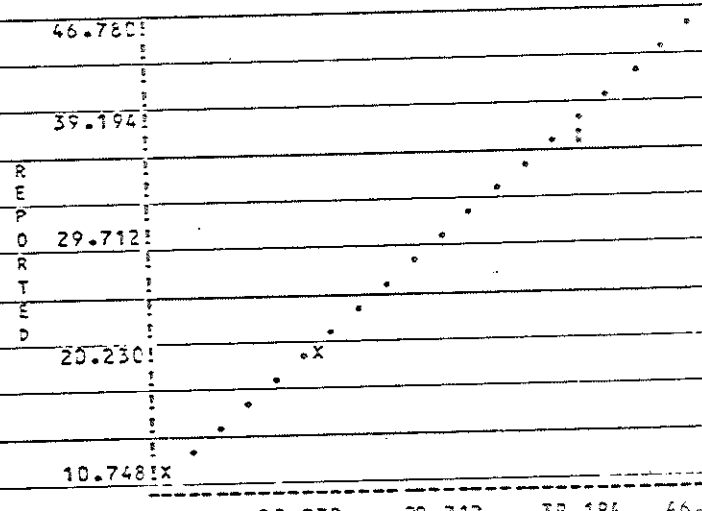
(SEPTEMBER 1980)

POLLUTANT - CO

7BRC01
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL
SITE - 007 JUQUITIBA

UNITS - PARTS PER MILLION

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1551	9.800	10.500	-6.67
2636	20.400	21.100	-3.32
3680	38.800	39.700	-2.27



ESTAÇÃO JUQUITIBA

EPA RESULTS

Y = .992X -0.593

INTER-LABORATORY STUDY RESULTS

DATE PRINTED: 12/02/80

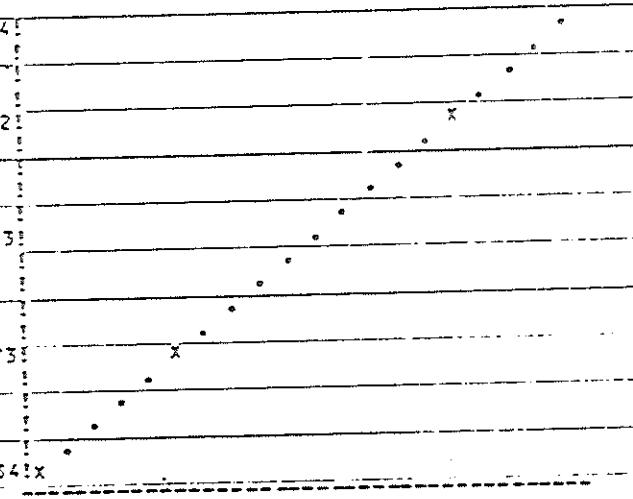
(SEPTEMBER 1980)

POLLUTANT - CO

UNITS - PARTS PER MILLION

78R001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL
SITE - 008 LV1 (CAÇAPAVA)

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1551	10.400	10.500	-.95
2636	21.600	21.100	2.37
3680	40.200	39.700	1.26



ESTAÇÃO CAÇAPAVA - LV-1

Y = 1.018X -0.133

INTER-LABORATORY STUDY RESULTS — DATE PRINTED: 12/22/80

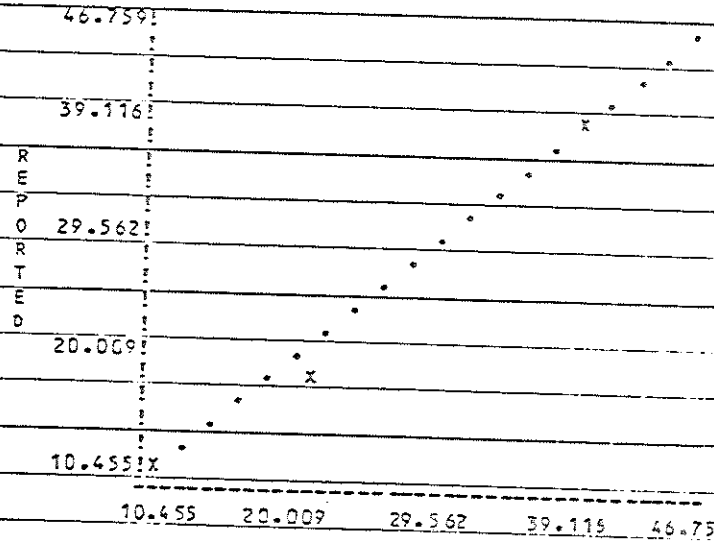
(SEPTEMBER 1980)

POLLUTANT - CO

ZBRC01
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECHNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL
SITE - 009 RESERVA

UNITS - PARTS PER MILLION

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1551	9.500	10.500	-9.52
2636	20.000	21.100	-5.21
3680	40.000	39.700	.76



EPA RESULTS

Y = 1.048X -1.741

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed CO study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "true values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA true value equal to 12.1 mg/m^3, 50% of the results had an aboluste percent difference of 4.71% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

CO Performance Survey

EPA value			Percentile									
mg/m^3	ppm	No.	Min.	10	20	30	40	50	60	70	80	90	Max.
12.1	10.5	1765	.00	.67	1.65	2.70	3.52	4.71	6.54	8.38	11.07	16.11	26.70
24.3	21.1	599	.00	.37	.75	1.12	1.77	2.27	2.99	3.54	5.04	6.94	11.11
45.6	39.7	1194	.00	.35	.69	1.10	1.48	1.85	2.54	3.20	4.16	5.90	9.74

If there are any questions or comments about these results, please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

CO 0980

DIÓXIDO DE ENXOFRE - SO_2

October 1979

Instructions for Inter-Lab Analysis

1. Check to make sure all samples arrived in good condition. If any samples were broken in shipment, note on proper line under COMMENTS on Data Card.

2. Record date samples were received in your laboratory on the Data Card.

   NOTE: Number in ( ) at top right-hand corner of Data Card is the number that has been assigned to your laboratory for the purpose of this study. In all subsequent reports, laboratories will be identified by Lab Number only.)

3. Insert units code in proper blanks. See Step 5b.

4. Insert method code in proper blanks.

5. Instructions for mixing unknown samples.

   (a) Quantitatively transfer the contents of the first sample to a 50-ml volumetric flask using successive washes (minimum of 3 washes) of tetrachloromercurate (TCM) absorbing reagent. Bring the volume to 50-ml using TCM. Mix thoroughly. The TCM used for dilution should be that which is normally used as a reagent for your routine SO_2 sampling.

      i. The top of the ampoule breaks off easily. A portion of the sample may be in the "shoulder" part of the ampoule or in the top, thus care should be taken to wash all material from the container (NOTE: Proper precautions should be taken to avoid injury when opening ampoule.)

      ii. Using TCM wash contents of upper and lower part of ampoule into 50-ml volumetric flask (use of a 250-ml polyethylene wash bottle is recommended). At least 3 rinses should be performed.

      iii. The freeze-dried material dissolves rather slowly. Thus, allow sufficient time to effect solubilization (about five minutes).

   (b) The sample you have just prepared simulates an air sample collected over a 24-hour period in 50-ml of TCM. Assume that the total air volume was 300 liters. Report the concentration of SO_2 in the sample.

   (c) From this point on, treat the sample as you would a regular field sample in accordance with your procedure. If the samples are not to be analyzed immediately after solubilization, the contents may be stabilized by refrigeration at 5°C until ready for analysis.

(d) Repeat steps (a) - (c) for the remaining samples.

6. Process unknown samples during routine analysis of SO_2 on a regular analysis day before November 14, 1979. Use your normal procedures for SO_2 analysis. Give brief description of method on back of Data Card and record method code in space provided.

7. Record date samples analyzed on Data Card.

8. Record analytical results on Data Card in proper row and column.

9. Return completed Data Card to this office using enclosed envelope.

10. Thank you very much for your cooperation. A tabulation of all data will be sent to you as soon as all results have been received.

CETESB

N O V E M B R O - 1979

SO_2 - Nov/79

SO_2
INTER-LABORATORY TEST
1 0 7 9 (col 4 7)

FORM APPROVED
OMB NO. 158 R0088

11 (col 1 3)

7 7 0 0 9 1 (col 8 - 13)

770001

770001

CLADIO DARWIN ALONSO
COMPANHIA DE TECHOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345 - CEP 05459 - PABX 210-1100
SAO PAULO, BRAZIL

*Method Code 0 1 (col 17 - 18)

*Units Code 0 1 (col 19 - 20)

*See back of card

	Sample Number	col	Results	col	Comments
1	7 3 4	21 - 24	9 1 7 4	25 - 30	
2	7 7 2	31 - 34	3 4 1 4 9	35 - 40	
	7 3 0	41 - 44	7 6 4 5 3	45 - 50	
4	8 4 3	51 - 54	1 1 9 7 7 6	55 - 60	
	6 6 0	61 - 64	1 5 9 0 2 0	65 - 70	

Date Samples Received: 1 1 1 6 7 9 (Mo Day Yr)

Date Samples Analyzed: 1 1 2 3 7 9 (Mo Day Yr)

Method Codes

Pararosaniline - manual

Pararosaniline - automated (please specify)

Other (please specify)

Unit Codes

01 Micrograms per cubic meter ($\mu g/m^3$)

02 Parts per million (ppm volume/volume)

Method Description

1 Transfer the Sample to a 50 ml volumetric flask using absorbing reagente complete the Fume Hix. 2. Pipet 10 ml of the sample into a 25 ml volumetric flask. 3. Add 1 ml 0,6% sulfamic acid. 4. Add 2 ml 0,2% formaldehyde solution. 5. Bring all flasks to fume with water. Mix and allow in 25°C - Constant-temperature bath. 6. After 30 min. and before 60 min, measure the absorbance at 548 nm using distilled water as the refer-ce. 7. Calculation using linear regression.

INTER-LABORATORY STUDY RESULTS — DATE PRINTED: 12/04/79

(OCTOBER 1979)

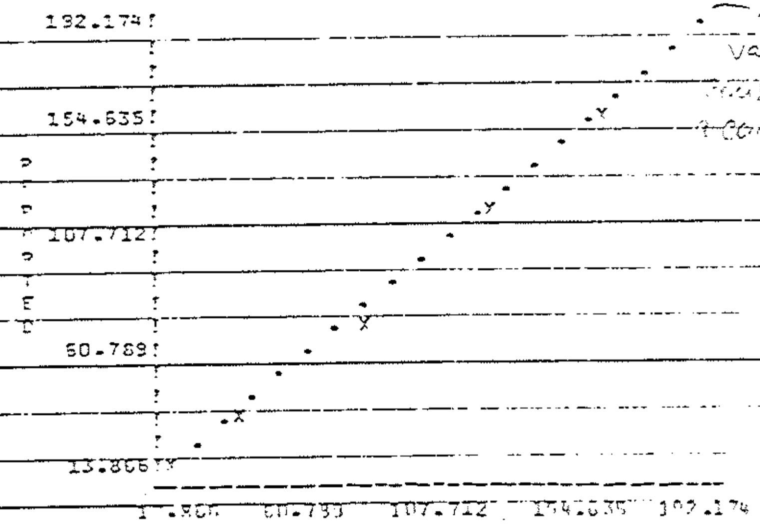
POLLUTANT - SO2

770001
CLAU[illegible] DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL

UNITS - MICROGRAMS PER CUBIC METER

SAMPLE NUMBER	REPORTED VALUE	*considerando-se b*	EPA VALUE	PERCENT DIFFERENCE	*≠ a %*
1734	9.174	*12,946*	13.500	-32.04	*-4,10*
2777	34.149	*37,920*	38.500	-11.30	*-1,51*
3730	76.457	*80,224*	80.000	-4.43	*-0,28*
4847	119.776	*123,547*	125.000	-4.13	*1,16*
5650	159.020	*162,793*	165.000	-3.62	*1,34*

Valores não considerando-se a constante b — *Valores considerando-se a fator b* — *Considerando-se o fator b.*



EPA RESULTS

Y = .982X -3.730

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed SO_2 study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "True Values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA True value equal to .030 ppm, 50% of the results had an absolute percent difference of 6.76% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

SO_2 Frequency Distribution

EPA Value		Percentile											
ppm	$\mu g/m^3$	No.	Min.	10	20	30	40	50	60	70	80	90	Max.
.005	13.5	532	.00	3.41	6.52	11.48	17.05	25.00	33.94	43.57	56.70	80.74	127.57
.014	38.5	532	.00	3.41	6.52	11.48	17.05	25.00	33.94	43.57	56.70	80.74	127.57
.030	80.0	324	.04	.93	2.10	3.33	4.84	6.76	8.04	10.50	14.57	20.09	32.49
.048	125.0	289	.06	1.09	1.98	2.80	3.65	4.87	5.90	7.53	10.65	13.22	20.89
.063	165.0	414	.03	1.03	2.06	3.43	4.46	5.99	7.49	10.03	12.76	17.93	29.69

If there are any questions or comments about these results, please contact me.

Sincerely yours,

Robert L. Lamne
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

SO_2 1079

CETESB

M A I O - 1980

CETESB - CIA. DE TECNOLOGIA DE SANEAMENTO AMBIENTAL
BIBLIOTECA

SO_2 INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0031

1 (col 1-3) 0 4 8 0 (col 4-7) 7 7 0 0 0 1 54. (col 8-13)

770001

770001
CLADIO DARWIN ALONSO
COMPANHIA DE TECHOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO - BRAZIL

*Method Code 0 1 (col 17-18)
*Units Code 0 1 (col 19-20)
*See back of card

Sample Number	col	Results	col	Comments
1 0 1 0	21-24	1 4 4 7 5	25-30	
2 1 9 6	31-34	4 1 9 9 8	35-40	
3 4 9 9	41-44	8 2 7 7 3	45-50	
4 4 9 3	51-54	1 4 1 8 9 6	55-60	
5 1 3 2	61-64	2 1 0 1 9 4	65-70	

	Mo	Day	Yr
Date Samples Received	0 5	2 7	8 0
Date Samples Analyzed	0 6	0 2	8 0

Method Codes

1 (1) Pararosaniline - manual
Pararosaniline - automated (please specify)
99 Other (please specify)

Unit Codes

01 Micrograms per cubic meter ($\mu g/m^3$)
02 Parts per million (ppm volume/volume)

Method Description

1. Transfer the Sample to a 50 ml volumetric flask using absorbing reagente to volume with water. Mix and allow in 25ºC - Constant-temperature bath. 6. After 30 min. and before 60 min, measure the absorbance at 548 nm using distilled water as the reference 7. Calculation using linear regression. 3. Add 1 ml 0,6% sulfanic acid. 4. Add 2 ml 0,2% formaldehyde solution. 5. Bring all flasks complete the volume Mix. 2. Pipet 10 ml of the sample into a 25 ml volumetric flask.

INTER-LABORATORY STUDY RESULTS

DATE PRINTED: 06/12/80

(APRIL 1980)

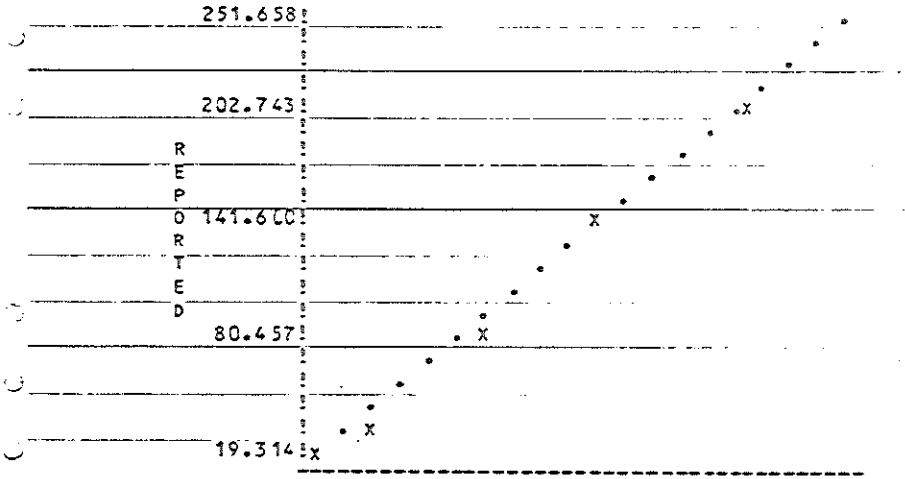
POLLUTANT - SO2

770001
CLADIO DARWIN ALONSO
COMPANHIA DE TECHOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL

$Y = aX + b$

UNITS - MICROGRAMS PER CUBIC METER

SAMPLE NUMBER	REPORTED VALUE	NAD Considerando b	EPA VALUE	PERCENT DIFFERENCE	PERCENT DIFFERENCE NAD CONSIDERANDO b
1010	14.475	10,703	13.200	9.66	18,90
2196	41.998	38,226	45.700	-8.10	-16,35
3499	82.773	79,001	94.000	-11.94	-15,95
4493	141.896	138,124	144.000	-1.46	-4,08
5132	210.194	206,422	216.000	-2.69	-4,43



Y = .978X -2.122

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed SO_2 study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "True Values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA True value equal to .036 ppm, 50% of the results had an absolute percent difference of 6.68% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

SO_2 Frequency Distribution

EPA Value		Percentile											
m	ug/m^3	No.	Min.	10	20	30	40	50	60	70	80	90	Max.
.005	13.2	618	.00	2.86	5.46	8.66	12.22	17.53	26.41	36.64	46.45	73.32	114.99
17	45.7	303	.00	.82	1.62	2.51	3.89	5.25	6.86	8.75	11.25	16.61	27.11
.036	94.0	192	.01	1.04	2.36	3.85	5.33	6.68	8.33	9.85	11.60	14.94	20.36
55	144.0	394	.00	1.05	1.92	2.59	3.43	4.47	5.68	7.19	10.03	13.36	22.05
.082	216.0	405	.02	1.03	1.96	3.06	4.18	5.59	7.18	10.08	12.76	17.93	29.69

If there are any questions or comments about these results, please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

SO_2 0480

CETESB

D E Z E M B R O - 1980

SO_2 INTER-LABORATORY TEST

1 0 8 0 (col 4-7)

7 B R 0 0 1 (col 8 - 13)

FORM APPROVED
OMB NO. 158-R0038

(col 1-3)

7BR001

7BR001

CLADIO DARVIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL

*Method Code 0 1 (col 17 - 18)

*Units Code 0 1 (col 19 - 20)

*See back of card

Sample Number	col	Results	col	Comments
1 2 4 9	21 - 24	0 1 5 5 5 0	25 - 30	
2 4 4 2	31 - 34	0 5 0 5 0 0	35 - 40	
3 1 8 9	41 - 44	0 6 0 7 3 4	45 - 50	
5 3 5 1	51 - 54	1 4 6 2 2 9	55 - 60	
4 5 0 2	61 - 64	1 2 4 ' 8 5 5	65 - 70	sample of the other serie

	Mo	Day	Yr
Date Samples Received	1 2	0 5	8 0
Date Samples Analyzed	1 2	1 0	8 0

Method Codes

Pararosaniline - manual

Pararosaniline - automated (please specify)

Other (please specify)

Unit Codes

01 Micrograms per cubic meter ($\mu g/m^3$)

02 Parts per million (ppm volume/volume)

Description

Transfer the Sample to a 50 ml volumetric flask using absorbing reagente complete the volume Mix. 2. Pipet 10 ml of the sample into a 25 ml volumetric flask. 3. Add 1 ml 0,6% sulfamic acid. 4. Add 2 ml 0,2% formaldehyde solution. 5. Bring all flasks to volume with water. Mix and allow in 25° C - Constant - Temperature bath. 6. After 30 min. and before 60 min, measure the absorbance at 548 nm using distilled water as the reference. 7. Calculation using linear regression

INTER-LABORATORY STUDY RESULTS — DATE PRINTED: 01/05/81

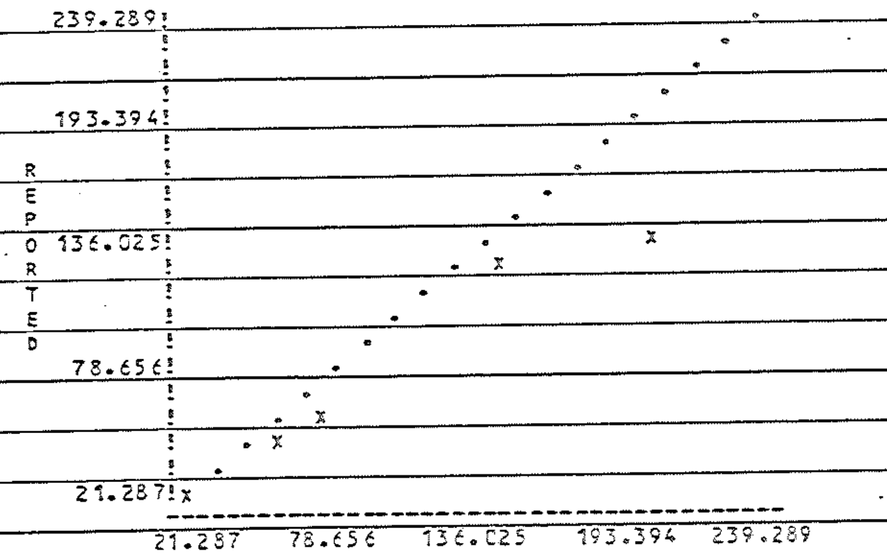
(OCTOBER 1980)

POLLUTANT - SO2

78RC01
CLADIO DARWIN ALONSO
COMPANHIA DE TECHOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL

UNITS - MICROGRAMS PER CUBIC METER

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1249	15.550	23.250	-33.12
2442	50.500	53.920	-6.34
3189	60.734	73.120	-16.94
4502	124.855	145.900	-14.42
5351	146.229	205.200	-28.74



Y = .723X +7.029

OBS – Valores calculados c/ [illegible]

58

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed SO_2 study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program for the calendar year will be issued when all data has been compiled. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "True Values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA True value equal to .021 ppm, 50% of the results had an absolute percent difference of 5.38% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

SO_2 Frequency Distribution

EPA Value				Percentile									
ppm	$\mu g/m^3$	No.	Min.	10	20	30	40	50	60	70	80	90	Max.
.09	23.2	608	.00	2.56	5.32	8.88	12.59	18.94	25.14	35.85	50.62	76.74	122.16
.21	53.9	164	.00	1.07	1.78	2.71	4.30	5.38	7.83	8.75	11.25	14.00	21.29
.28	73.1	164	.00	1.07	1.78	2.71	4.30	5.38	7.83	8.75	11.25	14.00	21.29
.056	145.9	365	.00	.97	1.62	2.56	3.58	4.87	6.10	7.92	11.15	14.23	23.79
.078	205.2	388	.02	.85	1.58	2.49	3.26	4.54	5.98	7.20	10.59	15.27	25.47

If there are any questions or comments about these results, please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

SO_2 1080

"HI - VOL"

Chefe da D.v. de Amostragem e
Anális

60.
Data de Recebimento do Equipamento no Laboratório
07/10/80

ENVIRONMENTAL PROTECTION AGENCY
Research Triangle Park, North Carolina 27711

Dear Participant:

This mailing contains materials necessary to participate in the High Volume Sampler Flow Rate Interlaboratory Study. The package should contain:

- One data card for each instrument to be tested
- Instruction sheet
- Return mailing envelope
- Reference Flow Device (ReF) and associated equipment

Please note that the ReF Device (Reference Flow Device) may not fit all high volume samplers. Due to the numerous models available it was impossible to design the device to fit all units. Please omit from the study those samplers that the ReF will not fit. DO NOT MODIFY OR CHANGE THE ReF.

NOTE: Any alteration of the data card will result in erroneous test results. Sufficient space has been provided on the card for the required information.

Also note the following points during conduct of the test:

- Temperature readings are to be recorded in °F
- When transferring flow readings from the back of the data card, the data should be adjusted according to the calibration curve for the unit. This corrected flow should be recorded on the front of the card.

All blanks MUST be filled in on the front of the data card.

After you complete your test, please repack the test device and return it to us. For return mailing, use the reverse side of the label on the shipping container (see instructions).

Six weeks have been allotted to your agency in which to complete all testing. To enable other participants to receive the device on time, please return the ReF by June 12, 1979.

If for some reason you cannot conduct or complete the test by June 16, PLEASE DO NOT DETAIN THE ReF. Data cards received after the above date will not be processed.

If there are any problems or questions, please contact your Regional Quality Control Coordinator, or call (919) 541-2573.

HiV 0580

INSTRUCTIONS INTERLABORATORY STUDY

I. MATERIALS AND ASSEMBLY: SAVE PACKING MATERIAL.

A. EPA supplied materials:

1. Wind deflector
2. ReF device
3. Five (5) resistance plates and one (1) check plate (red)
4. Collapsible U-tube water manometer
5. Tygon tubing
6. Data cards

B. Participating agency supplied materials:

1. Thermometer, capable of measuring to at least 1.0°F
2. Field operating high volume sampler with rotameter or pressure transducer
3. Air barometer (capable of measuring uncorrected atmospheric pressure).

NOTE: Barometric pressure may be obtained by calling the nearest U.S. Weather Bureau Office and requesting STATION PRESSURE or uncorrected barometric pressure.

4. Watch
5. If needed, four 2-inch "C" clamps (See Section I.C.2)

C. Assembly

1. Open high volume sampler shelter and loosen wing nuts, remove face plate and filter from filter holder.

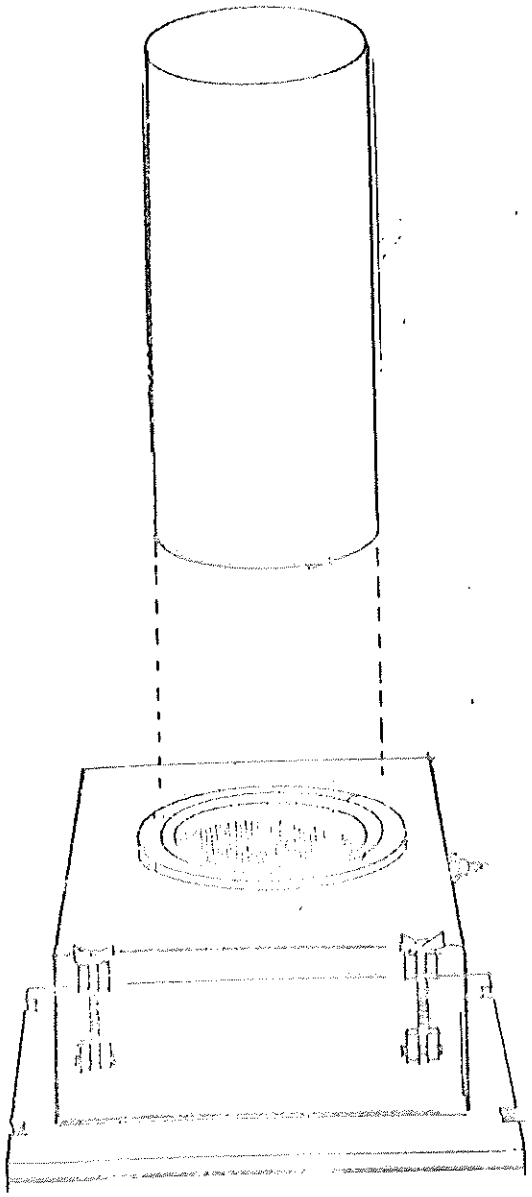


Figure 1

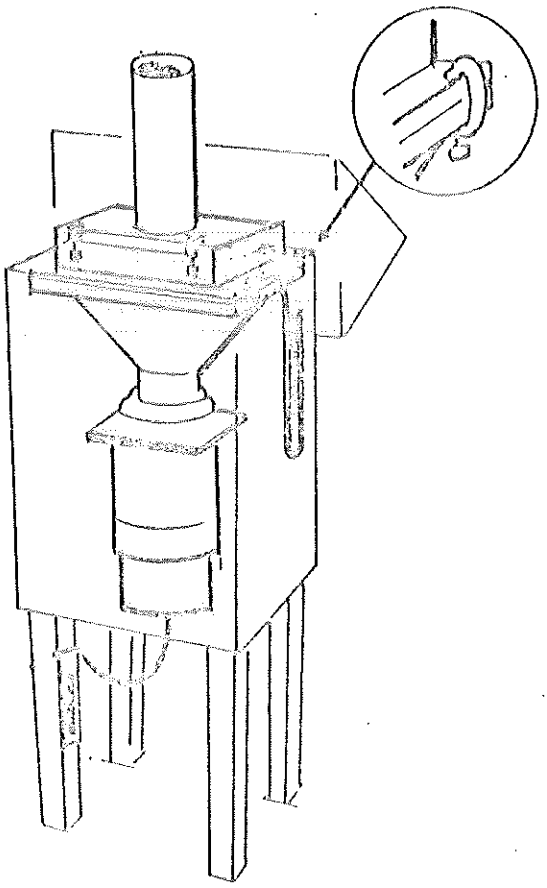


Figure 2

2. Install assembled ReF device on filter assembly of the sampler and fasten securely. (Figure 2)

NOTE: Filter adapter assemblies not having wing nuts must secure ReF device by use of "C" clamps. (Figure 2 insert).

3. Attach wind deflector to ReF device by inserting deflector into orifice retaining ring. (Figure 1). DO NOT MODIFY OR CHANGE ReF IN ANY MANNER TO FIT A PARTICULAR SAMPLER.
4. Mount water manometer in a vertical position.
5. Turn (2) manometer tubing connectors one turn counter-clockwise. Make sure both connectors are open.
6. Attach one manometer connector to ReF device pressure tap using tubing.
7. Adjust manometer midpoint by sliding movable scale until zero point corresponds with the water meniscus. Gently shake or tap to remove any air bubbles and/or liquid remaining on tubing connectors. (If additional liquid is required, remove tubing connector and add clean water.)

II. TEST PROCEDURES:

A. Data Card:

1. The number in the top right-hand corner of the data card is the number assigned to your agency. MAKE SURE THIS NUMBER APPEARS ON EVERY CARD.
2. Record name of your agency on your data card.
3. Record the ReF orifice number - this number can be found stamped into the top of the ReF device (col. 25-27).
4. Record high volume sampler site location identification number (col. 14-16). Use one data card per site. Participants should assign a 3-digit site number to each sampler to aid in interpretation upon return of data.
5. Record method code (col. 17-18). This code can be found on the reverse side of the data card.

6. Record Units Code - this code may be found on the reverse side of the data card (col. 19-20).

7. Record date ReF device received.

8. Record date of test.

9. Record uncorrected barometric pressure (col. 21-24).

Note ——— 10. Column 79 should be filled in to indicate whether the flow rates are reported for "actual" or "standard" conditions. Enter a "1" for actual or a "2" for standard. If this column is not filled in, the conditions will be recorded as "actual".

B. ReF - high volume sampler

1. Install the one hole red check plate in the ReF device by opening the lid and placing the check plate in the machined opening (Figure 3). The system can now be checked for leaks by turning on the high volume sampler motor and placing your finger over the hole in the plate. If signs of leakage are evident (leakage can usually be discovered by careful listening) they must be corrected before proceeding with the test. CAUTION: This check should be performed within a two minute period. Any longer could possibly damage the motor.

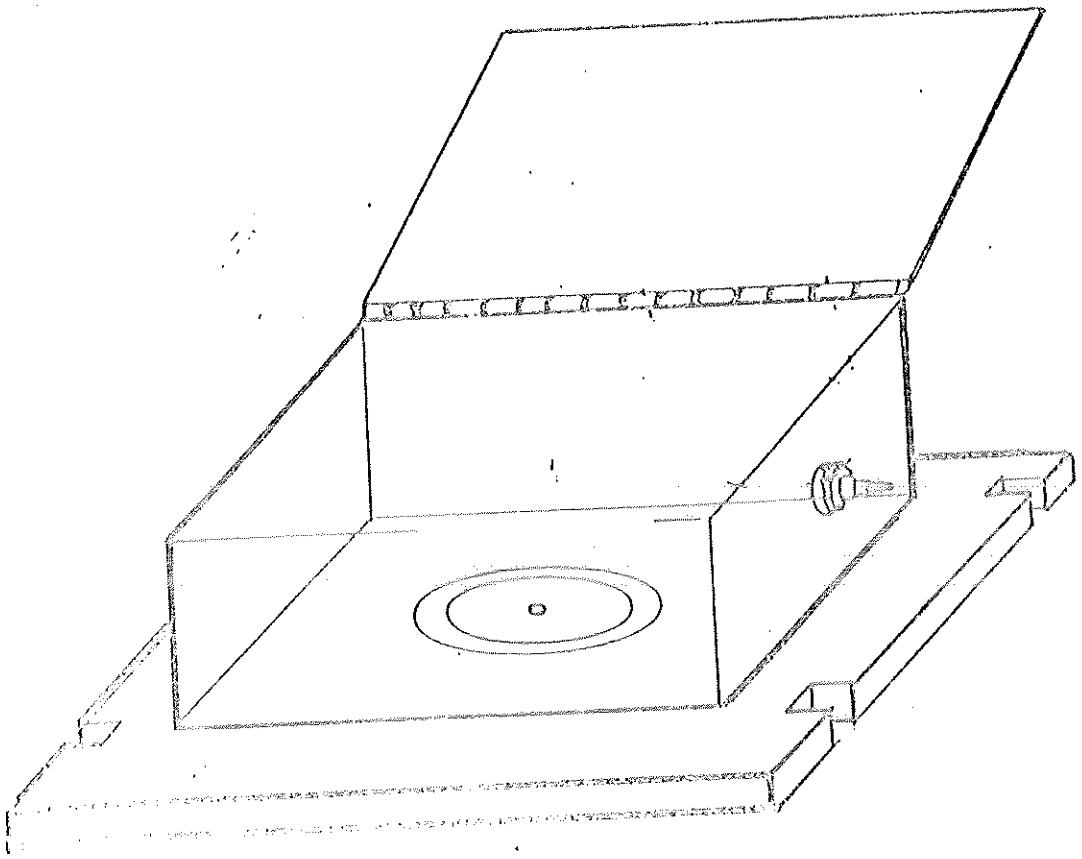


Figure 3

2. Remove the red check plate and replace it with one of the resistance plates. Close and fasten lid securely.
3. Turn high volume sampler motor on and let run five minutes.
4. Record (on the front of the data card) the atmospheric temperature to the nearest 1.0°F.

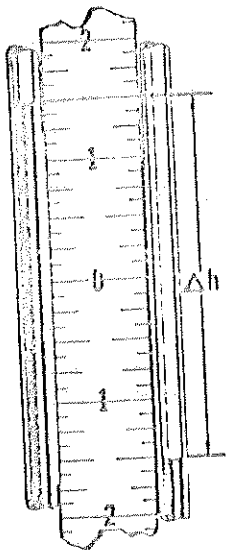
CIA. DE TECNOLOGIA DE SANEAMENTO AMBIENTAL
BIBLIOTECA

5. Record (on the back of the data card) under the proper column:

   a. The observed difference in pressure Δh (inches of water) as indicated by the U-tube manometer.

   b. The uncorrected flow measurement from either a rotameter or recording pressure transducer as you would normally do for a sample collection.

   NOTE: Δh is the sum of the differences from zero (0) of the two water column heights.



Δh = 1-1/2" + 1-1/2" = 3"

6. At one minute intervals, record four additional observations of Δh, and uncorrected air flow measurement.

7. Turn sampler off. Open ReF lid and replace resistance plate with a different plate. Close lid and fasten securely. Turn sampler on.

8. Repeat steps 4-7 until each resistance plate has been used.

9. Average the five Δh observations for each flow rate and record this average on the front of the data card.

10. Average the flow measurement observation for each flow rate from the rotameter or pressure transducer. Record corrected flow measurement on the front of the data card in the proper space. (The corrected flow measurement is obtained from the calibration curve developed for each sampler.)

11. For additional high volume samplers repeat Section I.C.1 through Section II.

III. DISMANTLING, PACKING AND RETURN:

A. Manometer:

1. Turn manometer fitting clockwise until hand-tight.

2. Replace manometer in case.

3. Replace case in shipping container.

B. ReF Device:

1. Remove wind deflector from ReF device.

2. Remove ReF device from high volume sampler and replace filter and face plate on filter adapter.

3. Repack wind deflector and ReF device in shipping container.

4. Fasten straps tightly around shipping container.

5. Remove address card from holder, turn card over and reinsert card so that the EPA address is showing. Container is now ready for mailing - NO POSTAGE REQUIRED.

C. Data Cards:

1. Inspect data cards for completeness (laboratory number, etc., all blanks completed).

2. Place all data cards into the return envelope provided and mail.

NOTE: Do not return data cards in the shipping container with the ReF device.

Thank you very much for your cooperation. A tabulation of your data will be sent to you as soon as the results have been processed. A summary report including data from all participants will follow.

S E T E M B R O - 1980

Análise do Ar

HI VOL FLOW RATE INTER-LABORATORY TEST

FORM APPROVE
OMB NO. 158-R010

(col 1-3) 0 5 8 0 (col 4-7) 7 7 0 0 0 1 69. (col 8-13

770001

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 25459-PABX 210-1160
SÃO PAULO, BRAZIL

VALOR CORRIGIDO VIA CURVA DE CALIBRAÇÃO DO DICKSON

23 Site No. ___ (col 14 - 16)
*Method Code 2 4 (col 17 - 18)
*Units Code 2 1 (col 19 - 20)
Bar. Pressure (in. Hg) 2 9.92 (col 21 - 24)
Orifice No. 1 1 5 (col 25 - 27)
*See back of ca

sis ce Plate Number	col	Temperature (°F)	col	High Volume Sampler Flow Rate	col	Inches Water	col
8	28 - 29	[illegible]	30 - 32	5 7.4 8	33 - 36	1 3.5	37 - 39
3	40 - 41	[illegible]		6 1.5 1	42 - 45	1 1.0	46 - 48
0	49 - 50	[illegible]		[illegible] 7.7 7	51 - 54	[illegible]	55 - 57
1	58 - 59	[illegible]		4 [illegible] 9	60 - 63	[illegible]	64 - 66
3	67 - 68	[illegible]	69 - 71	4 [illegible]	72 - 75	[illegible]	76 - 78

ENTER "1" FOR ACTUAL FLOW OR "2" FOR STANDARD FLOW ___ (col 79)

UR)310 Rev. 6/79

HI VOL FLOW RATE
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0101

60 (col 1-3) 0 5 8 0 (col 4-7) 7 7 0 0 0 1 70. (col 8-13)

770001

770001

CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 25459-PABX 210-1100
SAO PAULO, BRAZIL

25 Site No. [ ] (col 14-16)
*Method Code 2 4 (col 17-18)
*Units Code 0 7 (col 19-20)
Bar. Pressure (in. Hg) 27.86 (col 21-24)
Orifice No. 1 1 5 (col 25-27)
*See back of car

Resistance Plate Number	col	Temperature (°F)	col	High Volume Sampler Flow Rate	col	Inches Water	col
1 4	28-29	[ ]	30-32	[ ]	33-36	[ ]	37-39
[ ]	40-41	[ ]		[ ]	42-45	[ ]	46-48
1 6	49-50	[ ]		[ ]	51-54	[ ]	55-57
0 7	58-59	[ ]		[ ]	60-63	[ ]	64-66
6 5	67-68	[ ]	69-71	[ ]	72-75	6 [ ]	76-78

EPA(DUR)310 Rev. 6/79

ENTER "1" FOR ACTUAL FLOW OR "2" FOR STANDARD FLOW [ ] (col 79)

HI VOL FLOW RATE
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R010

060 (col 1-3) 0 5 8 0 (col 4-7) 7 7 0 0 0 1 (col 8-13)

770001

770001

CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 25459-PABX 210-1100
SAO PAULO, BRAZIL

25 Site No. [ ] (col 14-16)
*Method Code 2 4 (col 17-18)
*Units Code 0 7 (col 19-20)
Bar. Pressure (in. Hg) 27.86 (col 21-24)
Orifice No. 1 1 5 (col 25-27)
*See back of car

Resistance Plate Number	col	Temperature (°F)	col	High Volume Sampler Flow Rate	col	Inches Water	col
1 8	28-29	6 0 . 5	30-32	6 6 . 0 6	33-36	1 3 . 1	37-39
1 3	40-41	6 0 . 5		6 3 . 0 3	42-45	1 3 . 5	46-48
1 0	49-50	6 0 . 5		5 4 . 6 4	51-54	0 8 . 1	55-57
0 7	58-59	6 0 . 5		4 6 . 2 8	60-63	0 5 . 6	64-66
0 2	67-68	6 5 . 5	69-71	3 9 . 1 1	72-75	0 3 . 1	76-78

EPA(DUR)310 Rev. 6/79

ENTER "1" FOR ACTUAL FLOW OR "2" FOR STANDARD FLOW 2 (col 79)

HI VOL FLOW RATE
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0101

0 (col 1-3) 0 5 8 0 (col 4-7) 7 7 0 0 0 1 71. (col 8-13)

770001

770001

25 Site No. (col 14-16)
*Method Code 3 4 (col 17-18)
*Units Code 0 7 (col 19-20)
Bar. Pressure (in. Hg) 27.2 (col 21-24)
Orifice No. 1 1 5 (col 25-27)
*See back of card

CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 25459-PABX 210-1160
SAO PAULO, BRAZIL

Resistance Plate Number	col	Temperature (°F)	col	High Volume Sampler Flow Rate	col	Inches Water	col
1 8	28-29	6 9 . 5	30-32	4 0 . 0	33-36	1 5 . 3	37-39
1 3	40-41	6 9 . 5		6 2 . 3	42-45	1 0 . 2	46-48
1 0	49-50	6 9 . 5		5 5 . 5 8	51-54	. . .	55-57
0 7	58-59	6 9 . 5		. . . 0	60-63	. . .	64-66
0 5	67-68	6 9 . 5	69-71	. . .	72-75	6 .	76-78

EPA(DUR)310 Rev. 6/79

ENTER "1" FOR ACTUAL FLOW OR "2" FOR STANDARD FLOW 2 (col 79)

HI VOL FLOW RATE
INTER-LABORATORY TEST

FORM APPROVED
OMB NO. 158-R0101

50 (col 1-3) 0 5 8 0 (col 4-7) 7 7 0 0 0 1 (col 8-13)

770001

770001

21 Site No. (col 14-16)
*Method Code 3 4 (col 17-18)
*Units Code 0 7 (col 19-20)
Bar. Pressure (in. Hg) 27.86 (col 21-24)
Orifice No. 1 1 5 (col 25-27)
*See back of car

CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 25459-PABX 210-1160
SAO PAULO, BRAZIL

sistance Plate Number	col	Temperature (°F)	col	High Volume Sampler Flow Rate	col	Inches Water	col
1 8	28-29	7 6 . 0	30-32	4 1 . 1 2	33-36	1 . .	37-39
1 3	40-41	7 6 . 0		5 0 . 6 8	42-45	1 . .	46-48
1 0	49-50	7 6 . 0		5 2 . 9 2	51-54	. . .	55-57
0 7	58-59	7 6 . 0		4 3 . 9 2	60-63	. . .	64-66
0 5	67-68	7 6 . 0	69-71	. . .	72-75	see back card	76-78

EPA(DUR)310 Rev. 6/79

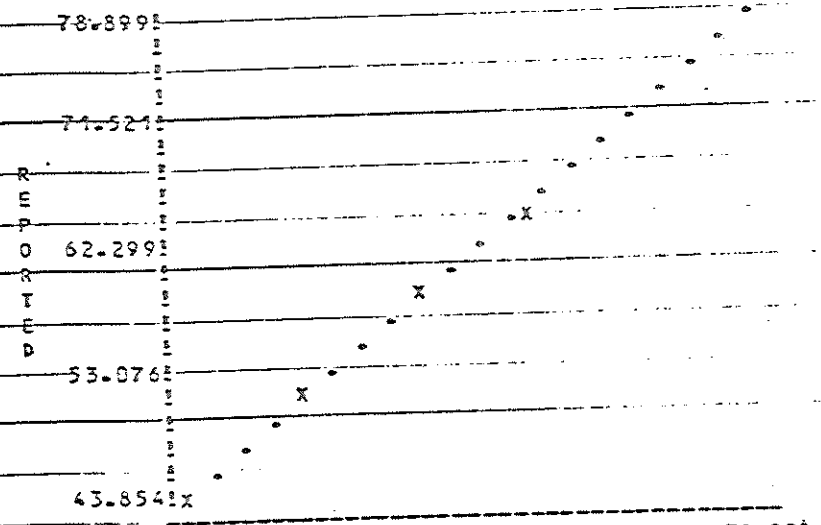
ENTER "1" FOR ACTUAL FLOW OR "2" FOR STANDARD FLOW 2 (col 79)

HI-VOL TEST

LAB CODE- 78R001
SITE NO.- 786
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 25459-PABX 210-1100
SAO PAULO, BRAZIL

UNITS - CFM
ORIFICE NO.- 115
METHOD- PRESS. TRANSDUCER
BAR. PRESSURE(IN. HG)- 27.86

RESISTANCE PLATE NO.	TEMPERATURE (DEG. F)	ACTUAL FIELD FLOW RATE	ACTUAL CALCULATED FLOW RATE	PERCENT DIFFERENCE
18	76.0	64.18	65.33	-1.76 40-50%
13	76.0	59.68	59.37	.53 - 50-60%
10	76.0	52.92	51.81	2.15 80%
7	76.0	43.92	42.93	2.30 - 80%



EPA RESULTS

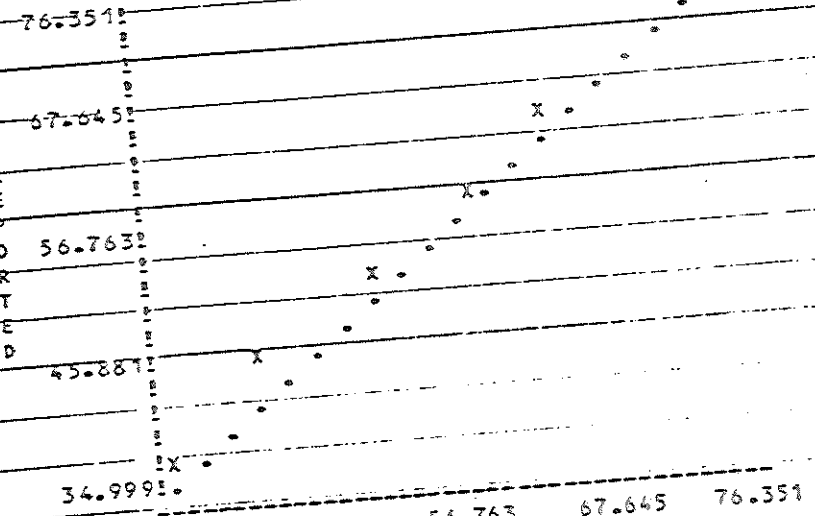
Y = .908X +5.352

HI-VOL TES.

LAB CODE- 78R001
SITE NO.- 729
CLAUDIO DARLIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 25459-PABX 210-1100
SAO PAULO, BRAZIL

UNITS - CFM
ORIFICE NO.- 115
METHOD- PRESS. TRANSDUCER
BAR. PRESSURE(IN. HG)- 27.86

RESISTANCE PLATE NO.	TEMPERATURE (DEG. F)	ACTUAL FIELD FLOW RATE	ACTUAL CALCULATED FLOW RATE	PERCENT DIFFERENCE
18	69.5	65.62	63.69	3.03 - 70-80%
13	69.5	60.42	57.91	4.33 80-90%
10	69.5	53.48	50.55	5.79 80-90%
7	69.5	45.97	41.91	9.67 >90%
5	69.5	38.45	33.91	13.39 >90%



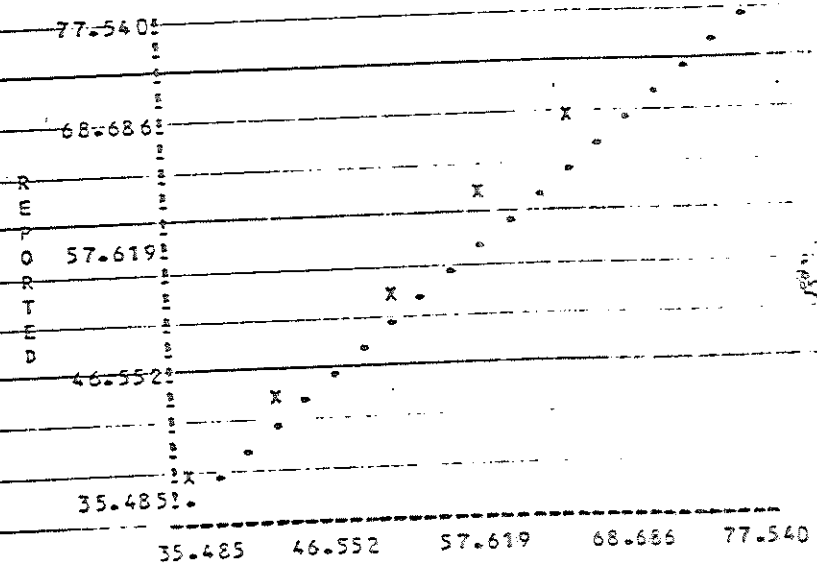
Y = .910X +7.646

HI-VOL TEST

LAB CODE- 78R001
SITE NO.- 721
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 25459-PABX 210-1100
SAO PAULO, BRAZIL

UNITS - CFM
ORIFICE NO.- 115
METHOD - PRESS. TRANSDUCER
BAR. PRESSURE(IN. HG)- 27.86

RESISTANCE PLATE NO.	TEMPERATURE (DEG. F)	ACTUAL FIELD FLOW RATE	ACTUAL CALCULATED FLOW RATE	PERCENT DIFFERENCE
18	69.5	68.98	64.69	6.64 >90%
13	69.5	63.01	58.74	7.28 >90%
10	69.5	54.64	50.87	7.42 > 90%
7	69.5	46.28	42.29	9.42 >90%
5	69.5	39.11	34.38	13.76 > 90%



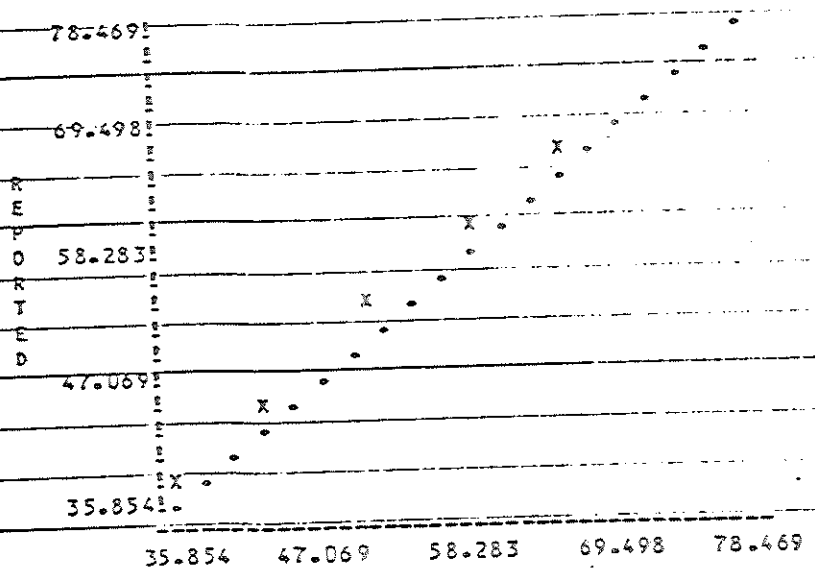
EPA RESULTS

Y = .991X +4.635

LAB CODE- 78R001
SITE NO.- 717
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 25459-PABX 210-1100
SAO PAULO, BRAZIL

UNITS - CFM
ORIFICE NO.- 115
METHOD - PRESS. TRANSDUCER
BAR. PRESSURE(IN. HG)- 27.82

RESISTANCE PLATE NO.	TEMPERATURE (DEG. F)	ACTUAL FIELD FLOW RATE	ACTUAL CALCULATED FLOW RATE	PERCENT DIFFERENCE
18	65.5	67.48	65.47	3.08 70-80%
13	65.5	61.51	59.09	4.09 80-90%
10	65.5	54.77	51.33	6.70 >90%
7	65.5	46.89	42.91	9.27 >90%
5	65.5	40.14	34.73	15.57 >90%



EPA RESULTS

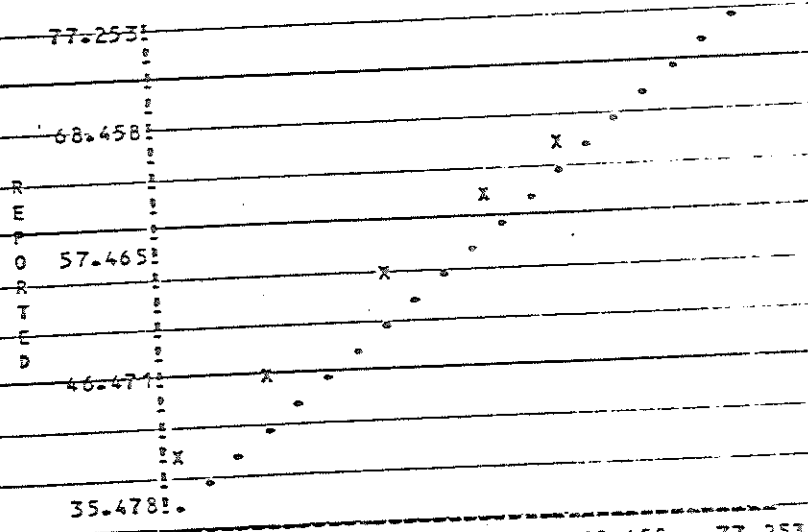
Y = .892X +8.926

HI-VOL TEST

LAB CODE- 7BR001
SITE NO.- 249
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 25459-PABX 210-1100
SAO PAULO, BRAZIL

UNITS - CFM
ORIFICE NO.- 715
METHOD- PRESS. TRANSDUCER
BAR. PRESSURE(IN. HG)- 27.86

RESISTANCE PLATE NO.	TEMPERATURE (DEG. F)	ACTUAL FIELD FLOW RATE	ACTUAL CALCULATED FLOW RATE	PERCENT DIFFERENCE	
18	69.5	66.56	64.44	3.29	70-80%
13	69.5	62.07	58.74	5.68	80-90%
10	69.5	55.58	51.18	8.60	>90%
7	69.5	47.60	42.29	12.54	>90%
5	69.5	40.11	34.38	16.67	>90%



Y = .881X +10.123

Dear Participant:

Thank you for your participation and cooperation in the recently completed hi-vol study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the results reported by your agency. The report also lists the EPA calculated flow rate as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, 50% of the results for any one of the five resistance plates had a percent difference of -.45 or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

Frequency Distribution

		Percentile								
No.	Min.	10	20	30	40	50	60	70	80	90	Max.
16929	-23.66	-9.97	-5.82	-3.46	-1.81	-.45	.80	2.13	3.77	6.56	21.58

If there are any questions or comments about these results, please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

Hivol 0580

CETESB - CIA. DE TECNOLOGIA DE SANEAMENTO AMBIENTAL
BIBLIOTECA

DIÓXIDO DE NITROGÊNIO - NO_2

May 1979

Instructions for Inter-Lab Analysis

1. Check to make sure all samples arrived in good condition. If any samples were damaged in shipment, note on proper line under COMMENTS on Data Card.

2. Record date samples were received in your laboratory on the Data Card.

3. Record on Data Card the name of your laboratory. (NOTE: Number in [ ] at top right-hand corner of Data Card is the number that has been assigned to your laboratory for the purpose of this study. In all subsequent reports laboratories will be identified by Lab Number only.)

4. Insert unit code in proper blanks. Use Code 04 - µg/ml.

5. Insert method code in proper blanks.

6. Instructions for mixing NO_2 static reference samples.

   (a) Remove labels by soaking ampoules in cold water for a few minutes; dry ampoules before proceeding. This step is necessary to avoid sample contamination during the transfer procedure (6.b) below.

   (b) Transfer the entire contents from the first sample ampoule to a 50-ml volumetric flask using absorbing reagent to bring the volume to 50-ml. Mix thoroughly.

   (c) The solution thus prepared simulates a collected air sample. Analyze the mixture for NO_2 by the method routinely employed. Report your results in µg/ml of NO_2 in the simulated collected air sample.

   (d) Repeat (b) and (c) for the remaining samples.

7. Process unknown samples during routine analysis of NO_2 on a regular analysis day. Use your normal procedure for NO_2 analysis. Give brief description of method in space provided on back of Data Card. Please return copy of calibration curve and analytical procedure with Data Card. Results should be returned by July 16, 1979.

8. Record date samples analyzed on Data Card.

9. Record analytical results on Data Card in proper row and column.

10. Return completed Data Card and calibration curve to this office using enclosed envelope.

11. Thank you very much for your cooperation. A tabulation of all data will be sent to you as soon as all results have been received.

J U L H O - 1979

NO2
INTER-LABORATORY TEST
0 6 7 9 (col 4-7)

FORM APPROVED
OMB NO. 158-R0068

7 7 0 0 0 1 79. (col 8 - 13)

(1-3)

770001

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO PEPMANN JR.
345-CEP 2545 9-PABX 210-1100
SAO PAULO, BRAZIL

*Method Code 0 5 (col 17 - 18)

*Units Code 0 4 (col 19 - 20)

*See back of card

Sample Number	col	Results	col	Comments
3 3 4	21 - 24	0 2 6 9	25 - 30	
3 9 4	31 - 34	0 4 0 9	35 - 40	
2 7 9	41 - 44	0 5 2 2	45 - 50	
2 8 5	51 - 54	0 7 2 2	55 - 60	
2 5 3	61 - 64	0 9 6 1	65 - 70	

Date Samples Received 0 6 2 7 7 0
Mo Day Yr

Date Samples Analyzed 0 7 0 2 7 9
Mo Day Yr

Method Codes

Griess - manual

Saltzman - automated (please specify)

Sodium arsenite - manual

Sodium arsenite - automated (please specify)

GS - ANSA - manual

TGS - ANSA - automated (please specify)

Other (please specify)

Unit Codes

04 Micrograms per milliliter (μg/ml)

Description
ansfer the Sample to a 50 ml volumetric flask using absorbing reagente complete the vo-
me. Mix - 2. Add 1 ml H_2O_2 solution. Mix - 3. Add 10 ml sulfanilamide solution . - 4. Add
d) NEDA solution. Mix - 5. Measure the absorbance at 540 nm against blank after a 10
n color development interval. - 6. Calculation - See calibration curve

INTER-LABORATORY STUDY RESULTS

JUNE 1979

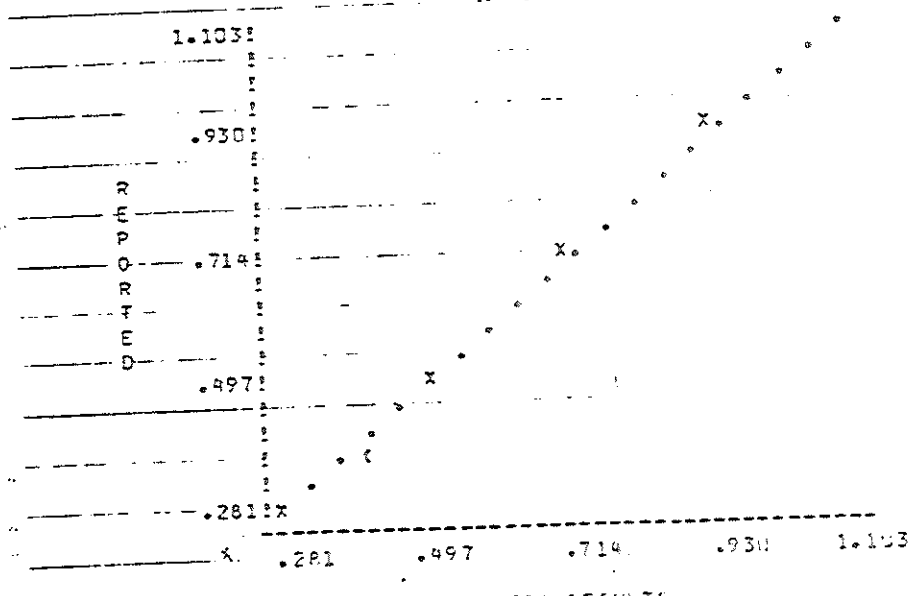
POLLUTANT - NO2

DATE PRINTED: 07/17/79

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 05459-PABX 210-1100
SAO PAULO, BRAZIL

UNITS - MICROGRAMS PER MILLILITER

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1334	.269	.259	3.86
2394	.409	.405	.99
3279	.522	.514	1.56
4285	.722	.700	3.14
5253	.961	.935	2.78



EPA RESULTS

Y = 1.031X -0.004

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING AND SUPPORT LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed NO_2 study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "True Values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA True value equal to .51, 50% of the results had an absolute percent difference of 4.23% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

NO_2 Frequency Distribution

EPA Value µg/ml	No.	Min.	Percentile 10	20	30	40	50	60	70	80	90	Max.
.26	767	.00	.96	2.06	3.07	3.89	4.87	6.06	7.20	9.24	12.88	20.90
.40	767	.00	.96	2.06	3.07	3.89	4.87	6.06	7.20	9.24	12.88	20.90
.51	255	.00	.99	1.59	2.71	3.37	4.23	5.04	6.01	7.75	11.51	17.26
.70	239	.00	.44	1.10	1.59	2.32	2.89	3.57	4.21	5.23	7.14	11.00
.94	165	.11	.75	1.15	1.61	2.30	2.79	3.45	4.18	5.75	8.62	12.64

If there are any questions or comments about these results please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Branch
Environmental Monitoring and
Support Laboratory

NO_2 0679

D E Z E M B R O - 1979

INTER-LABORATORY STUDY RESULTS - DATE PRINTED: 12/31/79

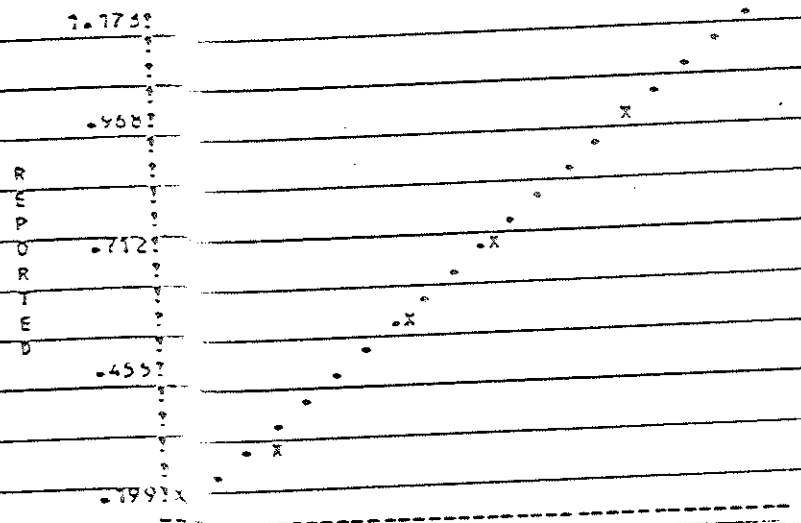
(DECEMBER 1979)

POLLUTANT - NO2

77C001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345 (ZIP 05459)-FABX 210-1100
SAO PAULO, BRAZIL

UNITS - MICROGRAMS PER MILLILITER

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1581	.173	.175	-1.14
2598	.343	.345	-.58
3682	.605	.600	.83
4655	.754	.755	-.13
5576	1.010	1.000	1.00



Y = 1.012X -0.005

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Research Triangle Park, North Carolina 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed NO_2 study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "True Values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA True value equal to .60, 50% of the results had an absolute percent difference of 3.57% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

NO_2 Frequency Distribution

EPA Value µg/ml	No.	Min.	Percentile 10	20	30	40	50	60	70	80	90	Max.
.17	161	.00	.55	1.66	2.76	3.66	4.46	6.05	7.73	11.05	16.24	22.65
.34	565	.00	.96	1.96	3.19	3.87	4.80	5.79	7.01	8.27	11.74	18.97
.60	407	.00	.78	1.23	2.02	2.78	3.57	4.23	5.36	6.85	10.12	16.73
.75	229	.00	.44	1.14	1.43	2.03	2.86	3.48	4.14	5.00	6.97	11.00
1.00	242	.00	.69	1.26	1.72	2.30	2.79	3.53	4.37	5.88	8.45	12.64

If there are any questions or comments about these results please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

NO_2 1279

J U N H O - 1980

NO_2
INTER-LABORATORY TEST

FORM APPROV
OMB NO. 158-R6

(col 1-3) C 6 8 (col 4-7) 7 7 0 0 C 1 84 (col 8-

770001

770001
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP.25459-PABX 210-1100
SAO PAULO, BRAZIL

*Method Code 0 5 (col 17 - 1
*Units Code 0 4 (col 19 - 2
*See back of

Sample Number	col	Results	col	Comments
1 4 8 0	21 - 24	0 3 5 5	25 - 30	
2 0 8	31 - 34	0 4 5 3	35 - 40	
3 4 0 3	41 - 44	0 7 0 6	45 - 50	
0 2 8	51 - 54	0 9 5 4	55 - 60	
3 2 1	61 - 64	1 1 4 8	65 - 70	

Date Samples Received 0 6 1 8 8 0 (Mo Day Yr)

Date Samples Analyzed 0 7 0 4 8 0 (Mo Day Yr)

Method Codes

03 Saltzman - manual

04 Saltzman - automated (please specify) _____

05 Sodium arsenite - manual

06 Sodium arsenite - automated (please specify) _____

07 TGS - ANSA - manual

08 TGS - ANSA - automated (please specify) _____

09 Other (please specify) _____

Unit Codes

04 Micrograms per milliliter ($\mu g/ml$)

Method Description 1-Transfer 5 ml from the samples ampoules to 50-ml volumetric flasks using absorbing reagent to bring the volume to 50-ml. Mix thoroughly. 2-Using class A pipette, transfer 10 ml from the samples volumetric flasks to 25-ml volumetric flasks. 3-Add 1 ml H_2O_2 solution. Mix. 4-Add 10 ml Sulfanilamide solution. Mix. 5-Add 1,4 ml NEDA solution. Mix. 6-Measure the absorbance at 540 nm against blank after a 10 minutes color development interval. 7-Calculation - See calibration curve.

INTER-LABORATORY STUDY RESULTS DATE PRINTED: 07/22/80

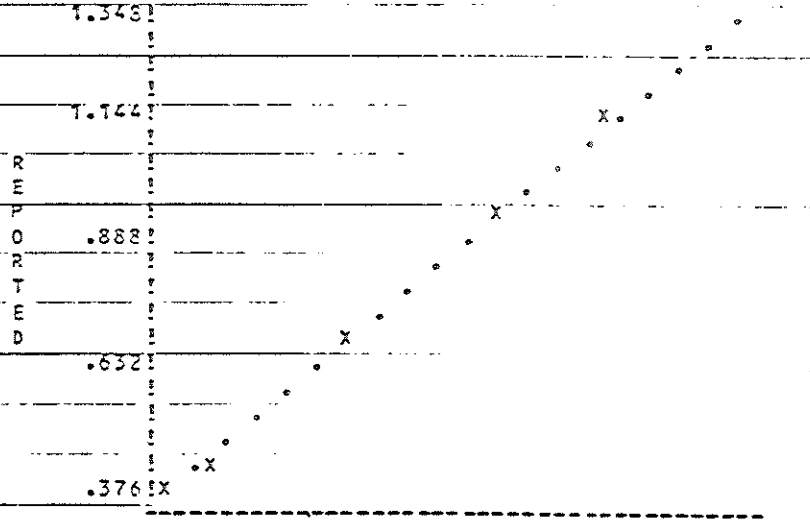
(JUNE 1980)

POLLUTANT - NO2

7BR101
CLAUDIO DARWIN ALONSO
COMPANHIA DE TECNOLOGIA DE
SANEAMENTO AMBIENTAL
AV. PROF. FREDERICO HERMANN JR.
345-CEP 25459-PABX 210-1100
SAO PAULO, BRAZIL

UNITS - MICROGRAMS PER MILLILITER

SAMPLE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
1480	.355	.350	1.43
2208	.453	.449	.89
3403	.706	.691	2.17
4028	.954	.941	1.38
5321	1.148	1.140	.70



Y = 1.007x +0.004

JUN/80

ENVIRONMENTAL PROTECTION AGENCY
Research Triangle Park, North Carolina 27711

Dear Participant:

Thank you for your participation and cooperation in the recently completed NO_2 study. Enclosed are your results for that survey. A report summarizing the entire EPA audit program will be issued at the end of the calendar year. Results from this audit will be included in that publication.

The enclosed report lists the analytical results reported by your agency. The report also lists the EPA "True Values" as well as the percent difference between your organization and EPA.

To assist you in judging your performance relative to others doing similar work, the following distribution based on past surveys has been constructed. For instance, for the EPA True value equal to .691, 50% of the results had an absolute percent difference of 2.86% or less. By using this information as well as data on the enclosed report, you should be able to determine not only your analytical accuracy, but also your performance relative to others.

NO_2 Frequency Distribution

EPA Value ug/ml	No.	Min.	Percentile 10	20	30	40	50	60	70	80	90	Max.
.350	559	.00	.78	1.74	2.98	3.73	4.64	5.68	6.95	8.11	11.23	18.18
.449	308	.00	.49	1.00	1.48	2.14	2.92	3.70	4.47	5.83	7.75	12.79
.691	309	.00	.43	1.06	1.45	2.14	2.86	3.48	4.21	5.17	7.14	12.32
.941	223	.00	.43	.86	1.60	2.00	2.68	3.11	3.96	4.60	6.42	10.51
1.14	223	.00	.43	.86	1.60	2.00	2.68	3.11	3.96	4.60	6.42	10.51

If there are any questions or comments about these results, please contact me.

Sincerely yours,

Robert L. Lampe
Quality Assurance Division
Environmental Monitoring
Systems Laboratory

NO_2 0680

4. Comentários:

Após o recebimento da resposta enviada pela EPA (valor EPA, porcentagem de diferença e distribuição percentílica o laboratório participante faz uma análise dos resultados em função do método utilizado. Se a performance para aquele estudo específico for considerada boa, então para a próxima auditoria daquele poluente (semestre seguinte), idêntico procedimento analítico deverá ser obedecido. Entretanto se a performance for considerada média ou má, é feito um estudo tentando-se descobrir quais os possíveis fatores que interferiram para gerar tais resultados ou então, que problemas de ordem técnica ocorreram para tanto.

Como exemplos consideremos:

a. Os dados da auditoria de outubro de 1979, referente ao chumbo. Nossos resultados se localizaram acima do percentil 60%. Conforme distribuição percentílica recebida (pag. 7)

A técnica utilizada para gerar estes resultados, foi a de Voltametria de Redissolução Anódica (VRA) (1). Paralelamente foi feita a análise utilizando a técnica de absorção atômica. Fez-se uma comparação das porcentagens de diferença entre as duas técnicas utilizadas, através dos resultados enviados pela EPA e constatou-se que a técnica de absorção atômica forneceu em geral resultados mais próximos aos da EPA.

Na auditoria seguinte para chumbo (janeiro de 1980), novamente foram feitas as análises através das duas técnicas acima citadas, sendo que foram enviados a EPA, dados gerados por absorção atômica. Pela resposta da EPA, pudemos comprovar que os dados relativos à absorção atômica foram mais precisos que os de VRA.

Na terceira auditoria (setembro de 1980) pudemos melhorar ainda mais nossa performance, através de uma alteração no condicionamento dos frascos de polietileno que continham as amostras extraidas a serem analisadas.

b. Na primeira auditoria de SO_2 (dezembro de 1979) as concentrações foram obtidas sem consideração da constante b da retada curva de calibração ($y = ax + b$), de acordo com Scaringelli (2).

Através dos resultados enviados pela EPA pudemos observar que, se as concentrações fossem calculadas levando-se em consideração a constante b, os resultados seriam mais próximos dos valores da EPA.

Na segunda auditoria de SO_2 (maio de 1980), os resultados remetidos a EPA foram calculados com a constante b, e pelos resultados da auditoria constatou-se uma performance melhor do laboratório em relação aos outros participantes, se comparado com a auditoria anterior (novembro de 1979) (pag.53). A partir de então, a constante b da reta passou a ser incluida nos cálculos.

c. Através da auditoria de Monóxido de Carbono (CO) foi possível verificar as concentrações nominais dos cilindros contendo o gás padrão que são utilizados para a calibração dos monitores, tanto da Estação Correio, quanto das Estações que compõem a Rede Telemétrica. A tabela abaixo mostra o resultado desta verificação efetuada em novembro de 1980.

Estação	Nº do Cilindro	Concentração anterior (ppm)	Concentração atual (corrigida) (ppm)
Correio	28	36,0	36,7
Móoca	CO - 13	68	65,0
Pque. D.Pedro II	CO - 04	65	65,0
Cerq. César	CO - 10	58	56,0
Congonhas	CO - 02	66	63,0
Cubatão	CO - 08	67	67,0
Juquitiba	CO - 01	67	68,0
Caçapava (LV 01)	18 - 584	21	20,7
Monitor reserva	CO - 12	61	60,0

d. Em relação a análise de Nitrato, as análises não foram realizadas pelo fato de não ter sido ainda desenvolvido o método neste laboratório.

CETESB

5. Bibliografia

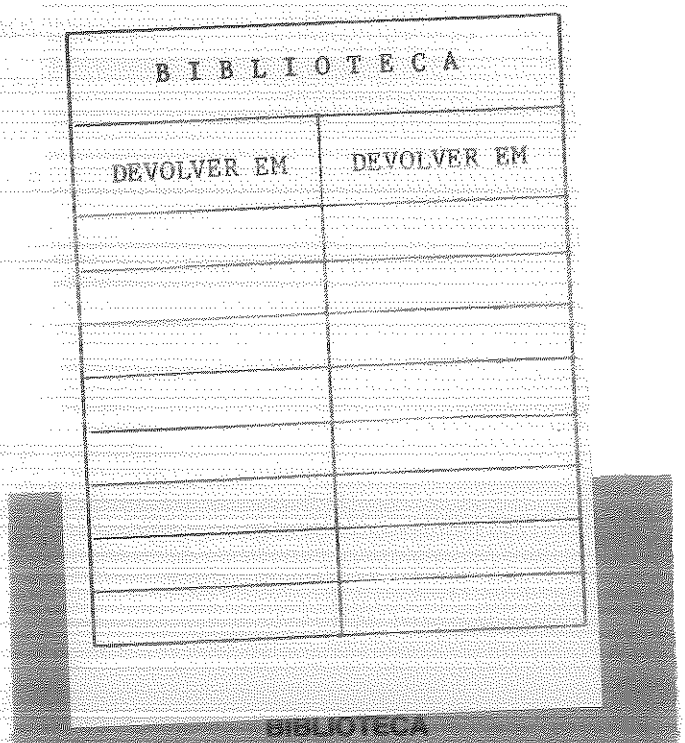
1. PG. 06/78 - "Análise de Chumbo em Material Particulado em Suspensão" - Desenvolver novos métodos de amostragem e análise de poluentes atmosféricos utilizando inclusive cromatografia de gases. - DAV/GQAR - STAR/DTSA - 1979

2. Scaringelli, F.P., Saltzman, B.E. and Frey, S.A., "Spectrofhotometric Determination of Atmospheric Sulfur Dioxide" - Anal. Chem. 39, 1709 - 1967.

Jesuíno Romano

Quím. Micheas Bueno Godoy
Chefe da Div. de Amostragem e Análise do Ar

Data Aquis.:
Autor: DAMAR - CLAUDIO ALONSO
Livraria: Xerox . 1,00
Preço: Cr$ 54,00
Data Tomba:



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