

WHO PROJECT-BRZ-2103
28 FEV 1974
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Project No BRZ - 2103, "Development of
Research and Environmental Pollution
Control Programs for the State of
Sao Paulo"

Report on "Assistance to the Superintendent Environmental
Sanitation (SUSAM) in presenting a short course and
providing on the job consultant assistance to personnel
in the Directorate for Air Pollution Control (D-PAR)

14 October - 1 November in Pittsburgh Pa., U.S.A.
2 November - 24 November in Sao Paulo

CETESSB - CIA. DE TECNOLOGIA DE SANEAMENTO AMBIENTAL
BIBLIOTECA
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OBJECTIVES OF THE ADVISORY SERVICE

1. To provide short-course on effects of air pollution. This objective is directed toward a better understanding of the possible effects of air pollution on vegetation, animals and humans. Also how the effects of air pollutants can be measured and how criteria and standards for air pollution exposures are prepared.
2. To provide on the job consultant assistance. This was primarily to review data collected during the past several years and to attempt to analyze the data in a systematic way for a clear presentation and for correlation with various parameters being measured simultaneously. Also to review the methodology for air pollutants analysis.

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

1. A large quantity of valid data has been accumulated on air pollutants in various sections of Sao Paulo. There is a need to analyze the data and to present it as an assessment of the situation in Sao Paulo. I have recommended that a formal paper be prepared for publication in a scientific journal such as the Journal of Air Pollution Control, Association in the U.S.A.
2. The personnel at SUSAM is well qualified, young and enthusiastic about their job. They ask a lot of questions and are concerned about using proper methodology. There is perhaps a lack of confidence in themselves, but this will come.
3. There is a very good awareness on what is going on in air pollution analysis techniques. The selection of methods and instrumentation is excellent. Plans are being made to change the measurement of suspended particulates from the reflectance method to the high volume sampler. This is excellent.
4. I have recommended that they adapt the ambient U.S. standards for pollutants as a goal to be achieved in the future but not to be taken seriously for the present and not to be enforced at present until a good assessment of the air pollution situation is completed. They should concentrate on emission standards rather than ambient air standards. Also there are obvious sources of pollution which if emission controls are applied to them will greatly improve the situation.
5. There is an obvious automobile pollution situation here. There has

been an assessment of this situation yet (however plans are underway to do so) and this should receive a high priority.

6. The study initiated to evaluate the possible health effects of air pollution has been initiated. It will provide a baseline for an assessment of the situation.

7. There is at present no data on the contribution of automobile exhaust to the general pollution. This is being initiated and should receive a high priority.

INTRODUCTION

In order to familiarize the personnel at SUSAM on the possible effects of air pollutants, a short course (30 hours) was prepared. Also a review was made; the data collected was used on various pollutants in order to assess as best as possible the situation in Sao Paulo.

Several discussion meetings were held to select the best possible way to improve the air pollution control program now in existence and what kinds of standards (emission, ambient, etc.) would be most suitable and effective. This was also discussed during the course. Emphasis was placed on health effects and the type of data needed to establish adequate basis for ambient air quality standards.

Description and Analysis of the Findings

Most of the data collected so far are sulfation rate, sulfur dioxide and total suspended particulates. Also meteorological data is available for correlation. Selection of sampling sites on the basis of obvious pollutants sources is adequate but could be expanded. Primarily, however, there is more need to expand the number of pollutants (i.e. CO, NO₂, etc) analysis than expanding the number of stations (if only SO₂ and particulates would be measured). This is a difficult choice to make but I favor expanding the number of pollutants analysis in some critical locations.

The data obtained so far should be analyzed in a more complete manner (only monthly and yearly average available) so that a better idea of what the situation is in various parts of Sao Paulo will be obtained. We have discussed various ways of doing this and a preliminary report was

completed for a three month duration comparing levels of pollutants in three different areas. This should be expanded.

The problem of applying U.S. ambient air quality standards to Sao Paulo is a difficult one. I understand that by having "numbers" this would greatly facilitate the task for SUSAM. On the other hand, we must ask if those standards are valid and secondly, if they are applicable (relevant) to Sao Paulo. The basis of the U.S. standards for CO and NO₂ is highly questionable. For oxidants it is only from a cross correlation with sensory irritants formed. For SO₂ and total suspended particulates the number given can certainly be modified by 50% without consequences.

Presently SUSAM has acquired an infrared carbon monoxide analyzer and an analyzer for NO_x based on the chemiluminescent principle. There is, however, difficulty to obtain calibration gases here in Sao Paulo and this is delaying the project. Continuous sulfur dioxide monitors of two types are being evaluated and will provide better monitoring capabilities to detect high peak levels. Comparison of the H₂O₂ method with the pararosaniline method indicates a good correlation for some location (P. Republica and Moema) but is more difficult for high levels and more variations in quantity and quality of pollutants in a location like San Caetano.

The paraosaniline method is favored. A change is contemplated for total suspended particulates from the reflectance method to the high volume method, this is excellent. Also the proportion of total suspended particulates which is in the "respirable size" will be evaluated for various sites. This will provide a very important parameter in comparing or projecting possible health effects due to particulates.

The staff at SUSAM is very competent and very concerned about the methodology used for assessment of air pollution. They understand fully the limitations of the methodologies and their future plans are well prepared.

The short-course prepared (280 pages manual) consisted of several sections covering basic principles as well as basic discussion of the effects of "air pollution" and important individual pollutants. The manual contained several recent articles published in the field of air pollution. Each article was discussed and illustrated the basic principles in air pollution research thus reinforcing the first portion of the course. The final portion was on the preparation of criteria and standards as has been done in the U.S.A. during the past 10 years. By having short exams on the material presented everyday I was able to get an evaluation of their understanding of the material presented. The students did extremely well on these and questions and discussion revealed an excellent comprehension. Each student received a complete copy of the manual. Also, one copy of the manual was prepared in the U.S. on transparencies for use with the overhead projector available here. This material was left with Engo Mesquita for his use in future course at SUSAM or as needed.

ANNEX I: Daily Activities and Meetings

- Sunday Nov. 3, 1974: Arrive in Sao Paulo. Meeting with Engo Gilberto de Oliveira and Armando Mesquita at the airport. Taken to Grand Hotel Ca d'Oro and brief discussion of the project.
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- Monday Nov. 4, 1974: Meeting with Engo Mesquita and Oliveira. Discussion of project, schedules, determination of content of short course, Material for short-course (2 xerox copies and one copy on transparencies for overhead projector use) presented to Engo Mesquita. Start to assemble this material in proper order.
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- Tuesday Nov. 5, 1974: Meeting with Engo William Finley and Carlos Celso do Amaral E. Silva, Discussion on project 2103 objectives. Visit to new Air Pollution laboratories under construction with Engo Oliveira. Visit with Dr. Diogo Pupo Nogueira at School of Public Health University of Sao Paulo who is conducting a study on the possible health effects of air pollution in children.
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- Wednesday Nov. 6, 1974: Discussion with Engo Nelson Mefussi and A. Mesquita on basis for air quality standards. Discussion with Engo Mesquita and his group about techniques for analysis of data collected on air pollution in Sao Paulo State.
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- Thursday Nov. 7, 1974: All day discussion and working with Engo Mesquita and his group of data analysis.
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- Friday Nov. 8, 1974: Completing final arrangements of short-course manual.
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- Monday Nov. 11, 1974: Working final details of data analysis with Engo Mesquita and his group for a preliminary report.
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- Wednesday Nov. 13, 1974: Short-course manual is ready for duplication (20 copies) for the students.
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Thursday Nov. 14, 1974: Worked with data on air pollution for three areas of Sao Paulo. Final analysis completed. Graphs and tables being prepared for a short report on levels of SO₂ and Suspended Particulates and the correlation with wind velocity.

Friday Nov. 15, 1974: Holiday (Election Day). Worked at the Hotel on presentation of short-course, preparation of short exam questions and questions for general discussion.

Monday Nov. 18, 1974: First day of short-course. By speaking very slowly in English there is no need (or very little need) for translation and this helps in the presentation of material. In fact, more material was covered than anticipated.

Tuesday Nov. 19, 1974: Second day of short-course. Correction of exam on material given yesterday reveals good comprehension of the material. Discussion also reveals same.

Wednesday Nov. 20, 1974: Third day of short-course. Covering material a little faster. Correction of exam on previous material reveals good comprehension.

Thursday Nov. 21, 1974: Fourth day of short-course. Covering more material than anticipated. Meeting with Mr. Finley after lectures.

Friday Nov. 22, 1974: Last day of course. Major portion on discussion of establishing criteria and standards for air pollutants.

Saturday Nov. 23, 1974: Informal meeting and discussion at dinner with Eng. Nefussi and personnel from SUSAM.

Sunday Nov. 24, 1974: End of assignment

ANNEX II: Short Course - Programa

18/11	09 - 11	Anatomia e Fisiologia do Trato Respiratorio
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18/11	11 - 12	Conceito de dose em Poluicao do Ar
	14 - 17	1. Absorcao de Gases a) Gases Inertes: nao-metabolizaveis: CO, Metano b) Gases Reativos: SO ₂ , O ₃
		2. Absorcao de Aerossois a) Parametros Fisicos b) Retencao Pulmonar c) Limpeza Pulmonar

19/11	09 - 12	Efeitos sobre a Vegetacao
	14 - 17	Efeitos sobre animais Efeitos sobre o homem

20/11	09 - 12	Metodos para Medida dos Efeitos de Poluentes A. Epidimiologicos B. Toxicologicos C. Avaliacao Clinica
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21/11	14 - 17	Metodos para Medida dos Efeitos de Poluentes D. Conceito de Dose-Resposta E. Determinacoes Biologicas
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21/11	14 - 17	Poluentes Especificos: SO ₂ , CO, NO ₂ , O ₃ , Gases de Escapamento, e Chumbo
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22/11	09 - 12	Poluentes especificos: irritantes (olho, nariz, garganta), sulfatos, e efeitos sinergeticos
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22/11	12 - 17	Estabelecimento de "Standard Limits" para exposicao A. Documentacao B. Avaliacao C. Discussao D. Amostragem E. Beneficio F. Algumas diretrizes para exposicoes de Emergencia G. "Boas Intencoes nao sao Suficientes"
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ANNEX III: Students Attending

Anisio Ribeiro de Lima

Julio M. Hatsumura

Vladimir Vieira de Oliveira

Jorge Iwamizu

Ione Aquemi Guibu

Herval Pina Ribeiro

Luiz Alberto B. Girao

Roberto Godinho

Jaime de Agostinho

Satoshi Kutamura

Joao Cesario V. da Silva

Armando Luiz S. Mesquita

