

MILNERTON (CAPE TOWN) AND SURROUNDING AREAS AIR QUALITY PROJECT : REPORT FOR 1 OCTOBER 1994 - 30 SEPTEMBER 1995

P TERBLANCE AND R NEL
CSIR Environmental Services

INTRODUCTION

Following wide complaints from the communities in Milnerton and surrounding areas (Milnerton, Table View, Bothasig, Montague Gardens, Goodwood, Elsies River, Edgemoed, Richwood, Melkbos, Durbanville and Blouberg) about air pollution, a one year research project was launched in consultation with the community. A multi-faceted study focused on exposure assessment followed by health risk assessment as a basis for decision making was undertaken. The project was managed by a Steering Committee and conducted by the CSIR in partnership with the Cape Town City Council's Air Quality Monitoring Unit.

This report conveys the results of the continuous gaseous and particulate monitoring for the period November 1994 until October 1995, passive volatile organic compound monitoring at 49 sites during October 1995, pollen and fungal monitoring from November 1994 until October 1995 as well as the public complaint profile (October 1994 - September 1995). The results of the different study components are given separately.

CONTINUOUS AMBIENT MONITORING NETWORK:

A continuous ambient monitoring network consisting of three fixed stations was set up. This consisted of two stations at new sites, Table View and Bothasig, and an existing station owned by the Cape Metropolitan Council in Goodwood.

• Bothasig:

This station measured Sulphur Dioxide (SO₂), Nitrogen Dioxide (NO₂), Nitric Oxide (NO), Oxides of Nitrogen (NO_x) and respirable particulates (PM₁₀) and is located to detect pollution from Kynoch amongst other sources. None of the hourly health guidelines of the South African Department of Environment Affairs and Tourism (DEA&T), Environmental Protection Agency (EPA) or World Health Organisation (WHO) were exceeded at the Bothasig site for the November 1994 - October 1995 period.

• Table View:

This station measured SO₂, NO₂, NO, NO_x, PM₁₀ as well as Hydrogen Sulphide (H₂S). The station is located to record ambient pollution from Caltex and Kynoch for most of the year. The WHO's 10 minutes-exposure guideline for SO₂ was exceeded a number of times at the Table View site: between 08h00 and 10h00 on the 17th of February 1995. The wind was blowing from the south-south east at the time. No further health guidelines were exceeded during the November 1994 -

October 1995 at this site. The odour threshold value for H₂S was exceeded four times during these periods, once between 04h30 and 04h11 on 20 December 1994 and three times early in the morning of 31 January 1995. Wind was blowing from the south during all four occasions.

• Goodwood

This station monitors SO₂, NO₂, NO_x and PM₁₀ concentrations on a continuous basis. It is located to give feedback on ambient pollution concentrations not necessarily with Caltex and Kynoch as sources. The DEA&T's hourly health guidelines values for nitric oxide and oxides of nitrogen was exceeded several times during the April 1995 - October 1995 period. Exceedances of nitric oxides above DEA&T hourly health guidelines value occurred during this period: twice in April, three times in May, on 1, 2, 6, 7, 19, 20 June; on the 4, 6, 10, 14, 22 July; on 11 August and on 5 September 1995.

The DEA&T 24-hour guideline value for NO_x was exceeded once, during the May - October 1995 period, namely on 2 June 1995. Exceedances of oxides of nitrogen above the DEA&T hourly health guideline value for the April - October 1995 period: twice in April, once in May, on 1, 2, 6, 7, 19 and 20 June, on 4, 6, 10, 14 and 22 July, on 28 August and on 5 of September 1995. The NO₂ hourly health guideline was exceeded only once during this period: on 14 July 1995.

VOLATILE ORGANIC COMPOUND MONITORING:

The CSIR conducted, as part of the project proposed to the Milnerton and Surrounding Areas Project Steering Committee, an assessment of ambient volatile organic compound concentrations at Caltex and Kynoch and in the surrounding residential areas. The objective of the study was to qualitatively assess the range of organic components in the areas monitored and to quantitatively determine the concentrations of the most commonly found organic compounds.

- The study concluded that although a number of volatile organic compounds were detected in the atmosphere around Milnerton, Bothasig, Table View, Edgemoed, Richwood, Goodwood, Vissershok and Morningstar, only benzene levels present an unacceptable health risk.

POLLEN AND FUNGAL MEASUREMENTS:

A continuous bio-aerosol monitoring programme was set up as part of the project to determine the concentrations of ambient pollen and fungal spores. The objective of this monitoring is to characterise bio-aerosol exposure as allergic reactions to

certain pollen and/or fungal species which are some of the main causes of upper respiratory tract allergies.

- The daily pollen counts for the pollen types considered to have an allergic potential were generally well below the levels where sensitised individuals could experience allergic reactions (30 grains/m³) or even where all individuals could experience allergic reactions (50 grains/m³). However, isolated episodes of exceedances of "allergenic" pollen types above upper and lower limits did occur during reference period and could have had an effect on the upper respiratory symptom prevalences of the citizens during that specific time.
- The lower limit for fungal beyond which sensitised individual could experience allergic symptoms (>500 spores/m³) were exceeded several times during the November 94 - September 95 period. The high counts were mostly the result of very high levels of Asco- and Basidiospores.

PUBLIC COMPLAINT PROFILE:

A formal public complaint system was introduced as an integral part of the study. The main objectives of the forum was to supply the public with an infrastructure to lodge their complaints/concerns about pollution and to use this data to subjectively identify the nature and extent of air pollution related problems experienced by the public. This input from the public would then be used to identify and address problems.

- Most of the complaints during the October '94 - September '95 period were received from residents living in the Table View area. The odour threshold value for H₂S was exceeded four times at the Table View monitoring station during this period.
- By far, the majority of the complaints were odour-related, followed by complaints of particulate type pollution (dust, smoke, visibility).
- The perception of the public is the responsibility for the ambient air pollution experienced in the residential areas lies mainly with Caltex or a combination of Caltex and Kynoch.
- An odour problem caused by Kilson Lime Works was investigated and taken to the DEA&T. The Chief Officer for air pollution control of the Department has instructed Kilson Lime Works to install appropriate air cleaning equipment before 31 March 1996.

The amine type "cat-urine" smell were solved by Waste-tech who "cleaned-up" their Vissershok site.

CONCLUSIONS:

Based on the exposure assessment data of this study over a period of one year the following conclusions can be made:

- SO₂ levels in isolated incidents present an acute health risk to sensitive individuals living in Table View (also likely in the other receptor areas of Caltex dependent on wind factors). However, these incidents occurred far less than 1% of the year and will only affect 10 - 20% of the population for short periods of time.

- The odour threshold of H₂S has been exceeded a number of times at Table View and contributes to odour complaints.
- NO_x levels in Goodwood exceeded the DEA&T guidelines on numerous occasions. This is serious and is very likely caused by motor vehicle emissions.
- Levels of benzene in the areas measured are a cause of concern. This needs attention as the likely source is motor vehicle related.
- Fungal spore levels are high enough from time to time to cause allergic reactions in sensitive individuals.
- Public complaints are extremely valid and should be an ongoing focus in future investigations.

This study therefore could not confirm initial speculation that SO₂ from industrial sources is the major cause of respiratory tract illnesses in the communities of Milnerton and surrounding areas. However, levels of NO₂, benzene, fungal spores and in a lesser way pollen were found to be risk factors for the community and should receive attention. In addition control of odour production by industrial sources should receive continued attention.

RECOMMENDATIONS/FUTURE PROPOSALS

The one-year study clarified a number of issues which forms the basis for decision making around further research or control measures. These are:

- SO₂ levels from mainly Caltex are not chronic health risk to the community. However, in isolated incidents levels could occur which are detrimental to health. Caltex is encouraged to continue with its control programmes and to endeavour to avoid incidents. The only way to enforce this is to continue monitoring to "detect" trends or episodes.
- Motor vehicle-related pollution (NO_x and benzene) is a problem and may become exacerbated after the introduction of unleaded petrol, which has a higher aromatic content, and the lack of use of catalytic convertors. This situation needs to be monitored carefully.
- Fungal spore levels present a risk to sensitive individuals in the community. This cannot be controlled but sensitive individuals should take prophylactic medicines such as anti-histamines. A warning system would encourage people to be proactive.
- Odour problems occur regularly and are continuously detected and reported by the public. A well-operated rapid response unit should be considered, to address odour related complaints.

It is recommended that:

- Continuous air pollution monitoring of SO₂, NO₂, H₂S and PM₁₀ should continue indefinitely at all three monitoring stations.
- Pollution levels (including incidences) should be reported to the community on a regular basis. A monthly newspaper column could be considered as well as the local radio station.
- Fungal spore monitoring should continue and a TV/radio/newspaper warning system should be introduced (similar

to the one operated in Gauteng by Radio Highveld) to assist people in making decisions around the administration of precautionary medicines.

- A more detailed, in-depth, ongoing benzene monitoring programme should be considered. It is critical to detect trends following the introduction of unleaded petrol.
- The actions taken by Kilson Lime Works, as instructed by the DEA&T, should be monitored for its effectiveness in combating the odour pollution from Kilson Lime Works.
- The results of this study, in view of the possible contribution of motor vehicles to the benzene levels in the study area, should be submitted to the Minister of Mineral and Energy Affairs.
- The Department of Environment Affairs and Tourism should receive a copy of this report.
- The public's input into the development of an effective odour detection, reporting and reaction system needs to be obtained and pursued.

Due to the difficulty in characterizing confounding variables when dealing with relatively low levels of exposure to air pollution as demonstrated by this study, it will be extremely difficult to determine through epidemiological studies whether there is an impact on the health of the communities. Epidemiological studies also cannot account for synergistic effects especially in a complex environment with low levels of air pollution. It is not recommended that resources be spent on a full scale longitudinal epidemiological study but rather on control measures and management systems to prevent the single episodes which occurs from time to time and which can trigger acute reactions in sensitive individuals such as asthmatics.

The allergenic risks associated with fungal and pollen exposures need to be communicated to the community and medical practitioners to assist in preventative treatment of allergic people.

RECOMMENDATIONS FROM THE STEERING COMMITTEE

The Study's Steering Committee convened a task Group who looked into the future of the project. The key recommendations from this task group is summarised below as an additional input into the study:

- Milnerton Air Quality Project was established with public consent and endorsement and the public must be involved in the future determination. There should be greater public involvement of all groups.

It is proposed that the project be continued on the same basis for the interim period between the end of the current 12-month period of analysis and the production of the final report and until such time as those recommendations have been considered by the Steering Committee and the public. This could take up to 6 months.

- It is necessary that the monitoring continue on a permanent basis in respect of those pollutants which are cause for concern. Additional sites may be necessary in respect of

these issues. The costs will have to be determined and undertakings will have to be reached as to payment and apportionment of these costs.

- It was suggested that the name Milnerton and Surrounding Areas Air Quality Project be changed to the Milnerton and Surrounding Air Quality Forum which should operate as an independent committee.
- If the project is to continue, it would be suggested that public feedback and meetings be held on a less frequent basis, but on a more "as required" basis, subject to there being at least perhaps one meeting annually.
- Ways should be sought of disseminating information to the public which will be less emotional than the present public meetings. This could perhaps be done through regular press releases.
- A pollution update in local newspapers on a monthly basis was suggested, while different formats indicating pollution and complaints levels should be considered.
- As the Department of Environment is the control authority there should be more of an active involvement both investigatory, advisory and financial from them towards the project.

Contributors to this report:

The CSIR would like to thank the following individuals/companies/societies for their valuable contribution towards this project:

1. The Steering Committee of this project under the Chairmanship of Mr Derrick Oxley
2. Milnerton Municipality especially Mr Dave Brooks
3. Department of Paediatrics and Child Health at the University of Cape Town, specifically Me Dilys Berman.
4. Cape Town City Council, Specifically Mr Grant Ravenscroft, Mr Haider and Mr Hans Linde
5. Cape Metropolitan Council, specifically Mr Neil Rossouw and Mr Ossie Oswald, Mr Len Bremer, Mr E Burger and Mr R Young.
6. Caltex, specifically Mr Steve de Bruyn, Mr A J Hanslo, Mr C W Nootenboom, Ms Astrid Petersen, Nazeema Abrahams and Celia Stander
7. Kynoch, specifically Mr Martin Burr, Ms Lynn Denis, T Matiwza and Mr C R Thorpe
8. Mr Martin Lloyd, Department of Environment Affairs and Tourism
9. National Association for Clean Air, Western Cape Branch as well as the National Council
10. Eskom, Technology Research and Investigations Group
11. Medical research Council, specifically Ms Nicci Strauss and Dr Charles Parry
12. The Table View Independent Practitioners Association
13. Mr J Coetzee, Department of National Health and Population Development
14. The Communities of Milnerton and surrounding residential areas, Bothasig Rate Payers and Residents Association, Edgemead Residents' Association, Friends of Rietvlei, the Table View Community Association.