

AIR POLLUTION CONTROL IN THE WESTERN CAPE

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INTRODUCTION

After promulgation of the Atmospheric Pollution Prevention Act (APPA) No. 45 of 1965 the whole of the Municipal area of Cape Town was declared a Smoke Control area in July 1968. This was followed by the appointment of the first Air Pollution Control Officer (APCO) to the Health Department of the Cape Town City Council (CCC) on 19 September 1969. The Western Cape Regional Services Council (WCRSC) control air pollution within its area and on an agency basis for eight (8) local authorities. In the other surrounding areas control is exercised by the local health inspector. The present staff complement dealing with air pollution control on a full time basis in the CCC area is one Air Pollution Control Officer and five Pollution Control Inspectors. The WCRSC has two Smoke Control Inspectors.

AIR POLLUTION PROBLEMS OF THE 70'S

Cape Town was blessed with three power stations in the area, (one converted to oil); the many coal burning locomotives operating on the foreshore; the coal burning tugs; industrial and commercial establishments with incinerators, heavy fuel oil burning appliances and even coal-fired hot water boilers, posed a difficult problem for air pollution control¹. This resulted in thick black smogs, especially between May and September each year.

ATMOSPHERIC POLLUTION PREVENTION ACT

Air Pollution Control in terms of the Act

The cleaning up of Cape Town commenced with the implementation of the APPA. New installations had to comply with the Smoke Control Regulation (SCR) and all opportunities were used by the authorities to update existing appliances and to ensure that modern state of the art technology was installed. Within a decade the situation had improved to the stage where Cape Town could be considered one of the cleanest major cities in the world.¹

Smokeless Zones

A programme of declaring Smoke Control Zone Orders was embarked on by CCC with the first of eight becoming effective on 14 February 1976. These Smoke Control zone orders differ from those of the rest of the Country in that the zone order applies to all premises and a limit of 10% obscuration.

Dust Control

Cape Town and several surrounding local authorities were declared as dust control areas on 23 March 1984. The Chief Air Pollution Control Officer's (CAPCO) powers

were delegated to the local Air Pollution Control Inspectors.

This enabled control of dusty industries which had been a shortcoming of the legislation for a long time. However, legal steps were still the privilege of the CAPCO. This proved to be unsatisfactory and on 6 May 1991 full powers, including that of litigation were delegated to the APCO of Cape Town.

Scheduled Industries

The inspection and control of Scheduled Industries falls under the CAPCO who had a local inspector in Cape Town. This post has been vacant since August 1992. These industries are the major polluters in the area and due to the pressure of work on the CAPCO's staff it is strongly suggested that the power of inspection be delegated to the local authorities.

Emission Inventory

In order to gain a better understanding of the emissions into the atmosphere by the various industries both big and small, the Energy Research Institute of the University of Cape Town in conjunction with the council has embarked on drawing up a computer aided emission inventory programme which will concentrate on the emissions from the burning of fossil fuels in industrial and commercial premises. The programme is capable of determining the amount of SO₂, NO_x, CO₂ and Particulate Matter (below 10 µm) contained in the exhaust gases. Strong consideration should be given to expanding the programme to incorporate hydrocarbon emissions, dust and any other pollutants emanating from stationary sources. Vehicle emissions as moving sources should also be included.

MONITORING OF AIR POLLUTION

For any authority to establish whether the air pollution control policy it has implemented is working they must monitor the ambient air. Between the CCC and the WCRSC a sophisticated network of monitors exists.

Sulphur Dioxide (SO₂) and Soiling Index (SI)

At present a network of 10 standard CSIR soiling index and SO₂ monitors exist throughout the region. Of these four (4) are under the control of CCC and six (6) under the control of the WCRSC. A further one is situated at Khayelitsha, a rapidly developing black township, which only monitors soiling index. This system is of a long-term nature and it can be clearly seen (Fig 1) that the levels of the pollutants have fallen to levels that are just within the measuring capability of the instruments.

Measurement of Lead (Pb)

Since 1980 the filter paper used for SI in the above-mentioned instruments has been subjected to an atomic absorption test for the analysis of Pb. The trend of lead in air can be assessed in this manner (Fig 2). It must be pointed out that neither the method nor the siting of monitors complies with the Environmental Protection Agency (EPA) standards and care should be taken when comparisons of readings are made.

Continuous Monitoring of Air Pollution

The monitoring of air pollution on a continuous basis is done in the Western Cape at various stations.

City Hall

The station is located in the Central Business District (CBD) of Cape Town and was established in 1984 and measures Hydrocarbons - C_nH_m , Oxides of Nitrogen - NO, NO_2 , NO_x , Ozone - O_3 , Sulphur Dioxide - SO_2 , Ambient Temperature-T, Ultraviolet light - U.V.

Oranjezicht Outstation

Instruments monitoring Peroxyacetyl Nitrate - (PAN), Nitrogen dioxide - NO_2 , Ozone - O_3 , Ambient Temperature - (T) are fitted in an air conditioned trailer which is situated on the outskirts of town at about 100m above sea level.

Western Cape Regional Services Council - Continuous Monitoring

An air conditioned caravan equipped to monitor NO , NO_2 , NO_x , O_3 , SO_2 , Temp., Windspeed and direction is operated by the WCRSC in its area and that of the local authorities it serves on an agency basis.

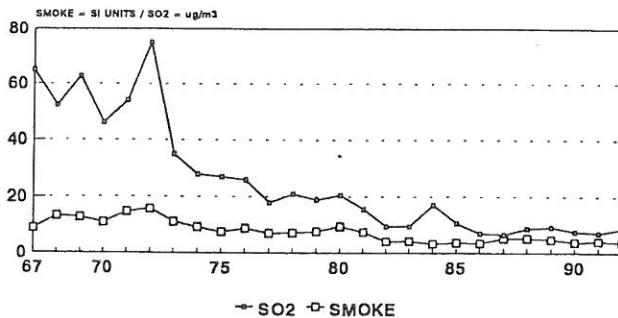
Scheduled Industries

A trailer equipped with a continuous SO_2 monitor which has been purchased by Caltex Oil Refinery is operated in conjunction with the WCRSC. This monitoring is called for and done in accordance with the specification of the CAPCO's guidelines for a Scheduled Industry. This will shortly be supplemented with a NO_x monitor by Kynoch.

Data Logging and Calibration

A PC is used as a data logging system. The software was developed within the Scientific Services Branch of the CCC and is utilised at all the continuous monitoring stations. Readings are taken at twenty second intervals, logged as minute averages and recorded as an hourly average. All instruments are automatically calibrated between the hours of 02:00 to 03:00 and twice a month the instruments are manually calibrated. The instruments at the WCRSC are maintained by the CCC on an agency basis. By way of a modem link the readings at City Hall and Oranjezicht can be read in the Air Pollution Control Office. This modem link provides for the information to be obtained from the data logger without interrupting the data capture system.

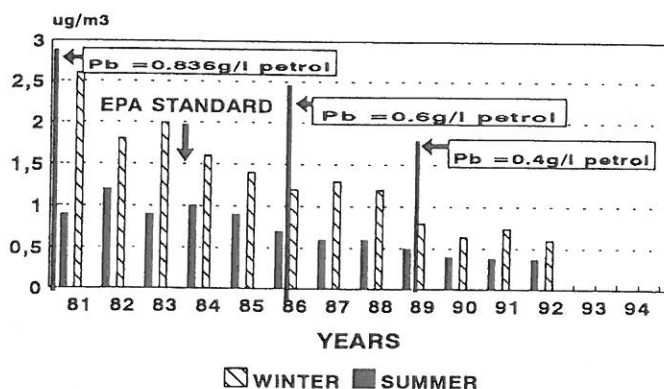
CAPE TOWN CITY COUNCIL COMPARISON OF SMOKE & SULPHUR DIOXIDE STANDARD SI & SO_2 INSTRUMENT



AIR POLLUTION CONTROL
FIGURE 1

LEAD IN AIR - CAPE TOWN

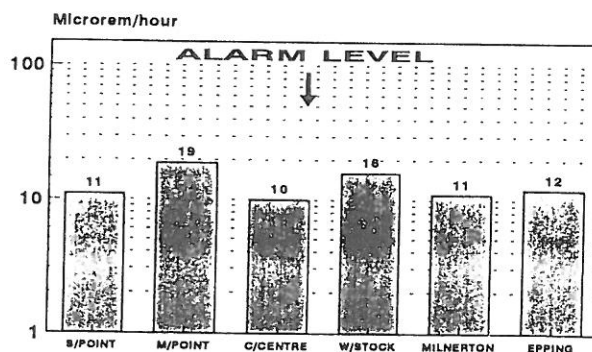
AVERAGE OF THREE STATIONS HEERENGRACHT/DRILL HALL/CITY HALL



SUMMAR
FIGURE 2

BACKGROUND RADIATION

CAPE TOWN



AIR POLLUTION CONTROL
FIGURE 3

Media Liaison

The Cape Times publishes the peak NO_2 and NO_x readings obtained at City Hall for the last 24 hours on a daily basis. When the DNHPD guidelines are exceeded, on days when a visible pollution episode occurs, strong media reaction follows.

BACKGROUND RADIATION MONITORING SYSTEM

Prior to the advent of the first nuclear power station in South Africa the general public was concerned about the effect of such an installation on their health and safety. This 2000 MW nuclear power station commenced operation in April 1984 and is situated at Dufnefontein approximately 28 km north east of the metropolitan area of Cape Town. To allay the fears of the public, six gamma radiation monitors, (measuring on a scale from 0 to 10^4 microRem/hour) were installed on the northern boundary of the densely populated City of Cape Town in March 1982, two years before the commissioning of the power station in order to provide a data-base on the background radiation.

Alarm setting is set at 50 microRem/hour, which is about $2\frac{1}{2}$ times ambient. The alarm is also activated at the Civil Protection Command Centre which is manned 24 hours a day. Any alarm is investigated and if necessary the reading verified. The emergency civil protection programme could then be activated if required. The system is calibrated annually and has operated satisfactorily for eleven years with almost 100% availability. Figure (3) indicates the annual average readings of the monitors.

In 1984 a further gamma radiation monitoring system was completed with one outstation on Robben Island (situated in Table Bay, half-way between the power station and the city) and measures in the range 10^{-1} to 10^4 milliRem/hour.

There has been no increase in background radiation since the system was commissioned.

BROWN HAZE OVER CAPE TOWN

The vehicle population in the greater Cape Town is steadily on the increase. Under certain climatic conditions the pollutants emitted from vehicles give cause for concern. The ambient air pollution guidelines set by the DNHPD for NO_x & NO_2 are often exceeded.

During 1991 the Cape Town City Council submitted a report to the Minister of Health pointing out that vehicle emissions are a problem and called for the control of emissions from petrol driven vehicles. There are many ramifications of such a decision and all interested parties should be able to make submissions before adoption of a control policy.²

The reaction from the Minister entailed the following:

- The problem was acknowledged but no money was available for research.
- It was accepted that the magnitude and the extent of the problem be determined before action could be finalised.
- It was considered premature to appoint a Commission of Enquiry into the control of motor vehicle emissions but the matter is continuously being evaluated.

Brown Haze Study

Due to the lack of funds within DNHPD, the Western Cape Branch of NACA raised money in the form of sponsorships from the oil companies, industry and local authorities. Energy Research Institute of UCT was commissioned to undertake a Pilot Study to determine the constituents of the Brown Haze. This has now been completed and the results are available.

This needs to be followed up with a more comprehensive major study. The financing of such a study is now a subject of discussion and it is hoped that the DNHPD could provide the necessary funding.

Pollution from Black Residential Areas

The Chief Air Pollution Officer confirmed that we have serious smoke pollution from coal combustion in non-electrified and informal residential areas which is a major if not the largest source of visible pollution³. In the Western Cape there are several black townships with similar problems. However, because coal is very expensive the main sources of energy used are paraffin, gas and wood in various appliances for cooking and heating and also candles for lighting.

Due to the lack of regular services such as refuse removals and the sweeping of streets the people have resorted to the burning of refuse. Although this has merit in the control of rodents and flies it causes a serious air pollution problem.

Air pollution is not high on the priority list of the black community. For various reasons it has never been perceived as a menace to life. It must be remembered that the other hardships which the communities face daily make the problem of air pollution a minor one.²

In Khayelitsha smoke recorded on a month to month basis shows an upward trend. The figures for all the other stations in the Western Cape indicate a downward trend for the same period. See figure 4.

SMOKE COMPARISON

MONTHLY AVERAGES

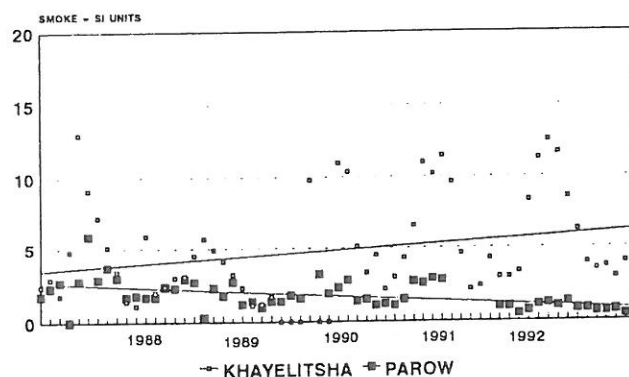


FIGURE 4

Conclusions

1. Brown Haze over Cape Town is of concern and a pilot study has been completed. Financial support, hopefully from the DNHPD, for the commissioning of the follow-up major study is now of the utmost importance. The results should serve as a major planning tool for controlling authorities to determine policy for the future.
2. Pollution from the developing black townships is constantly increasing. The supply of electricity to each dwelling unit should be a national priority and should be implemented with the necessary urgency and subsidy.
3. The long awaited New Clean Air Act needs to be promulgated without further delay. This should enable a more efficient control of all forms of air pollution.
4. The Emission Inventory programme should be fully developed and should be made available to all controlling authorities by the DNHPD.
5. Monitoring of pollutants and recording of the results should continuously be updated and expanded to meet the future requirements.

6. Finally, clean air cannot be achieved through study and research. Clean air can only be achieved through an appropriate amount of study followed by a major commitment to a plan of action.⁵

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