

DIESEL VEHICLE EMISSIONS TESTING IN THE CITY CAPE TOWN

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1. INTRODUCTION

Rudolf Diesel invented the diesel engine in 1892. It was more efficient and less expensive than the steam engine and soon gained popularity and by the 1920s and 1930s trucks and railroad engines, factories and buses were using diesel engines. "The diesel engine operates by combining air and fuel into a cylinder and compressing it with air that is hot enough to ignite the fuel, in a process called compression-ignition. The engines burn fuel oil instead of the gasoline that is burnt in most passenger cars. The oil base of the diesel fuel makes the fuel heavier, oilier, and full of more dangerous contaminants than gasoline."¹

Diesel vehicles are by far the most popular method of transporting products across South Africa and internationally. Diesel vehicles are also some of the worst polluters of our environment, causing more than their share of harm to our health and the environment. The fleet of diesel vehicles on the South African roads comprises of heavy-duty vehicles, small trucks, bakkies, buses, refuse trucks and passenger vehicles. "The majority of heavy duty vehicles run on diesel fuel. Although heavy-duty vehicles make up only 2 percent of all vehicles on the road, they are responsible for one third of all smog-forming nitrogen oxides and nearly two-thirds of all particulate pollution emitted by all on-road vehicles. Diesel pollution is particularly dangerous because it contains over 40 substances that are considered toxic. Furthermore, over 30 epidemiological studies have linked diesel exhaust to cancer."² One poorly maintained diesel truck can pollute as much as 100 cars.²

According to the Environmental Protection Agency (EPA), "Although diesel trucks and buses make up only 2 percent of all vehicles on the road, they are responsible for more than one-third (38%) of all smog-forming nitrogen oxides and nearly two-thirds (60%) of all particulate pollution emitted by all on-road vehicles."⁴ It should be mentioned that the pollution mostly comes from poorly maintained diesel vehicles.

The Cape Town Brown Haze Report, which was released in September 1997, indicated that 65% of the visibility degradation is attributed to vehicular emissions, of which 48% is caused by diesel driven vehicles.

As diesel vehicle emissions are responsible for approximately half of the brown haze phenomena it became imperative for the City of Cape Town – CMC Administration to implement a programme aimed at controlling and reducing these emissions as recommended in the Brown Haze report.

This paper focuses on the implementation of a control strategy using existing legislation within the metropolitan area of the City of Cape Town.

2. HISTORICAL BACKGROUND

Part V of the Atmospheric Pollution Prevention Act (APPA) No.45 of 1965 makes provision for the control of "Air Pollution by Fumes Emitted by Vehicles". On 20 September 1974 Government No. R1651 was published promulgating "Regulations Concerning the Control of Noxious or Offensive Gases Emitted by Diesel-Driven Vehicles." These national regulations were made applicable in the then Divisional Council of Cape Town, and the municipalities of Bellville, Cape Town, Durbanville, Fish Hoek, Goodwood, Milnerton, Parow, Pinelands and Simonstown. The regulations prescribed the procedure, known as the free acceleration test, of performing an opacity test using a BP Hartridge Meter.

Initially the Road Traffic Ordinance was used by the traffic departments within environs of the City of Cape Town did law-enforcement with respect to excessive smoke. The method of testing as prescribed by Regulation No. R1651 was only used as a back-up mechanism in the case of a prosecution.

During May 1980 the Air Pollution Control Section of the Health Department of the then Municipality of the City of Cape Town, in accordance with the policy of the State Health Department took over diesel vehicle smoke control. Of the 10 (ten) declared municipal areas within the environs this was the only municipality that used the legislative machinery provided by Part V of the Act.

Roadside testing of diesel vehicles continued for a period of three years until the testing programme was forced to a halt when the BP Hartridge Meter malfunctioned. The agents were unable to calibrate and repair the instrument. As it was anticipated that the promulgation of revised regulation was imminent at that time the programme was temporarily discontinued. The new regulations however never came to fruition.

3. PRESENT LEGISLATION

With reference to Part V of the Act, which deals with, "Air Pollution Emitted by Vehicles"; the following points need to be highlighted:

1. The provisions of this section of the act only apply in areas that have been declared by the Minister.
2. The act provides for the promulgation of regulations to control the emissions from vehicles. It is not restrictive to diesel vehicles only. To date the avenue has not been explored to its fullest extent.
3. In the event of failing the test a notice is to be served on the registered owner of the vehicle to submit the vehicle for a retest within a prescribed period.

4. The offence is failure to comply with the notice and not excessive smoke emission.
5. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. "National Air Pollutant Emission Trends, 1900-1998," March 2000.
6. The offence is committed in terms of the Act and not the Regulations. (First offence-R500 or six months imprisonment and second offence-R2000 or twelve months imprisonment).
7. A local authority may authorise any person in its employ to enforce the legislation.

The Regulations promulgated in terms of Section 39 provide for the following:

1. Only vehicles driven by a diesel engine may be subjected to the test.
2. Only diesel vehicles with naturally aspirated engines may be tested, turbo-charged vehicles are excluded.
3. Only one type of instrument, the BP Hartridge Smoke Meter is prescribed.

4. IMPLEMENTATION OF THE DIESEL VEHICLE TESTING PROGRAMME

Phased Approach

In 1998 the Cape Metropolitan Council (now the City of Cape Town – CMC Administration) adopted a two-phase approach to implement the diesel vehicle emissions testing programme.

Phase One

Roadside Testing

During this phase, the existing Specialist Environmental Officers of the Air Pollution Control Section did roadside testing. This gave the staff the opportunity to gain hands-on experience with the Hartridge Smoke Meter and also to set up the necessary administration system for future use.

Testing of diesel vehicles for smoke emission commences as a major public relations exercise with extensive media coverage.

During the first few months of the programme staff concentrated on the education of diesel vehicle owners regarding the common causes of excessive smoke emissions. Liaison with the Traffic Chiefs of the Municipal Local Councils took place before and during the implementation of the programme to ensure that traffic officers were available to pull vehicles off the road. Municipal motor vehicle testing stations were issued with Hartridge Smoke Meters as they would act as re-testing sites.

A working relationship was established with the Civil Defence Command Centre for verification of ownership details of offending vehicles.

Roadside testing twice a week followed, vehicles failing the test were issued with warning notices.

Infrastructure Development

In order to facilitate and manage the testing and retesting procedure a data base programme for record keeping purposes was developed. Clerical staff was appointed and the necessary vehicles were acquired.

The traffic departments of the various municipalities in the metropolitan area of Cape Town were approached to become retesting sites. The necessary training was given to the testing officers by the Air Pollution Control staff.

Health Risk Assessment

With the assistance of an independent company a health risk assessment was carried out. Stemming from this the following criteria were established and are followed:-

- 'Day-Glo' type vest to be worn by all staff involved in road-side testing.
- Over wear to be made of natural fibre reduce the risks of burns.
- Traffic to be pulled on the slow side of the road.
- Vehicles used to be well identified with the logo of the city.
- A fully stocked first aid kit should be in the testing vehicle.
- The fire extinguisher should be kept close at hand during roadside testing.
- All staff to wear safety dust goggles.
- Fire retardant gloves to be worn by the helper.
- All staff to wear ear plugs while doing road-side testing.
- All staff to wear 3M8822 Respirators while emissions testing is being done.
- All staff to undergo a medical examination to before appointment.

Phase Two

Phase two was aimed at the appointment of staff to implement the testing programme on a full time basis and to enforce the legislation to its fullest extent. This resulted in:

Appointment of Staff

The appointment of three teams consisting, of an Environmental Health Assistant who would be the leader of the team and a helper to assist him with the insertion of the probe and other tasks.

Staff received extensive training regarding safety procedures that they should follow in the workshop and while doing roadside testing.

Pre-appointment medical examination

Before staff were appointed they following test were conducted:

- Lung function test.
- Urinary lead
- Urinary Creatinine
- Urinary Lead: Creatinine ratio
- Chest X-ray

Full cardiorespiratory questionnaire and cardiorespiratory medical evaluation was carried out. Blood samples were also taken so that baseline information for future monitoring of the quality of red blood cells white blood cells and platelets. This baseline information will put the employer in the position to detect bone marrow depression, which may occur as a result of benzene exposure.

Each incumbent is on a bi-annual basis required to undergo follow-up examinations.

Law enforcement

All drivers of vehicles are issued with a notice indicating a pass or failure. The owners of vehicles which fails the emissions test are given a notice to repair the vehicle and submit the vehicle for a retest within 14 days of the test. The process dictated by the regulations are cumbersome and does not make for easy administration.

5. THEROADTEST

A testing site is selected and cordoned off with traffic cones. Diesel driven vehicles are stopped at random or where excessive smoke is observed. In selecting a site, the safety of public and the staff is taken into consideration. Testing is only carried out at selected sites where vehicles can be pulled off without obstructing traffic and where the surface along the roadside is hard enough to accommodate the load of the vehicle.

The Hartridge Smoke Meter is used at the roadside to do the free acceleration test on diesel vehicles. A total staff of three mans the roadside testing site: -

- a traffic officer to direct vehicles on and off the road and
- one member operates the smoke meter and does the on site administration work
- one helper who attach the inlet probe to the exhaust pipe of the vehicle

The Mark V1 Lucas Hartridge Smoke Meter is used as this supercedes the BP Hartridge Smoke Meter. The instrument measures the opacity and light absorption coefficient ("K") of tailpipe exhaust fumes. The said instrument is capable of measuring emissions from both naturally aspirated diesel engines and turbo-charged diesel engines.

The diesel vehicle testing team is required on each occasion to set up the roadside testing in accordance to prescribed road and staff safety requirements.

A safety audit is carried out along the roadside on a monthly basis by management to check whether the staff adheres to all safety procedures.

6. PROBLEMS EXPERIENCED WITH THE IMPLEMENTATION OF THE PROGRAMME

The APPA excludes turbo charged diesel vehicles from being tested although the Hartridge Meter has been developed to include the testing of turbo charged vehicles. Instituting legal proceedings is a cumbersome procedure. Furthermore, the APPA does not allow for the imposition of a spot fine. Failing the roadside test is not an offence in terms of the APPA but rather failure to submit the vehicle for a retest.

The City of Cape Town has embarked on drawing up its own Air Pollution Control By-Laws. The by-laws will strive to:

These problems will be addressed in our Law Reform.

Make it an offence if the diesel vehicle tested fails the prescribed test. Legalise to issue a spot summons at the time of the offence. If the offender submit the vehicle for a retest within time stipulated on the notice a reduced fine would have to be paid..

Conclusion

At the start of the implementation of the programme the average of diesel vehicles which failed the smoke test was 23%. During the first 12 months since roadside testing took place the average decreased to 17% failure. There is currently 36 court cases pending against owners who did not comply with the notice to present their vehicles for retesting. The downward trend in the failure rate of vehicles which are being tested would indicate that the awareness of the testing programme has a positive effect on the maintenance of diesel vehicle engines using public roads within the boundaries of the City of Cape Town. At present, the testing teams are dependent on traffic officers to do roadside testing. An investigation are underway to have the Environmental

Health Assistants appointed as traffic wardens in order to improve logistical problems relating to dependency on the traffic departments resources.

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