**Annex 2**

# HEALTH & SAFETY

# SERVICE PLAN

# 2004/2005

# SOUTH DERBYSHIRE DISTRICT COUNCIL

# HEALTH & SAFETY SERVICE PLAN

## 2004/2005

## 1.0 Introduction

This Service Plan for health and safety enforcement outlines objectives and major issues, key programmes for inspection and contribution to the HSC Strategic Plan and HELA Strategy, future targets, performance against last year's targets information on the service and a review of performance.

## 2.0 Service Plan

Health and safety enforcement is carried out by the Commercial Team, which forms part of the Environmental Health Division. The service is normally provided in-house by qualified Environmental Health Officers and a Safety Officer. 1.5 full time equivalent officer's time is spent on health and safety enforcement.

The Council's Safety Officer function also falls within the team which results in the safety officer working 50% of his time on "in-house" Health & Safety matters and 50% of his time on enforcement work.

The service provided includes proactive inspections, other proactive actions to meet objectives, licensing and registration, accident and complaint investigation and provision of advice and information to businesses through visits, seminars and written information in hard copy and in the future via the web site and e-mail.

## 3.0 Objectives

The main objectives of the service are outlined below. Full details are in the attached Appendix.

3.1 Improve the safety of working conditions and leisure facilities in the District through a programme of workplace inspections.

3.2 Improve consistency, transparency, proportionality and targeting of licensing and registration functions (Health and Safety inspections are undertaken on all Entertainment Licences and Animal Health Licence Applications.

3.3 To make available a comprehensive range of health and safety information for small businesses.

3.4 To comply with the Section 18 guidance on enforcement of health and safety law issued by the Health and Safety Commission.

3.5 To contribute on a local and national level to the HELA Strategic Plan in order to reduce injury and ill health associated with work activities.

## 4.0 Performance Targets

The following table shows health and safety targets for 2004/2005.

Inspections to be undertaken from April 2004 to March 2005

| Risk Category | No. Of Premises | No. Of Inspections estimated 2004/05 | Periods of Inspection |
|---|---|---|---|
| A | 6 | 6 | Every year |
| B1 | 13 | 6 | 18 months |
| B2 | 31 | 11 | 2 Years |
| B3 | 92 | 30 | 3 Years |
| B4 | 122 | 23 | 4 Years |
| C | 919 | 398 | 5 Years or other method |
| Unclassified premises | 0 | 0 | |
| TOTAL | 1183 | 398 | |

The section will be undertaking full inspections on those premises that fall within Category A - B4 in accordance with the requirements of the Health and Safety Commission (HSC).
Because we have introduced a new Risk Based inspection programme on the Flare System we have skewed the number of Cat C premises that require inspection this year. We have ear marked 398 premises for this year out of a total of 919 Cat C premises. On average we should be inspecting 175 cat C premises.

In regard to the category C premises we will assess those premises that posse the greatest risk and undertake inspections of those.

## 5.0 Requests for Service / Reactive Enforcement

Reactive enforcement results in inspections (part or full) being carried out as a result of requests for advice, complaints, statutory notifications, e.g. accident notifiacations, lift reports etc.

Prioritisesation of health and safety enforcement work is as follows, in descending priority:-

i) A major incident or serious accident involving actual or potential fatalities.
**Response time: Immediate (if possible) or within 24 hours.**

1) A statutory notification requiring immediate works to protect employees, e.g. lift report/asbestos notification.
**Response time: Within 24 hours.**

2) Consultation from Pollution Team, Building Control, Licensing Team.
**Response times: Within time limits specified on consultations.**

3) A notification of a major injury(s).
**Response time: Within 24 hours.**

4) Complaints and other statutory notifications without known immediate risks to health.
**Respones time: Within 5 working days.**

**5)** Requests by employees/employers/public for informal advice / inspection and, for example,a new business being set up. As these types of request are infrequent they should **NOT** take priority over **ANY** of the above. Response time: Within 10 working days (if possible without delaying ANY of 1 to 5 discussed above.

5.1 Best Value Performance Indicator 166 / Section 18 Guidance
The health and safety service contributed well to this target by producing an updated Health and Safety Enforcement Policy and all relevant Policies required by the above indicator and HSC Section 18 Guidance.

All enforcement actions followed the provisions of the Health & Safety Enforcement Policy and there were no variations.

The following procedures and policies are now in use within the Health & Safety Section

Health and Safety Enforcement Policy
Health and Safety Arrangement and Authorisation of Officers
Health and Safety Inspection Procedures
Health and Safety Accident Investigation
Health and Safety Enforcement Notices
Health and Safety Prosecution Procedure
Health and Safety Core Competencies
Health and Safety Information

6.0 **Accident Investigation Criteria**
This section details the criteria for accidents that are to be, or not to be, investigated and the time within which the accident investigation must start upon receipt of the accident report by the Department (see Section 5 Request for Service)

Accidents meeting the criteria listed below will be recommended for investigation and should be investigated further: -
a) The death(s) of any person.
b) All specific major injuries.
c) All dangerous occurrences, e.g. electrical fires, explosions, etc
d) Certain 'over 3 day injuries' which related to:

i) An employer with a poor health and safety record;
ii) A dangerous machinery or substance being involved in the injury;
iii) A premises revealing a spate or trend of similar accidents;

iv) Special projects for accident investigation. These are normally drawn up by the Department or nationally by the HSE. They are usually in line with new legislation to give it more public profile and increase general awareness of certain health and safety matters;

v) Prima facie evidence of a contravention of health and safety legislation.

**Exemptions**

Any accident falling into the above cases where special circumstances indicate investigation is not required, e.g. criminal assault, death by natural causes, etc

## 6.0 Planned Improvements

The following improvements relate to improvements anticipated in 2004/2005 targets as described above in Section 5.

6.1 Health and Safety Inspections

A review of the workload of staff members will be carried out by 31st October 2004 and reviewed regularly.

This may require re-allocation of inspection workload and discontinuing some areas of work. Implementing procedures as required by Section 18 guidance will influence performance. Measures are in place to regularly monitor inspection performance.

6.2 Computer System

We now have a new computer system, which will allow greater accuracy in regard to Health and Safety. It will allow officers to maintain information relating to all complaints, Accident investigations, health & safety Inspections all on one computer system. We are presently ensuring that the information held on the computer system is correct, which is a not only a sensible approach but also a requirement of Section 18 Guidance. This is taking a considerable amount of officer time to verify the information.

6.3 Section 18 Guidance

We will build on our present position in regard to compliance with Section 18 Guidance compliance and continue improvements to the service.

6.4 Enforcement

I formal caution was issued to a Company during this year for an accident that occurred at their premises.

2 separate premise within SDDC are being recommended for prosecution for offences under the Health and Safety at Work etc Act 1974. These files are presently with legal services for institution of legal proceedings for accidents that occurred at the specific premises.

6.5 Information Pack for Small Businesses

The pack has now been completed by the Health and Safety Officer and has been piloted. Once the pack has been piloted it will be forwarded to Small Category C businesses or new premises.

6.6 Education / Information in Asbestos

To promote awareness and compliance with the new duty to manage asbestos in buildings.We have undertaken a training session for small business's which was held this year with the assistance of the Health & Safety Executive.

6.7 Questionnaire

We have also introduced this financial year a questionnaire, which will be forwarded to businesses on completion of inspections to determine satisfaction of officer's activities. It will also determine what additional information is required by businesses to undertake their health and safety activities safely. It will also determine the best methods of distributing the information to businesses.

**HELA Strategic Plan 2001-2004**

Priority 1 – Preventing Slips/Trips

Priority 2 – Workplace Transport

Priority 3 – Musculoskeletal Disorders

Priority 4 – Stress

Priority 5 – Falls from a Height

**METHOD OF APPROACH**

All inspecttions will concentrate on these 5 areas . Officers are using the Revitalising Health and Safety Inspections packs which have been drawn up by the health & safety commison for use by Local Authorities.

**ANNEXE A**

# South Derbyshire District Council

# Green Fleet
# Options Review

# August 2004

## CONTENTS

# 1. DRIVERS FOR OPERATING A GREEN FLEET

## 1.1 Air Quality and Environmental Issues

### 1.1.1 Air Pollution and its Sources

The nature of air pollution has changed considerably since the 1950s with smoke and Sulphur Dioxide (SO2) now regulated. However, with a six-fold increase in road traffic between 1955 and 2003, coal combustion is no longer the main cause. Instead, motor vehicle emissions have had an increasing impact on urban air quality, the majority being run on either diesel or petroleum engines.

Vehicle engines, although one of the most efficient forms of producing energy, create a variety of toxic exhaust emissions. This in turn affects the air that we breathe and ultimately has an effect on our well being. Research has proven that toxic emissions cost the taxpayers considerable sums of money, particularly with medical care. These emissions are also having a significant detrimental effect upon the environment through ozone depletion and global warming.

The amount of lead and sulphur present in petroleum and diesel fuels has steadily been reduced by the Petroleum Industry during the last decade. Unleaded petroleum is now the norm as is the production of Ultra low sulphur and sulphur-free fuels. As a consequence the amount of lead and Sulphur being released into the atmosphere has also reduced. European legislation continues to be the driver for these changes.

The main emission pollutants of concern are now considered to be;

- Particulate matter (PM) (especially PM10, which are particles with a diameter of less than one hundredths of a millimetre, i.e. 10 µm). These are generally formed as a result of an incomplete combustion of diesel fuel and are predominantly a formation of carbon and other organic compounds. It appears as black exhaust smoke and is a product of un-combusted hydrocarbons. PM' s are carcinogenic and contribute to smog formation

- Un-combusted hydrocarbons (CH) which are less visible are also poisonous and like Particulate Matter, form fog and ozone and can be carcinogenic.

- Nitrogen oxides (NOx), including NO, NO2 which can cause a variety of health and environmental problems to due to the nature of the compounding and derivative effects of the gasses. NOx in itself cannot be seen by the naked eye but when combined with oxygen in the atmosphere creates a visual toxic grey haze which can often be seen over some of the world's cities. It is acutely poisonous, creates smog and ozone and converts into nitric acid which falls as rain.

- Carbon monoxide (CO) being a product of combustion and is poisonous converting naturally into Carbon Dioxide (CO2) and contributing towards environmental damage in the form of greenhouse gas.

- Volatile organic compounds (VOCs) which are the product of vapour used in petrol engines and like diesel engines also generate significant amounts of Carbon monoxide. Volatile Organic Compounds have a detrimental effect on the respiratory system and when combusted create greenhouse gasses. Sunlight also causes

them to react with nitrogen oxides to form ground level ozone. Ground level ozone can damage crops and building materials and cause breathing difficulties in sensitive people. Evaporating petrol and other combustion products emit VOCs.

The government continues to investigate ways of reducing other pollutants such as heavy metals (nickel, cadmium, arsenic and mercury) as well as benzenes which are also present to a degree in fuels but appear in lower quantities. This technology is still emerging and industry standards are being developed to provide solutions in response to legislation, mainly from Europe. However, the present focus for industry remains on reducing emissions of the main pollutants.

## 1.2 Environmental Effects of Pollution

Vehicle pollution produces a number of gases which create a 'greenhouse effect' causing global warming. Two of the main greenhouse gases are carbon dioxide (CO2), nitrogen oxides (NOx). Both of these gasses build up in the atmosphere and act as an insulator to the earth. This in turn creates a barrier whereby heat builds up to change the earth's climatic conditions.

Nitrogen oxides can have further effects on the planet by combining with water to create acid rain or sunlight to create low level ozone which unlike the higher level ozone that acts as a filter to the sun's rays can cause environmental and health problems.

Since 1990 UK greenhouse gas emissions have steadily fallen in the UK. This, however, was mainly because of the move away from energy generation using coal and oil to gas and nuclear.

Although UK industrial emissions of carbon dioxide are falling because of these changes in energy production, the rise in the volume of road traffic has resulted in an increase in transport emissions over recent years.

## 1.3 Health Effects of Air Pollutants

Many elderly and young people and those with respiratory diseases such as asthma or bronchitis can be affected;

- *Nitrogen Oxides (NOx)* - irritation and inflammation of lungs
- *Particulate Matter(PM) and Uncombusted Hydrocarbons (CH)* - inflammation of lungs, worsening of symptoms of people with heart and lung conditions, linkage of long-term exposure to coronary heart disease and lung cancer
- *Carbon Monoxide (CO)* - prevention of normal transport of oxygen by blood, resulting in the reduction of oxygen supply to the heart
- *Volatile Organic Compounds (VOC)* – can cause respiratory problems for existing sufferers

## 1.4 Legislative Issues

Local authorities continue to have statutory duties for local air quality management under the Environment Act 1995. They are required to carry out regular reviews and assessments of air quality in their area against standards and objectives in the national Air Quality Strategy

Furthermore, following the Kyoto climate change conference in December 1997, the UK has now a legally binding target to reduce greenhouse gas emissions to 12.5% below 1990 levels by the period 2008 to 2012. This means a reduction equivalent to 27 million tonnes of carbon dioxide. The UK

also has a domestic aim of reducing CO2 emissions to 20% below 1990 levels by 2010 and is committed to putting itself on the path to cut CO2 emissions by 60% by about 2050

European regulations for the production of new diesel engines (commonly know as euro I to V) defines standards, first introduced in 1992 to progressively reduce the emission levels of Nitrous oxides, Carbon monoxide, Particulate matter and Uncombusted Hydrocarbons by key dates.

- Euro I became effective in 1993
- Euro II in 1996
- Euro III in 2000
- Euro IV in 2005
- Euro V in 2008

It is expected that the stringent emission levels set for Euro IV in 2005 and Euro V in 2008 will require all new diesel powered heavy duty vehicles to be fitted with exhaust gas after treatment devices to meet the standards.

New medium and light duty diesel engines are also being fitted with a variety of catalytic solutions appropriate to their size in line with the European standards.

# 2. GREEN FUELS, TECHNOLOGIES AND FUNDING OPTIONS

## 2.1 Green Fuels and Technologies

There are a range of fuels, additives and technologies available on the market, each with different environmental characteristics that can help to reduce emissions. The use of such fuels is mostly combined with exhaust emission technologies to improve emission levels further.

### 2.1.1 Diesel and Petrol

The relative environmental benefits of diesel and petrol remain an ongoing debate with improvements continually being made at refinery stage and in engine technology. Diesel engines tend to be more fuel efficient and emit less carbon dioxide (the main greenhouse gas) than their petrol engine counterparts. However, they do produce higher levels of Particle Matter and Nitrogen oxide. Selective Catalytic Reduction Systems (SCR's) and Continuously Regenerating Particulate Traps (CRT's) are now generally fitted to new Heavy Duty vehicles in compliance with latest European emission standards. There is also similar emerging technology for medium and light diesel vehicles which had up until recent years not been readily available.

Manufacturers are continuing to develop a variety of ever more sophisticated exhaust after treatments for light, medium and heavy duty diesel vehicles which when combined with a range of additive technologies offer impressive results. Typical CRT's can reduce emissions in Pm's, CH's and CO by around 95% at peak performance and when combined with an SCR can reduce Nox also by around 90%.

There are a number of differing types of additives for diesel on the market that act as a cleaning agent and catalyst which, when combined with an SCR and CRT system, can reduce emissions still further.

There is a view that combined CRT and SCR systems will be an integral part of all Heavy Duty diesel vehicles in the next few years in order to conform to Euro V standards. As a consequence, the environmental and air quality benefits of diesel continue to compare favourably against other green fuels like LPG and CNG.

### 2.1.2 Bio diesel

Bio diesel is a product of oil from crops such as rapeseed which is reacted with methanol to produce methyl ester. This is blended as a 5% solution with 95% Ultra Low sulphur Diesel to produce a slightly cleaner burning fuel with less Particle Matter, Sulphur and Carbon monoxide but slightly higher Nitrous Oxide emissions.

Although bio diesel can be slightly more expensive than conventional diesel at around 2 pence per litre, the attraction is that it is considered to be a renewable energy source which can be grown and cultivated from natural processes. There are a growing number of suppliers of the fuel within the UK and some are now offering bio diesel at similar prices to diesel.

Engine and exhaust after treatment manufacturers have previously been cautious about offering warranties for vehicles that use in excess of 5% mixture owing to the potential to damage engines. EN 590 governs the allowable industry standard for diesel fuels (including Bio diesel). However,

these conditions are beginning to change as trials are demonstrating higher percentages of bio diesel mixtures are workable.

Bio diesel offers similar engine performance in fuel efficiency and engine power to that of diesel and is generally between 0 and 2 pence per litre more than Ultra Low Sulphur Diesel

The bio diesel industry continues to work on a solution whereby it can ultimately replace conventional diesel in its entirety.

### 2.1.3 LPG (Liquefied Petroleum Gas)

LPG is mainly comprised of propane and is probably the most attractive alternative to petrol, especially for cars and light vehicles. It is the product of oil refining but is also is found in natural gas. LPG will run on petrol and diesel engines. There is a slight power reduction with an LPG powered engine when compared with other fuels.

Most LPG vehicles are bi fuelled which means that they can run on either LPG or petrol/diesel and can change from one fuel to the other without stopping. This gives a greater mileage range for vehicles and flexibility to run on petrol when LPG is not available. LPG gives around 15% less miles per litre when compared with petrol and a slight reduction in performance.

Relative to pure diesel engines with no exhaust after treatment solution the best LPG vehicles can offer some 85% reduction in nitrous oxides and approximately 90% reduction in particulate matter. Lately, the advantages of LPG have been reduced when compared against the Euro IV and Euro V petrol and diesel engines fitted with after treatment systems.

LPG vehicles are noticeably quieter than diesels. However, among the dis advantages of running an LPG vehicle is the storage of the fuel which can take up valuable space and payload within the boot or compartment area of the vehicle. Recently, doughnut shaped fuel tanks have been developed to take the space of a spare wheel in order to minimise the problem. Drivers then are given an alternative puncture repair solution.

LPG is now becoming more widely available on petrol station forecourts but these are still scarce. The only local LPG facility to Swadlincote are at Church Gresley and Appleby Magna. In the longer term, it may therefore be a more attractive option for the Council to have an LPG fuelling facility installed at the depot if they were to consider use of LPG as an option.

### 2.1.4 CNG/CLG (Compressed Natural/Liquefied Gas)

Natural Gas is mainly methane and is extracted from crude oil and gas fields around the world. When used in vehicles, natural gas can be stored under pressure or as a liquid, hence the terms – compressed natural gas (CNG) and liquefied natural gas (LNG). LNG needs to be stored at -160 degrees to maintain its liquid state otherwise tanks capable of operating at 3000 psi are required to maintain it efficiently in low volumes.

Diesel and petrol engines run on natural gas typically offer a 95% reduction of particulate matter, 85% less nitrous oxides. The advantages do however disappear when compared with diesel used in conjunction with a CRT and SCR system. CNG/CLG also gives a slight increase in Carbon Monoxide emissions and lower miles per litre when compared with their diesel equivalent.

Natural gas engines are far quieter than diesel engines making these vehicles suitable for overnight deliveries and in noise-sensitive locations.

Natural gas vehicles can either have a dedicated gas engine or a duel fuel engine which means they can burn both diesel and natural gas simultaneously.

Use of natural gas is less popular than with other alternative fuels owing to the additional weights involved in on board storage. It is also highly compressed and can take a number of hours to refuel in the depot using a conventional converted high pressure natural gas supply. Fast fill facilities are expensive to install and generally require a long term commitment to defray costs. Current duty relief compared with diesel offers around 20 pence per litre saving making it more attractive to some large fleet operators for wholesale conversion.

Due to the significant additional weight and cost of on-board gas tanks, CNG conversions vehicles are considered to be more appropriate for trucks, buses and larger vehicles. Lighter and Medium vehicles can run on CNG but often have to sacrifice a higher proportion of payload than their LPG counterpart. CNG offers around 15% less mileage per litre than its diesel equivalent.

### 2.1.5 Electric Vehicles

Electric vehicles have been around for around 100 years. During the period technology has steadily improved, particularly with battery development where the performance and more particularly the range of vehicles has steadily improved.

Battery powered electric vehicles produce no pollution and are quiet when in use although the environmental and pollution disbenefits are arguably transferred 'upstream' to the electricity generators. There is no road tax on electric powered vehicles.

Modern electric powered vehicles are mainly cars or light vans. There is no current available technology to power heavier vehicles. Unfortunately, they are still viewed as lacking flexibility owing to limitations in range. A typical electric vehicle would be best suited to urban use and have a range of between 40 – 80 miles but this would tend to depend upon terrain and the stop start cycle. The range can be unpredictable and planning journeys are often necessary. Recharging the vehicle would generally take between 5 and 8 hours.

### 2.1.6 Hybrid Electric Vehicles

Hybrid electric vehicles are powered by petrol or diesel and electricity. The electric powered engine acts in a supportive role to the petrol engine to reduce fuel consumption. Hybrids are capable of delivering around 55 mpg from a gallon of petrol and do not, unlike battery powered vehicles, require recharging. They do however have a slightly lower acceleration and top speed. All hybrids use regenerative braking which means power is put back into the battery when the vehicle is slowed down using the brakes. This improves energy efficiency and reduces brake wear.

The cost of electric and hybrid vehicles is generally £1000 - £3000 more than a conventional vehicle and is more expensive to maintain. These costs can often outweigh any financial benefits gained through better economy, particularly if the vehicle was of low annual mileage. Hybrids are generally only available in conventional saloon car form and have slightly heavier payloads due to the additional batteries and electric engine.

### 2.1.7 Fuel Cell Vehicles

Fuel celled vehicles combine hydrogen, which is stored in a compressed form or derived from fuel rich forms like methanol or petroleum, and oxygen from

air to produce electricity. The technology is still in its infancy but is set to become more commercially available during the next decade. The application is currently geared towards larger heavy duty vehicles but as yet is not readily available.

## 2.2 Grant Funded Options

### 2.2.1 PowerShift Grants

The Government sponsors the Energy Saving Trust's PowerShift programme which aims to develop a sustainable market for clean fuel vehicles in the UK.

PowerShift promotes clean fuel vehicles and can offer grant support to local authorities and the private sector varying from 25% – 75% to help with the purchase of vehicles and conversion of existing vehicles which are proven to offer emissions benefits and which have been shown to be technically viable. These include vehicles running on natural gas (CNG and LNG), liquefied petroleum gas (LPG) and electricity (including hybrids).

PowerShift have a register of approved suppliers and provides financial advice to would-be purchasers. Grants are however are in great demand.

### 2.2.2 Clean Up Grants

As part of the Energy Savings Trust Clean Up programme, grants to clean up new and existing diesel fleets are also provided. These operate in a similar way to the PowerShift grant where funding of up to 60% is provided to fleet operator to convert vehicles to deliver lower levels of emissions in line with the latest Euro standards.

The clean up grants on offer are subject to a number of criteria

- Vehicles must run on diesel and be in service for at least another 3 years
- No previous grants can have been awarded for the vehicles
- Applications for conversions may be for one or a fleet of vehicles but must be carried out by an approved system supplier contained on the Clean Up register
- Grants are not available for vehicles that run on red 'low duty' diesel which is used on agricultural and horticultural vehicles like tractors and mowers.

The grants are available for UK operators of commercial and public sector diesel vehicles which include Refuse Collection trucks and there is a variety of conversion technology available upon the register including LPG, CNG, Particulate Traps, SCR's.

### 2.2.3 Reduced Duty Incentives

In the past the government has reduced the duty on environmentally friendly fuels like LPG, CNG and Bio diesel as an incentive to operators to convert their fleets and try new alternatives. However, the financial benefits of using such fuels can be short lived as the duty is reviewed annually in each March budget.

Most recently, the duty on LPG which was heavily discounted a few years ago, is to progressively to be increased over the next three years to fall in

line with other more conventional fuels. CNG duty is still advantageous over all other fuels and both LPG and CNG offer reduced duty incentives when compared to bio diesel.

Such benefits should however, not be relied upon as long term budgetary management incentives.

The current duty on fuels since the recent budget is as follows:

- Ultra Low Sulphur Diesel – 49.2 pence per litre
- Sulphur – free petrol/diesel – 48.52 pence per litre
- Bio diesel – 28.52 pence per litre
- LPG – 13.03 pence per Kg (7.8 pence per litre equivalent)
- CNG/CLG – 11.10 pence per Kg (7.5 pence per litre equivalent)
- Red Diesel – 6.64 pence per litre

# 3. THE PRESENT FLEET ANALYSIS AND LIKELY FUTURE NEEDS

## 3.1 Current Position – Vehicle Type, Numbers and Usage

The fleet currently operated by the Council consists of 38 No. road going vehicles. There are also 2 No. Schmidt Sweepers, 2 No. Tractors and 6 mowers. These vehicles are spread across all departments.

Appendix A shows the vehicles currently in use by the authority with a profile of their mileage, fuel usage and the number of remaining years of likely use.

The tractors and mowers which are not included in this analysis operate on Red Duty Reduced Diesel. All of the other roads going vehicles run on Ultra Low Sulphur Diesel which is dispensed from the council's own depot facility.

Petroleum is also dispensed in small quantities for use by the Grounds Maintenance Division in plant such as strimmers and chainsaws.

There are 22 No. Medium sized vehicles in the form of Pick ups, Tipper Trucks and Panel vans and 6 No. light vehicles consisting mainly of car derived vans. None of the medium or light vehicles are fitted with emission control devices.

The majority of the 10 No. larger heavy duty RCV vehicles operated by the Refuse Section (including 1 No. hired vehicle) are already equipped with emission reduction equipment in the form of Continuous Regenerating Particulate Traps (CRT's) and have been grant funded during the purchase stage to meet Euro standards of the time (Euro III).

One refuse freighter, which is shortly due for replacement, has no emission control system.

No further grant funding would be available for any vehicles that have already received grants or have already been fitted with emission control devices, therefore any additional costs to make further improvements to these vehicles would fall upon the Council.

All vehicles are maintained by the Council's own fitters in the vehicle maintenance workshop.

Specialist work on vehicles is generally carried out by manufacturers or their designated agents.

Every vehicle is serviced in accordance with manufacturer's recommendations and tested annually.

The total collective annual mileage of the fleet is approximately 420,000 miles which uses around 237,000 litres of fuel (52,000 gallons)

Figure 1 illustrates the category of road going vehicles used by each department, their respective annual mileages, fuel consumption and the current level of emission reduction against each of the 4 primary sources of pollution from diesel. The information is then weighted based upon the annual total consumption of fuel to present the likely overall emissions of the fleet.

| Department | No./Vehicle Type | Total Annual mileage/%age of Total | Total Annual fuel Consumption /%age of Total (Ltrs) | Emission Regulation Type | Percentage Reduction of Emissions in | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Particulate Matter (PM) | Hydro Carbons (CH) | Nitrous Oxides (NOx) | Carbon Monoxide (CO) |
| Cleaning | 5 No/Medium | 93,323 | 20,077 | None | Nil | Nil | Nil | Nil |
| Refuse | 9 No/Heavy | 123,929 | 172,877 | Euro III CRT | 75 to 95% | 75 to 95% | 0 to 5% | 75 to 95% |
| | 1 No/Heavy | 16,284 | 14,198 | None | Nil | Nil | Nil | Nil |
| | 1 No/Medium | 18,399 | 3,283 | None | Nil | Nil | Nil | Nil |
| Grounds | 4 No/Medium | 26,292 | 5,916 | None | Nil | Nil | Nil | Nil |
| | 1 No/Light | 4,214 | 1,109 | None | Nil | Nil | Nil | Nil |
| Housing | 11 No/Medium | 78,469 | 13,560 | None | Nil | Nil | Nil | Nil |
| | 1 No/Light | 5,381 | 672 | None | Nil | Nil | Nil | Nil |
| Env Health | 3 No/Light | 41,563 | 3,905 | None | Nil | Nil | Nil | Nil |
| Leisure | 1 No/Medium | 3,156 | 503 | None | Nil | Nil | Nil | Nil |
| Pool Vehicle | 1 No/Light | 7,724 | 693 | None | Nil | Nil | Nil | Nil |
| | **Totals** | 418,734 | 236,793 | | | | | |
| **Weighted Percentage Reduction of Fleet Emissions by Fuel Consumption** | | | | | 55 - 70% | 55 - 70% | 0 – 3.65% | 55 - 70% |

FIGURE 1

## 3.2 Analysis of Data

Despite the 29 of the 38 fleet vehicles having no specific emissions control, from analysis of the data contained in Figure 1, it is clear that the Refuse Division is by far the biggest consumer of diesel fuel. The total annual consumption of the CRT fitted Refuse Trucks during the period from May 2003 to May 2004 represents around 73% of all diesel fuel used by the fleet.

The Refuse Division also contributes to around 38% of the overall fleet mileage.

The remainder of the fleet are responsible for consuming approximately 50,000 litres of diesel fuel which represents roughly 280,000 miles.

In essence, this effectively means that almost three quarters of emissions generated by the council's fleet are covered under the latest Euro III standards. Only one vehicle fails to meet this standard and this is due for renewal. If its replacement is included this would improve emission regulation to around 80%.

Averaged out over the fleet usage of fuel, this means that 55 – 70% of all Particulate Matter, Hydro Carbons and Carbon Monoxide are being extracted from emissions and that 75% of all fuel emissions are meeting the latest industry emission standards. The only area where improvements could therefore be made are on Nitrous Oxide emissions from the refuse fleet and the remaining 25% of fuel used by the remainder of the fleet.

## 3.3 Likely Future Fleet Deployment Needs

From discussions with the Transport and Departmental Managers, it is likely that as well as 'like for like' replacements there will be an increase in demand for additional vehicles during the next year. This is due to increased demands in the services.

These replacements will provide the Council with the opportunity to consider its purchasing policy to provide the best environmental benefits as well as any opportunities to improve its current fleet in line with the latest emission technologies that are readily available.

# 4. CONCLUSIONS AND SUMMARY

## 4.1 Conclusions of the Present Green Position

From analysis of the current fleet's position, it is clear that the Council's original decision to operate Euro III compliant Refuse Trucks with CRT's has significantly improved its performance in recent years regarding the overall emissions of the fleet. This is despite the higher proportion of numbers of medium and light vehicles. As a consequence any areas for improvement on PM, CH and CO emissions would be at best marginal.

### 4.1.1 Improving Current Diesel Emission Technology

NOx emissions from the existing Refuse fleet could be improved by up to 85% by the latest technology but this would involve converting each vehicle to a combination of a compatible Continuous Regenerating Particulate Trap (CRT) with a Selective Catalytic Converter (SCR). Alternative additive technology could provide halfway solution but unfortunately owing to the requirements of the Clean Up grant, the funds for conversion would not be available and the full cost (£4000 - £8000/vehicle plus maintenance) would fall upon the Council.

It may be that such additional costs could be considered to outweigh any environmental benefit and therefore, in the case of the existing Refuse fleet, it could be sensible to accept the position and replace with the latest available technology when each vehicle reaches the end of its leased working life.

Of the remainder of the existing fleet, Clean Up grants should be available for 3 No. of the existing medium sized vehicles currently deployed on Cleaning and Grounds. Technology is available to reduce emission levels for all four of the major pollutants in diesel.

The net cost to the Council after grant funding is likely to be in the region of £2000 for each vehicle depending on the type of system and the type of vehicle.

### 4.1.2 Introducing Bio diesel to Current Fuel Facilities

The development of bio diesel may open up opportunities for use by the existing fleet. This could be blended with the existing Ultra Low Sulphur Diesel at proportions agreed by the current manufacturers to provide more environmentally sustainable opportunities for the Council.

Bio diesel offers one of the few renewable energy solutions not having been taken from natural resources.

The cost and impact of storage in the depot and administration of the fuel would be minimal to the authority, as they already exist.

Although there is no financial benefit Bio diesel could also be used as a replacement to the Red diesel currently used in Tractors and Mowers.

### 4.1.3 Installing an LPG Facility

The practical applications of an LPG conversion lie with the likely number of vehicles that would be powered by the fuel. Nox reductions would undoubtedly be achieved when compared to the existing diesel powered

fleet and the cost of installing an LPG fuelling facility could be written down through a lease agreement with a designated provider like Auto Gas. Vehicle conversion costs would be similar to that of diesel exhaust after treatments like CRT's at around £500 - £1800 per vehicle

LPG could be used to power all the light vehicles and a sizeable proportion of the medium sized vehicles. Financially, however, LPG may not be a practical option if the facility is purely limited to the 6 No. light vehicles only. Introduction of LPG to all suitable vehicles would be likely to take 5 years to achieve as leases on the existing light and medium sized vehicles come to an end. Owing to the limited number of local fuelling facilities, consideration would also have to be given to accommodate a fuelling facility within Darklands Road Depot. Fire procedures would also need upgrading as well as training to all users of the fuel.

Advances in small engine technology combined with the development of CRT's and SCR's for smaller diesel engine vehicles have significantly narrowed the advantages of Nox reduction that would have been evident a matter of a few years ago and many authorities that originally embarked wholesale on LPG are now reviewing their policies. So to with the financial advantages gained with reduced duty on LPG which is now due to be changed over the next few years.

### 4.1.4 Installing a CNG Facility

The environmental benefits currently being achieved by combined CRT and SCR systems offer similar results to that being offered by CNG. Nox levels could be reduced on the existing CRT only fleet but the cost of installation and conversion of the Refuse Fleet would be considerably higher than an equivalent diesel SCR conversion.

Although technology is available for medium and lighter vehicles CNG would be better served for use with Heavy Duty vehicles only save for the payload restrictions. A significant investment in a fast fuelling facility and a long term commitment to CNG would also be necessary (more likely in conjunction with a gas supplier). Conversion would be restricted to replacement vehicles only and would take around 6 years to achieve during which time both diesel and CNG would need to be used on the fleet.

CNG is not, therefore considered to be a viable practical or financial option.

### 4.1.5 Trialling Electric Vehicles

The deployment of an electric powered fleet in place of the current light diesel fleet would be a speculative risk owing to the restriction in range of each vehicle and their lack of versatility. As such this does not present a practical option. However, electric vehicles without question offer the greenest of all the current technologies. Therefore, the Council may wish to consider trialling a vehicle in place of one of the existing light Car Derived Vans in order to establish if there is a practical application for such a vehicle.

Apart from establishing a power supply, setting up costs would not be as significant as LPG or CNG given that agreement could be reached with a suitable vehicle provider.

## 4.2 Summary

Having considered the appropriateness of the readily available green fuels and technologies to reduce emissions, the Council will need to consider its present position in order to move forward.

Most certainly the current policy of maintaining a diesel fleet has kept the position comparatively straightforward and allowed the Council to embrace the technological advances of exhaust after treatment for its Refuse Fleet and keep overall emissions comparatively low. This technology is now also available for medium vehicles and could consequently cover the bulk of the fleet if the council decided to maintain its position. A single fuel policy would minimise the cost and disruption of installing new facilities and training staff to use them. Clean up grants would also be available for new and existing vehicle conversion.

The advent of bio fuel technology could also strengthen the case for maintaining a 'diesel only' policy with the likelihood that this technology will continue to improve and allow the council to reconsider its use and application in conjunction with its use of diesel. Financial duty incentives do also currently exist to use the fuel.

Converting to CNG offers a limited attraction for the Council owing to payload limitations and refuelling time, such technology would likely to be limited for use with the Refuse Fleet. Conversion costs could be grant funded and similar to that of a full diesel after treatment system but this would only be on replacement vehicle and would therefore take around 6 years to achieve. A slow fill facility would cost around £5000 to install. It does at present, however, like LPG offer some additional duty advantages over bio diesel.

LPG could offer a solution for much of the fleet other than the Refuse Trucks but would involve a wholesale commitment to conversion of all eligible vehicles. Over the replacement cycle, the bulk of conversions could be achieved in 2 – 3 years. The environmental benefits would be significantly improved when compared to the existing Medium and Light fleet. The capital costs of conversion would vary upon the size of vehicle but with grant funding would be in the region of £500 - £1500. Any new fuelling installation in the depot would likely be supplied free of charge subject to agreement on minimum consumption and timescale with an LPG supplier. The facility would take up extra space and is likely to need planning permission. The environmental and cost advantages compared to other fuels are however, being made less attractive as diesel technology improves and the duty advantages offered by the chancellor diminish.

Electric Vehicles offer the best environmental and clean air advantages but have some considerable limitations. The cost of an electric charging point would be likely to be less than £1000. However, the application of such a vehicle would be restricted to light vehicle use only. Acquiring such a vehicle without first trialling its appropriateness for purpose would be unwise.

Hybrid Vehicles like Fuel Celled vehicles are not readily available at present in any commercial vehicle form as industry continues to experiment with the technology. They therefore do not offer a practical solution for the fleet in general.

In summary, there does remain a strong argument for continuing with diesel and incorporating the latest bio diesel and exhaust after treatment technology within a replacement programme.

However the benefits of both LPG and Electric vehicles are also evident, the Council therefore may wish to consider looking into their most appropriate application. It may at this stage be better to conduct a series of trials before embarking on a full scale commitment to either technology.

# 5. ANLYISIS OF GREEN FLEET OPTIONS

## 5.1 Option Matrices

The following matrices bring together the financial, environmental and operational implications of the each option. These are presented against the green fuel applications that are available for each category of vehicle. They are:

- Heavy Duty, being made up of the Council's Refuse Collection Vehicles.
- Medium, consisting of vehicle 7.5 tonne and below and made up of a variety of Pick Up Trucks and Panel Vans.
- Light, consisting of mainly Car Derived Vans.

Each financial benefit has been evaluated against a likely capital expenditure for installation of facilities, conversion of vehicles (where necessary and accounting for any grant benefit) and the current estimated annual duty benefits for the various fuels. This figure is based upon the annual consumption of each vehicle type and taking into account any likely reduction in performance for each fuel type and any possible increase cost of fuel provision.

**5.1.1 Heavy Duty Vehicles (10 No.)**

| Option Number | Option Type | Financial Implications | | Environmental Implications<br>% ages relative to ULSD - Emission Consequences | | | | Operational Implications | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | Capital<br>£ | Revenue Benefits or Costs +/- £ | | | | | | |
| 1 | Status Quo (Using ULSD and CRT Traps) | Nil | None | Continue to emit NOx from current CRT converted Fleet | | | | None | |
| | | | | PM -95% | CH -95% | Nox -5% | CO -95% | | |
| 2 | Status Quo plus all new vehicles fitted with CRT/SCR system | £2000 per vehicle X 10 vehicles (£20,000) | Up to £350 per vehicle maintenance costs X 10 vehicles (£3,500) | Significant reduction in NOx as replacement of vehicles occurs over lease terms | | | | Hazardous Chemicals used as dosing agent for SCR system. Needs special storage and training. Maintenance costs | No further grants for existing fleet. Will take time to achieve over life of existing fleet |
| | | | | PM -95% | CH -95% | Nox -85% | CO -95% | | |
| 3 | Bio diesel | As either above | Nil to + £350 per vehicle | Slight additional reduction of PM's and CO. Slight increase in Nox. **A renewable energy source** | | | | Risk of invalidating engine guarantee. Consultation with manufacturers necessary | Environmental benefits based upon a 5% mix of bio diesel. Potential to increase benefits as technology develops |
| | | | | PM -95% | CH -95% | Nox -5% to -85% | CO -95% | | |

| Option Number | Option Type | Financial Implications | | Environmental Implications | | | | Operational Implications | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | Capital £ | Revenue Benefits or Costs +/- £ | % ages relative to ULSD - Emission Consequences | | | | | |
| 4 | CNG | +£5000 Slow Fill station + 3,500 per vehicle conv'sion after grant funding | Up to - £2,300 per vehicle @ 20 p/litre cost saving but 15% less efficiency | Significant reduction in PM, CH, CO and NOx | | | | Training of Users. Installation of Fuelling Facility to Depot. Reduced weights of collectable Refuse owing to added payload. May require additional vehicle and staffing resources to compensate | Existing Fleet conversion would not be eligible for grants until replacement. Long Term commitment needed |
| | | | | PM -95% | CH -95% | Nox -85% | CO -95% | | |
| 5 | LPG | N/A | N/A | N/A | | | | N/A | Not appropriate technology for Heavy Duty Vehicles |
| 6 | Electric | N/A | N/A | N/A | | | | N/A | No readily available technology for Heavy Duty vehicles |
| 7 | Hybrid | N/A | N/A | N/A | | | | N/A | No readily available technology for Heavy Duty vehicles |
| 8 | Fuel Cells | N/A | N/A | N/A | | | | N/A | No readily available technology for Heavy Duty vehicles |

**5.1.2 Medium Duty Vehicles (22 No.)**

| Option Number | Option Type | Financial Implications | | Environmental Implications | | | | Operational Implications | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | Capital £ | Annual Benefits or Costs £ | | | | | | |
| 1 | Status Quo (using ULSD but no CRT Traps) | Nil | Nil | Continue to emit PM, CH, CO and NOx from current Medium Fleet | | | | None | |
| | | | | PM 0% | CH 0% | Nox 0% | CO 0% | | |
| 2 | Status Quo (using ULSD but with CRT Traps) | +£1000 per vehicle con'v'sn X 22 vehicles (£22,000) | Nil | Reduce PM, CH, CO but not NOx from current Medium Fleet | | | | None | Opportunity to immediately convert 3 No. of existing fleet vehicles with CRT through funding and reduce further PM,, CH and CO emissions. Remaining vehicles can be converted as leases expire and attract funding |
| | | | | PM -95% | CH -95% | Nox -5% | CO -95% | | |
| 3 | Status Quo (using ULSD but with CRT /SCR Traps) | +£1500 per vehicle conv'sion X 22 vehicles (£33,000) | Up to £200 per vehicle maintenance costs X 22 vehicles (£4,400) | Significant reduction in NOx as replacement of vehicles occurs over lease terms | | | | Hazardous Chemicals used as dosing agent for SCR system. Needs special storage and training. Maintenance costs. | Opportunity to immediately convert 3 No. of existing fleet vehicles with CRT/SCR through funding and reduce further PM,, CH, CO and NOx emissions. Remaining vehicles can be converted as leases expire and attract funding |
| | | | | PM -95% | CH -95% | Nox -85% | CO -95% | | |

| Option Number | Option Type | Financial Implications | | Environmental Implications | | | | Operational Implications | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | Capital | Annual Benefits or Costs | | | | | | |
| 4 | Bio diesel | As Either Above | Nil to + £40 per vehicle | Slight reduction in PM's and CO Slight increase in Nox. **A renewable energy Source** | | | | Risk of invalidating engine guarantee. Consultation with manufacturers necessary | Environmental benefits based upon a 5% mix of bio diesel. Potential to increase benefits as technology develops |
| | | | | PM -95% | CH -95% | Nox -5% to -85% | CO -95% | | |
| 5 | CNG | +£5000 Slow Fill station + 2,500 per vehicle conv'sion after grant funding | Up to - £220 per vehicle @ 20 p/litre cost saving but 15% less efficiency | Significant reduction in PM, CH, CO and NOx | | | | Training of Users. Installation of Fuelling Facility to Depot. Reduced weights of collectable Refuse owing to added payload. May require additional vehicle and staffing resources to compensate | Most of existing fleet, except for 3 No. of the younger vehicles would not be eligible for grants until replacement. May be an impractical option owing to significant reduction in payload |
| | | | | PM -95% | CH -95% | Nox -85% | CO -95% | | |
| 6 | LPG | Nil installation cost +£1500 per vehicle conv'sion | Up to - £220 per vehicle @ 20 p/litre cost saving but 15% less efficiency | Significant reduction in PM, CH, CO and NOx | | | | Training of Users. Installation and space of Fuelling Facility. Slight reduction of carrying weights owing to added payload. Possible planning consent | Most of light vehicle would be eligible for grant funding at replacement stage. Phasing could take 3 - 5 yrs |
| | | | | PM -95% | CH -95% | Nox -85% | CO -95% | | |
| 7 | Electric | N/A | N/A | N/A | | | | N/A | No readily available technology for Medium sized vehicles |
| 8 | Hybrid | N/A | N/A | N/A | | | | N/A | No readily available technology for Medium sized vehicles |

| Option Number | Option Type | Financial Implications | | Environmental Implications | Operational Implications | Comments |
|---|---|---|---|---|---|---|
| | | Capital | Annual Benefits or Costs | | | |
| 9 | Fuel Cells | N/A | N/A | N/A | N/A | No readily available technology for Medium sized vehicles |

**5.1.3 Light Duty Vehicles (6 No.)**

| Option Number | Option Type | Financial Implications Approx £ | | Environmental Implications | | | | Operational Implications | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | Capital £ | Annual Benefits or Costs £ | | | | | | |
| 1 | Status Quo (using ULSD) | None | None | Continue to emit PM, CH, CO and NOx from current Medium Fleet | | | | None | |
| | | | | PM 0% | CH 0% | Nox 0% | CO 0% | | |
| 2 | Status Quo (using ULSD but with CRT/ SCR Traps) | N/A | N/A | Only estimated 20% Nox reduction | | | | Hazardous Chemicals used as dosing agent for SCR system. Needs special storage and training. Maintenance costs. | New light vehicle diesel emissions technology using techniques similar to CRT/SCR emissions processes isnow developed to meet separate Euro IV regulations |
| | | | | PM -95% | CH -95% | Nox -20% | CO -95% | | |
| 3 | Bio diesel | As Above | Nil to + £20 per vehicle | Slight reduction in PM's and CO Slight increase in Nox. **A renewable energy Source** | | | | Risk of invalidating engine guarantee. Consultation with manufacturers necessary | Environmental benefits based upon a 5% mix of bio diesel. Potential to increase benefits as technology develops |
| | | | | PM -95% | CH -95% | Nox -20% | CO -95% | | |
| 4 | CNG | N/A | N/A | N/A | | | | N/A | No readily available technology for light vehicles |

| Option Number | Option Type | Financial Implications Approx £ | | Environmental Implications | | | | Operational Implications | Comments |
|---|---|---|---|---|---|---|---|---|---|
| | | Capital | Annual Benefits or Costs | | | | | | |
| 5 | LPG | Nil inst'tion +£500 / vehicle conv'sion | Up to -£130 per vehicle @ 20 p/litre cost saving but 15% less efficiency | Some reduction of NOx and slight reduction in CO | | | | Training of Users. Installation and space of Fuelling Facility. Slight reduction of carrying weights owing to added payload. Possible planning consent | Most of light vehicle would be eligible for grant funding at replacement stage. Phasing could take 3 - 5 yrs |
| | | | | PM -95% | CH -95% | Nox -85% | CO -95% | | |
| 6 | Electric | >£1000 charging point Added £2500 cost to purchase | Up to -£200 per vehicle based upon fuel savings less costs of recharging | No emissions. Unknown upstream emissions from electricity generation | | | | Training of Users. Installation of charging point. Long re charging times. Limited Range of vehicle | Limited Availability of vehicles |
| | | | | PM - 100% | CH - 100% | Nox - 100% | CO - 100% | | |
| 7 | Hybrid | N/A | N/A | N/A | | | | N/A | No readily available technology for light vehicles |
| 8 | Fuel Cells | N/A | N/A | N/A | | | | N/A | No readily available technology for light vehicles |

# 6. GLOSSARY

**PM – Particulate matter** like soot found in diesel fuel which is harmful to health and causes environmental pollution

**CH - Uncombusted Hydrocarbons** which are the product of inefficient burning of diesel but are also slightly present in Petrol, LPG and CNG and like PM are harmful to health and create environmental pollution

**NOx – Nitrogen Oxides** prevalent in diesel and present in petrol, LPG and CNG at around half the quantity, NOx is emitted as a toxic gas which is harmful to health, poisonous, creates environmental pollution and acid rain

**CO – Carbon Monoxide** being the product of exhaust gasses from diesel, petrol, LPG and CNG, CO is poisonous and converts naturally in the air with oxygen to form Carbon Dioxide (CO2) which is a greenhouse gas.

**VOC – Volatile Organic Compounds** an evaporate present in petroleum and in LPG and CNG in less quantities, VOC's can aggravate respirator functions and produce greenhouse gasses and ozone

**LPG – Liquefied Petroleum Gas** an alternative road fuel and the product of crude oil

**CNG – Compressed Natural Gas** an alternative road fuel and product of natural gas wells and crude oil

**CRT – Continuously Regenerating Traps** an exhaust after treatment system that removes the majority of PM, CH and CO from exhaust gasses produced by diesel engines

**SCR – Selective Catalytic Reduction** similar to a CRT an SCR system also reduces the majority of NOx from diesel exhaust gasses and combined with a variety of fuel additives converts the gasses into harmless nitrogen and water

**ULSD – Ultra Low Sulphur Diesel** normal diesel which has refined and processed to reduce the content of sulphur to a minimum