Department for Transport

Traffic Advisory Leaflet 9/00
December 2000

SCOOT® Estimates of Emissions from Vehicles

SPLIT CYCLE and OFFSET OPTIMISATION TECHNIQUE

Introduction

This leaflet expands the advice given in TAL7/99 on the effects that SCOOT® can have on the levels of vehicle emissions. More information about SCOOT® is available at **www.scoot-utc.com** .

Background

Many studies have shown that air pollution effects peoples health. UK road traffic makes a significant contribution to emissions of particles(including PM_{10} [1]), volatile organic compounds (VOCs), oxides of nitrogen(NOx) and carbon monoxide (CO). The importance of road vehicles to air quality is even more apparent in urban areas where typically 95% or more of CO emissions and over 60% of emissions of NO_2 are due to local traffic.

Local authorities responsibilities

Local authorities in the UK have an obligation to manage air quality within their areas. The process of local air quality management involves them in a review and assessment of air quality in their areas, against standards and objectives set out in the Air Quality Regulations 2000 and

the Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS). Where there is a high risk that objectives for a particular pollutant will not be met, then local authorities are required to designate an Air Quality Management Area (AQMA) and develop an action plan to achieve improvements.

Many local authorities are well on the way to completing their review and assessments, and early indications are that more than 100 will need to designate an AQMA. Nitrogen dioxide (NO_2) and Particulate matter (PM_{10}) will be the pollutants for which most of the designations will be made, but Carbon monoxide (CO) may also be of concern for some areas. Developing an action plan in pursuit of the objectives for these pollutants is the next step facing these local authorities.

How SCOOT® can help

SCOOT® has been modified to provide information on the contribution of road traffic to air pollution. Version 4 of SCOOT® introduced estimates of pollutants emitted from the exhaust pipes of vehicles within the SCOOT® controlled area.

The pollutants estimated are:

- Carbon dioxide, CO_2
- Carbon monoxide, CO
- Oxides of Nitrogen, NOx
- Volatile organic compounds, VOC
- Particulate matter with an aerodynamic diameter of less than 10µm

The estimates are based on relationships between link speed, vehicle type and pollutant emissions. The SCOOT® model provides estimates of the delay on all links. With the addition of information on link length, the model converts the delay estimate into link speed to produce a rate of emission per vehicle. The total emission on each link is the estimated rate of emission multiplied by the link length. A standard mix of vehicle types is used by default in the calculations, through different proportions of vehicle types can be entered where there is significant departure form the UK national averages in a city, on a particular link such as a bus only road or in a different country.

Estimates of emissions are available for individual links or aggregated, as required. They are provided numerically as standard, but can also be input to the ASTRID database for storage and analysis.

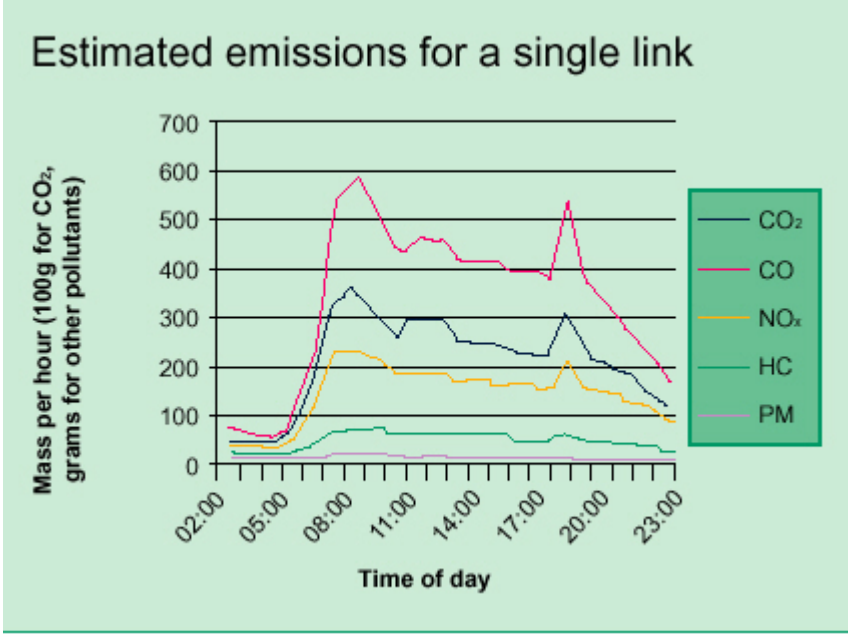

Figure 1

Estimates of emissions are available for individual links or aggregated, as required. Typical examples showing the variation on a single link are shown in Figures 1 & 2.

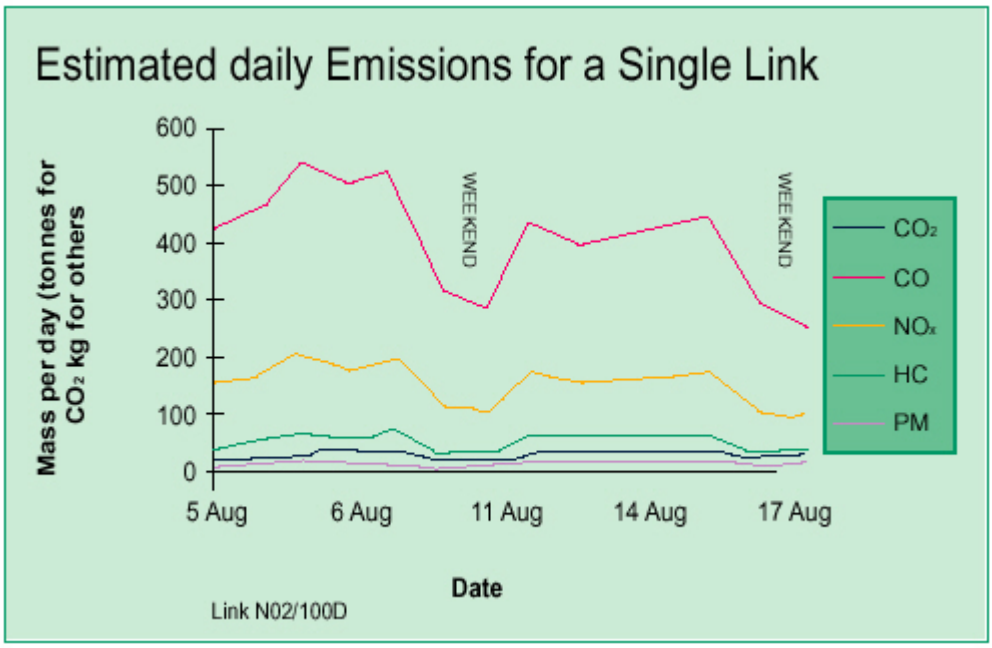

Figure 2

As well as estimating emissions, SCOOT® can help lower the overall level by reducing delays, and the SCOOT® traffic management features can be used to help manage them. For example, an experiment using the SCOOT® gating facility to relocate queues is taking place on the Soho Road (A41) in Birmingham. In the morning peak, traffic is held at the outer end of the radial road, in an open area near the M5 motorway, to protect conditions where the Soho Road passes through Handsworth. Peak emissions of pollutants are estimated to have fallen by between 5and 6% over the whole length of the protected section of road, where there is considerable pedestrian activity and a number of buildings close to the road. A large increase in pollutants is estimated at the relocated queue, but as this is in an open area few non-travellers will be affected. Overall, the average exposure to pollutants has been reduced.

This experiment is one example of how SCOOT® can greatly assist in the quest to reduce pollution from vehicles in urban areas.

- By reducing delays, SCOOT® reduces the overall levels of emissions.
- By managing emissions through the traffic management facilities in SCOOT ®, for example by relocating queues and emissions in less sensitive areas.
- By the use of tools provided in version 4 of SCOOT® estimates of the emissions from vehicles in each link in the area that is under control are derived. Different strategies can then be evaluated to reduce these levels.

References

1. P B Hunt, D I Robertson, R D Bretherton and R I Winton. SCOOT®- a traffic responsive method of co-ordinating signals. TRL Laboratory Report1014.(1981).

2. S Sheam and K Wood. The production of emissions estimates using SCOOT®. Proceedings of Seminar C at the25th European Transport Forum (September 1997).

3. R D Bretherton, K Wood and G T Bowen. SCOOT® Version 4.Proceedings IEE 9th international conference on Traffic monitoring and control. London. (April 98).

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