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TITLE Accident blackspot investigation

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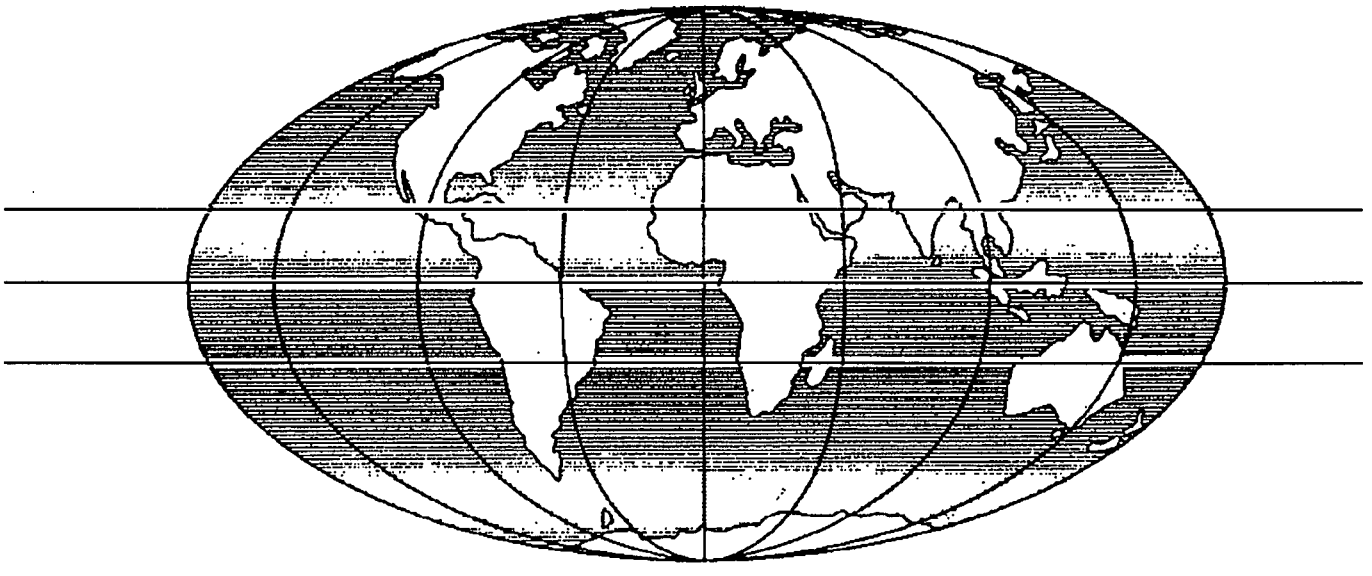

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ACCIDENT BLACKSPOT INVESTIGATION

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OBJECTIVES

To present an outline of the steps needed by investigators to carry out blackspot accident investigation.

INTRODUCTION

There are two complementary approaches to accident investigation work; accident reduction, in which measures are taken to reduce the number and severity of accidents, and accident prevention. Accident prevention is the application of remedial measures preventing accidents from taking place in the future.

The phenomenon of accident clusters has been recognised for many years and there is considerable evidence showing that the identification and treatment of such sites with low-cost engineering remedial measures can be extremely cost-effective.

Approaches to accident cluster reduction includes Single Site, Mass, Area, and Route Action plans. Of the four basic strategies, the potential for accident reduction using simple low-cost remedial measures at single hazardous sites is particularly high. In terms of accident reduction and prevention, local authorities in the UK have had considerable success with low-cost engineering safety improvements directed towards treating accident clusters at localised sites.

Treatment can be classified into three main categories; road safety engineering measures, vehicle safety improvements and measures aimed at improving road user behaviour. These notes concern road safety engineering measures.

Treatment of locations involving such single sites, are generally known as 'blackspots' or 'high accident treatment sites'. In countries with limited experience of accident remedial measure work, this straightforward approach is likely to be the most effective.

Advantages of the low-cost blackspot approach includes the measures involved are affordable and that they can be introduced on an experimental basis until they have proven their worth. Low-cost measures can also provide a demonstration that the existing roads network can be made safer by small scale improvements without the need for large financial investments. For example, a study by (Helliar-Symons and Lynham) showed for selected accident and reduction programmes in the UK, First Year Rates of Return ranged from 65 to 950 per cent.

TECHNICAL PROCEDURES AND DATA REQUIREMENTS

1. Data collection and analysis

Figure 1 illustrates 12 essential steps of accident investigation. The success of most accident reduction programmes are heavily dependent on the existence of a reliable and easily analysed data base. Probably the most valuable and common source of road accident data are the accident report forms/booklets completed by reporting police officers at the scene of a road traffic accident (Police).

Essential elements of an accident report form include factual and accurate data about the accident location, the casualties and vehicles involved, the immediate environment and witness' statements. Arguably the most important information recorded in a police booklet relates to accident location.
Sources of additional data include hospital records, highway departments for traffic flow data, letters from the public, insurance companies, transport and bus companies, local councils etc.

Various analysis and investigations are needed at different stages of the investigation. Initially, a broad study of the data base is required identifying hazardous sites and locations. This data base should consist of three to five year's worth of information. Such a time span allows for sufficient accidents to have been amassed for meaningful analysis, helps reduce fluctuations in the data and should not be too long a time span for traffic flow and engineering changes to have affected results.

Increasingly, microcomputers are being used to analyse road accident data. TRL's Microcomputer Accident Analysis Package (MAAP) is among the foremost software packages available to developing countries for analysing road accident data.

The initial analysis of the accident data highlights the hazardous sites that will be subject future to detailed study with a view to introducing low-cost engineering treatment.

2. SITE SELECTION

Defining a blackspot is not straightforward. Given a range of approaches to data collation and variations in areas and locations under consideration, investigating bodies differ in defining what constitutes a blackspot. Resources available are also a consideration.

Sites chosen for further investigation may not necessarily be selected on the number and severity of accidents reported alone. Sites can be chosen on ranking or 'weighting' of accident severity or traffic flow. Traffic flow based criteria requires a reliable and constant source of traffic data. Reliable, long term traffic counting information is difficult and expensive to acquire and depending on how it is used bias the accident analysis towards sites with low traffic flows. Other factors reflected in accident weighting schemes can include type of road user injured, severity of injury and accident costs. This approach may favour pedestrian accidents rather than vehicle-vehicle collisions. Length of road may be a parameter in rural area considerations. However, in the UK, sites chosen for further study are for practical reasons, often selected on totals and severity of accidents alone, without reference to any measure of exposure such as traffic flow.

Given an agreed definition of a high accident site, then with accurate, adequate data and an analysis system it is then possible to rank selected sites in terms of their accident history (Step 1 - 4).

3. ADDITIONAL INFORMATION

Once a series of accident sites have been selected for possible treatment and before a decision can be made on which site(s) will be treated and the type of improvement work necessary, further information is usually needed. This extra data, obtained through site visits, should relate to both the site accident data and to the other factors that might help determine what the problem(s) at the site is/are. On-site visit data should include details of the road, its environment, vehicle features and road user characteristics. It is important that investigators become very familiar with the existing site conditions from the view of road users and the factors revealed in the accident analysis (Steps 5 - 7).

The final selection of site(s) for treatment is then based on the ranking of selected priorities eg severity and frequency of accidents, prevalence of specific road side features affecting the accidents recorded, the potential savings in accidents and cost benefit analysis.

4. CHOICE OF REMEDIAL MEASURE

Unless there are good reasons for it not working, it would be normal to implement the lowest cost solution first (Steps 8 - 9). Implementation of works should take place as soon as possible after detailed plans have been prepared. Upon completion the scheme should be carefully monitored, ensuring that no unexpected problems had been introduced at the site.

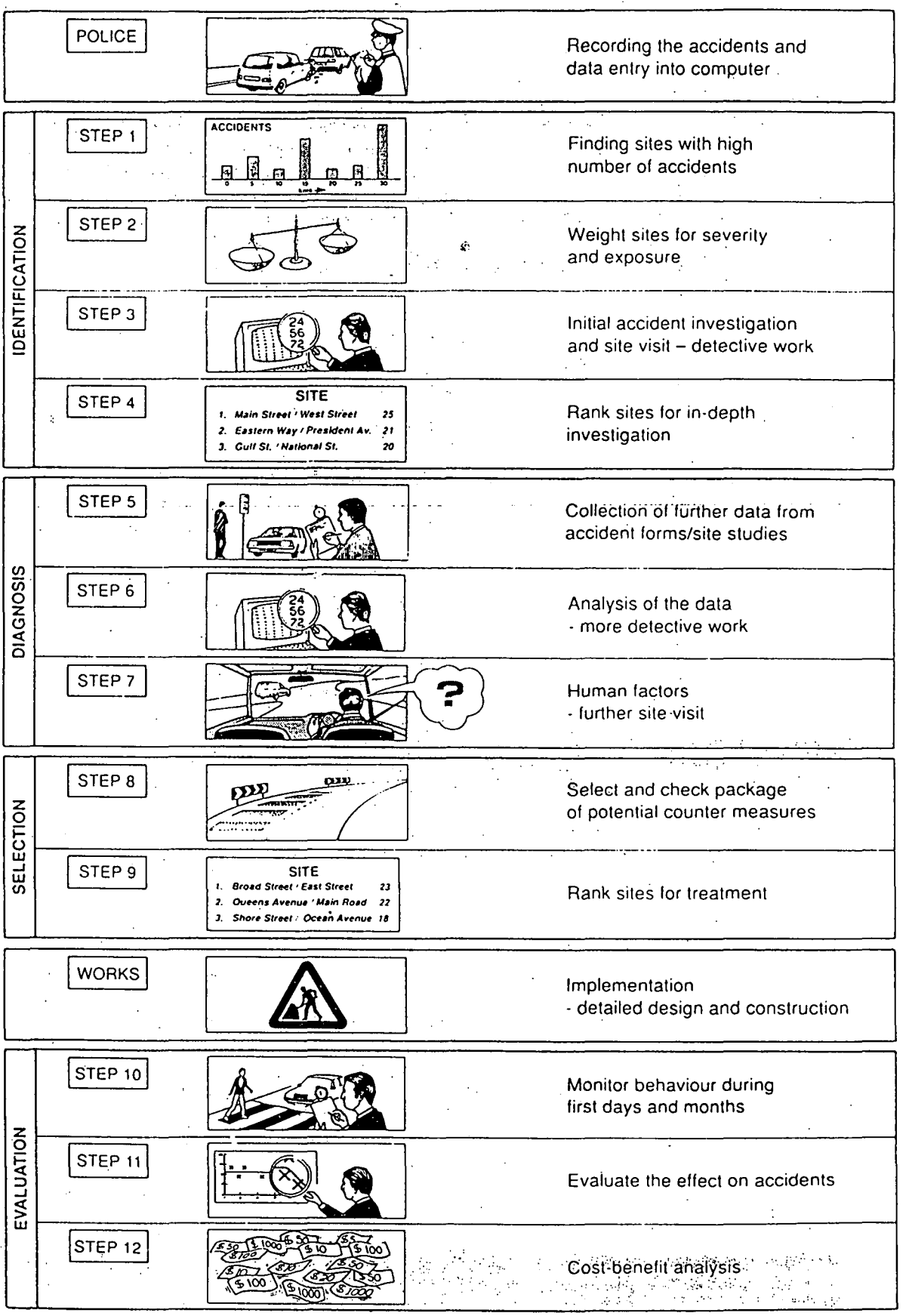

Figure 1 The twelve steps of accident investigation

5. SAFETY AUDITING

A basic premise in accident remedial work is that engineering safety principles are adhered to at all times and it is a necessary exercise to ensure that no adverse features are unwittingly introduced at a treatment site. In the UK safety checking is being adopted in a formal systematic way through safety auditing. Safety auditing may be defined as a systematic method of checking the safety aspects of new schemes affecting roads. By making extensive use of check lists, safety auditing aims at providing guidance on how to cater for the safety needs of the road user. Objectives of safety auditing include ensuring that all highway schemes operate as safely as possible and that accident producing elements are not present in any completed scheme. It is essential that safety auditing is carried out independently of the remedial measure design team.

6. MONITORING AND EVALUATION

Monitoring (Steps 11 - 12) not only enables an assessment of the action(s) taken, they can also play an important part in determining future strategies and policies.

Monitoring is usually carried out using 'Before and After' studies in conjunction with selected control data. Control data may be from untreated sites in the locality with similar characteristics to that of the treated sites or from reliable regional or provincial data. Use of control site data helps in eliminating extraneous factors that might affect the 'After' treatment accident levels eg government legislation that influences vehicle speeds etc. 'After' data should be examined in some detail. This will highlight whether the target group of accidents has reduced and whether any other accident type(s) has increased or been introduced.

There have been a number of studies (see bibliography) examining the best statistical methods for monitoring changes at treated sites. The Chi square test with Yates' correction for small numbers is commonly used to determine whether changes a the treated site are statistically significant. The test compares treated site data with data from the control sites.

A problem in evaluation studies include taking into account environmental changes such as closures to junctions close to the treated site, and random fluctuations. Random fluctuations make determining the effectiveness of treatment difficult and includes the regression to the mean effect. Here there is a reduction in accidents at a site(s) not due to any applied treatment but due to the random nature of road accidents. This is especially true of sites selected for the high number of accidents that might have occurred in a particular year.

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