

REVIEW OF FAIRGROUND SAFETY

Report to the Health and Safety Commission

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EXECUTIVE SUMMARY

Introduction

1.1 This paper reports to the Health and Safety Commission (HSC) on the Review of Fairground Safety. It was commissioned following a cluster of fatal accidents at fairground rides in the 2000 season. Specific conclusions and recommendations are listed in the various sections of the report, and are presented in summary below.

Summary of Conclusions

1.2 Risks to the public at fairs and amusement parks have proved to be quite small, on average, despite common perceptions to the contrary. For example, the risk of death from a typical session is estimated, on a pessimistic basis, at 1 in 83 million, which is:

- a) about one twelfth that from a typical walk to get to the site;
- b) less than one third of the risk of death at fairgrounds during the 1980s.

1.3 Nevertheless, no deaths or injuries at fairground accidents can be considered acceptable. Rigorous control of hazards is essential. The events of the 2000 season show that high standards of control have not always been maintained throughout the industry. This has resulted in pockets of unacceptable risk. Action taken since is likely to have reduced considerably the likelihood of repetition, but some additional measures are needed. The key question is what are the quickest and most effective means of achieving these changes.

1.4 A proposal for more legislation, such as compulsory licensing, remains an option to tackle these concerns. But the conclusion is that to introduce changes through this route could be slower, less flexible in adapting to changing circumstances, and no more effective than continuing to improve the existing regime and its enforcement by the industry and HSE.

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1.5 The current regime is considered to be fit for purpose as a flexible framework for continuing to improve accident prevention. It is based on a sound framework of law and industry-specific guidance, receives a high level of support from the leaders of the industry, and has been shown to be enforceable by HSE. If it is complied with fully, competently and diligently the risk of deaths and injuries will be minimised. There is a considerable "self-policing" by the industry of its members. This adds to the legislation, inspection and enforcement by HSE and should be viewed as a major benefit.

1.6 The continuing development of this regime could be seen as an early example of an industry and a regulator working together in line with the current model for "Revitalising Health and Safety". Assuming active support from the industry and HSE, further development of the existing regime involving a broader range of stakeholders is the recommended option. On this basis the recommendations for the development of the regime and the promotion of full compliance are as follows.

Summary of Main Recommendations

- 1.7 The current regime should be developed as soon as feasible by:
- a) putting in place specific guidance on the "Design" and "Inspection" of rides;
 - b) updating the guidance and clarifying the application of recent legislation;
 - c) introducing requirements for the public display of ride inspection certificates;
 - d) introducing a scheme for the registration of ride inspectors that is independent of HSE, is administered in a way that transparently avoids any conflict of interests, and includes effective arrangements for periodic sampling of the work of individual ride inspectors. This should be based on UKAS accreditation, subject to the development and consideration of detailed and costed proposals which HSE will pursue. This need not be part of a statutory scheme requiring legal changes if, as for lifting equipment, it becomes the accepted norm.

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1.8 The implementation and enforcement of the regime should be strengthened as follows:

- a) the industry associations should:
 - i) increase awareness, for example by means of regional workshops following on from earlier initiatives, and perhaps a video;
 - ii) ensure there are effective procedures to monitor full and diligent compliance by members;
- b) HSE should:
 - i) continue to take a firm and well publicised regulatory stance, especially where there is non-compliance with the ADIPS scheme;
 - ii) improve on this within existing resource by increasing the specialisation of operational inspectors dealing with fairgrounds and maintaining continuity of expertise in the Sector;
 - iii) audit the registered ride inspection bodies as planned;
 - iv) implement improvements to the handling of ride investigations and complaints.

1.9 Other recommended changes are that:

- a) the Fairgrounds Joint Advisory Committee should broaden its representation to include more direct input from consumers, local authorities and workers, and introduce with HSE support more streamlined procedures for agreeing guidance;
- b) the legislation controlling the allocation of enforcement between HSE and the Local Authorities should be simplified to make it easier to understand and operate.

1.10 In the longer term:

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- a) consideration should be given to supplementing the existing programme of research and guidance with projects to:
 - i) assess the probability of major accidents at fairs, and check the adequacy of countermeasures;
 - ii) create guidance for assessing younger childrens' behaviour on rides and how this affects standards for passenger restraint systems;
- b) HSE should continue to press for International Standards for ride design and construction, and to give active support to their development, in view of the importance of safety by design and the world wide trade in these machines;
- c) the industry associations should consider the development of training and quality standards for members as a means of assisting in the maintenance of high standards.

Costs and Benefits

1.11 The main long term costs of implementing all these recommendations would be in significantly increased fees for ride inspections. Although not quantified, these could rise by up to several hundred pounds per annual inspection, which could impact adversely on smaller ride controllers. Increases would cover:

- a) the appreciable costs of developing and managing an accreditation scheme;
- b) high standards of ride inspection throughout the industry;
- c) increased funding by the industry (either directly or by means of a levy on inspections) for work such as the production of Technical Bulletins and Guidance.

1.12 Benefits would be increased consumer confidence, and possibly reductions in the direct costs of accidents and in the potentially huge hidden costs to the whole industry of bad publicity arising from preventable accidents. More detailed work would be needed to demonstrate a positive cost-benefit.

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AIMS, SCOPE AND MANAGEMENT OF THE REVIEW

Justification

2.1 The review was commissioned following a cluster of fatalities to members of the public at fairground rides. After a period of 3 years without any such deaths there were 6 within 11 months. Concerns raised by issues uncovered by investigations prompted HSE to launch this review into the adequacy of the existing safety regime.

Aims

2.2 The aims as given were to:

- a) review the current regime for safety at fairground rides, as set out in “Fairground and Amusement Parks - Guidance on Safe Practice” (HSG175) (1), to assess its fitness for purpose;
- b) make recommendations on any issues needing to be developed within the current guidance, particularly whether the system of initial inspection and subsequent annual inspection should be part of a statutory Quality Assured regime;
- c) highlight any other issues of concern that may require a longer term, research based, analysis.

Scope

2.3 For reasons of time the review was intended to focus on the immediate issues exposed by recent incidents, i.e. risks to the public and workers from rides, and how those risks are controlled, rather than covering fairground safety in general.

2.4 The specific topics on which the review was tasked specifically to report, which are dealt with in sequence forming the titles of sections 6 - 11, were:

- a) product safety;
- b) initial test and annual inspection of rides;
- c) the competence and diligence of the ride inspection bodies;
- d) the adequacy of physical standards at rides;

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- e) the roles of fairground operators and arrangements for supervision;
- f) issues emerging from the current and relevant other investigations;
- g) the effectiveness of the Fairgrounds Joint Advisory Committee (FJAC).

2.5 Each of these elements in the current framework has been analysed to check if it is capable of being complied with, whether industry actions are in place to meet it, the extent of compliance, whether the industry can effectively self-regulate and how HSE would find out about non-compliance in order to take the appropriate enforcement action. The review takes account of the continuing evolution of the regime, with new features introduced this year.

2.6 For the purposes of this report:

- a) “rides” means fairground equipment classified as such in Table 2 of HSG 175. This includes machinery-type rides and inflatables such as bouncing castles, but excludes other attractions such as shooting galleries and catering facilities;
- b) coin operated “kiddie rides” are not included - they are subject to an alternative version of the Amusement Devices Inspection Procedures Scheme (ADIPS) (2);
- c) the term “fairground” means anywhere that rides are operated, and includes amusement and theme parks, travelling fairs and other venues.

Methodology

2.7 Although focussing on recent fatalities, the review has also collected and analysed additional information to avoid reaching misleading conclusions based on too small a pool of information. Consideration has been given to :

- a) fairground accidents of all levels of severity;
- b) the legislation and how it has been enforced;
- c) the views of stakeholder representatives, i.e.:
 - i) the industry associations;
 - ii) the ride inspectors;

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- iii) relevant government departments;
 - iv) other bodies concerned with health and safety of the public;
 - v) HSE's own inspectors and policy makers;
 - vi) local authorities;
 - vii) other individuals and bodies who approached the author as invited in HSE's press notice for the review;
- d) the requirements of other types of safety regime in Great Britain, for comparison - Accreditation of bodies for the inspection of lifting equipment, Registration of Gas Installers (CORGI), and Licensing of adventure activities (AALA).

Management of the Review

2.8 The review was carried out by Safety Policy Directorate (SPD) and Field Operations Directorate (FOD). It has had a high measure of internal independence and seniority, being under the control of:

- a) a Review Manager - Paul Roberts, H M Principal Inspector of Health and Safety, on secondment from Hazardous Installations Directorate, which has no direct involvement in fairground safety, in conjunction with the Food and Entertainment Sector of FOD (the "Sector");
- b) a Project Board consisting of 3 members of the Senior Civil Service:
 - i) Mike Fountain, Chairman - Technology Division (TD), which no direct involvement in fairgrounds;
 - ii) Allan Sefton - FOD;
 - iii) Jane Willis - SPD.

Consultation and Quality Control

2.9 External contributions to the review were invited by means of a press notice, information on HSE's web site, and an article in a newsletter to local authorities (LA's). There was also an interactive presentation to the FJAC on 4 December 2000, attended by the Chair of the Health and Safety Commission. Thanks are due

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to all those who gave up time to provide information and explain their views in a very open and constructive manner - the principal contributors are listed in Annex 3.

2.10 To monitor progress and to assure the quality of the report HSE has established a project board, a user assurance group and progress monitoring arrangements. The report has been subject to internal and external consultation before being published. Views are those of the author, validated by the Project Board on the basis of the information presented.

2.11 External quality control consisted of internal and external consultation on earlier drafts before presentation to HSC. Consultees were :

- a) those listed in Annex 3;
- b) other members of the FJAC;
- c) other people and organisations who asked to be consulted following the issue of the press notice.

2.12 The draft has been updated taking into account comments received. The findings are expected to be published on HSE's web site after consideration by HSE, subject to avoidance of any prejudice to current legal proceedings.

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OVERVIEW OF THE INDUSTRY

Introduction

3.1 This section provides background information about the industry, its principal trade associations, and how its organisation impacts on the regulation of safety.

3.2 The industry is important economically for leisure and tourism and, in the case of older traditional rides, for the preservation of national heritage. A trip to the fair or amusement park is an increasingly popular leisure activity. One major amusement park alone attracted 6.8 million visitors in the 2000 season, and the total numbers of passenger rides are estimated by industry sources to have doubled during the last decade to over 1,000,000,000 pa.

3.3 It is generally recognised by the industry that accidents result in bad publicity for all and are thus damaging commercially. The industry associations work together on safety with HSE, through the Fairgrounds Joint Advisory Committee (see Section 11) and related activities.

3.4 Sites can be categorised as:

- a) amusement and theme parks - fixed sites where rides are permanently or semi-permanently installed;
- b) travelling fairs - temporary sites, often occupied for the same slot each year, where travelling showmen set up and operate mobile rides;
- c) other - typically events where fairground rides are present but not as the main activity at the site.

Amusement Parks

3.5 Amusement parks are fixed sites where rides are installed permanently or semi-permanently. Many of the rides are the same as those used at travelling fairs, although naturally the largest ones tend to be found at parks.

3.6 The industry association for amusement and theme parks is the British Association of Leisure Parks, Piers and Attractions (BALPPA). Most parks are

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members, 120 in total of which 5 are based outside the UK. BALPPA has an annual income of £250k income and 4 staff. Lobbying of MPs and government departments over new legislation is an important role, and BALPPA is a founder member of Europarks, which exists to lobby the EU.

3.7 Adoption of the Amusement Devices Inspection Procedures Scheme (ADIPS - see later) is now a condition of membership. 2 major sites were said to have left BALPPA over this issue, but have since returned. BALPPA has promoted safety generally, and compliance with the current safety regime in particular. Action includes:

- a) putting time and effort into supporting the FJAC and subgroups;
- b) organising safety seminars;
- c) providing safety guidance;
- d) sharing information with members on accidents and incidents;
- e) circulating safety information and advice, and developing training material such as the BALPPA Certificate for Visitor Attraction.

3.8 Because they are static sites, parks can be inspected periodically by HSE on a pre-planned basis, with a frequency determined by overall risk in relation to other priorities.

Fairs

3.9 Travelling fairs have a long history and were originally intended as open markets for trading purposes, entertainment being a secondary feature. Over the years the entertainment aspect came to prominence and is still widely enjoyed today. Thousands of fairs of various sizes are held each year. Organisers arrange fairs, negotiate with the authorities for sites, and are responsible for the planning and layout of rides. Pitches, the spaces occupied by rides and attractions, are sublet to travelling showmen who control or own the rides.

3.10 Many travelling showman can be considered as one person businesses. They operate the rides themselves or with the assistance of a few attendants or

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family members. The industry is strongly hierarchical and most participants have family associations with it.

3.11 A recent report by the Environment, Transport and Regional Affairs Select Committee (3) "... totally rejected the view that travelling fairs have had their day." and expressed the view that "... it is very important that all the relevant regulators work together to help make travelling fairs a success." The same report stated that "Everyone seems to recognise how much the industry has to lose from any bad publicity surrounding safety. Through the Fairgrounds Joint Advisory Committee (FJAC), co-operation... with HSE has been very close. There is in place an agreed system of steps and checks which ensure the health and safety of fairground attractions from design to disposal, and this system appears to be working very successfully."

3.12 It is said that all travelling fairs operate under ADIPS, because the industry associations overseeing the organisation of fairs insist upon it, although a somewhat contrary view is presented by HSE statistics in Section 5. The industry associations representing ride controllers, all taking an active role in keeping members briefed on safety, are:

- a) Showmen's Guild of Great Britain (SGGB);
- b) The Society of Independent Roundabout Proprietors (SIRP);
- c) Association of Independent Showmen (AIS);
- d) Amusement Catering Equipment Society (ACES).

3.13 By far the largest of these is the Showmen's Guild of Great Britain (SGGB). It has about 5,000 members controlling around 6,000 rides, although not all members are active ride controllers. The Guild has around 20 employees, based nationally and regionally. It provides experienced members to attend meetings of the FJAC and working groups, as well as BSI and CEN meetings. The Guild has taken an active role in promoting safety through its regional structure, and its rules are said to contain provisions for self-policing, including powers to suspend or fine members for safety contraventions. Examples of actions by the Guild sections include:

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- a) requiring members to follow HSG 175 and ADIPS;
- b) collating ride inspection reports by the Guild sections (although how systematically this is done varies between sections, and some are said to complete the process only by the end of each season, which may reduce its value);
- c) disciplinary action against members who do not meet the standards;
- d) organising and paying for by special levy a one-off programme of re-inspection of 1,450 rides, following doubts last year about the adequacy of some ride inspections that had been carried out.

3.14 The other industry associations also take an active role in promoting safety and require adoption of ADIPS as a condition of membership. The brevity of their mention here is not a reflection of the importance of their role.

3.15 HSE is responsible for enforcement of health and safety legislation at travelling fairs but, like other mobile industries, they are intrinsically less easy to regulate by inspection (not necessarily less safe) than fixed sites for reasons including:

- a) the transient, seasonal and peripatetic nature of the industry;
- b) the practical difficulties of trying to carry out inspections at times when fairs are setting up or in operation;
- c) difficulties in accident investigation, with witnesses often hard to track down;
- d) some illiteracy in the fairs community - it must be stressed that this is a question of the travelling lifestyle sometimes having made formal education difficult and not of intelligence - and;
- e) a cultural aversion, according to some HSE inspectors, to maintaining paper records.

Other Sites

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3.16 Rides may also be found at venues such as small private amusement sites, amusement arcades, shopping arcades, holiday camps, pub car parks, car boot sales and private parties. It is said that usually such rides typically of the older, slower types. Not all controllers are members of the industry associations, although many are, and in consequence may not be required by membership rules to implement ADIPS. One industry association stated that some potential applicants had been deterred from joining by membership conditions requiring ADIPS certification and public liability insurance.

3.17 Responsibility for regulation will always rest with HSE except for bouncy castles and go karts which are allocated specifically to LA's, or where enforcement allocation agreements to the contrary have been made (see Section 12 for more details). However, it is not always easy for HSE to identify sites where rides are in use to enable inspection. HSG 175 applies only to amusement parks and "fairgrounds", and this wording might be potentially misleading to controllers of small rides who might not consider themselves included.

Manufacturers and Suppliers of Rides

3.18 There are about 30 domestic manufacturers. However, much of the GB output consists of coin operated kiddie rides, which although not covered by this review are subject to The Health and Safety at Work etc. Act 1974 (HSW) s6. This covers product safety and is enforced by HSE.

3.19 There are said to be about 100 ride manufactures internationally, based mainly in Europe, especially Italy, and the USA. Ride controllers procure new rides mainly by direct import. There is also a thriving second-hand trade, and rides typically change hands many times during their lives.

3.20 Some domestic manufacturers are represented by the British Amusement Catering Trade Association (BACTA) and others are members of associations such as SGGB and NAFLIC. These organisations support ADIPS.

3.21 All rides sold for entertainment purposes attract the requirements of HSW s6, as amended by the Consumer Protection Act 1987 which brought rides explicitly

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within the requirements. Given that most manufacturers are outside HSE's jurisdiction, and the variety of supply routes, it is seldom possible for HSE to regulate directly at the point of manufacture or sale. Control is exercised in GB under the independent pre-use inspections of rides required by ADIPS (see Section 5).

Independent Ride Inspection Bodies

3.22 Clarification of the terminology associated with ride inspection is provided as follows to assist any readers who are not familiar with the industry:

- a) this report uses the term "ride inspector" to distinguish such individuals from "HSE inspector" (i.e. regulator of health and safety);
- b) inspection bodies (IB's) offer a commercial service, and employ the ride inspectors (although some small IB's are one person businesses);
- c) ride "inspection" covers a range of activities, one of which is "thorough examination" (now termed "in-service inspection" within ADIPS). The term "thorough inspection" is not defined in detail in law, but includes the physical scrutiny of rides, whereas other activities such as Design Review may be paper-based. "Inspector" is used both to reflect adequately the full range of activities, and to accord with British Standards terminology;
- d) "ride examiner" is a older term for a person who would now be referred to as a "ride inspector".

3.23 Ride inspectors carry out the four types of inspection required under ADIPS. The inspection bodies to which the inspectors belong tend to concentrate on either the "parks" or "fairs" branches of the industry. Few individual ride inspectors are registered as professionally competent in all disciplines, so subcontracting is common in the smaller companies who do not necessarily have the full range of expertise in-house. There were at the last count about 20 registered and active inspection bodies.

3.24 Most ride inspection bodies belong to their trade association, the National Association for Leisure Industry Certification (NAFLIC). This body also carries out

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the administration of the registration process under the ADIPS scheme, although NAFLIC representatives are in a minority on the ADIPS subcommittee and on the vetting committee that consider applications. NAFLIC has laid down six main objectives in its constitution which are in summary:

- a) to represent the interest of those organisations providing a service to the leisure industry;
- b) to maintain a register of member organisations agreeing to the appropriate conditions of membership and attaining adequate standards of competence;
- c) to agree detailed Codes of Practice to improve standards of safety and engineering excellence;
- d) to encourage the leisure industry to recognise the importance and benefits of agreed standards and to use the services of association members;
- e) to establish direct links with all external bodies associated with the design, manufacture and safe operation of amusement devices and associated equipment, on all matters relating to examination, testing and certification;
- f) to represent the interests of the association on all appropriate committees.

3.25 NAFLIC is currently funded from registration fees, and its income is about £10k per year. This is acknowledged as inadequate to resource properly all the work listed above, and to fund the preparation of its Technical Bulletins (of which over 200 had been prepared at the last count). Committee members currently give their time free and do not claim travelling expenses. Although there are acknowledged commercial spin-off benefits, the time that can be given on this basis is naturally limited. This is said to have delayed the development of guidance such as “Advice for Inspection Bodies” (see Section 5).

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3.26 The ride inspectors work widely over the country, and some internationally. Enforcement responsibility for their on-site activities rests with the enforcing authority for the premises on which they operate - almost always HSE. Inspection of these bodies was included in the FOD Sector Strategic Plan for 1998/99 and proposals have now been developed for a programme of Audits.

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THE NATURE AND DEGREE OF RISK

Introduction

4.1 This section explores the nature and degree of risk to workers and the public, considers whether risks could be changing, and provides references to other sources of information. Annex 4 contains much of the data on which this is based and explains its limitations.

Perception and Tolerance of Risk

4.2 The extent of media coverage of fairground accidents is such that the risks are liable to be perceived as higher than demonstrated by the statistics. Nevertheless, particularly high standards of risk control throughout the industry are considered justified because:

- a) injuries and deaths involve mainly children and young people;
- b) accidents in the course of family fun activities seem all the more shocking;
- c) customers have difficulties in making informed assessments of how well or badly risks are being controlled;
- d) customers also have limited control over many of those risks once they - or their children - are on board.

Overview of Risk

4.3 A review of risks was carried out for HSE in 1990 by the United Kingdom Atomic Energy Authority's Safety and Reliability Directorate. Their report "An Assessment of Risks at Fairground Rides" (4) investigated the magnitude of risks to fairground workers and the public in comparison with other activities. The Sector has now had this assessment updated by AEA Technology plc as part of the Review. There follows a selective summary of the report - for the full picture the report itself should be consulted.

4.4 There are important reservations about the report, which arise mainly because of the data supplied to AEA:

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- a) HSE asked only for the risk estimates to be updated, so the report contains some out-of-date narrative carried over from the previous report;
- b) the report incorrectly includes description of some fatal accidents that occurred at non-fairground sites such as play areas - however, these have not been included in the risk estimates for fairgrounds fatalities;
- c) accident rates and risk estimates for non-fatal accidents are based on HSE statistics which overstate considerably the numbers, severity and trends of these accidents because:
 - i) the figures include an unknown but significant number of reportable accidents that did not happen at fairs or amusement parks, i.e. occurred at other sites within the same Standard Industrial Classification, including playgrounds and recreation fields;
 - ii) from 1995/96 onwards statistics relating to accidents reported to the Local Authorities were included whereas previously only those reported to HSE were added;
 - iii) from 1996/97 the figures considerably overstate the numbers of "major injuries". This is because accidents involving "... any other injury which results in the person injured being admitted immediately into hospital for more than 24 hours" were logged in HSE systems as if they were all "major injuries". These accidents are also said to be subject to over-reporting because a ride controller cannot usually find out how long an injured person was in hospital and must thus submit a report to be on the safe side.

4.5 Risks to the Public. The statisticians were asked to include 5 deaths occurring in the 2000/2001 year. On this basis estimates of the risk of death at a typical session at a fairground showed a greater than 3-fold reduction between the 1981-1987/88 and 1989/90-2000/01 periods, dropping from 1 in 25 million (4.0×10^{-8}) to 1 in 83 million (1.2×10^{-8}). However, even these estimates are pessimistic,

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because they include some deaths that are not directly attributable to accidents to fee paying members of the public.

4.6 Valid comparisons with other activities are possible only for deaths, as these involve little or no under-reporting or differences of interpretation. On this basis their assessment was that risks to the public are "...quite small in relation to comparable activities". For example the risk of a pedestrian being killed on a typical walk to the fairground was estimated at about 12 times the risk of being killed once he or she is there.

4.7 The statisticians advise that the recent batch of fatalities are not statistically significant of an upward trend, as the numbers of fatalities are low and there were a total of 7 years in the last 12 in which no fatalities involving members of the public were recorded.

4.8 The report does calculate the risk of a member of the public being "killed or seriously injured" and the figures can be consulted, but given the reservations about the data these are not considered valid.

4.9 **Workers.** It was concluded that the fatal risk to employees (in this context this will include self-employed workers) is 3.5×10^{-5} . This is at the higher end of the range for industrial activities, below the risk to construction workers but above that for metal manufacture.

4.10 The risk of major injury to workers is calculated in the report, but again changes in the reporting criteria, uncertainty about the levels of reporting, and differences in the definitions used make comparisons for major injuries of limited validity.

4.11 The report makes the general points that "...all the estimated risks are averages..." and that "...it is expected to find some groups exposed to substantially higher, and others to substantially lower, risks."

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Fatal Accidents

4.12 Statistics on fatalities at fairgrounds are included in Annex 4, filtered to include only deaths of passengers at fairground rides.

4.13 Most of these deaths were a consequence of passengers not being contained within the rides, this being related to:

- a) design and maintenance of passenger containment systems;
- b) fatigue failure of stressed parts;
- c) ergonomic and human factors.

4.14 The main primary preventative measures required were, in the opinion of the author:

- a) high standards of safety by design, taking into account human factors;
- b) effective maintenance, especially of passenger containment devices;
- c) competent and diligent ride inspection under ADIPS, both periodically and after modification, with particular attention to containment devices, parts subject to failure by metal fatigue, and replacement of guarding;
- d) effective supervision of passengers.

4.15 Without commenting on these fatalities, nor the extent to which duty holders discharged their responsibilities, there appear to be no obvious new risk factors. Although there are reasons why each of these accidents occurred as it did, there is no clear reason why they all occurred within such a short period - statistical variation seems the most likely explanation.

4.16 Six discrete incidents form too small an information base on which to draw comprehensive and valid conclusions about the fairground safety regime as a whole; there is a fine line between an incident leading to a fatality or to a lesser injury, or perhaps no injury at all. So the report goes on below to consider additional sources of information.

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“Major Injuries”

4.17 Annex 4 also presents statistics on “major injuries” reported to HSE, and includes guidance on the meaning of this term. For the reasons explained earlier in this section the data contains some accidents that are not “major” and accidents that did not occur at fairgrounds. The risks are therefore overstated. It is not possible to estimate the extent of any under-reporting, but a good argument can be made that the influence of the industry associations and the extent of media interest in fairground accidents are such that this is likely to be less of a problem in this industry than in others. The ARIS reporting system (see later) will if implemented by the industry much improve the data available for prevention.

4.18 Recent figures for the “major accidents” are of the order of:

- a) 415 per year to members of the public, of which less than 5% are coded as “machinery” (although some may be hidden under other codes such as “struck by” or “falls”);
- b) 42 to workers, of which less than 10% are coded as “machinery”.

4.19 By far the commonest causes of injuries are slips, trips, falls and handling accidents, as in most industries. The numbers of machinery accidents are small by comparison although they are more often severe when they do occur.

4.20 There are no obvious trends over time, with variation perhaps accounted for partly by statistical variation and partly by the numbers of passengers riding each year, which are tending to increase over time, but are also partly dependent on the weather each season.

LASS Data

4.21 The Department of Trade and Industry (DTI) collects in its Leisure Accident Surveillance System (LASS) data about injuries serious enough to warrant a visit to hospital. The data is collected by questioning patients attending Accident and Emergency units at sample sites. From this information national estimates are prepared. The severity of these injuries are variable, and not all were “major”.

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4.22 The data includes information on the involvement of products and articles in the accidents. Relevant figures for 1998 are given in Annex 4, although the data includes accidents that occurred elsewhere than at fairgrounds. This is taken from the 22nd annual report by the DTI “Home Accident Surveillance System Including Leisure Activities” (5).

4.23 The author has derived from the figures a national estimate of about 12,000 attendances involving all types of ride including dodgems and inflatables. The latter are more commonly found at sites other than fairgrounds or amusement parks and are, therefore, less likely to be inspected under ADIPS. (By way of comparison, the estimate for “football/basketball” is about 208,000.) Data on the national usage of each type of equipment is not known, nor is the extent to which the accidents are due to failure to follow good practice, so the raw figures are not a good guide to preventive strategy.

4.24 The data suggests that of “fairground equipment”, bouncing castles are far and away the most likely to be cited, with machinery rides such as waltzers, dodgems and roller coasters well behind. These figures suggest that following recently published guidance on safety at inflatables is important. Large numbers of these inflatables are in use - many are likely to be used at small venues and may be outside the ADIPS regimen.

Is the Pattern of Risk Changing?

4.25 Accident rates will continue to decline only if the precautionary measures that are applied keep up with any developing hazards. The items below are ones where some consultees suggested that the pattern of risk might be changing and therefore suggest potential areas for future research and the development of standards.

4.26 **Major Incidents.** The size of some modern rides mean that a single incident of catastrophic failure could result in many deaths or injuries. Such an event has the potential to change the accident incidence statistics radically for the worse. Other possible sources of multiple fatalities are fire in enclosed structures or crowd behaviour (HSE guidance on this subject has recently been issued). One study into

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public safety has been carried out at Pinner Fair, and this led to changes in layout and organisation of the site.

4.27 Whilst it must be stressed that there has been no such major event for over a generation (the last was failure at a ride at Battersea Park in the 1970's), the consequences if one did occur could be severe. The author considers it would be wise that to carry out a practical research study into the potential for major incidents and their prevention. This could consist of:

- a) Hazop (Hazard and Operability) Studies of some typical large fixed and travelling rides, enclosed structures and crowd assembly areas;
- b) comparison of precautions with current guidance;
- c) conclusions about the adequacy of guidance and typical precautions.

4.28 NAFLIC are of the view that hazard analysis is already carried out by ride inspectors under ADIPS, which provides for risk assessment to be carried out on a case by case basis as part of Design Review, and that there is nothing to be gained by such research. This may be so, but there may also be value in an overview.

4.29 **More challenging rides.** It has been suggested by several consultees that the continuous introduction of new and more exciting rides at the top of the industry is increasing hazards. This is not because the hazards associated with these new rides are necessarily higher - there may be a net improvement with the advance of engineering design. It is because existing rides, perhaps complex and of innovative design, are passed on to ride controllers who are more used to traditional designs and may not have the resources to understand or maintain the newer ones successfully. Other consultees disputed that this is a new trend, or that ride controllers are not generally competent to ensure their rides are maintained successfully. It has not proved possible to reach a firm conclusion either way, but the key point is that controllers do need to be clear on their responsibilities to operate safely the rides they choose to deploy.

4.30 Some newer rides are computer controlled. Although not necessarily increasing risks, there are potential issues to do with design and testing. Research

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is underway (see later). Assessment of such control systems is carried out under ADIPS as part of Design Review.

4.31 It has also been suggested that energetic rides, not necessarily new designs, may result in physiological damage because of sudden changes in acceleration. Research has been commissioned by the Sector on this issue too, and research work is under way (under the slightly misleading title of “G Forces”) to assess the nature and extent of the problem.

4.32 **Human factors.** Some contributors, not all, were strongly of the view from personal experience of ride operation that the behaviours of individuals and crowds are changing. Fair goers are said to be typically less disciplined and less willing to follow instructions than in the past. A few are said to be determined to get a thrill by whatever means - including defeating passenger containment systems. Drink and drugs may also be factors here, and young adults are perhaps at special risk. Such trends may increase risks in the short term, especially at older rides where the passenger restraint systems were designed when more compliant passenger behaviour was the norm. In the longer term this issue may have implications for passenger containment systems, suggesting that higher levels of passenger restraint or containment may be needed more often.

4.33 A related issue is that of **childrens’ behaviour** (i.e. younger children below the age of 12). The extent to which age-related constraints should be imposed on rides that do not offer full passenger containment is contentious, with at least one HSE inspector arguing that below a certain age children cannot, for child developmental reasons, adequately recognise danger and follow instructions. The industry argues that there is little supporting evidence for this proposition, and that ride controllers are in no position to measure age and so must rely on size. NAFLIC is of the view that risks are already well understood and, based on extensive experience world wide, are already factored into risk-based Maturity of Design Statements for existing rides (see later).

4.34 Two bodies with interests in public safety commented that children are becoming more cocooned and less aware of risk, and need education on how to

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assess dangers and behave accordingly. Given these opinions work is needed to establish an agreed model and guidance for assessing such risks, and the best methods of dealing with them, for use in risk assessment. Meanwhile, risk education is one of the areas being taken forward under “Revitalising Health and Safety” and fairgrounds could provide a practical example that would be of interest to children.

4.35 **ADIPS.** Finally, it is the emphatic view of the industry that the implementation of ADIPS, with an emphasis on risk assessment, flexibility to adapt to changing risk and knowledge about risk, and strong industry-level support, will drive levels of safety higher and reduce risks overall.

NAFLIC Information

4.36 The NAFLIC web site at <http://www.naflic.org.uk/> provides Technical Bulletins and Incident Bulletins, as well as information about ADIPS and NAFLIC itself. The Bulletins enable the lessons of experience in fairground safety to be shared nationally and internationally, and are an invaluable source of information for use in the prevention of accidents. The willingness of the industry to share information in this way is an exceptionally strong feature for which credit is due, and to NAFLIC committee members in particular for managing the process on an unpaid basis.

International Data

4.37 Although not claiming to provide comprehensive statistics, two campaigning web sites based on the USA provide information and views. These sites collate data from various sources and encourage the public to report accidents. They are used by people in GB, including NAFLIC members, as further sources of information for use in accident prevention. These sites are:

- a) <http://members.aol.com/rides911/accidents.htm>
- b) <http://www.saferparks.org/accidents.htm> .

4.38 There could be advantages in establishing and maintaining a UK site for information exchange, including perhaps anonymous reporting of dangerous incidents. NAFLIC would appear to be the obvious candidate, but resource would

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be an issue. Such a site could also be used to collate and display ride inspection certificates, providing transparency for the industry, regulators and the public.

University of Sheffield

4.39 The National Fairground Archive (NFA) is a collection of photographic, printed, manuscript and audio-visual material covering all aspects of the culture of travelling showpeople, their organisation as a community, their social history and everyday life; and the artefacts and machinery of fairgrounds (see <http://www.shef.ac.uk/~nfa/>). A large number of photographs have been digitalised. Although containing no information on accidents, and not generally available for commercial and copyright reasons, the archive proved invaluable to HSE in tracking down rides that needed re-inspection. HSE is currently considering what further use might be made of the system in managing risk.

ARIS

4.40 The industry and HSE have carried out a scoping study into an "Amusement Reporting Information Scheme" (ARIS). Such a system would involve public access to reported accident data, accident reports by the industry, and anonymised incident reporting. This could be a major step forward in improving the quality of data available for accident prevention.

Conclusions and Recommendations

4.41 The **conclusions** are:

- a) on average risks at fairground rides are quite small and have been reducing over the years;
- b) leaving aside the question of preventability, there is no ready explanation other than statistical variation as to why recent fatalities happened over a short time period;
- c) nevertheless, vigilance must be maintained because:
 - i) if the guidance is not complied with competently and diligently pockets of much higher than typical risk may develop;

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- ii) there is a potential for major incidents that may not be fully reflected in statistics of “actuals”;
- iii) there is a need for preventative measures to keep abreast of the risk factors;
- d) statistics suggest that the most fruitful areas for special attention to accident prevention are:
 - i) all aspects of safety at machinery-type rides, including ergonomic and human behaviour, to control risks of fatalities and serious injuries;
 - ii) bouncing castles and similar inflatables, to reduce overall numbers of accidents related to such equipment and its operation;
 - iii) slips, trips, falls and handling accidents, to tackle the most common causes.

4.42 **Recommendations** specific to this part of the report are that:

- a) additional research should be considered to assess the likelihood of, and preventive strategy for, major accidents at fairgrounds;
- b) a model and guidance is needed for childrens’ developmental stages and behaviour on rides, and the implications if any for containment systems.

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OVERVIEW OF THE CURRENT REGIME

Introduction

5.1 This section provides an overview of the current safety regime including the status of the guidance and relevant legislation, and information about the level of compliance. Issues relating to the detailed requirements are dealt with in later sections.

History of Development

5.2 The current guidance is the latest in a line of developing standards. Concerns were raised by a major incident involving multiple fatalities at Battersea Fun Fair in 1972. Fairground safety was brought under health and safety law for the first time with the introduction of the HSW Act 1974, and following this a Fairgrounds Joint Advisory Committee was set up by the industry and HSE.

5.3 Prior to 1984, guidance consisted of a Home Office Code of Practice. This recommended amongst other things the thorough examination of rides at not less than 14 monthly intervals by independent appointed persons. These persons were required to have appropriate qualifications, experience and technical competence.

5.4 The FJAC worked with HSE's chairmanship on the preparation of new guidance which was issued in 1984. This document was supplemented by a Technical Annex and HSE Guidance Notes in the Plant and Machinery series. Changes included:

- a) the concept of “design verification” for all new rides;
- b) requirements to use independent ride inspectors, by agreement with the main industry associations.

There was also a 1992 issue of the code (HSG 81).

5.5 After 4 fatalities to members of the public in 1994/95 HSC came under pressure to consider licensing, specific regulations or an Approved Code of Practice (ACoP). However, the Commission accepted at that time the view that

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“...improvements to health and safety can best be achieved by co-operation between manufacturers, examiners, operators and attendants working within the existing legal framework supported by the CoP” [i.e. the guidance current at that time].

5.6 On this basis HSE revised the guidance with detailed discussion and agreement with the FJAC. This created a new framework in which obligations and duties were allocated to the responsible duty holders. It was issued in October 1997 as the current version “Fairgrounds and Amusement Parks - Guidance on Safe Practice”, HSG 175. Meanwhile the series of ride-related guidance notes was extended to cover further well known rides, and a two-part video on passenger containment was produced in 1996. Work is going on at present to update HSG 175.

The Current System

5.7 Like its predecessors, HSG 175 is a guidance document, and sets out “...what the FJAC considers are the appropriate measures for those involved and others in the industry to work safely and comply with the law.” There are some transitional provisions for existing rides. HSG 175 is supported by a range of Guidance Notes and Entertainment Sheets covering safety at specific rides and other issues. HSG 175 introduced 4 main changes (more details of which are given in Annex 7):

- a) more emphasis on initial design safety;
- b) the formal registration of Inspection Bodies;
- c) creation of a hierarchy of ride inspections, covering the steps and checks required throughout the life of a ride;
- d) clarification of the roles and responsibilities of the various duty holders.

5.8 Although duty holders are in principle free to ensure the safety of rides and meet their legal obligations by means other than compliance with this industry-specific guidance, in practice they need to follow it closely. It is given teeth by:

- a) agreement, adoption and support by all the industry associations, who make compliance a condition of membership;

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- b) the requirements of health and safety law (see below);
- c) examples of enforcement action by HSE based on the law and guidance.

5.9 In the view of the author and of consultees, the guidance is of high quality, and provides a sound and logical set of principles on which duty holders can base effective accident prevention. However:

- a) it is not yet complete, in that planned, more specific, guidance on “Advice to Designers” and “Advice for Inspection Bodies” has not yet been released. Work is in hand on these topics, but they have not yet been approved and issued. In the case of Advice for Design there is a text approved for publication, but clearance through the FJAC working groups and HSE publications section has yet to be achieved under HSE’s control. There has been debate on whether “Advice for Inspection Bodies” should be issued as part of HSE 175 or separately by NAFLIC - the former is considered to be much better as it will provide the authority of industry endorsement;
- b) the publication is not an easy read, and is likely to be too hard for many of the smaller operators, some of who may not be fully literate, to understand. If so this leads to a danger of inadequate awareness. A possible solution would be to produce a video explaining the key issues.

Legislation

5.10 The health and safety legislation relating to fairground rides includes :

- a) the general requirements of the HSW Act for the protection of employees, the self-employed and the public in the operation of rides;
- b) the requirements of the HSW Act for product safety, in particular Section 6 which places duties on designers, manufactures and importers of rides (“Fairground Equipment” is covered explicitly within these requirements, and the term is defined in s53 of the Act);

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- c) the Provision and Use of Work Equipment Regulations 1998 (PUWER) and The Lifting Operations and Lifting Equipment Regulations 1998 (LOLER) regulations relating to the safety of equipment used at work (HSE is currently revising its guidance on the application of LOLER to rides following Solicitors' advice and will be consulting the industry on this point in the course of revising HSG 175);
- d) Pressure Systems Safety Regulations 2000, relating to risks from hydraulic and pneumatic systems;
- e) Electricity at Work Regulations 1989, covering electrical safety;
- f) Management of Health and Safety Regulations 1999, requiring amongst other things risk assessments; arrangements for planning; organisation, control, monitoring and review of preventative and protective measures; competent persons to assist; procedures for serious and imminent danger and for danger areas; contact with external services including first-aid; emergency medical cases and rescue work; co-operation between employers; employee training and information for temporary workers;
- g) Construction (Design and Management) Regulations 1994. These will apply to construction processes associated with the installation and maintenance of rides, particularly large complex rides at theme parks.

Extent of Compliance

5.11 FOD has a 5 year programme to contact all duty holders and to advise, exhort and to enforce uptake of the guidance. There have also been some awareness-building seminars delivered by the Sector and by some local inspectors.

5.12 Statistics on the extent of compliance found at HSE visits are shown below (for details of enforcement action see Section 12 and Annex 6):

Table 5.1: Extent of Compliance with HSG 175

Feature	% Most or Full 1998/1999	% Most or Full 1999/00	% Most or Full 2000/01*
Buying and selling	61	39	64

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Feature	% Most or Full 1998/1999	% Most or Full 1999/00	% Most or Full 2000/01*
Annual examination	54	71	86
Operations manual	33	26	42
Supervision	87	73	70

* figures to October 2000

5.13 Representatives of NAFLIC stated that there are in excess of 1,000 machinery-type rides that are not operating under ADIPS at all, situated mainly at small private sites in coastal areas. No evidence has been produced to validate this figure, and the Sector believes that the number is much smaller - perhaps 100 mainly smaller and part time operators, consisting of about 1-2% of the industry, not within the industry associations. HSE needs to consult NAFLIC to obtain details of sites not in compliance for follow up action.

5.14 It has not been possible to carry out a survey within the time scale of the review that would verify either of these estimates. Clearly 100% adoption of the guidance by the industry has not yet been achieved, and where adopted accident investigation suggests that it has not always been complied with competently and diligently. To some extent this may be explained by the fact that HSG 175 is fairly recent and still being implemented, and that some of the failures of compliance could be due to paperwork not being available for inspection, rather than inadequate primary safety precautions. But given the key role of ADIPS in ensuring safety, less than 100% cannot be considered acceptable, and a vigorous approach by the industry and HSE to identifying non-compliance and taking enforcement action is needed. BALPPA is on record as advocating that "it is time to name and shame". There may a role for all the trade associations in developing safety systems to assist in managing compliance.

5.15 As almost all insurance companies agreed in 2000 to require compliance with ADIPS as a condition of cover, the position can be expected to improve further. Several consultees commented to the effect that HSE should make more use of intermediaries such as LA's and trade associations (e.g. for publicans, event

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organisers, car boot sale operators etc), both to alert them to requirements and to ask them to act as eyes and ears, and this seems sensible. But neither option is likely to provide a complete solution and further action by the industry supported by HSE is required (see below).

"Self Regulation"

5.16 The industry is subject to the same legislation, inspection and enforcement as any other. Comparisons in Section 12 show that the industry has received a fair or even relatively generous allocation of HSE resource and enforcement action in relation to risk. In this sense it is not wholly "self regulating". But in addition it receives the benefit of a probably uniquely high level of active involvement and support for safety by associations covering the great majority of the industry. This should be seen as a benefit.

Further Development

5.17 The Sector is of the view that the current position is sustainable given the high level of industry support for the guidance and the relatively low accident statistics, has indeed been strengthened by recent legislation such as PUWER, and should remain; albeit with continuing development in certain areas as follows:

- a) **Accreditation of Ride Inspectors.** It was always intended, once this regime had taken hold (recognising that a delicate balance exists between the market for such inspections and the availability of those competent to do them), to gradually edge the current registration and self declaration of competence of ride inspectors up the accreditation route. This was discussed at length during the drafting of the new fairgrounds guidance and generally agreed. Improvements introduced in 1999 now go beyond self declaration and require vetting of training, skills and experience;
- b) **International Standards.** One problem is that most rides are imported and overseas makers have no product safety legislation applicable to them at manufacture (although they are subject to HSW s6 and pre-use inspections under ADIPS before use in GB; there is also a German Standard DIN 4112 covering structural safety). The

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completion of an international standard is desirable, although not within GB control;

- c) **Learning from incidents.** The FJAC is exploring the possibility of setting up an industry incident reporting system (ARIS) such that they can learn from others experience, agree technical solutions needed and feed these to ride controllers and ride inspectors;
- d) **Standards of physical design of ride safeguards.** Safeguards often rely primarily on members of the public using restraining devices. However, people do not always follow instructions, and on occasions expose themselves to risk by defeating safety systems. HSE proposals covering catches, latches, restraints and passenger containment were taken into account in preparing the draft of “Advice by Design” .

Conclusions and Recommendations

5.18 The **conclusion** is that taken as a whole the current system of law and guidance is fit for purpose as a framework for the management of accident prevention at fairgrounds, and contains enforceable precautions that are both necessary and well matched to the risks. There are advantages in the flexibility it provides to tailor precautions to particular rides, and to update the regime without the need for changes to the law. Further legislation would smack of firm action, but would be likely to be a slower and more costly route to achieving the improvements that are needed (see also Section 13).

5.19 The improvements **recommended** to the present regime arising from this section are as follows:

- a) guidance on “Advice for Inspection Bodies ” and “Advice for Design” should be completed as soon as feasible, for issue as annexes to HSG 175. This will require resourcing by HSE as well as the industry, and best way to achieve this might be to set up an intensive drafting session with representatives of the Sector, the industry and HSE’s publications section to enable completion, approval and publication without delay (some preliminary work would be needed to prepare a

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first draft of Advice for Inspection Bodies, whereas Advice for Design is substantially complete and should require little attention);

- b) additional measures are needed to build greater compliance:
 - i) more systematic checking by all the industry associations of full compliance by their members;
 - ii) some simpler form of guidance should be delivered to enable the whole of the industry to understand as soon as possible to improve the depth of understanding of the scheme - an urgent programme of industry seminars with some support from HSE seems the best option in the short term, where they have not been delivered recently, with the production of an explanatory video (demonstrating in a practical way the main responsibilities) as a possible option in the longer term;
 - iii) publicity for the scheme, based perhaps on the release of this review with an emphasis on the benefits in terms of low risks, and on examples of enforcement action;
 - iv) the industry should report to HSE any sites or rides thought not to be in compliance with ADIPS, using the formal HSE Complaints Procedure, and HSE should liaise specifically with NAFLIC to identify such sites and take follow up action.

HEALTH AND SAFETY EXECUTIVE REVIEW OF FAIRGROUND SAFETY

PRODUCT SAFETY

Introduction

6.1 This section reviews issues relating specifically to requirements for safety by design.

Legislation and Standards

6.2 The product safety requirements of the HSW Act s6 apply to the safety of rides manufactured, imported or supplied for use at work, whether new or second-hand.

6.3 There are no agreed standards applicable specifically to the design of fairground rides for use in GB. There are:

- a) British and International Standards relating to general issues such as stability and electrical safety;
- b) some guidance in HSG 175, both on the general principles and on the management of the design process;
- c) a draft CEN standard - prEN 13814 "Fairground amusement park machinery and structures - Safety" ;
- d) a draft technical annex to HSG 175 on "Advice for Design" which has been prepared by the Technical Working Group but is not yet in its final form.

6.4 The European work to produce a CEN Standard has been fully supported by HSE and the industry, but has not yet produced an agreed version. There is a deadline of the end of December 2001 for submission of the version currently being worked on to CEN, but it is not clear if this will be met. The current draft is ambitious to say the least; it attempts to cover the whole range of rides currently being manufactured and those designs that will inevitably emerge in the foreseeable future. HSE has recently resigned the chairmanship of the corresponding BSI committee (MCE/3/4). Although HSE and the industry have put a lot of work into the CEN standards, it is not within their control to get it completed and published.

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6.5 Fortunately the process of Design Review (see later) is intended to identify and remedy any shortcomings before rides are actually taken into use in GB, but it is much preferable for them to be safe by design. Given the international trade in rides the lack of international standards is a significant issue, and in consequence:

- a) levels of safety are not fully consistent, with rides being manufactured in Europe not necessarily acceptable in GB without modification;
- b) the Sector considers that HSE lacks sufficient leverage on foreign manufacturers, as would be provided by a Directive on Fairground Rides (although other parts of HSE consider that to get agreement on a Directive standards might end up being lowered, making this a counterproductive exercise);
- c) HSE's ergonomic and technical specialists were of the view that these aspects of design are not always being given enough weight, and that some rides are still being delivered that do not meet well understood design principles.

Conclusions and Recommendations

6.6 As recommended earlier in the report, there is a pressing need to get "Advice for Design" published in GB to provide a baseline of sound guidance in this country. ADIPS is known to have some influence in other countries (for example, representatives of the Italian Manufacturers' organisation praised it highly to the author), so the fact of publication is likely to have a far reaching effect.

6.7 In the longer term:

- a) work should be done to establish a model and guidance for design to take account of the behaviour of younger children (also an earlier recommendation);
- b) the industry and HSE should support actively efforts to establish international standards.

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PRE-USE AND IN-SERVICE INSPECTIONS

Introduction

7.1 This section reviews issues relating specifically to pre-use and in-service inspections. Issues concerning the competence and diligence of ride inspection bodies are dealt with separately in the next section.

Legislation and Standards

7.2 All fairground rides used at work are subject to PUWER, and some to LOLER and The Pressure Systems Regulations 2000 (Solicitors' opinion has been obtained on this point). These regulations set down requirements for inspections by competent persons which do not match exactly those in ADIPS, some being more onerous and others less so. None includes specific requirements for "design review" nor for "assessment of conformity to design" as required under ADIPS. In these respects the guidance is more stringent than the law. However these steps may be required implicitly under more general HSW legislation, if they are necessary in the circumstances to ensure safety. The standard period for inspection under LOLER is 6 months compared to up to 14 months under ADIPS.

7.3 The ADIPS scheme for ride inspections is set out in HSG 175 and supplemented in Entertainment Sheet No. 8.

Amusement Devices Inspection Procedures Scheme

7.4 ADIPS covers both new and second-hand rides and provides guidance in principle on the four types of inspection, i.e.:

- a) pre-use inspections:
 - i) design review - a managed process to determine the adequacy of a design specification and the assumptions on which it is based (with an alternative "Maturity of Design" process for existing rides with a good safety record);
 - ii) assessment of conformity to design - a check on whether an entire manufactured device conforms to its design specification;

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- iii) initial test - a demonstration that the device is capable of performing safely and in accordance with the design specification, and can be used for a specified period. This is required before first use in this country, before reuse after a safety-critical modification or before first use of a device installed at a fixed site;
- b) in-service inspection (previously known as thorough examination) - a periodic check (this is at 14 month maximum intervals unless otherwise specified) on fitness for further use, which may include procedures, tests and examinations.

7.5 This is a clear and logical framework for independent checks throughout the life of a ride, although it is not a replacement for other precautions such as routine maintenance. The systematic approach to pre-use inspection imposes higher levels of safety than the specific legislation, but is considered justified in the circumstances under general legislation. It is particularly relevant and necessary for rides; because they are not mass produced and the industry relies on novelty and innovation, many rides are effectively “one-offs”.

7.6 ADIPS specifies that records of these inspections should be contained in the Operations Manual for each ride, and a new Declaration of Operational Compliance (DOC) should not be issued under the scheme unless this manual is in place, and also that the records of inspection are in the operations manual. This is very important, as information on the pre-use inspections is necessary to inform the subsequent in-service inspections.

7.7 Successful completion of inspection leads to the issue of a Declaration of Operational Compliance (DOC). Inspection is required at least annually, although up to 14 months is allowed to provide flexibility. If repairs are needed, the inspection body should inform the controller immediately in writing. Thorough examination usually includes visual inspection, Non-destructive Testing (NDT) of safety critical components and functional tests of safety-related systems. Selection of some tests such as NDT are based on information contained in the Operations

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Manual and the inspection body's skill and experience. Some parts of the inspection, most commonly NDT or electrical inspection, may be subcontracted.

7.8 The inspection process is heavily dependant on the skills and professionalism of the ride inspectors. They need to have knowledge of past failures, eg by consulting Technical Bulletins on <http://www.naflic.org.uk/technical.htm>. Fairground ride inspection and testing tends to be of a bespoke nature, as many rides are one-offs. As the sophistication of ride designs increases, design reviewers and ride inspectors need to be more versatile and more acutely aware of longer term effects such as stress that may become manifest after several years of operation.

7.9 Inspection is an essential component in ensuring long term safety. NAFLIC advise that the number of design and in-service defects identified by registered inspection bodies each year is in 5 figures. This can not but be good for safety and a significant contribution to the low and reducing level of risk to passengers.

7.10 The issue of the paperwork is of course nothing in itself - what counts is the quality of the inspection behind it. To be done to high standards, even in bulk, will always be quite costly and an upward pressure on costs can be expected as the price of adequate assurance.

7.11 There are no requirements in the scheme to display DOC certificates, so consumers have not been able to tell which rides have been inspected within the appropriate time period. This is to become a condition of most of the industry associations in the coming year. There might be some difficulties in attaching paper certificates at some rides, and ride inspectors and ride controllers would not, for security reasons, want home addresses displayed, so some modification of the certificates or the use of stickers may be needed. NAFLIC has recently put forward a suggestion that stickers could be sent out from an ADIPS (NAFLIC) office signifying that a DOC has been received. It is proposed that this would act as a national registration that DOCS are in place, and could provide an income to be used for preventative work such as the preparation of Technical Bulletins. This does appear to be an idea worth pursuing.

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7.12 The legislation does not require serious defects to be reported to the enforcing authority, unless required under LOLER for lifting equipment. However, the guidance is that if faults are discovered on a particular device which could have wider implications, HSE and the trade associations should be informed - HSE will inform NAFLIC who are expected to verify the information and if appropriate make it more widely available. There are reservations about how well this process operates when legal proceedings are being considered (see Section 12).

7.13 Compliance with the ADIPS scheme has been enforced successfully by HSE using notices and prosecutions (see Annex 5), and it is now required by most insurers. The scheme received some publicity as it was adopted for the pre-use and in-service inspections of the Millennium wheel.

Conclusions and Recommendations

7.14 The **conclusions** are this scheme is fit for purpose if followed competently and diligently. In some respects it exceeds specific legal requirements.

7.15 **Recommendations** are:

- a) the display of certificates should be specified by the scheme, both to inform customers and to facilitate identification of rides that have not been inspected. Where this is not feasible a system of stickers should be developed;
- b) HSE should clarify its advice to inspectors on the application of PUWER and LOLER, consulting the industry in so doing.

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COMPETENCE AND DILIGENCE OF THE RIDE INSPECTION BODIES

Introduction

8.1 This section reviews issues relating specifically to the competence and diligence of ride inspection bodies. The point needs to be made early on that GB has some well respected practitioners of the highest standards of competence and diligence. These individuals have led the development of standards and the continuous improvement of risk assessment and risk control methods over the years.

Legislation and Standards

8.2 The previous section explained that regulations require inspections to be carried out by competent persons. This term is not defined in law, although guidance is given in ACoP's and guidance.

8.3 ADIPS requires ride inspectors (i.e. competent persons) to:

- a) have appropriate qualifications, experience and training (there are some "grandfather clauses" that do allow some existing practitioners to continue without formal qualifications if alternative evidence of competence is produced);
- b) belong to registered inspection bodies;
- c) be independent of the device concerned, i.e. independent of the designer, manufacturer or controller of the equipment;
- d) make specified checks.

8.4 HSE and the industry have over the years been progressively tightening the requirements for ride inspectors. A rolling balance has been struck between the desire for higher standards and the limited supply of engineers with the special skills and knowledge required - in the short term FJAC members have been sensitive to the need for a sufficient cadre of ride inspectors to exist to enable ADIPS to function across the industry. There has been a potential shortage of registered ride

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inspectors for all disciplines, and particularly for electrical inspections. Higher standards of inspection throughout the industry might exacerbate possible shortages. Customers - i.e. ride controllers and their industry associations - need to accept that inspection fees must be adequate to support high quality inspections. NAFLIC is of the view that the risk of prosecution by HSE is part of the reason why some companies are reluctant to take on the work. There are also seasonal pressures for inspections to be carried out in the early part of the season, which might be eased if clients could be persuaded to spread the load more evenly over the year.

8.5 The Sector has worked to attract new bodies into the field, and with three larger bodies applying for registration recently it is possible that the problem of supply will decrease. Constraints may remain in recruiting sufficient individual inspectors with the requisite skills, training and experience, especially as no training courses or formal qualifications for amusement engineering are available (an opportunity here for higher education establishments!). Concerns have been expressed that German bodies are able to work in GB whilst the converse is said to be illegal under German law. Although if correct this might be a restrictive practice, the issue is outside the scope of this report.

Registration Processes

8.6 Registration of inspection bodies is administered by NAFLIC for all the trade associations that are represented on the FJAC. Although NAFLIC does not itself accept or reject registration applications, it is seen as closely associated with decisions on fitness to inspect rides. Few inspection bodies are registered to carry out the full range of inspections, and controlled subcontracting is allowed.

8.7 Prior to the year 2000 the registration process was essentially one of self-declaration of competence backed up by a "quality file". In 2000 procedures were introduced, as previously planned, for the qualifications, training and experience to be vetted. The quality files must conform to 2 or more Parts of the "Rules for the accreditation of bodies performing inspection of fairground and amusement park machinery and structures." The arrangements now in place are

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much stronger than before to check competence, and at least one IB has dropped out.

8.8 Registration requirements are that the quality file must contain details required by the “service quality schedules”. There is a service quality schedule for each type of inspection which identifies the types of qualifications, experience and service performance the industry considers to be appropriate for each inspection task. The files are vetted by a subcommittee of the FJAC, which makes recommendations to the ADIPS Working Group. The vetting committee currently consists of:

- a) Eric Pirie (HSE - Sector);
- b) John McDonald (HSE - Specialist Engineer);
- c) Ken Rundle (ride inspector and manufacturer, and FJAC representative on UKAS).

8.9 There are two issues with the current registration process:

- a) the fact that HSE staff form the majority on the vetting committee, although welcomed by the industry and reassuring in the short term, raises the possibility of compromise of the regulatory role. Inspection bodies accepted today as competent might need to be considered for prosecution tomorrow, and in the view of HSE representatives the current arrangements do not preserve sufficient regulatory independence and separation of function;
- b) if there is to be public confidence in the ride registration process there must be seen to be a clear separation of NAFLICs roles in administering the registration process and in representing the interests of its members as a trade association.

8.10 There is an evidence-based complaints system. This has been used recently to suspend an inspection body that carried out NDT without the appropriate qualifications, and on an earlier occasion to require additional training for ride inspectors.

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8.11 The system of inspection has been developed to be consistent with BS EN 45004:1995 "General Criteria for the operation of various types of bodies performing inspection". NAFLIC had a representative on the BSI and CEN committees that wrote this standard. It specifies general criteria for the competence of impartial bodies performing inspection irrespective of the sector involved. It also specifies independence criteria, including that "The personnel of the inspection body shall be free from any commercial, financial and other pressures which might affect their judgement."

8.12 The standard also specifies organisation and management criteria including supervision and deputisation arrangements. As things stand there has been little systematic check by the industry on the exercise of due diligence by individual ride inspectors. At present there may be some variation in interpretations of how far duties under inspection should extend. Once "Advice for Inspection Bodies" has been published there will be a clear standard against which diligence can be assessed.

Accreditation

8.13 In the view of the author the industry-based registration scheme does not automatically command the confidence of independent accreditation (the method under CORGI and LOLER schemes described in Annex 6), although it shares many of the same features and would operate in a similar way and would also involve people from the industry carrying out vetting of candidates.

8.14 The Certification of IB's using an Accreditation body under United Kingdom Accreditation Service (UKAS) instead of the current arrangements has been discussed and has some support in the industry. Both NAFLIC and SGGB have reservations, based on the considerable cost implications of setting up and maintaining an accreditation system without demonstrable safety benefit. In the view of the author the fundamental importance of independent and diligent inspection, and the possibility of regulatory compromise in the present system, strengthen the case for such formal accreditation, although it may be that the existing scheme could be developed further to deal with any reservations.

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Audit of Inspection Bodies

8.15 Plans for audit of all 20 or so inspection bodies (i.e. all those active) were proposed by the Sector as part of its Sector Strategic Plan for 2001/02. Steve Flanagan, an operational inspector in Wales and West Region has been asked to head the audit team. This would involve a systematic approach to auditing the 20 IB's at 10 per year in 2001/2 and 2002/3, on a prioritised basis and conducted by a team drawn from resources nationally. Inspections would be in two stages; firstly an Inspection Body head office based audit type inspection, focused on systems in place to ensure compliance with HSG175, the ADIPS scheme and other specific guidance, closely followed by an on-site inspection of ride examination activities, designed to test out that the systems claimed are in place.

8.16 To audit each IB would involve about 2 days each for an inspector, a specialist mechanical inspector, and a specialist electrical inspector. These individuals would need to be experienced in fairground work, although less experienced colleagues could accompany the visits as a means of acquiring knowledge

8.17 Although these audits will take place as part of HSE's regulatory role, they are also an opportunity to contribute to the harmonisation of inspection standards, to identify any areas where guidance can be improved, and to reinforce the efforts of the ride inspectors, most of whose competence and diligence is well respected. The early completion of "Advice for Inspection Bodies" as previously recommended will be an important step in facilitating this work.

Conclusions and Recommendations

8.18 The **conclusion** is that although greatly strengthened since 1999 the registration and monitoring processes are not as strong as they need to be given the critical role of ride inspectors in the safety regime.

8.19 The **recommendations** are that:

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- a) the industry should move as soon as possible to formal independent Accreditation of ride inspectors under UKAS, with periodic monitoring of ride inspectors' work to check for lack of diligence, or to achieve the same standards by alternative means ;
- b) in the meantime, HSE should audit all ride inspection bodies as soon as feasible.

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PHYSICAL STANDARDS FOR RIDES

Introduction

9.1 This section reviews issues relating specifically to physical safeguards when rides are in use. These include maintenance and fencing. The shortness of this section reflects a lack of issues requiring changes in standards or guidance, not the practical importance of the issues themselves which are critical in ensuring safety. As in other industries, most accidents are caused by slips, trips and falls, so maintenance of platforms and access arrangements is important.

Legislation and Standards

9.2 Legislation covering physical standards is summarised in Section 5 of this report, and includes PUWER and LOLER.

9.3 The main guidance for fairgrounds is included in Part F of HSG 175, "Guidance for Controllers". In the view of the author this offers guidance that is clear and well matched to the risks. It contains topics on, amongst others:

- a) buying and selling an attraction, including requirements for ADIPS paperwork to be obtained and updated ;
- b) modification and repair;
- c) effective maintenance, including requirements for daily checks and regular maintenance;
- d) transporting and assembling rides, including operational stability;
- e) preventing access to dangerous parts, including barriers, interlocks and platforms;
- f) passenger containment, including the principles of design, and operational precautions such as the restriction of passengers by size.

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Issues

9.4 A number of consultees commented that some ride controllers tend to rely too heavily on annual inspection under ADIPS and not enough on effective maintenance throughout the year, perhaps assuming that the certification process is sufficient in its self.

Conclusions and Recommendations

9.5 The **conclusion** is that the importance of regular maintenance needs to be stressed, and the **recommendation** is that this should be covered explicitly in new measures to build awareness and diligent compliance (eg Regional Seminars by the industry with some HSE support) and in HSE inspections.

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ROLES OF FAIRGROUND OPERATORS AND ARRANGEMENTS FOR SUPERVISION

Introduction

10.1 This section covers issues relating specifically to the supervision of rides. Like the previous section, its shortness does not reflect its practical importance.

Legislation and Standards

10.2 The main legislation is:

- a) PUWER, which requires, in summary, that people who supervise the use of work equipment must be adequately trained;
- b) general requirements of the HSW Act relating to duties on employer and employees.

10.3 HSG 175 provides guidance that in the opinion of the author is clear and well matched to the risks, covering:

- a) in Section F, the selection and training of staff;
- b) in Section G, the responsibilities of operators and attendants, including daily checks of rides, safe operation, supervision of attendants and supervision by attendants of the public.

Issues

10.4 One issue that has been exposed in accident investigation is the difficulty of maintaining effective supervision in dark rides. The availability of cheaper infrared surveillance systems may provide a practical solution here.

10.5 BALPPA has prepared a training programme leading to the BALPPA Certificate for Visitor Attraction Operation. NAFLIC have suggested that other industry associations could benefit from such an approach on training and quality standards.

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Conclusions and Recommendations

10.6 The **conclusion** is that supervision is one of the key issues in maintaining safety in ride operation.

10.7 Industry associations are **recommended** to consider the development of training and quality standards for members.

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EFFECTIVENESS OF THE FAIRGROUNDS JOINT ADVISORY COMMITTEE

Introduction

11.1 This section reviews the effectiveness of the FJAC. The Committee has been in existence for over 20 years. It's aims are to:

- a) promote health, safety and welfare of employees and members of the public in the fairgrounds and amusement parks industry;
- b) help prevent all accidents and especially fatal or serious ones;
- c) discuss investigated incidents in order to identify key issues;
- d) initiate research into accident causation;
- e) prepare guidance documents, with the principal effort going into fine tuning HSG 175.

11.2 Much of the detailed work is done by:

- a) the Research Sub-Committee;
- b) the Technical Working Group;
- c) the ADIPS Working Group;
- d) the New Guidance Working Group.

11.3 Membership consists of:

- a) HSE - the secretariat is provided by the Sector, and there is also representation of the Local Authority Unit and Policy sections;
- b) the Amusement Catering Equipment Society;
- c) the British Amusement Catering Trades Association;
- d) the British Association of Leisure Parks and Piers;
- e) the National Association for Leisure Industry Certification;
- f) the Showmen's Guild of Great Britain;
- g) the Society of Independent Roundabout Proprietors;

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- h) the Association of Independent Showmen;
- i) one consumer representative with links to the British Standards Institution.

Issues

11.4 **Representation.** The FJAC represents almost the whole of the industry, with the exception of ride manufactures. Domestic ride manufacturers who do not belong to BACTA, i.e. those who manufacture adult rides, do not have a trade association, and apparently no one representative would be in a position to speak for the others. 3 showmen and 2 NAFLIC members on the committee who are all also manufactures attend in their own right. Foreign manufacturers are not represented in the absence of a trade association.

11.5 The committee is essentially a dialogue between the industry and HSE, and although efforts have been made in the past to broaden representation:

- a) there is only one consumer representative;
- b) there is no worker representation, said to be because the industry is not heavily unionised, many of the workers are self-employed, and there is no natural representative body (although NAFLIC have suggested parks' maintenance staff as one possible group that could provide some representation);
- c) there are no direct representatives of LA's, who have interests as regulators in their own right, and often as the owners of land used for fairs;
- d) the industry has reservations about extending membership, arguing that introducing people without knowledge of fairgrounds and the responsibility of implementing standards would be likely to lead to delays in agreeing standards and so be counterproductive. In the view of the author these risks could be managed and would be outweighed by the benefits of greater transparency and wider representation.

11.6 **Status.** The Committee is not a full Industry Advisory Committee (IAC) - this may be considered a weakness in that it may not be seen as so prestigious, but a

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strength in that the main role of an IAC - to advise the Commission - has only limited application in this case.

11.7 **Functioning.** A number of consultees expressed the view that the committee works rather slowly, and that new research has been held up recently by unforeseen events such as the millennium bug, the necessity to investigate other pressing matters suggested by recent fatalities, and a shortage of HSE staff to attend meetings.

11.8 The current procedures for the acceptance of guidance do appear too slow. For example technical guidance may be drafted in the Technical Working Group, go then to the New Guidance Working Group, and then to the HSE publications section when further changes may be made. It is desirable to streamline these processes. The trade associations do have a strong record of promoting and enforcing standards once they have given formal agreement, and any new arrangements need to ensure that this benefit is not lost.

Conclusions and Recommendations

11.9 The **conclusion** is that the FJAC works effectively overall, and would not benefit from becoming an IAC, but that improvements are desirable to its representation and functioning.

11.10 The **recommendations** are that the FJAC:

- a) should agree to include on the Committee, with a status to be determined, more consumer, worker and LA representatives, and that HSE should help to identify people who may act as such. Some of who may be consultees in this review, or members proposed by HSC, but there would be an overall requirement for appointees to be from responsible and representative bodies (eg RoSPA), and to engage constructively to ensure that the work of the FJAC would be speeded up and not delayed;
- b) should recognise the need to speed up its decision making and introduce with HSE support streamlined procedures for agreeing

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guidance (the report has already recommended a fast track procedure for preparing awaited guidance).

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HSE's ROLE AS REGULATOR

Introduction

12.1 This section provides information on enforcement allocation issues, and on HSE's role in regulating health and safety.

Enforcement Allocation

12.2 **Product Safety.** HSE has enforcement responsibility for all product safety issues relating to "fairground equipment", which is included explicitly in s6 of HSW.

12.3 **Fairgrounds.** HSE also has responsibility for the enforcement of health and safety legislation in relation to the use of many fairground rides. The two main items of legislation defining this are:

- a) the Health and Safety (Enforcing Authorities) Regulations 1998 - under these regulations HSE is the enforcing authority for any activity in a "fairground". "Fairground" means "...such part of premises as is for the time being used wholly or mainly for the operation of any fairground equipment, *other than a coin operated ride, non-powered children's playground equipment, swimming pool slide, go-kart, or plant designed to be used by members of the public for entertainment purposes for bouncing upon*". (The equipment italicised above is the enforcement responsibility of Local Authorities, although there may be uncertainty where a mix of equipment is in use);
- b) "Fairground equipment" is defined in HSW s53 as meaning "...any fairground ride, any similar plant which is designed to be in motion for entertainment purposes with members of the public on or inside it or any plant which is designed to be used by members of the public for entertainment purposes either as a slide or for bouncing upon, and in this definition the reference to plant which is designed to be in motion with members of the public on or inside it includes a reference to swings, dodgems and other plant which is designed to be motion wholly or partly under the control of, or to be put in motion by, a member of the public."

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12.4 Thus the presence of a single small and low risk ride is sufficient in law to turn a place into a “fairground”. Some “fairgrounds” occupy parts of premises that are otherwise allocated to Local Authorities on the basis of main activity. For example, if at a car boot sale there was a single low speed kiddies roundabout, that part of the premises would come under the jurisdiction of HSE. Conversely, some equipment for which LA’s would otherwise be responsible (eg bouncy castles) are situated in parts of premises such as amusement parks for which HSE is the enforcing authority. Such situations have apparently lead to the establishment of a number of bespoke allocation agreements between HSE and various LA’s under the Health and Safety (Enforcement Allocation) Regulations 1988. These are needed to clarify uncertainty about which bodies are responsible for particular premises, and to reduce the amount of dual inspection, but perhaps the time would be better spent directly on preventative work.

12.5 A number of consultees raised issues:

- a) the definition of “fairground equipment“ is hard to understand, and catches “rides” that are far outside the natural meaning of the word, such as miniature railways, go-karts, and even motor cars in some circumstances. Whilst this coverage may be quite justifiable in terms of protection of the public, some consultees found the wording confusing and wanted the definition improved and simplified;
- b) similarly, the complexity of the enforcement allocation definitions are such that some consultees from LA’s in particular were not clear who is responsible for what;
- c) bespoke allocation agreements are needed to reduce dual inspection - changes to the law could reduce the numbers of these resource-consuming agreements that are needed.

12.6 There appears to be potential advantage here in converting the law into plainer English and possibly to shift the enforcement allocation boundaries to enable LA’s take responsibility for low risk rides where these are not the main activity at the site, thus leaving HSE with true fairgrounds and amusement parks in their entirety

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and the more complex rides if used elsewhere. This might enable LA's to get to grips with the small number of small operators who are outside ADIPS, but located on their "patch". Industry representatives supported clarification of the legislation, but are opposed to any extension of the role of LA's. Fortunately, the enforcement allocation regulations are themselves under review at present, providing an opportunity for this issue to be discussed and negotiated.

12.7 Even where HSE is the enforcing authority, some LA's exercise a measure of active control over safety at travelling fairs, acting in accordance with:

- a) their duties under HSW s4 as controllers of premises, because LAs are often the owners of sites on which fairs operate, and/or;
- b) in England and Wales, by-laws that have been drafted to include safety requirements enforceable by the LA's;
- c) in Scotland, licences that are issued to travelling and static fairs as places of Public Entertainment in terms of the Civic Government (Scotland) Act 1982, and to which Licensing Authorities may attach reasonable conditions including ones in respect of safety .

12.8 Consultees from the LA's considered that greater operational liaison between themselves and HSE inspectors would be mutually beneficial in the interests of safety; this would be facilitated by greater specialisation of HSE fairground inspectors (see later in this section).

12.9 Bylaws made under Local Government legislation allow control of public safety (i.e. crowd control) and public health (i.e. litter and food standards. If applied to mechanical or electrical safety, these bylaws may be ultra vires (outside their powers). So in practice bylaws should not overlap with health and safety requirements, and following an approach by the Sector, the Home Office is directing LAs to adopt new versions of model conditions to avoid this.

Regulatory Work

12.10 HSE's regulatory effort includes:

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- a) standards setting and the preparation of guidance - primarily the responsibility of the Sector, based in Glasgow;
- b) preventative inspection and audit of parks and fairgrounds - the responsibility of inspectors in FOD's Areas;
- c) regulating product safety - in practice the main route for this is checking for pre-use inspection, which if carried out well should ensure the initial integrity of both new and second-hand rides (another argument for speeding up the production of "Advice for Design");
- d) investigation of accidents and complaints - the responsibility of inspectors in FOD's Areas, supported by HSE technical specialists;
- e) formal enforcement, i.e. legal proceedings and the issue of improvement and prohibition notices - the responsibility of inspectors in FOD's Areas, supported by HSE technical specialists;
- f) research, i.e. the carrying out of research into hazards and controls, the commissioning of which is primarily the responsibility of the Sector.

12.11 Information on the level of contacts, enforcement notices and prosecutions in recent years may be found in Annex 5. Data in the Table 12.1 following, although a relatively crude set of comparisons, suggests that fairground work has received broadly proportionate enforcement effort from HSE. This comparison is based purely on accident totals. As most other industries have a greater proportion of other hazards, the allocation appears relatively generous in relation to competing demands.

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Table 12.1: Comparison of Fairgrounds with National Figures (1999/2000 year)

Events	National Totals for HSE	Total for Fairgrounds	% for Fairgrounds
Fatal Accidents (workers and members of the public)	655	1	0.15%
Major Accidents* (workers and members of the public)	53,673	509*	0.95
Regulatory Contacts	185,496	1,718 (site contacts)	0.92
Prohibition Notices	5,877	12	0.2
Improvement Notices	6,954	34	0.49
Prosecutions (informations)	2, 253	7 (completed)	0.31

Figures were derived by the author from "Health and Safety Statistics 1999/2000", the HSC Annual Report for 999/2000, and data in the FOCUS database.

* For reasons explained earlier, HSE systems log all reported nonfatal accidents to members of the public as "major", although many will not involve major injury.

12.12 There is an ongoing programme of research organised by the Sector, currently:

- a) Passenger Containment (completed);
- b) Ergonomic assessment of control panels and operating procedures (completed);
- c) Go-kart design and operating procedures (completed);
- d) Health Effects of High G Force levels on fairground rides (this is understood to be a somewhat misleading title as it is mainly concerned with changes in acceleration rather than G forces as such);
- e) Safety Integrity of PES (Programmable Electronic Systems - computer control) at fairground rides (completed);

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- f) Amusement Reporting Information Scheme ("ARIS" or "IRAS") - Scoping Study;
- g) Revision of 'An assessment of risks at fairground rides' (completed).

Issues

12.13 **Training and Experience of Inspectors.** Industry representatives and HSE's own inspectors were emphatic that the industry is a specialised one, and that both training and experience are essential to enable inspectors to be able to regulate effectively and apply consistent standards. The Sector itself has delivered training courses for 30 HSE inspectors at about 2 yearly intervals. But fairgrounds are only one part of the workload for most inspectors, and given the movement of staff between posts due to the pressures on FOD only a handful develop particularly high levels of experience and knowledge of the industry.

12.14 Similar comments were made about the need to ensure a succession of skilled staff in the Sector itself, and industry representatives expressed the view that changes and reductions in the staffing of the Sector have slowed up the development of standards and guidance.

12.15 There does appear to the author to be an advantage, on balance, in treating fairground work as something of a specialism, as this would reduce the training burden and enable more effective regulation without increasing resource. A similar argument might perhaps be made for other industries, and have to be rejected in the wider interests of flexibility and staff development, but fairgrounds is probably the most special case.

12.16 Two alternative models have been discussed by the Project Board:

- a) making fairground inspection a form of specialism at Regional level, with a smaller number of nominated inspectors spending appreciable amounts of their time on this work, for longer periods of their careers, and covering wider geographical areas. This approach would require careful management of succession planning, and arrangements to ensure there was fairgrounds cover when staff were absent;

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- b) managing fairground inspection under the control of a national team, with inspectors allocated full time on this work and located at geographically convenient offices. Something similar was done successfully by HSE's Offshore Division to deal effectively with problems with diving which is also a peripatetic industry.

12.17 Complaints. Some consultees were of the opinion that HSE does not always respond effectively enough to complaints and tip offs about unsafe conditions. Two instances were investigated as part of the review and it was found that they had not been followed up, probably because they had not been presented through the Complaints procedures. HSE should publicise its complaints procedures to the industry and the public, making it clear that objective complaints about unsafe conditions are welcome and will be treated formally.

12.18 Investigations. Industry consultees were concerned by:

- a) the length of time taken to complete investigations, often combined in practice with blanket bans on the release of information needed to enable preventative action elsewhere, for fear of prejudicing legal proceedings. In some instances HSE has seized or taken control of rides, and without access the industry can not make its own assessment of whether any urgent action is needed elsewhere. There are acknowledged constraints in this area, particularly when joint HSE/Police investigations are ongoing, and apparent conflicts between various sets of laws governing evidence, openness and disclosure. But it does appear to the author that better feedback could be given than is being given, with potential benefits for accident prevention;
- b) HSE's use of its own specialists, perhaps highly competent and well qualified but not necessarily highly experienced in fairground rides, to provide technical advice on investigations. NAFLIC in particular suggested that HSE should make more use of industry expertise to provide balance and knowledge - either in primary investigation or in validating technical reports before sign-off. This would often be problematic, given the need for impartiality and independence, and is

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not fully supported by other industry organisations, but it might be possible and of benefit in some circumstances;

- c) the inadequate quality of data captured as an output from HSE investigations, being perhaps sufficient for local needs, but of limited use in planning industry-wide accident prevention. This view is endorsed by the author, having studied records from the FOCUS database.

12.19 The author recommends that an investigation protocol should be drawn up by HSE in consultation with the industry and HSE's legal advisors, to define the balance between competing requirements and to cover:

- a) the timeliness of investigations;
- b) the quality assurance of technical reports before sign-off;
- c) conditions under which involvement of industry specialists could be both valuable and legitimate;
- d) feedback of information on fatalities and serious incidents, giving guidance that takes into account the various legislation on disclosure;
- e) a specification for a standard set of data to be recorded by inspectors as an output from investigations of fairground accidents, especially when these involve rides.

Conclusions and Recommendations

12.20 The **conclusions** are that the law on enforcement allocation would benefit from simplification and clarification, that FOD has a sound regulatory history but could provide a more effective service overall by increasing specialisation, and that procedures for both complaints and investigations can be improved to tighten regulation.

12.21 **Recommendations** are that:

- a) the legal definitions and enforcement allocation rules for fairgrounds should be simplified as part of the current review of the Health and Safety (Enforcing Authorities) Regulations;

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- b) FOD should, as far as consistent with other responsibilities, make fairground inspection a more specialised topic and ensure continuity of expertise both in the Sector and the field;
- c) the existing complaints procedures should be publicised to the industry;
- d) a fairground ride investigation protocol should be drawn up.

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ALTERNATIVES TO THE CURRENT REGIME

Introduction

13.1 Previous sections of the report concentrated on the adequacy or otherwise of the existing regime of law underpinned by guidance. This section summarises possible options for strengthening the regime with additional legislation. It takes into account a sub-review of alternative types of regulatory regime (see Annex 6).

Background

13.2 Proposals for legislative changes would be subject to Regulatory Impact Assessment under the Government's Better Regulation rules. This would in turn require analysis of costs and benefits, which are outside the scope of the present review.

13.3 There is an important distinction to be made between:

- a) legal changes that are intended to impose higher levels of protection;
- b) legal changes that are intended to make it easier for the authorities to enforce compliance , by means of:
 - i) legal requirements worded in absolute terms; or
 - ii) measures that prompt or facilitate the checking of safety , such as requirements for licences or notifications.

13.4 Given the conclusions of this review that the current system of law and guidance is fit for purpose as a framework for the management of accident prevention at fairgrounds, and contains enforceable precautions that are both necessary and well matched to the risks, this section concentrates mainly on type 'b' measures.

13.5 Changes in legislation may lead to better protection, but do not necessarily do so. The clarity and validity of legislation, its acceptance by the duty holders, their awareness of it, and the quality and extent of enforcement are all relevant factors in

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ensuring compliance. Specific legislation must be kept up to date if it is not to make the situation worse by enshrining out of date standards.

13.6 There was a strong consensus among consultees, inside the industry and out, that legal changes would achieve nothing in themselves, and certainly not without an increase in inspection resource . The collective view was that the needs are for increased awareness and self-regulation in the industry, and vigorous enforcement action against “cowboys”, rather than more law.

Fairgrounds Regulations

13.7 Such regulations could include specific requirements relating to all the main topics areas of the guidance. The regulations could be free standing, or a specific section of PUWER.

13.8 **Strengths** could be:

- a) the regulations would make it clearer to the industry what the legal requirements were;
- b) specific regulations might be more straightforward to enforce.

13.9 **Weaknesses** could be:

- a) a further increase in the volume of health and safety law, without increasing actual levels of safety or obviating the need for additional guidance;
- b) difficulties in writing regulations that were specific enough to be easily enforceable, yet flexible enough to cope with the variety of equipment in use;
- c) constraints in achieving timely updates;
- d) diversion of HSE resource from inspection and enforcement to writing and updating legislation.

Approved Code of Practice

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13.10 This would involve upgrading the main elements of existing guidance to Approved Code of Practice (ACoP) status. The legal significance is that if in a prosecution it were proved that a duty holder did not comply with the provisions of the ACoP, the onus would pass to the defence to prove that the law was complied with in some other way.

13.11 The main **Strengths** could be:

- a) higher perceived status for the guidance;
- b) easier enforcement of requirements.

13.12 The main **Weaknesses** could be:

- a) the need for additional guidance as well as the ACoP;
- b) more constraints in achieving timely updates.

Licensing Requirements

13.13 These could involve requirements for fairs to be licensed by either HSE or the LA, or for rides or ride controllers to be licensed.

13.14 **Strengths** could be:

- a) it could be easier for the authorities to keep check of the safety of rides, by providing information about where and by whom they were operated;
- b) if display of licences were required, it would be easier for the public and the authorities to identify those outside the scheme;
- c) withdrawal of licences could be an exceptionally powerful sanction.

13.15 **Weaknesses** could be:

- a) increased costs for the industry and the regulator (although licences could be made self-funding through fees);

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- b) obtaining a piece of paper would be no guarantee of ride safety or safe operation, so would still need to be backed by inspection and enforcement;
- c) licensing schemes tend to transfer responsibility for safety away from those in control of the risks and towards the authority issuing the licence.

Notification Requirements

13.16 There are no legal requirements at present to notify the use of a ride nor the use of a site as a “fairground”, so they may never come to the attention of the authorities except in the event of incidents. Such requirements could involve the pre-notification to the authorities of:

- a) ride controllers;
- b) fairs;
- c) taking into use of a ride for the first time by a controller .

13.17 **Strengths** could be:

- a) the authorities could have up to date information on which to plan and target inspection;
- b) the information would act as a prompt to check compliance.

13.18 **Weaknesses** could be:

- a) increased costs to the industry;
- b) increased costs to the authorities in processing notifications;
- c) problems in giving a reasonable period of notice, as not all uses of rides can be planned far ahead;
- d) that the requirements would be unlikely to have an impact unless notifications were followed up, requiring increased regulatory resource to be applied to this low risk industry.

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Registration Requirements

13.19 These could involve ride controllers or ride inspectors being required to be Registered, probably through an Accreditation scheme, before being legally permitted to operate in the industry. Alternatively a registration scheme for rides might require registration on import, on change of ownership, or on modification. It could involve the issue of a registration number to be displayed on the ride.

13.20 **Strengths** could be:

- a) a properly administered scheme for registering people could provide increased confidence that they were competent to fulfil their duties;
- b) registration of rides could provide the authority with information to facilitate inspection, and could help customers to choose rides that were registered;
- c) withdrawal of registration would be a powerful sanction.

13.21 **Weaknesses** could be:

- a) increased costs for the industry;
- b) registration might be a test of competence but not necessarily of diligence, so inspection and enforcement would continue to be required in addition.

Conclusions and Recommendations

13.22 The earlier conclusions of this report are in summary that:

- a) on average, risks to the public are low and have been decreasing over the years;
- b) rides are already subject to the same legislation as other equipment, and the current system of law plus guidance is fit for purpose as a framework for the management of accident prevention at fairgrounds;
- c) there have been planned continuous improvements to the regime for fairground safety over the years, including ones prior to the events of

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2000 which might have prevented some of those accidents if implemented in time, but;

- d) further improvements to the regime, industry awareness of it, how it is implemented, and how HSE enforces it are all desirable to reduce remaining risks and to make it more difficult still to evade full and diligent compliance.

13.23 If these improvements can be accepted and implemented by all concerned, and if deaths and serious accidents remain low year on year, the case for yet more legislation seems weak and unlikely to survive Regulatory Impact Assessment.

There are two main arguments:

- a) the lack of proportionality and targeting, as legislation would impact on the best as well as the worst;
- b) a lack of confidence that legal changes would in themselves prompt changes in behaviour that would lead to a reduction in accidents.

13.24 Conversely, if the events in 2000 should prove to have been the start of a trend of increasing accidents rather than a cluster, additional controls and an additional input of regulatory resource are likely to be imposed. The most effective candidate would appear to be the Licensing of both rides and fairs by HSE, providing a high degree of central control on a self-funding basis.

13.25 The **conclusion** is that additional legislative controls are not warranted at present, nor would they be likely to be very effective without much increased regulatory resource. However, they remain an option.

13.26 The **recommendation** is that if there is deterioration in either compliance with the regime or in accidents, formal Regulatory Impact Assessment of the options above should be carried out with a view to legislation.

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Annex 1

GLOSSARY

Table A1.1

Acronym or Defined Term	Meaning
AALA	Adventure Activities Licensing Scheme
ACES	Amusement Catering Equipment Society
ACoP	Approved Code of Practice
ADIPS	Amusement Devices Inspection Procedures Scheme
AIB	Appointed Inspection Body - a body nominated by a ride controller to co-ordinate the inspection of a ride, when more than one IB is involved (see also IB)
AIS	Association of Independent Showmen
ARIS or IRAS	Amusement Reporting Information Scheme
BACTA	British Amusement Catering Association (Ride Manufactures)
BALPPA	British Association of Leisure Parks, Piers and Attractions
CORGI	The Council for Registered Gas Installers
DOC	Declaration of Operational Compliance - a certificate issued by the IB on satisfactory completion of the pre-use inspection of a device, or on satisfactory completion of an in-service inspection.
FJAC	Fairgrounds Joint Advisory Committee
FOCUS	Field Operations Computer System - the FOD database for recording accidents, contacts, investigations and enforcement action, in addition to other information
FOD	Field Operations Directorate of HSE
HSC	The Health and Safety Commission
HSE Inspector	Inspector employed by HSE - a regulator
HSE	The Health and Safety Executive
HSG 175	Fairgrounds and Amusement Parks - Guidance on Safe Practice
HSW	The Health and Safety at Work etc. Act 1974

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Acronym or Defined Term	Meaning
IB	Inspection Body - a body recognised for the inspection of rides (see also AIB)
LA	Local Authority
LASS	Leisure Activities Surveillance System - a DTI database containing data sampled from accident and emergency admissions
LOLER	The Lifting Operations and Lifting Equipment Regulations 1998
NAFLIC	The National Association for Leisure Industry Certification
NDT	Non Destructive Testing
PUWER	The Provision and Use of Work Equipment Regulations 1998
RIDDOR	The Reporting of Accidents, Diseases and Dangerous Occurrences Regulations 1995
Ride Inspector	A term used in this report to signify an inspector employed by an inspection body offering a commercial service
Sector	The Food and Entertainment Sector of FOD, based in Glasgow, with national responsibilities for fairground safety policy and guidance
SGGB	The Showmen's Guild of Great Britain
SIRP	The Society of Independent Roundabout Proprietors
SPD	Safety Policy Directorate of HSE

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Annex 2

REFERENCES

1. "Fairgrounds and Amusement Parks - Guidance on safe practice", HSG 175, published October 1997.
2. "The amusement devices inspection procedures scheme (ADIPS)" - Entertainment Sheet No 8, published 09/99.
3. "Travelling Fairs", Ninth Report of the Select Committee on Environment, Transport and Regional Affairs, June 2000.
4. "An Assessment of Risks at Fairground Rides" by the Safety and Reliability Directorate, published by HSE March 1990.
5. "Home Accident Surveillance System Including Leisure Activities", 22nd annual report, 1998 data, published by the Department of Trade and Industry, March 2000.

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Annex 3

LIST OF CONSULTEES

A3.1 This annex lists with thanks those who were the principal contributors of information and views.

Table A3.1

ORGANISATIONS	PEOPLE
Amusement Catering Equipment Society	Geoffrey Thompson
Association of Independent Showmen	John Crane
British Association of Leisure Parks, Piers and Attractions	Richard Pawley
British Amusement Catering Trade Association	Alan Buckley
BSI and European Consumers Organisation.	Geoff Robson
Child Accident Prevention Trust:	Carol Sherriff
Department for Education and Employment	Martin Elliott (AALA scheme)
Department of Trade and Industry	Amy Yan (LASS statistics)
Great Britain's Little Railways	Malcolm B Beevers
HSE - Technical	Alan Jackson (HSL) John McDonald (TD)
HSE - Operational	Caroline Wake Steve Flanagan David Cory
HSE - Policy	Stuart Bullock (SPD B) Nigel Hammond (LAU) Shila Patel (LAU) Kathy Kirby (Better Regulation) Barry Watkinson (re CORGI)
HSE - Solicitors	Richard Hooker Chris Hales Kevin O'Reilly

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ORGANISATIONS	PEOPLE
HSE - Sector	Stuart North (former member) Terry Williams Eric Pirie Jayne Whitehead (former member) Jeanette Reuben
Local Authorities	John Green (East Lindsey DC) Julie O'Brian (Wokingham DC) Jan Paley (Rochdale MBC)
National Association For Leisure Industry Certification	Ken Rundle Garry Fawcett Richard Barnes Mike Preston Doug Dadswell Bob Nicholls
Royal Society for the Prevention of Accidents	Peter Cornall
Safety Assessment Federation	Richard Morgan
Showmen's Guild of Great Britain	Anthony Harris Bill Greville
Society of Independent Roundabout Proprietors	John Schofield

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Annex 4

ACCIDENT DATA

Introduction

A4.1 This annex sets out historical data on accidents involving fairground rides. I interpretation needs to be treated with caution, because:

- a) the extent of any under-reporting is not known, although it is unlikely that this is significant for fatalities;
- b) this is all historical data with constraints on quality, and in particular there are well known problems with coding accidents accurately from paper reports;
- c) the figures are not related to the numbers of rides given in any one year, which are subject to fluctuation for various reasons not least the weather and customer demand - the industry estimates that the number of rides sold has doubled over the last decade;
- d) “3 day” accidents to employees are reportable, but not to the self-employed nor members of the public;
- e) RIDDOR 1995 introduced a new category of “... any other injury which results in the person injured being admitted immediately into hospital for more than 24 hours.” Unfortunately these are captured in HSE systems as “major injuries” which are thus overstated. This and other changes mean that figures after 1997 can not be compared with earlier ones; in the case of the fatalities in particular, the numbers each year are subject to statistically variation;
- f) the data does not distinguish between fairs and parks, and includes other sites such as play areas.

Fatal Accidents

A4.2 The data in Table A4.1 below shows the total number of deaths to members of the public, employees and the self-employed at fairgrounds, reported to HSE under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1985 and 1995. All these fatalities involved fairground rides. The figures exclude deaths later classified as natural causes. Although the review is concentrating on

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the most recent five seasons, from April 1996 onwards, earlier years are given for comparison.

Table A4.1:

Year	86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94
No.	1	5	1	0	3	1	-	1
Year	94/95	95/96	96/97	97/98	98/99	99/00	00/01	
No.	4	0	1	1	0	1*	5*	

* = provisional statistics

** = assembled from incidents known to the Sector.

"Major Injuries"

A4.3 For reasons explained elsewhere in the report the statistics below contain accidents that did not occur at fairgrounds, and also overstate considerably the numbers of accidents that are truly "major". As a result the "major accidents" data is of limited value and is included mainly for completeness. Table A4.2 below summarises reported "major injuries", showing the most significant causative factors, in the period 1996/97 to 1999/2000. Figure A4.1 shows the same figures graphically. Statistics for 2000/2001 are not yet available.

Table A4.2

Year	Falls	Slips, trips and falls	Handling/Sprains	Sub-total	Percentage of Total	Total "major injury" accidents
96/97	81	128	15	224	47%	479
97/98	79	132	14	225	48%	473
98/99	76	116	11	203	47%	433
99/00	91	109	25	225	44%	509

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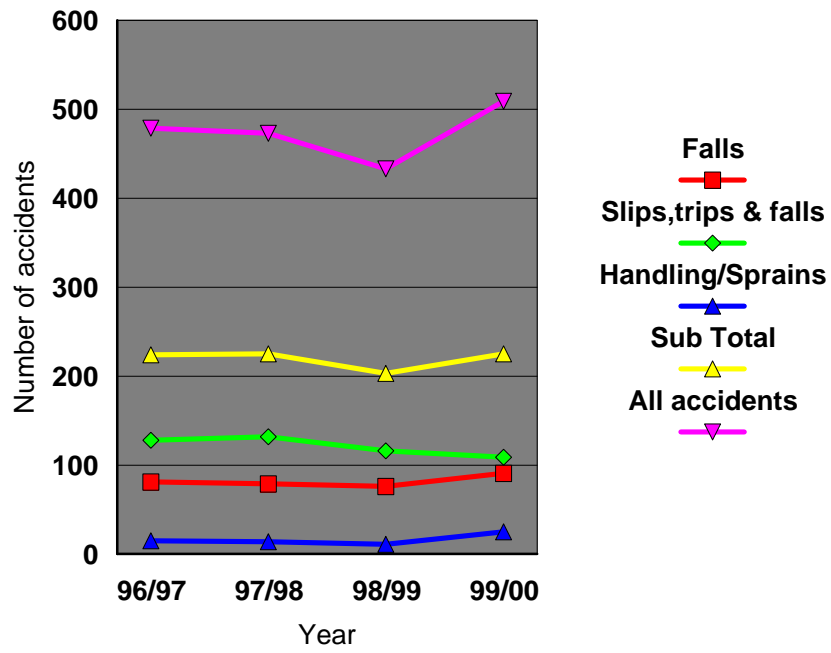


Figure
A4.1

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Over 3 day injuries

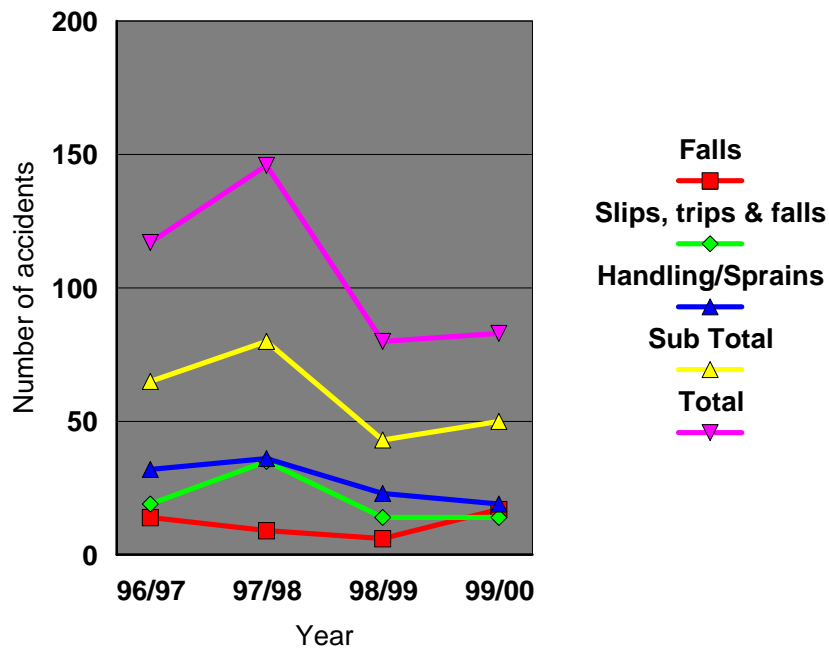
A4.4 Table A4.3 below summarises reported “3 day” accidents to employees at fairgrounds and amusement parks by causation in the period 1996/97 to 1999/2000.

Figure A4.2 shows the same data graphically. Figures for 2000/2001 are not yet available.

Table A4.3

Year	Falls	Slips, trips and falls	Handling/Sprains	Sub-total	Percentage of Total	Total over 3 day injury accidents
96/97	14	19	32	65	56%	117
97/98	9	35	36	80	55%	146
98/99	6	14	23	43	54%	80
99/00	17	14	19	50	60%	83

Figure A4.2



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Accident Causation

A4.5 The tables below give more detailed breakdowns of accidents by causation in the period from 1996/97 to 1999/2000.

Table A4.4 - 1996/97, Employees

Status	Kind	"Major injury"	Over 3 day	Grand Total
Employee	Animal		2	2
	Assault/Violence	1	6	7
	Collapse/Overturn		1	1
	Exposure/ Hot substances		4	4
	Fall	2	6	8
	High Fall	4		4
	Low Fall	1	8	9
	Handling/Sprains	5	32	37
	Machinery	2	1	3
	Not known	1		1
	Other kind	1	7	8
	Strike/Step on	9	5	14
	Struck by	4	22	26
	Transport	1	1	2
	Trip	15	19	34
	Volt	1	3	4
Totals		47	117	164

Above figures include one over 3 day accident to a self employed person, recorded as being caused by 'other kind'.

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Table A4.5 - 1996/97, Members of Public

Status	Kind	"Major injury"	Over 3 day	Grand Total
Members of the public	Animal	3		
	Assault/Violence	1		
	Collapse/Overturn	1		
	Exposure/ Hot substances	4		
	Fall	24		
	High Fall	5		
	Low Fall	45		
	Handling/Sprains	10		
	Machinery	13		
	Not known	4		
	Other kind	56		
	Strike/Step on	61		
	Struck by	66		
	Transport	26		
	Trip	113		
	Volt			
Total		432	0	432

Table A4.6 - 1997/98, Employees

Status	Kind	"Major injury"	Over 3 day	Grand Total
Employee	Animal		1	1
	Assault/Violence	2	5	7
	Collapse/Overturn	1	1	2
	Exposure/ Hot substances	2	4	6
	Fall	4	3	7
	High Fall	1		1
	Low Fall	1	6	7
	Handling/Sprains	1	36	37
	Machinery	4	5	9
	Not known	1		1
	Other kind	2	12	14
	Strike/Step on	4	10	14
	Struck by	7	24	31
	Transport	1	4	5
	Trip	13	35	48
	Volt			
Totals		44	146	190

Above figures include one self employed person, major injury caused by transport and one self employed person, over 3 day accident caused by 'struck by'.

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Table A4.7 - 1997/98, Members of Public

Status	Kind	"Major injury"	Over 3 day	Grand Total
Members of the public	Animal	1		
	Assault/Violence	1		
	Collapse/Overturn	1		
	Exposure/ Hot substances	1		
	Fall	24		
	High Fall	6		
	Low Fall	43		
	Handling/Sprains	13		
	Machinery	16		
	Not known	5		
	Other kind	72		
	Strike/Step on	64		
	Struck by	39		
	Transport	24		
	Trip	119		
	Volt			
Totals		429	0	429

Table A4.8 - 1998/99, Employees

Status	Kind	"Major injury"	Over 3 day	Grand Total
Employee	Animal		1	1
	Assault/Violence	2	3	5
	Collapse/Overturn			
	Exposure/ Hot substances		6	6
	Fall			
	High Fall	2	1	3
	Low Fall	4	5	9
	Handling/Sprains	1	23	24
	Machinery	2	1	3
	Not known			
	Other kind		3	3
	Strike/Step on	2	10	12
	Struck by	3	11	14
	Transport	4	2	6
	Trip	15	14	29
	Volt			
Totals		35	80	115

Above figures include one self employed person, "major injury" caused by trip.

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Table A4.9 - 1998/99, Members of Public

Status	Kind	"Major injury"	Over 3 day	Grand Total
Members of the public	Animal	1		
	Assault/Violence			
	Collapse/Overturn	1		
	Exposure/ Hot substances	2		
	Fall	28		
	High Fall	8		
	Low Fall	44		
	Handling/Sprains	10		
	Machinery	16		
	Not known	4		
	Other kind	54		
	Strike/Step on	68		
	Struck by	40		
	Transport	16		
	Trip	102		
	Volt			
Totals		398*	0	398

* Figures for major injuries include 3 accidents for which the cause was non-fatal drowning or asphyxiation.

Table A4.10 - 1999/2000, Employees

Status	Kind	"Major injury"	Over 3 day	Grand Total
Employee	Animal			
	Assault/Violence		3	3
	Collapse/Overturn			
	Exposure/ Hot substances	1	5	6
	Fall	2	7	9
	High Fall		2	2
	Low Fall	4	8	12
	Handling/Sprains	5	19	24
	Machinery	1	2	3
	Not known			
	Other kind	1	1	2
	Strike/Step on	4	10	14
	Struck by	9	11	20
	Transport	3	1	4
	Trip	15	14	29
		Volt		
Totals		45	83	128

Above figures include one self employed person, "major injury" caused by 'strike/step on'.

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Table A4.11 - 1999/2000, Members of Public

Status	Kind	"Major injury"	Over 3 day	Grand Total
Members of the public	Animal	3		
	Assault/Violence			
	Collapse/Overturn			
	Exposure/ Hot substances			
	Fall	30		
	High Fall	3		
	Low Fall	52		
	Handling/Sprains	20		
	Machinery	27		
	Not known	9		
	Other kind	68		
	Strike/Step on	86		
	Struck by	63		
	Transport	7		
	Trip	94		
	Volt	2		
Totals		464	0	464

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Table A4.12 - Description of Accident Causation (Kind) used in tables above:

"Kind"	Definition
Animal	Any injury by an animal
Assault/Violence	Physical assault or violence. Injuries sustained as a result of a deliberate criminal act.
Collapse/Overturn	Trapped by something collapsing or overturning.
Exposure/ Hot substances	Exposure to or contact with harmful or hot substance or object.
Fall	Height of fall not known
High Fall	High fall over 2 meters
Low Fall	Low fall up to and including 2 meters
Handling/Sprains	Injured while handling, lifting or carrying - sprains and strains
Machinery	Contact with moving machine or material being machined.
Not known	Kind of accident not known
Other kind	Other kind of accident
Strike/Step on	Struck against something fixed or stationary, stepping on something.
Struck by	Struck by moving, including flying or falling object - includes accidents involving powered hand tools.
Transport	Struck by moving vehicle
Trip	Slip, trip or fall on same level
Volt	Contact with electricity or electrical charge

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LASS Data

A4.6 The table below shows a set of accident data derived from the DTI's Leisure Activities Surveillance System (LASS). The main body of the table shows the numbers of attendances at a sample of Accident and Emergency Departments. The bottom row of the table provides an estimate of the national numbers of such attendances in each year. The figures displayed do not detail the type nor severity of injuries, although such figures are available from DTI (5).

A4.7 The data is not capable of providing an accurate picture of accidents at fairgrounds and amusement parks. Many of these accidents occurred at other venues such as the home and playgrounds. Moreover, this set of data does not contain data about accidents that may not necessarily involve equipment, such as slips, trips and falls, which can not be extracted against fairgrounds and parks specifically. The numbers are also subject to statistical variation. (NAFLIC have suggested that this data is potentially valuable in accident prevention and should be analysed further, perhaps as a research project, and this seems a valuable suggestion.)

A4.8 Nevertheless the data is of interest because it gives an indication of which types of equipment that have given rise the greatest numbers of admissions and is, therefore, relevant in formulating preventative strategies. In fact, bouncing castles, rather than high tech rides, account for the highest numbers of admissions. HSE is about to publish updated guidance - Entertainment Sheet 7 "Safety in the Use and Operation of Play Inflatables, including Bouncy Castles".

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Table A4.13

Fair&Playground articles / Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
PADDLING POOL/ WATER IN IT	14	39	37	13	13	12	20	25	33	28
SANDPIT OR BOX	22	18	25	16	14	17	21	41	35	31
SWING	906	773	799	685	418	411	456	794	777	688
ROPE SWING	0	242	267	273	146	154	184	330	327	247
CLIMBING FRAME	627	708	732	670	404	438	529	1041	1106	992
SLIDE	619	574	543	563	281	354	429	874	828	745
SEE SAW	134	128	174	137	74	93	99	176	197	155
PLAYGROUND ROUNDABOUT	122	94	154	102	77	68	84	127	131	112
ADVENTURE PLAYGROUND EQUIPMENT	0	1	51	48	15	21	30	58	53	74
OTHER PLAYGROUND EQUIPMENT	0	0	0	13	40	46	57	94	91	125
UNSPECIFIED PLAYGROUND EQUIPMENT	0	0	0	1	8	11	15	19	25	26
ROLLER COASTER	0	0	0	0	4	14	8	15	17	17
AMUSEMENT TRAIN	1	2	14	16	1	7	2	6	6	1
LOG FLUME OR WATER RIDE	0	0	10	5	1	2	7	15	14	17
BIG WHEEL	2	1	2	1	2	1	0	4	2	1
OCTOPUS	7	1	1	3	0	2	2	2	4	1
WALTZER	18	20	12	18	12	13	20	16	32	48
FAIRGROUND ROUNDABOUT	20	34	30	30	10	13	9	16	22	22
OTHER FAIRGROUND RIDE	0	1	61	55	42	61	70	148	141	96
BOUNCING CASTLE	128	120	203	201	112	149	196	343	303	288
OTHER INFLATABLE EQUIPMENT	0	0	0	0	14	13	11	23	37	39
RODEO HORSE/SIMULATOR MACHINE FOR CHILD	6	4	3	5	3	4	4	4	6	6
GAME MACHINE (PIN-BALL/ VIDEO GAME ETC)	0	0	27	17	17	7	11	27	15	21
OTHER AMUSEMENT MACHINE	0	0	0	2	11	18	25	34	37	14
BUMPER CAR OR DODGEM CAR	40	50	47	54	36	29	49	96	86	89
HELTER-SKELTER	16	5	3	1	4	6	9	3	3	4
MAZE (INDOOR)	2	0	0	0	1	0	0	0	0	2
FAIRGROUND PUNCH MACHINE - WITH GLOVE	0	0	0	0	0	0	0	0	0	5
FAIRGROUND PUNCH MACHINE - WITHOUT GLOVE	0	0	0	0	0	0	0	0	0	7
FAIRGROUND PUNCH MACHINE - GLOVE UNSP	0	0	0	0	0	0	0	0	0	18
OTHER FAIRGROUND EQUIPMENT	78	92	48	63	12	11	11	42	21	24
UNSPECIFIED FAIRGROUND EQUIPMENT	22	40	18	14	5	13	15	38	36	26
Average	87	92	102	94	56	62	74	138	137	124
Sum	2784	2947	3261	3006	1777	1988	2373	4411	4385	3969
National Estimate	98275	80158	92939	85370	88317	80991	86757	84735	86428	77515

NB: The figures given for each year are the numbers sampled - to obtain national estimates they should be multiplied by the “National Estimate” and divided by the “Sum” (eg for the 1998 year the estimated number of attendances involving Waltzers would be estimated as $48 \times 77515/3969 = 937$. On the same basis the national estimate for “Football/basket ball” is 208, 287.

FAIRGROUND SAFETY REVIEW

Annex 5

ENFORCEMENT DATA

A5.1 This annex contains data relating to HSE's regulatory activities in the field.

Contacts

A5.2 The table below shows the numbers and type of contacts by FOD field staff with "Fairgrounds" (SIC 92330):

Table A5.1:

Year	Total Nos. of Contacts	Nos. of Site Contacts	Total Contact Time (days)	Site Contact Time (days)
1996/97	1,610	1,303	222	169
1997/98	1,645	1,327	223	177
1998/99	1,517	1,148	188	147
1999/2000	2,209	1,718	262	207
2000/01 *	*2037	*1502	*272	209

* to 31/12/2000

+ to 23/01/01

Improvement and Prohibition Notices

A5.3 The numbers of enforcement notices issued in the past 4.5 years are shown below. All were issued under HSW S2 and 3.

Table A5.2:

Year	Prohibition	Improvement
1996/97	3	16
1997/98	3	11
1998/99	14	20
1999/00	12	34
2000/01 (half year)	11*	24*

* half year

Prosecutions

A5.4 The table below shows a summary of prosecutions, excluding ones in progress from 1999 onwards:

Table A5.3:

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Year	Defendants	Charges
1996/97	2	6
1997/98	4	4
1998/99	5	6
1999/00	6	7
2000/01 (half year)	6*	6*

* part year

NB: Other cases for the period 1999 -2001 are pending.

A5.5 These prosecutions have been taken against ride controllers, inspection bodies, and suppliers and manufactures of rides. Charges relate to a range of deficiencies in the areas of mechanical safety of rides, ride inspection, supervision and training of operators, systems of work, and electrical hazards.

COMPARISON WITH OTHER SAFETY REGIMES

A6.1 This annex provides background information on the regimes that were used as comparators.

LOLER - A Regime Involving Accreditation

A6.2 This regime is probably the nearest match for fairground rides in terms of risks and the similarity of the control measures needed. It involves the non-statutory accreditation of inspection bodies.

A6.3 Lifting equipment is required, in précis, to be inspected under LOLER

- a) before it is used for the first time;
- b) after reassembly;
- c) periodically if it is exposed to conditions causing deterioration which is liable to result in dangerous situations.

A6.3 Inspectors must be “competent persons”. This term is not defined in law. There are no requirements in the regulations for either independence from the owner or user of the plant, nor for accreditation. Guidance accompanying the regulations does stress the importance of independent and authoritative inspection.

A6.4 Voluntary arrangements for the accreditation of inspection bodies are well established, based on a tradition in GB for most such inspections to be carried out by insurance engineers.

A6.5 The Safety Assessment Federataion (SAFED) represents independent inspection bodies. Membership is not required under LOLER nor UKAS accreditation, but SAFED currently claims to covers about 95% of independent inspection in the UK on a voluntary basis. (Not fairgrounds inspection, as only one ADIPS registered IB is a member.) It provides a non-commercial environment in which information can be shared and standards developed, and negotiates with other bodies such as HSE. SAFED membership subscriptions are based on

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Inspection Body turnover figures; currently the minimum band of subscription is £1500 pa for annual turnovers of less than £0.5M.

A6.6 The UK Accreditation Service (UKAS) accredits bodies to appropriate general standards such as BSEN 45004. There are specific supporting documents used by UKAS when undertaking assessments for individual disciplines, these are called RG's ("Regulations and Guidance), eg RG6 is the specific RG document for Accreditation for In-Service Inspection of Lifting Equipment". UKAS accreditation costs typically £3.5 - £5k, renewable periodically, plus an annual surveillance fee.

A6.7 Bodies rather than individuals are accredited, but the process takes into account individuals' educational knowledge, experience of inspection, and detailed knowledge of the particular type of equipment. There are "grandfather clauses" for existing practitioners.

A6.8 Inspection bodies must under the scheme sample the work of individuals at least 3-yearly. Subcontracting is not allowed, unless the subcontractors are themselves accredited to EN45004 for the specific scope of inspection or have been assessed by the IB to ensure that they meet the appropriate criteria of EN45004.

A6.9 Current issues with the regime quoted by are SAFED is experiencing a lack of clarity in the interpretation of LOLER, and that owners of equipment are said to tend to rely to much on the competent person's inspection, rather than on a programme of effective maintenance. Either they don't have a maintenance log, or don't keep it up to date.

A6.10 There appears to the author no reason in principle why the UKAS accreditation scheme could not be used as a model for fairground equipment inspections, rather than the current industry based registration scheme, provided specific UKAS RG series accreditation standards were to be developed. It would be substantially more costly. NAFLIC estimate that thorough examination costs would go up by about £150 per annum, with a disproportionate effect on the smaller IB's.

CORGI - A Regime Based on Statutory Registration

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A6.11 Registration to carry out gas installations is compulsory under the law, and is currently managed by CORGI. Any lessons to be learned might be applicable to ride controllers and operators as well as ride inspectors.

A6.12 The scheme has evolved over nearly 30 years, initially as a voluntary register until it became a statutory requirement in 1991. There are currently about 44.5k businesses registered. This represents about 93.5k operators, of whom most are self-employed. About 20M homes have natural gas.

A6.13 In principle bodies other than CORGI could apply to run the scheme - in practice, none has. The 4 roles for CORGI are to run the statutory register, monitor performance, investigate all complaints, and publicise gas safety.

A6.14 Registration costs £157 pa per organisation, yielding about £8M pa. This does not cover the £9.5M costs in full, but CORGI subsidises these from other activities (some of which are seen by some people as taking an unfair advantage from the well established name).

A6.15 CORGI monitors standards by inspections of installers, supported by good information technology. Checks are made within 6 months of registration, and frequencies after that are based on a rating scheme. About 20% of installers disappeared from the register after the first tightening up, post 1996.

A6.16 To become registered, businesses must show they use certificated installers. Certification is obtained by assessment at assessment centres. (Training is available from training providers such as TECS - now being replaced by Learning and Skills Centres.) There are a range of competencies (132 assessments in total). This can be a time consuming process, but is being speeded up by removing duplicate tests. The development of assessments is supported by the existence of a framework of standards (eg BS's).

A6.17 There are 5 accredited certification bodies. Accreditation is managed by UKAS. "Grandfather clauses" meant that some installers remained without

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certification, but these clauses have become time expired - some people have left the industry at a time of shortage of installers.

A6.18 CORGI issues cards for installers, listing their competencies; CORGI may develop to become a certification body, as part of a package for eliminating “cowboys”.

A6.19 It seems to the author that there are good features of this scheme that could be applied to ride inspection:

- a) the requirement for training, including tests of competence;
- b) monitoring of performance shortly after first registration and periodically thereafter.

A6.20 These requirements applied to ride inspection would be more costly, to develop and fund training courses and training certification, and to maintain UKAS accreditation. There would be some problems for a relatively small industry in funding comparable arrangements.

Adventure Activities Licensing - A Licensing Regime

A6.21 This scheme requires providers of specified adventure activities to be licensed. Provision of such activities is more directly comparable to the operation of rides rather than their inspection.

A6.22 Providers are inspected and licenses issued or refused by a private company (employing 9 inspectors) appointed by the Secretary of State for Education as the Adventure Activities Licensing Authority (AALA). The AALA is a non-profit making cross-border public authority. The enforcing agency for AALA is either HSE or the local authority depending on the enforcement allocation.

A6.23 The scheme is restricted in its application to providers of activities to young persons under the age of 18 and to certain types of activities namely water sport activities, caving activities, trekking and climbing. It has been running for just over 3

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years. Activities carried out by voluntary groups or by pupils led by their own school teachers from the same school are not licensable activities.

A6.24 Standards used in assessing licensees are the ones issued by the National Governing Bodies (NGB's), plus "collective interpretations" that are now available on the web. Possession of an NGB certificate would preclude the AALA inspection requirement.

A6.25 There are currently about 930 license holders. A license is for 1 - 3 years, with 2 years typical. Conditions, eg restricting the licence by time and location, may be added as schedules. Education is a devolved matter. Costs are about £500 per license, generating total charges to the industry of about £300k pa nationally. Increases are due but will not cover total costs. Also grant in aid of £300k, and costs of running DfEE section (notional £50k).

A6.26 About 30 - 40 establishments ceased trading in first year. So far there has been only one appeal against refusal to grant a license.

A6.27 The industry has the chance to propose effective alternatives, but is said that it has not yet achieved the coherence to do so nor to manage effective self-regulation. Extension of the scheme continues to be resisted, despite enthusiasm by some politicians and the police. The scheme was reviewed in 1999 - the conclusion was that it should continue, with changes proposed to ease burdens on small firms and the licensing authority. These include acceptance of NGB certificates, and introduction of banded charges.

A6.28 Strengths are a good history, with no deaths in licensable activities over 3 years, compared with an average of about 2 per year for schools and similar for scouts, and a reduction in public concern.

A6.29 Weaknesses may be considered to be the narrow scope, lack of public appreciation, lack of wholehearted support by the industry, and the costs. There are problems with the seasonal peaks and troughs in the workload. It is not wholly self-financing. There is no external validation of the work of the inspectors, nor of

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certificates issued by the NGB's (which may be taken at face value under proposed changes). The licence covers only the safety mechanisms of leadership, instruction and equipment. It does not cover any other aspect of the provision. (Some may see this as a specific strength so long as people are fully aware.)

A6.30 Benefits come from good history, public confidence and the ease with which organisers can identify licensed establishments.

A6.31 In the author's view this form of control has few advantages for ride inspection. The key element in licensing ride inspectors would be the assessment of competence and diligence; essentially the same in either licensing or compulsory accreditation.

A6.32 It might have some advantages for controlling ride operation, in that it would provide the authorities with a means of identifying and making a positive check on the precautions adopted by controllers. On the same basis as AALA this could be made self-financing. Any such proposal would need to be subjected to Regulatory Impact Assessment to determine whether it would in practice lead to higher standards, and if so whether the costs would be justifiable in relation to benefits. All consultees, from within the industry or outside it, were sceptical that licensing would in practice improve fairground safety.

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ANNEX 7

CHANGES INTRODUCED BY HSG 175

A7.1 Initial Design Safety. The first main change was to put more emphasis on initial design safety. It was recognised that as rides had become more complex so only makers and those at the design stage were in a position to identify the safety critical parts, assign design lives, maintenance schedules, appropriate technical safeguards and write instruction manuals (i.e. an approach similar to the Machinery Directive although this excludes “special equipment for use in fairground and/or amusement parks”). At the Edinburgh Council of Ministers meeting there was a decision that there was no need for a Directive on Fairground Safety as this was a matter for subsidiarity. (NAFLIC have flagged up that there are still significant barriers to trade in relation to fairground equipment and Germany, and predict that because of this most Design Review work will be carried out in Germany within 5 years.) This systematic approach would be made to work via a requirement for independent inspections of the design (design review): and assessment of conformity to design. For existing rides, where the risk assessment showed it warranted, retrospective design review would be carried out of safety critical components. A programme for these retrospective design reviews was later agreed with the industry and published in the HSE Information Sheet No. 8 explaining the Amusement Device Inspection Procedures Scheme (ADIPS).

A7.2 This move to establish initial integrity was further pushed by FOD prosecuting a ride inspector for faults missed at an annual inspection. Ride inspectors, through NAFLIC, have understandably argued throughout that they could only be expected to identify deterioration at annual inspections, as they did not have access to all the information to determine the adequacy of the original design. The retrospective programme for design maturity assessments by controllers could not be completed until 2004.

A7.3 Registration of Inspection Bodies. The second main change introduced was to form a register of inspection bodies competent to do the different types of inspection identified. This was initially set up with them self-declaring their quality files against recognised engineering inspection service quality schedules. It was

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always intended this system could be gradually tightened up to a full quality assured (accredited) scheme. The first steps could now be taken to see if the scheme can gain accreditation by UKAS on the basis of detailed proposals.

A7.4 Hierarchy of Ride Inspections. The third main change introduced was to set up a clear hierarchy of inspection steps and checks throughout the life of a ride covering initial integrity (as above) annual in service inspection, documentation (Declaration of Operational Compliance) and a complete record of all inspections, instructions and maintenance requirements kept in the Operations Manual.

A7.5 Roles and Responsibilities. The fourth main change was to clarify the roles and responsibilities of the various duty holders. The industry associations bought bulk supplies of HSG 175 to send out to members.