RISK ASSESSMENT APPLIED TO CONSUMER PRODUCTS WITH REFERENCE TO CE MARKING MACHINES FOR USE AT WORK

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June 2004

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THESIS SUMMARY

'New Approach' Directives now govern the health and safety of most products whether destined for workplace or domestic use. These Directives have been enacted into UK law by various specific legislation principally relating to work equipment, machinery, and consumer products.

This research investigates whether the risk assessment approach used to ensure the safety of machinery may be applied to consumer products. Crucially, consumer products are subject to the Consumer Protection Act (CPA) 1987, where there is no direct reference to "*assessing risk*".

This contrasts with the law governing the safety of products used in the workplace, where risk assessment underpins the approach. New Approach Directives are supported by European harmonized standards, and in the case of machinery, further supported by the risk assessment standard, EN 1050.

The system regulating consumer product safety is discussed, its key elements identified and a graphical model produced. This model incorporates such matters as conformity assessment, the system of regulation, near miss and accident reporting.

A key finding of the research is that New Approach Directives have a common feature of specifying essential performance requirements that provide a hazard prompt-list that can form the basis for a risk assessment (the hazard identification stage).

Drawing upon 272 prosecution cases, and with thirty examples examined in detail, this research provides evidence that despite the high degree of regulation, unsafe consumer products still find their way onto the market.

The research presents a number of risk assessment tools to help Trading Standards Officers (TSOs) prioritise their work at the initial inspection stage and when dealing with subsequent enforcement action.

KEY WORDS:
Consumer product, safety, hazard, injury, accident prevention.

Acknowledgements

This research was carried out under the supervision of Dr Mark Cooper and Dr Hani Raafat of the School of Engineering and Applied Science at the University of Aston in Birmingham whose help, encouragement and patience is greatly appreciated.

During the research I was aided by many Trading Standards Officers (TSOs) and other enforcement officers whilst assisting them with their investigations. As a participant observer in the research, I explored relevant issues with many others who had a personal and professional interest in the safety of consumer products and am grateful to all those who helped me.

Whilst carrying out this research I was also Product Safety Adviser to the Royal Society for the Prevention of Accidents (RoSPA) and my thanks are extended to John Howard, O.B.E. RoSPA's Chief Executive Officer for his encouragement and support.

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Abbreviations

ACR	Association for Consumer Research
AFNOR	Association Francaise de Normalisation
ALARP	As Low as is Reasonably Practicable
ANEC	European Association for Consumers in Standardization
ANSI	American National Standards Institute
BEUC	European Bureau of Consumer Unions
BSI	British Standards Institution
CA	Consumers' Association
CAPT	Child Accident Prevention Trust
CCC	Consumer Consultative Committee of the European Commission
CE	Communitee Europeen [European Community]
CEC	Commission of the European Communities
CECG	Consumers in the European Community Group (UK)
CEG	Council of the European Communities
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
COPOLCO	ISO Committee on Consumer Policy
CoP	Code of Practice
CORGI	Council for Registered Gas Installers
CPA	Consumer Protection Act 1987
CPC and OC/11	Consumer Policy Committee, BSI
CSU	Consumer Safety Unit, DTI
DTI	Department of Trade and Industry
ECOSA	European Consumer Safety Association
EEA	European Economic Area

EEC	European Economic Community
EFTA	European Free Trade Area
EHLASS	European Home and Leisure Accident Surveillance System
EN	European Standard
EU	European Union
FMEA	Failure Modes and Effects Analysis
FTA	Fault Tree Analysis
HADD	Home Accident Deaths Database
HASS	Home Accident Surveillance System
HD	Harmonized Document
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
ITSA	Institute of Trading Standards Administration (now TSI)
LACORS	Local Authorities Coordinators of Regulatory Services (formerly LACOTS)
NCC	National Consumer Council
NFCG	National Federation of Consumer Groups
OFT	Office of Fair Trading
QA	Quality Assurance
RAPEX	Rapid Exchange system for information on dangerous products
RoSPA	Royal Society for the Prevention of Accidents
TSO/D/S/I /R	Trading Standards Officer/Department/Service/Institute/Review

Chapter 1: Introduction

1 INTRODUCTION

1.1 Raison d'etre

I approach this research as a participant-observer, having been concerned with accidents, recalls and official action involving consumer products for over thirty years. As a Principal Trading Standards Officer (TSO), with responsibility for consumer product safety, I was employed by the UK's then largest local authority, the former West Midlands Metropolitan County Council (WMCC), serving 2.8 million residents. My primary duty was to ensure that consumer products sold within the Authority' s jurisdiction were "*safe*" and in compliance with the Consumer Protection Act 1987 (CPA) and previous legislation. I developed a simple but effective method for assessing the risks posed by products referred to the Unit in order to prioritise appropriate enforcement action. Those products that presented a serious and immediate danger to the public were dealt with immediately, whilst others that were found to present a lower risk were dealt with less urgently. During its five-year existence, the Unit recorded a steady increase in the number of unsafe consumer products being referred to it – over 200 unsafe consumer products being investigated during its final year of operation (1985-1986). During this period I was awarded a travelling scholarship to study enforcement methods throughout the European Community and following the publication of my report Jenkins (1982) was made a Fellow of the Institute of Trading Standards Administration, now the Trading Standards Institute.

Following the abolition of the Metropolitan Councils in 1986, I was invited to become Product Safety Adviser to the Royal Society for the Prevention of Accidents (RoSPA) and I continued to assist TSOs with their product safety investigations. To further my attempts to improve the safety of products and reduce product related injuries, I was invited to represent RoSPA on several national bodies including the Council for Registered Gas Installers (CORGI), the British Standards Institution (BSI) and the National Inspection Council for Electrical Installation Contracting (NICEIC).

1.1.1 Key Issue

The need for better product safety management is the Key Issue identified by this research project. This research and supporting the work of TSOs, is carried out independently of my RoSPA commitments, although the data and the findings of my research are clearly relevant to my work for the Society and will be used accordingly.

One purpose of my research is to support good practice in law enforcement and to identify where further research might be needed to improve the management of product safety. Having also studied the steps taken to ensure the safety of machinery used at work, I wished to investigate the similarities and differences in the regulatory systems for consumer products and that for work equipment. I wished to see whether there are lessons to be learned from comparing the two, if indeed they were different approaches.

1.1.2 Quantifying the Problem

There were 2.8 million accidents in UK homes in 1999 resulting in injuries requiring medical treatment HASS (2000), up to half of them involving products, other than food or medicines. Currently, 30,000 complaints are made each year to TSOs concerning unsafe products (OFT, 2000a). Sixty products were recalled from the market for safety reasons in one year (DTI, 1999a). These data suggest that the systems for ensuring product safety, Chapter 3.2 p.80, are failing to achieve their primary objective of ensuring that only "*safe*" products are made available to the public.

1.1.3 Causal Connection

Although intuitively it would seem that the use of unsafe products increases the likelihood of accidental injuries, the causal link has not been proved. The relationship between unsafe products and accidents is the subject of on-going research at Nottingham University, Norris (2000) commissioned by the DTI.

The only relevant data that have been produced at the time of writing are contained in a National Consumer Council (NCC, 1995) survey from which it can be estimated that 600,000 unsafe products caused personal injuries in one year. If this figure is accepted, it is possible that as many as one in five of the 2.8 million accidents in the home each year may be caused by an unsafe product.

The cost to society of accidental injuries in UK homes has been estimated at £25,000 million annually (TRL, 1996). The accident data sources and those of the complaints, recalls and prosecutions are detailed later in this study (Chapter 6 p.207).

1.1.4 Investigator Bias

As a participant-observer in the research, and having been actively involved in promoting all aspects of product safety (from discussing new products with designers to dealing with complaints from dissatisfied consumers), I have been acutely aware of the need to maintain an objective approach. Due notice has been taken of the warnings of bias likely to be encountered in such a situation given by Saunders (2000) and Hamel (1993) and every effort made to keep the approach as objective as possible. These matters are discussed further in Chapter 5.

1.2 Research Questions

From what has been said previously, the principal aim of this research is to compare the different legislative approaches for ensuring the safety of workplace machinery and that of consumer products and to identify any lessons, particularly from the way in which machinery safety is controlled, that might be applied to managing the safety of consumer products and vice-versa.

1.2.1 Trading Standards Officers (TSOs)

The overarching interest in undertaking this study was to investigate the factors that affect the efficient functioning of the product safety system and in particular the involvement of enforcement officers in exercising their powers under the Consumer Protection Act 1987.

The questions that needed to be addressed included the following: How is the system managed or regulated? How is this dependent upon the legislation that sets the required standards for product safety? How is the manufacturing and supply chain controlled? What factors affect how TSOs approach their investigation and enforcement duties? How do they assess the risks to the public? Is there a need for a standard approach to risk assessment? Would a formal risk-based approach help them in their work? How might this be achieved?

1.2.2 Risk Assessment and TSOs

Two methods of assessing the risk presented by consumer products have been known to the Trading Standards Service (TSS) since 1995 when Hooker (1995) and I presented papers at European conferences on the subject. The extent to which such an approach had been adopted by the profession was unclear and an important part of this research was to establish whether officers were using the techniques to prioritise their work and when presenting cases for prosecution in the courts.

1.2.3 Risk Assessment Generally

A further line of enquiry for this research was to establish how the techniques of risk assessment might be applied to managing product safety generally. That is, promoting safer consumer products from the development stage and manufacture through to the end user, including market surveillance. Establishing how enforcement officers view and use risk assessment was fundamental to the study. Clearly, their support is vital to achieve a wider acceptance of such an approach to product safety by lawmakers, standards writers, manufacturers and the courts.

1.2.4 "Safe Product"

The research also considers what is a "*safe product*" in respect of consumer products and how risk assessment might be used to assist in that process. It is necessary to rely on the law to determine what is acceptably "*safe*" but this rather nebulous concept must, as far as possible, be independent of manufacturer or product user bias. There is a perceived need in both criminal and civil law to employ a more objective assessment of the safety of consumer products than the largely subjective methods currently thought to be employed. It is also essential as advocated by Jenkins & Davies (1989) to take into account what may be done with goods, or "*foreseeable conditions of use*", in order to satisfy the test of what is "*reasonably safe*". How this may be achieved in practice will be examined.

1.2.5 Outcomes

The results of the research are intended to help manufacturers address product safety issues more objectively and assist those who have to develop standards and administer the law, particularly enforcement officers and the courts, to reach decisions as to the safety of consumer products more effectively.

1.3 Research Aim and Objectives

Central to this study is the enforcement of the product safety legislation by local authority officers, particularly TSOs 'in the field' who make test purchases and submit samples for testing to check that products meet the statutory requirements. They also inspect business premises, receive and follow up complaints from the public and investigate infringements that can lead to prosecutions being taken.

1.3.1 Aim

The aim of the research is to answer the question:

Do enforcement officers use risk assessment techniques to prioritise their work?

1.3.2 Objectives

Having reflected on the issues raised in the preceding paragraphs, the following three research objectives were derived:

1. To compare the legislative approaches to product safety given in both the Consumer Protection Act and the Health and Safety at Work etc Act (HASWA) and to identify whether there are any lessons that can be learnt that would benefit consumers;
2. To examine the attitudes of enforcement officers and establish whether they are using any objective method of assessing safety priorities in practice; and
3. To develop a model of the product safety system identifying those aspects where a risk assessment approach might be applied to advantage.

1.4 Product Safety System

Whilst examining particular examples of consumer products that had been involved in accidents and near-miss situations, consideration was given to the use of the law and standards in helping to determine what is acceptably safe. The contribution of the law and standards in failing to address the issues that had enabled the products referred to in the research to be marketed was examined. The aim was to study the wider product safety system (Chapter 3.2 p.80) and identify where in that system a more objective, risk assessment approach might be applied to advantage. To this end a model of the product safety system is developed showing where a risk assessment approach might be used.

1.4.1 Accident Data

The Home Accident Surveillance System (HASS) and Leisure Accident Surveillance System (LASS) are linked databases that contain accident data collected since 1978 under the direction of the Department of Trade and Industry (DTI).

The data are collected in the Accident and Emergency departments of eighteen hospitals out of 300 such hospitals around the country. The hospitals are selected on the basis that collectively their A&E cases can be said to be nationally representative. 324,151 cases were recorded in 1999, HASS (2000) representing 5.9 million home and leisure accidents that resulted in people seeking hospital treatment during that year.

Accident reports from 11 of the 18 HASS/LASS hospitals are then passed to the European Home and Leisure Safety System (EHLASS) first set up in 1986 to collect accident records from all EU member states. The European Commission is planning to integrate EHLASS as the Home and Leisure Accident (HLA) element of its Injury Prevention Programme and the 15-country combined database was due to be active in 2001 HASS (2000).

During 1999 there were 3,974 deaths caused by accidents in the home according to the Office of National Statistics (ONS) and the Home Accidents Deaths Database (HADD) as reported by HASS (2000). HADD was set up in 1982 to establish the extent of the involvement of products in fatal accidents in the home.

Product involvement in an accident is one of the headings in the questionnaire that clerks use to record data in the 18 HASS hospital A&E departments. Although the databases contain information on 1,500 products, neither the brand name nor model number involved in the accident is provided. Product involvement does not mean that there was a fault in the product itself that resulted in the injury but rather that the product was associated with the accident, such as the patient tripping over it and falling down the stairs. A quarter of a million people are treated in hospital after injuring themselves in this way each year in UK homes! There is insufficient detail therefore in the data to identify a particular faulty product and the information is likely to be published eighteen months after the accident in any case.

1.4.2 Products and Machines

Machinery used in the domestic situation, although presenting similar hazards to its users, is regulated differently with the onus being placed on producers and suppliers to ensure that it is safe when it is supplied. The consumer has to ensure that it is used in a safe manner in accordance with the operating instructions and take into account any warnings supplied with the product.

Considerable efforts have been made over the past thirty years by the Health and Safety Executive (HSE) in their attempts to ensure that machinery used at work is safe, as determined by the Health and Safety at Work etc Act 1974 (HSWA), keeping accidents in the workplace to what may be accepted as a tolerably low level. Lessons may be learnt from the manner in which workplace machinery is controlled that could be applied to ensuring that consumer products were made safer. In particular, the use of a risk assessment approach to the law enforcement work of TSOs, along the lines required of employers under the Management of Health and Safety at Work Regulations 1999 (MHSW), appeared to warrant closer scrutiny. Many types of machinery and consumer product supplied throughout the European Union must carry the CE (Committee European) mark, the manufacturers' declaration that their products satisfy the relevant European Directives. How this was carried out and monitored both for machinery and consumer products is also examined.

1.4.3 Home and Workplace

With an increasing number of people starting up their own businesses and working from home both voluntarily and encouraged by employers, to reduce company headquarters overheads, the distinction between domestic products and workplace machines is becoming less clear. The use of electric jug kettles and toasters in workplace staff rooms is common and yet most of these appliances are intended by their manufacturers to be used in a domestic setting.

Other equipment including ladders sold to consumers through DIY stores can be found in a workplace situation where they are likely to be subjected to far harsher conditions of use. On the other hand there are many sophisticated power tools and chainsaws for example that are widely available for consumer use, either by purchasing them through DIY retail outlets or hiring them from specialist shops. Although the trade association, the Hire Association of Europe, has a code of practice that requires its members to provide expert advice to its customers, the type of equipment that presents cause for concern is more likely to require specialist training to operate it safely. One manufacturer of workplace power tools, Makita [email 12.03.02 Stuart McCruden] were so concerned about the use of their equipment by ordinary untrained consumers that a national public awareness campaign emphasising the safe use of power tools was mounted with the help of RoSPA.

CE marking is required on an increasing range of products intended for both domestic and workplace environments. It is likely that the application of "*suitable and sufficient risk assessments*" by employers has contributed to improving the safety of workplace machinery and it is suggested that the use of risk assessment could be more widely applied to consumer products. Products and appliances used in the home present many similar hazards to those used at work and yet are not formally subject to any formal risk assessment unless that equipment can be used both at work and in the home. In some cases the products used in both environments are identical, such as electric toasters used in many staff rooms of schools and factories as well as office equipment. This study looks at some common domestic appliances, identifies the hazards they present and assesses the risks to users, in a similar way to the approach required to be followed by employers and manufacturers of machinery supplied for use at work under the Management of Health and Safety at Work Regulations (MHSWR) in order to meet the requirements for mandatory CE marking under the amending Directive 93/68/EEC.

The distinction between domestic and work equipment has become increasingly blurred over recent years as confirmed by a report into the subject produced by the Consumers' Association's Research and Testing Centre for the DTI (1999a). Work and domestic equipment has been subject to "*migration*" in both directions where the use of products intended by manufacturers for trained workers is now made available to the inexperienced and untrained domestic user and also where companies provide consumer products, which are likely to be cheaper than the professional versions, for use by their employees at work. Businesses are increasingly being run from home, further obscuring the traditional work/home product demarcation. Domestic stepladders and cooking appliances are used in the workplace whilst office machinery and sophisticated power tools are increasingly being used at home.

Safety requirements should not therefore depend on the environment in which a product will be used, the workplace or the home, but more on the prospective users' abilities and other relevant factors affecting the safe use of that product. Employers have a statutory obligation to ensure the safety of their employees under the Health & Safety at Work Act 1974 and the self-employed are also subject to similar controls under section 3(2) of the HSWA with respect to the machinery they provide for use in the workplace. However, home improvement enthusiasts have to rely on the Consumer Protection Act 1987 and the civil law to ensure that the products they buy and use are safe. The responsibilities in the latter case are, as far as the criminal law is concerned, imposed on product suppliers, those who place products on the market, and producers, own-branders and importers in the case of defects resulting in injury.

It is likely that products presently covered by the General Product Safety Directive (GPSD) will soon be extended from consumer products to those made available for use by customers in supermarkets such as shopping trolleys and in the gymnasium e.g. the exercise bicycle.

The distinction drawn between work and consumer products is that where consumers have control over the operation of the equipment rather than an employee, the wider safety controls provided by the GPSD must apply.

1.5 Historical Context

Human evolution is closely associated with the development of mechanical devices, particularly tools, which are now some of the most sophisticated manifestations of human achievement. Shelter, security, food and clothing, the basic necessities for survival, depended largely on primitive tools. Maslow (1943) called them the "*Hierarchy of Needs*" that helped provide the motivation for human development. Alderfer (1972), rated safety and security as second only to satisfying the basic human physiological need to counter hunger and thirst. Ploughs, rakes and hoes enabled crops to be grown and weapons provided protection against wild animals and enemies. The development of more advanced tools and machines presaged the Industrial Revolution enabling the mass production of goods to satisfy the demands of an international market. Products and safety have been inextricably linked since the beginnings of civilisation but it is the safety of the products themselves that forms the basis of the present study. The benefits provided by products must not be outweighed by the detriment they sometimes cause to individuals and society. It is right therefore to impose legal controls on what society demands from manufacturers with regard to the safety of their products.

1.5.1 Safety Developments

Governments have moved away from a prescriptive approach to safety, legislating against specific hazards and dangerous products, and have introduced more general controls under the General Product Safety Regulations 1994 (GPSR) which should encourage producers to take on greater responsibility for assessing the risk presented by their products. Also, machines and products are generally superseded by safer versions, some being rejected voluntarily and others modified as dictated by experience.

More sophisticated products continue to be be developed to cater for increased public demand but these new and novel products often have hidden dangers that are not immediately apparent to the user. There is less opportunity to protect oneself against personal injury when the hazards are hidden such as poisonous carbon monoxide produced by a faulty gas fire or the toxic substances found in paint on toys and nursery products. These less obvious hazards require that the public be protected under specific criminal law and for those who breach the requirements to be punished by the courts, partly to act as a deterrent to others. Individuals who suffer injury are entitled to sue the producers of the unsafe products for damages under the civil law product liability provisions in the CPA, placing further pressure on manufacturers to manage the risks effectively.

Manufacturers have developed their own internal systems based on international quality standards such as ISO 9000 to assess the performance of their products and to ensure that quality and safety are maintained. They may also subject their procedures to independent third-party assurance, such as that provided by the BSI Kitemark, the British Standards Institution's Registered Quality Assurance Mark and British Electrotechnical Approvals Board (BEAB) schemes. Competition, particularly unfair competition from those who are prepared to take short cuts by not monitoring their products properly, places additional pressures on manufacturers to reduce the quality of materials they use and methods of control and this can have a detrimental effect on the overall level of safety that can be achieved. From my informal discussions with British producers and distributors during the course of this research, some of whom are cited in the Appendices, although it is clear they are very conscious of the competition, often from the Far East, they nevertheless confidently claim not to have compromised their own levels of safety.

However, it is not always accepted that safety should be seen as a fundamental pre-requisite of product design rather than as an avoidable and expensive add-on, as demonstrated by the need for subsequent

modifications, product recalls and warnings. It is vital to ensure that agreed levels of safety and performance as determined by the law and standards are maintained to ensure fair trading and safety, and this can often only be achieved effectively by taking legal action, either by prosecuting suppliers or suing the producers of unsafe products.

Standards are increasingly important in providing the technical interpretation of what the law requires of products with regard to safe performance. Because they are voluntary and are drawn up by technical committees on which representatives of all interested parties sit, including manufacturers and consumers, they represent a level of safety that must be considered reasonable. Because manufacturers dominate the standards work, it would be reasonable to say that standards represent the minimum level of safety that should be tolerated.

1.5.2 Cost/benefit Approach

Consumer products, according to Kirk & Ridgeway (1970) are intended to provide useful benefits and to be "*safe, efficient, reliable and durable*", but occasionally undesired outcomes occur, including personal injuries caused whilst using a product. Society carries out a form of complex collective cost/benefit analysis to determine the acceptability and future success of products with benefits outweighing the costs involved.

The calculation of benefits however must also include aesthetic and psychological, rather than purely utilitarian, factors. Footwear, such as shoes with high stiletto heels that render them unstable are frequently involved in accidents and have been widely criticised on safety grounds and yet continue to be popular with fashion conscious young ladies. Toys embedded in sweets have been involved in several fatal choking accidents and yet they continue to be in great demand and have sold in millions. Although recognising their popularity, RoSPA continues to warn against such products primarily because they are aimed at children who may not be able to distinguish between the food and the plaything contained within it and as a result, choke on the small parts. Assessing the safety of

consumer products has to take into account many factors that are not immediately obvious and more objective guidance would be useful.

1.6 Legislation

Both the HSWA and CPA address the subject of product safety but in different ways and for different purposes. Employers have to demonstrate that machinery used by their employees is safe as required by the Provision and Use of Work Equipment Regulations (PUWER) made under the HSWA, whereas the CPA makes it an offence to supply consumer products that fail the safety provisions or to place such products on the market.

1.6.1 Product Safety Law

Although there is a considerable amount of product safety legislation, largely based on European Directives, and a specific duty is placed on "*local weights and measures authorities*", now more commonly known as the Trading Standards Service (TSS), to enforce the Consumer Protection Act 1987 (CPA), many accidents involving unsafe products are recorded in the Home Accident Surveillance System, HASS (2000) data. The product safety legislation is dealt with in more detail later (Chapter 3 p.84).

Several fatal accidents involving such products that failed to meet the safety criteria are examined in this study. They include a dishwasher in which a knife was stored with its blade exposed and onto which a child fell, a long nylon cord attached to an anorak that became caught in a bus door dragging a child under its wheels, a bath seat in which a baby was left unattended and drowned whilst the mother answered the telephone and a gas fire which produced poisonous carbon monoxide gas that killed an elderly gentleman.

Changes in custom and law take a considerable time to effect improvements and can be resisted by influential commercial interests. It is considered that if an objective assessment can be made of the risks involved when a safety issue is first identified, following a serious injury or

fatal accident involving a product, it would receive better support from manufacturing interests and help speed up the risk reduction process. A comprehensive risk/benefit analysis involving consumer products may be difficult to carry out but it is essential that this be done following an objective, independent professional approach.

1.6.2 Regulatory Controls

When death and serious injury has been caused by products in the past, the authorities have been pressed by consumer groups and individual campaigners into taking official action to deal with the problem. An example is cotton nightdresses that readily caught fire in front of open grates and resulted in the deaths of many young girls. Such garments were banned in 1967 under the Nightdresses (Safety) Regulations 1967 [SI 1967 No.839], unless they had been treated to reduce their ease of ignition and the rate of spread of flame if the material was ignited. Similar measures continue today under the Nightwear (Safety) Regulations 1985 [SI 1985 No.2043] despite the risk being considerably reduced by open fires being superseded by central heating systems and heaters that do not produce naked flames. The Nightwear (Safety) Regulations 1985 are amongst the country's oldest product safety controls and represent the type of prescriptive approach that has been applied to consumer products for the past forty years. The CPA has introduced other measures to deal with products that present a serious risk including Suspension Notices and Notices to Warn and it is these procedures that are now used rather than introducing new regulations to prohibit the supply of unsafe products.

1.6.3 Enforcement

The Trading Standards Service (TSS) is required to enforce 35 Acts listed Appendice 6 and a further 23 Acts ancillary to their role in maintaining a fair trading environment. This includes the duty on their employing authorities to enforce the requirements of the CPA in relation to unsafe consumer products.

One of the objectives of this study is to produce proposals for the application of a risk assessment approach for use by officers when carrying out their authorities' statutory duty to enforce the safety provisions of the CPA. This is intended to help them prioritise their work and to support the type of action that is appropriate when dealing with particularly serious cases.

By questioning TSOs operating "*in the field*" the aim was to gain a first hand understanding of what difficulties they were experiencing in exercising their law enforcement function, specifically in the area of product safety. An examination of official and other records both public and private was undertaken to help quantify the resources put into ensuring compliance with the product safety legislation by local authorities and provide an indication of how far that effort has succeeded.

Emphasis has been placed on the work of trading standards in this study. Their involvement in maintaining the safety of consumer products is crucial in ensuring that product related accidents are kept to a minimum. If risk assessment could be established as a viable and acceptable process for use in all aspects of consumer products, from their development to disposal, its use in law enforcement could also become a stimulus for an even wider application of a more objective approach to the assessment of risk.

With fewer unsafe products on the market it would follow that there would be less pressure from the public on limited local authority resources in the form of complaints and the need to investigate. It can be argued that the use of risk assessment at the design stage and in the formulation of voluntary standards would contribute to this end. A risk assessment approach would also enable TSOs to prioritise the complaints from the public that they are required to deal with and determine what action is appropriate with regard to those products that have failed routine testing.

Quantifying the risk helps to justify any further expensive action that may be necessary such as a formal investigation and testing with a view to prosecuting suppliers and manufacturers of offending products. This is an expensive, time-consuming but often necessary means of dealing with unsafe products but is justified if the risk to the public is substantial and the actions of the defendant warrant it. Examples of cases are examined and alternative strategies suggested to deal with the problems identified on the basis of risk assessment.

1.6.4 Safety Campaigning

If consumers can be encouraged to take appropriate action to reduce their exposure to risk there would be less need for mandatory controls. An example of how products are identified and dealt with by interested bodies is provided by the Fire Service in Northern Ireland which tried to phase out the use of chip pans in 1999 with its "*Ban the Pan*" fire safety campaign as reported by the Northern Ireland Executive news release 15.12.99.

According to Home Office (2000) data chip pans are the source of one in six of all fires in the home in the UK. The safety rule promoted in RoSPA's Home Safety Policy to fill pans to a maximum of one-third of their capacity and adding chips so as not to exceed two-thirds of the capacity was clearly not being followed, also leaving pans unattended was another factor that increased the likelihood of a chip pan fire. The public were encouraged to use alternative and much safer products such as the automatic deep fat fryer that reduced the risk of fire by separating the flammable vapour from the ignition source.

Awareness campaigns of this kind have not been adequately assessed regarding their contribution to reducing accidents but there is continuing support for them, partly because it demonstrates that at least "*something is being done*" by the authorities and organisations concerned.

1.7 Thesis Layout

The current state of knowledge of the multi-disciplined, legal/ systems/ engineering subject area of product safety is explored and summarised in the Literature Search. This is followed by the Product Safety System placing the research into its present day context.

Various risk assessment approaches are examined and consideration given to how such techniques could be more widely adopted by the many individuals and organisations that participate in the product safety system. The Methodology used for the study that looks into the role and attitudes of enforcement officers to ensure that consumer products are safe, is explained and the results of the study are presented. The data are presented and analysed and conclusions are then drawn from the study and presented with recommendations for further work.

1.8 Chapter Conclusions

Over the past forty years, since the introduction of the Consumer Protection Act 1961, safety regulations have been introduced in a piecemeal fashion to deal with the worst cases of product failures that were identified. They including unstable oil lamps and heaters that were the cause of many domestic fires and unsafe electrical appliances that resulted in fatal electrocutions. Regulations now apply to specific categories of products including electrical equipment, gas appliances, toys, and cosmetic products, mainly as determined by European Directives that have to be transposed into member states' legislation.

Those products that are not subject to their own specific set of regulations have to comply with the General Product Safety Regulations 1994 (GPSR). These regulations can be said to implicitly require the application of risk assessment to attempt to quantify the risk presented by the product under investigation to determine whether it is a "*safe product*".

There has been a radical change in approach to the law on consumer product safety from prescribing detailed requirements in regulations to the

New Approach based on the need to satisfy Essential Safety Requirements (ESR). This permits manufacturers to claim compliance and demonstrate, if called upon to do so, how their products meet the ESR.

They need to show that the risk their products present is reasonable and consistent with a high level of protection for consumers. This necessitates a risk assessment approach when developing products and before placing them on the market. The same approach is particularly important with regard to the General Product Safety Regulations: although there is no specific requirement for manufacturers to do so it is difficult to see how else they could show compliance unless they carry out a risk assessment.

This research compares the approaches to product safety that have been adopted under occupational and consumer legislation. It concludes with a discussion of the issues raised and makes recommendations on how the safety of consumer products might be improved by following a more objective approach such as that provided by risk assessment.

An important element of the study is the presentation of a risk assessment strategy for enforcement officers in the form of CoPRA (Chapter 9 p.366) following an examination of the alternative methods available to them which have not, according to the findings of the study, been taken up to any great extent. The overall objective of the study is to help reduce complaints, litigation and injuries to ensure the production and marketing of safer products that consistently satisfy at least the minimum requirements laid down by law.

Chapter 2: Literature Review

2 LITERATURE REVIEW

2.1 Introduction

The primary elements of the product safety system are accidents, consumer complaints, the law, standards, design and risk assessment. Each of these areas has been explored for the purpose of this research. Unfortunately under the current reactive approach to product safety it is often an accident rather than preventive action that generates action by product manufacturers and the authorities. The study also includes reference to my personal records, much of it primary evidence, acquired in my capacity as Product Safety Adviser to RoSPA and as an expert witness in civil and criminal cases involving unsafe products, over the ten-year period ending December 2000.

2.1.1 Scope

The subject of consumer product safety is multi-disciplinary, crossing the boundaries of several academic fields particularly the law and engineering aspects of product design, ergonomics and manufacturing. The principal areas considered in this study are product safety law and its enforcement, the product safety system and product design.

Anthropometrics, i.e. body size, and other ergonomic data were developed to help designers and manufacturers improve the safety of their products. The importance has been officially recognised and the results are provided in four DTI funded studies listed in Appendix 1, covering adult data DTI (1998a) including one dealing with people over 60 DTI (2000), and one for children DTI (1995b) with a further study dealing with strength data DTI (2000a). These documents provide a useful source of information previously held by individual companies and institutions or published piecemeal by academics and others around the world but now accessible to all interested parties.

Research by the University of Nottingham's Product Safety and Testing Group for the DTI (1997a) "*Designing safety into products*" in 1997 states

in its Foreword "*greater emphasis on safety at the design stage will lead to reduced frequency and severity of accidents for users and thus to fewer legal problems, either with dissatisfied customers or the enforcement authorities*". This research supports that view which is consistent with a more pro-active, accident prevention approach.

2.1.2 "Accident"

It is necessary to address those unplanned events that inadvertently cause injury and other damage, but not those that are caused by deliberate misuse or indeed any illegal aggressive act.

"*Accident*" is not defined in the Health and Safety at Work Act but Croner (2004) in its Health and Safety at Work document recommends "*it be given its ordinary meaning i.e. an unexpected event, especially one causing injury*". HSE (1996) defines "accident" as "any unplanned event that resulted in injury or ill health of people, or damage or loss to property, plant, materials or the environment or a loss of business opportunity". HASS (1998) defines "accident" for the purposes of the Home Accident Surveillance System (HASS) as "*any unintentional injury or suspected injury, no matter how caused except deliberately self-inflicted injuries or suspected suicides (but suspect child overdoses are included) and injuries resulting from physical attacks by other persons*".

Other definitions provide a similar explanation of the result of outside influences causing harm and a new approach which refers to the transfer of energy should be considered i.e. "*An undesired event, which results in physical harm and/or property damage, usually resulting from contact with a source of energy above the ability of the body or structure to withstand it*" according to the Principles of Health and Safety at Work, Fifth Edition (Revised), St John Holt (1999), IOSH Services at p.91.

Stranks (1997) asks what is an accident and proceeds to list some of the definitions produced over the past thirty years (see Table 1).

Table 1: Definitions of Accident
Source: Stranks, 1997

Stranks (1997) identifies several common factors from these definitions and concludes that accidents are in general –

- Unforeseeable, as far as the victim is concerned,
- Unplanned,
- Unintended and
- Unexpected.

Lehto & Salvendy (1991) and others recognise that accidents are the result of consecutive interactions between man and machine in an environment but there are critics of current approaches to accident analysis, including Weegels (1996) who claim that many such methods are not explicit on how the causes of accidents are identified and that insufficient attention has been paid to identifying the causes. The outcomes of accident analysis are unreliable where little is known about how causes are inferred from the available accident data.

2.2 Accident Data

Chapter 6 deals with the data collected for the purposes of this research but a brief look at two areas of particular concern would help set the scene. Accident data are important because they provide an indication of the scale of the problem and highlight particular products and situations in which they are used that cause problems. Also, there is useful data from the feedback from consumers after they have experienced accidents with products and the data collected by TSOs and fed back to the OFT indicate which product areas are giving the public cause for greatest concern.

2.2.1 Accidents

The accident prevention and recalls database that I developed for the Royal Society for the Prevention of Accidents has been examined for information relating to this research and many of the publications referred to are listed in the References at the end of this study.

Of particular relevance to this study are the research reports commissioned and published by the Department of Trade and Industry (DTI) specialist Consumer Safety Unit (CSU), now absorbed into the much larger Consumer Affairs Directorate. The 144 reports produced to date deal mainly with products and activities involved in domestic accidents and which feature in the Home Accident Surveillance System HASS (2000) accident data. They refer to important areas of consumer product safety identified by HASS and which the CSU decided justified closer study. The reports relating to consumer products referred to in this study are listed in Appendix 1. The list has been modified from that produced by the DTI so that the subject matter, usually the product type, appears prominently at the start of the title thus enabling the reports to be listed alphabetically.

2.2.2 Complaints

Complaints from the public are a useful source of information about suspect products and records are published by the Office of Fair Trading (OFT). No records of complaints are required to be kept by producers and suppliers although many use such information to provide useful feed back

into their systems in order to improve performance. The complaints made to TSOs, after they have been resolved, are then recorded by the OFT. This and the accident data provided by HASS give an indication of the frequency of product failures and the severity of injuries and damage sustained, providing essential information to assess the risks involved.

A summary of complaints published by the OFT in their quarterly journal "*Fair Trading*" has been studied and the types of product complained about identified. Data obtained from the annual Chartered Institute of Public Finance and Accountancy (CIPFA) Trading Standards Statistics; Statistical Information Service reports for the past ten years and the latest official study into enforcement practices by the Audit Commission (1999) have also provided useful sources of information for this research.

2.2.3 Product Safety Research

Communications with government departments, primarily the Department of Trade and Industry took place at regular intervals and were considered to be generally useful. Reference is made to the many research projects on product safety and related issues funded by their Consumer Policy Division. They are listed alphabetically by product type in Appendix 1.

Although listed on the DTI website (Appendix 12) the research documents are not easily identifiable by product type. It was not possible to establish how widely the information was distributed and, more importantly, used. Enquiries suggest that more effort needs to be put into the presentation and publicising the availability of these reports if the useful findings they contain are to be used more widely by manufacturers, standards writers, researchers and enforcement officers.

2.3 Legislation

The law provides a basis for setting the level of safety below which consumer products should not fall. Product safety legislation is primarily covered by the Consumer Protection Act 1987 and the safety regulations made under it are listed in Appendix 2. Case law and relevant

judgements must also be considered, particularly where they relate to the actions that are expected to be taken by manufacturers, importers and distributors of products to ensure that they can establish a "*due diligence defence*" under Section 39 of the CPA. The Health and Safety at Work Act and regulations relating to the safety of machinery provide the statutory requirements for workplace products for comparison purposes and to examine the use of risk assessment in that context.

2.3.1 Consumer Protection Act 1987

The authoritative source on consumer product safety law, Miller (1988) is supplemented by its associated updating service the Consumer Law Bulletin edited by Rowell and published monthly for subscribers by Butterworths. Publications providing guidance on product safety law include Cotter (1996) and Hodges (1993) who frequently defend clients charged with offences under the Act for supplying unsafe, non-conforming products. Hodges (1996) provides useful practical help including recalling products from the market as well as legal advice.

Most domestic product safety law is issued jointly by the European Council and Parliament and applied under the European Communities Act 1972, Askham & Stoneham (1994). Reference is also made to the Directives listed in Appendix 3 and dealt with later in the study (Chapter 3, p.90). Although the civil law, including Part 1 of the Consumer Protection Act 1987, may have failed to be applied effectively in relation to product liability there has been considerable discussion and academic work in this area Hodges (1993).

The liability of a manufacturer for personal injury caused as a result of a defect in his product supplied to a consumer who has been injured has been well established since the seminal case of Donoghue v. Stevenson [1932] AC 562, 101 LJPC 119. A civil action in contract as well as tort may be appropriate but would apply only to the contracting parties. The person who bought the goods may not be the one who has been injured by them as in this case and the injured person until this decision did not

necessarily have a valid claim. In his judgement Lord Atkin said, addressing the manufacturer of the defective product "*you must take reasonable care to avoid acts or omissions which you can reasonably foresee would be likely to injure your neighbour.*" The "*neighbour*" is likely to be considered as any person who may be directly affected by the act or omission which resulted in the action and whose interests should have been considered more carefully at that time. The "*reasonable care*" that a manufacturer would be expected to use would depend on the circumstances but this would clearly mean that he should at least observe the legal requirements with regard to the safety of his products as interpreted by the relevant standards.

2.3.2 "Reasonably Safe"

Modern lifestyles and expectancy is based on a safe environment with safe equipment; indeed the law demands this of employers and producers of products. The other term often found when it is necessary to provide a level of acceptability as when setting the degree of safety that must be provided by producers and employers is "*reasonable*". A balance must therefore be achieved aided by the law. To study how improvements in design can lead to reductions in product-related accidents the established fields of ergonomics, risk analysis and the law should be utilised.

Manufacturers are encouraged to improve product design by the Product Liability Directive (85/374/EEC) implemented by Part 1 of the Consumer Protection Act 1987. Producers and importers into Europe as well as companies who apply their brand names to goods are directly liable to anyone who is injured by a defective in their products and for damage caused to personal property. The question of whether a particular product is "*reasonably safe*" will be asked more frequently in the courts in order to determine whether its producer is liable. Deficiencies in the design and manufacture of goods can lead to accidents including those caused by misuse of the product because the user was not provided with adequate warnings or instructions for its correct and safe operation. In addition to the civil law remedies, the enforcement powers in the criminal

law are significantly expanded to prevent the supply of unsafe consumer goods on the British market. Again, the test of goods being reasonably safe will apply.

2.4 Standards

Guidance documents produced primarily by the Department of Trade and Industry and the Health and Safety Executive assist in the interpretation of the law. The related British, Harmonized European and International standards provide the technical interpretation of what the law requires of products in order to satisfy the New Approach Directives' "*essential safety requirements*". British standards that have been harmonized for use throughout Europe are important, particularly with regard to their use of risk assessment and the safety of machinery. Many of the harmonized standards that deal with household electrical equipment and children's products are listed in Appendix 4.

Standards are reviewed every five years and usually substantial amendments are made to accommodate both technical and legal developments over that period. The standards listed in Appendix 4 refer therefore to the latest published versions and any interim amendments made. The BSI provides a catalogue of British (BS), European (EN) and International (ISO) standards and an online listing is also available from the Infonorme London Information (ILI) the trading name of London Information and Bidmile.

2.4.1 Harmonized Standards

Harmonized standards have a particular status in law in that compliance with them will confer a presumption of conformity with the Directives and in turn with the Member States' domestic legislation based on those Directives. Under the Low Voltage Directive (LVD), as with other European Directives, standards are regarded as harmonized once they are drawn up by common agreement between the bodies notified by the Member States in accordance with the procedure laid down in Article 11 of the LVD, and published under national procedures.

Standards are required to be kept up to date in the light of technological progress and the developments in good engineering practice in safety matters. For purposes of information the list of harmonized standards and their references must be published in the Official Journal of the European Communities.

2.4.2 EN 1050 Safety of Machinery

EN 1050:1996 Safety of machinery – Principles for risk assessment, a Type-A standard for wide application across relevant areas, was developed to "*describe principles for a consistent systematic procedure for risk assessment*". The standard provides guidance for decision making when designing machinery and helps in the preparation of consistent and appropriate standards to comply with the essential safety and health requirements. It is recommended that it be incorporated in training courses and manuals to give basic instruction on design methods.

The standard establishes general principles for risk assessment "*by which the knowledge and experience of the design, use, incidents, accidents and harm related to machinery is brought together in order to assess the risks during all phases of the life of the machinery.*" The hazard checklist developed from EN 1050 is used widely in this study (Appendix 8).

2.5 Product Design

Several publications on product safety and particular areas of relevance including the recall of unsafe products from the market and product design have also been referred to for the purpose of this study. There was little reference to product safety in any detail in most of the works other than the vague general prerequisite that products "*must satisfy all legal requirements*". How this was to be achieved in practice was largely passed over and dealt with only superficially and the use of risk assessment as an approach was not referred to.

Although the Design Council helps promote safe product design by publishing some books on the subject, Abbott (1987), when challenged as to the application of a formal risk assessment approach to product design there appeared to be little recognition of, or indeed interest in, such techniques. The emphasis for those questioned about design appeared to be mainly on the appearance and function of products with safety presumed to be "adequately covered by standards and the law".

2.5.1 Design Policy

Designers' training courses and text books that have been examined during the course of this study have been found to make only general references to safety, typically "*the product must be safe and reliable*" according to Cross (1994). There is no evidence of a comprehensive safe design or risk-based approach being applied in product design. Following several presentations to students of engineering, ergonomics and design, I found them all very responsive to product safety issues, particularly to the examples of product failures, where serious injury and even death had resulted from bad design. There appears to be an opportunity to use such examples to promote a risk assessment approach to the design of consumer products.

The lack of a formal approach to design and safety is also found in the USA. The 1996 Symposium reports "*This lack of training [in design safety methodology] results from a lack of instructional materials and literature describing design safety. Currently, there are no books, training manuals, or guidelines on design safety. So even employers and faculty motivated to teach design safety methods cannot find instructional materials to do so.*" The Preface to the report on the Proceeding of the 1997 Symposium organised by the National Safety Council (1998) "*Benchmarks for World Class Safety Through Design*" states "*it is also clear that there is a definite void in technical books, case studies, checklists and simple engineering tools to support the process* [safety through design]"

Safety regulations and standards rightly concentrate on children's products, but standards for domestic appliances which children regularly use, such as microwave ovens, usually exclude consideration of their use by children. The British Standards Consumer Policy Committee and the European Association for Consumers in Standardization (ANEC) are now addressing this issue and it is hoped that more manufacturers will accept that standards need to deal with all reasonably foreseeable conditions of use and all types of user. Similar criticism can be made of product design generally which could be overcome by using a risk assessment approach.

To begin with therefore, a clear policy needs to be stated by companies identifying what their objective is with regard to product safety. A product design policy should operate within a company's overall Product Safety Management System and needs to be integrated with all other manufacturers' procedures, including its environmental protection and worker safety obligations.

2.5.2 Accident Causation

It is perhaps self-evident that safe environments containing safe products will, if all other factors remain constant, result in fewer accidents to those people using the products provided they are used in a reasonable way and for the purpose intended. The frequency and severity of accidents involving products can be further reduced by making changes in the design of those products which encourage more careful usage and which present the user with potentially fewer and less serious opportunities for hazards to manifest themselves.

When the Building Research Establishment (BRE) examined the subject of accidents in the home they concluded that the causes were attributable mainly to careless and foolish behaviour, but 8% were caused by faulty design (see Table 2).

Root Cause	%
Careless and foolish behaviour	67
Inadequate maintenance	25
Faulty design	8

Table 2: Causes of Accidents
Source: Poyner (1980)

According to a DTI (1980b) report, operator behaviour can be influenced by the design of the product being used and in particular the lack of adequate operating instructions and warnings. Faulty design could well account for many more accidents than the BRE report suggests therefore. When Poyner (1980) at the Tavistock Institute looked at the subject of accident prevention through product design he concluded, "*If we are to tackle the problem of personal factors in accident prevention, we have to adopt a more complex view of accident causation than most people do at present*". That process is still developing but slowly and the use of a risk assessment approach should provide further stimulus.

2.5.3 Safe Design

"*Safe*" is another nebulous term that is difficult to define. Unlike a unit of measurement such as the metre for example which can be defined precisely in metrological terms in line with the Weights and Measures Act 1985 as "*an ideally invariable quantity of some particular kind in terms of which other quantities of the same kind can be expressed*" it has a more subjective nature that needs qualification, suggesting a transitory nature dependent on time, circumstances and societal demands.

The Concise Oxford Dictionary defines "*safe*" as "*free of danger or injury; not exposed to danger*". However, a formal and more reliable legal definition is to be found in section 19 of the Consumer Protection Act 1987 that applies to the criminal provisions regulating the supply of unsafe consumer products. It can be summarised as follows: "*safe*", in relation to any goods, means such that there is no risk, or no risk apart from one reduced to a minimum, that the goods, their keeping, use or consumption, or assembly, etc. will (whether immediately or after a

definite or indefinite period) cause the death of, or personal injury to, any person whatsoever.

British Standard Specification BS 4778:1979 provides a glossary of terms used in quality assurance, and defines "*safe*" as: "*the freedom from unacceptable risks of personal harm*". It is to be noted that the absolute condition for the definition of "*safe*" in the dictionary that is not achievable in practice, is qualified in both the pragmatic technical and legal definitions of the word. The technical specification and the criminal law requirements with regard to the safety of products limits the scope primarily to personal harm and introduces the concept of a minimum level of risk and a level of safety that is considered acceptable. The definitions of "*safe*" and "*safe product*" in Section 19(1) of the CPA and Regulation 2(1) of the General Product Safety Regulations (GPSR) support this interpretation.

Feedback from consumer complaints and accident data are invaluable but are often insufficiently used by manufacturers to learn how their products are performing in practice. Control group studies and laboratory assessments are part of the development process but much more needs to be done to minimise the risk to the user. Consumers particularly children constantly seem to surpass the imaginations of designers with their inventive ways of using products.

Mauro (1978) called on industrial designers to "*seize every opportunity to obtain information about accidents with their products*". He stated that electric hairdryers should have their power isolated from the product after discovering a significant number of fatal electrocutions had occurred when the product had fallen into water in the bathroom, a foreseeable condition of use. In the UK it is not permitted to have power sockets in bathrooms and specially adapted electric razor sockets and other protective arrangements have to be made for electrical equipment including lighting. In the USA what is known in UK as a residual current device (RCD) must be provided for use with electrical equipment, such as hairdryers, in the bathroom. This device detects any leakage of current to earth caused by

a fault condition and immediately switches off the power to the appliance thus rendering it inoperative but safe. The power isolating principle is another means of protection against electrocution in which case the electrical hazard cannot result in injury because of its physical separation from the user.

2.5.4 Ergonomic Considerations

To ensure a product is capable of performing its function effectively and safely is a matter for the designer and the engineer and they will employ their skills to ensure that the products for which they are responsible meet the specifications laid down by their customers. However, the cost of development, production and testing will be a significant constraint on their actions and it has to be recognised that safety has a price.

Ergonomics, traditionally the study of people in their working environment, has become increasingly important in the home and leisure areas. An early pioneer of ergonomics and product safety, Grandjean (1973) considered that the wide application of ergonomic principles to domestic situations was long overdue and the examples quoted in this study suggest that much more still needs to be done. The anatomy, physiology and psychology of users of domestic products must be considered at the development stage if serious problems, which could lead to the misuse of products and result in accidents, are to be avoided, or at least kept to an acceptable level.

A study of products that feature in some of the three million domestic accidents reported by HASS (2000) leads to the conclusion that the severity of accidents and their frequency could have been reduced if greater attention had been paid to the design of the product. Examples of such deficiencies are covered in this study and some general conclusions drawn from them that should have wider application. A typical response by manufacturer and suppliers to complaints concerning deficiencies in their products reported during discussions with TSOs was "*But that's blatant misuse!*" or "*How on earth could I have anticipated that*?" which

suggests that there is some reluctance to come to terms with what level of safety is in fact required and what level of misuse should be tolerated and incorporated into the design of consumer products. It is considered that there will be many other complex problems in the area of design and anticipated misuse that they will have to address in order to satisfy the new legal requirements and maintain their reputations as producers of safe and reliable products.

A guidance document for manufacturers by Norris & Wilson (1997) entitled "*Designing safety into products*" is based on government-funded research that encourages the use of ergonomic evaluation as part of the design process.

2.5.5 Limitations

Much of the work published on product design deals more with aesthetics, how to make products that are attractive to prospective purchasers, and touches only relatively briefly on the important technical and legal aspects of safety. Recognising this, the introduction to a report sponsored by the DTI (1989) on product design states "*The success of a product in the market place will have much to do with function, cost, aesthetics and views on reliability*". It continues, "*For the majority of products, safety is unlikely to be high on the purchaser's list of considerations*".

The report concludes at page 14 "*professional and other supporting organisations seemed to have little to offer on the day to day practicalities of designing safer products*". Although it was only a small-scale study it claimed to have carried out a broad sweep of relevant design training and practice at the time. There is little evidence that I could find of any significant improvement in the training of designers with regard to product safety. Not all writings on design recognise the importance of satisfying the legal requirements as a starting point. Abbott (1987) deals with the law in some detail and adds the warning "*not only must the design be reasonably safe for the intended use, but it also should accommodate foreseeable misuse*". However, Cross (1994) makes only passing

reference to the machine having to be safe when setting the objectives without any specific guidance regarding the important legal requirements that have to be satisfied.

2.5.6 Lessons

Product designers should aim to eliminate the identifiable hazards or control them and could learn a lot from safety engineers it has been suggested by Main (1996) in the way they analyse the performance of new products. Reference should be made to risk assessment methods it recommends as outlined in the report.

Wilson (1983) claimed that the misuse of a product can be induced by the design of that product and that manufacturers should take more care when products are being developed to address any user related problems. One may sympathise with those who dislike having to iron clothes for example who may be annoyed by some feature of the appliance such as its weight, handle design, adjustable settings, protruding cable which could have been better designed. Anecdotal evidence suggests that irons are frequently dropped and yet the present EN 60335-2-3 standard does not take this into account during the testing process. Prosecutions have been brought by TSOs listed in Appendices 5 and 7 including unsafe irons and ironing boards.

Haddon (1973) provides a ten-point strategy to "*reduce human and economic losses which occur when energy is transferred in such a way that damage results*".

Safety issues must be addressed early at the product design stage. Farnworth (1989) provides a comparative table showing the ten-fold increase in cost at each stage of product development and supply, further supporting the need to concentrate more effort at the product design stage.

Stage	Relative cost
Design	1 (base)
Test	10
Development	100
Pre-production	1000
Pilot production	10000
Production	100000
In service	1000000

Table 3: Relative Cost of Safety Improvements
Source: Farnworth (1989)

2.6 Risk Assessment

The Royal Society (1992) building on its earlier work on the subject of risk provides a valuable guide to applying a risk assessment approach to many aspects of modern life, including product safety, although it sees its scope as having far wider application. Studying the use of the technique in government departments has also proved useful in the current research, in particular the work of the government's Interdepartmental Liaison Group on Risk Assessment (ILGRA) published by the HSE (1998).

Quantified Risk Assessment (QRA) is important when measuring the risk presented by machine, product or system, and this allows the subsequent decision to be, in the words of the Royal Society (1983) Study Group, "*essentially political although informed scientifically*".

The Health and Safety Laboratory (2000) report found that there was now considerable activity and interest in the use of risk assessment in the machinery sector that was not the case when machinery risk assessment methodology was first developed. There was still a need according to the report for comprehensive practical guidance for the application of risk assessment to machinery by designers.

The Open University (1980) pioneered the subject with a course on Risk, ground breaking at the time, but unfortunately no longer available. There appears to be a growing demand for greater authoritative public enlightenment on the subject of risk in order to come to terms with vital worldwide issues including AIDS, BSE and genetically modified foods. In an era when it has become vitally important for the general public to have an understanding of risk so that sensible choices can be made, based on good evidence as recognised by HSE (2001) in its study of the public's response to and demands for information from the media, there appears to be little valid and authoritative guidance available to them.

Efforts have been made to introduce the subject into the school curriculum at Key Stages 3 and 4 and this may have a bearing on public attitudes to risk in the future. Further information on this is available on the National Curriculum (2003) website.

Key Stages 3 and 4 of the National Schools Curriculum includes design and technology as a subject to be studied in schools but the objective is to *make products that are reliable and robust and that fully meet the quality requirements given in the design proposal* without making specific reference to a formal process of risk assessment to achieve this end.

The assessment of risk presented by products is fundamental to this study and many approaches are considered in Chapter 4. A technique specifically developed to assist those who enforce product safety law known as the Nomograph was developed by Hooker (1995) at the New Zealand Ministry of Consumer Affairs. This is discussed and the Nomograph illustrated and used to assess the risk presented by examples of consumer products that had been the subject of official investigation.

A review of the literature however indicates that there is little uniformity in approach and a plethora of techniques available for assessing risks. These issues were recognised at an International Workshop to promote technical harmonization on risk-based decision-making held in Italy by the EC and its Joint Research Centre (2000). Similarly, the Engineers'

Institutions group on Health and Safety in their report on Safety, Health and Environment SHE (2000) said that risk issues were not adequately covered in the current taught syllabus for engineering students. It is surprising that what appears to be a useful technique is not more widely used, but the wide range of methods available and the lack of training in its use probably accounts for this.

2.6.1 Methods

The New Zealand Nomograph method and my basic Risk Matrix risk assessment methods are presented in Chapter 4 together with the Raafat (1995) Risk Calculator. Many other methods, summarised in Annex B to EN 1050, are available for hazard analysis and risk estimation, some appropriate for assessing the risks presented by consumer products. Failure to use any of the techniques would not reflect well on manufacturers in the event of a serious accident involving a product or a charge that he had placed a dangerous product on the market.

2.6.1.1 Failure Modes and Effects Analysis

FMEA is an inductive method that evaluates the frequency and consequences of component failure. Those aspects of the product having the potential to cause harm, namely the hazards, are identified but every mode of failure has to be considered for every component, which is a time consuming process. The technique uses a matrix to combine likelihood or probability of failure with severity of consequence and the likelihood of detection to give a Risk Priority number. Abbott (1987) suggests a number of good characteristics of a good FMEA (see Table 4)

The detailed nature of this method may not lend itself to the needs of enforcement officers who need a quick method initially to prioritise their work and then to assist them in determining the appropriate course of action from giving advice to the manufacturer or supplier to conducting a full-scale investigation with a view to bringing a prosecution.

FMEA is more appropriate for use at the design stage of a product where the nature and performance of components and their effects on other parts of the product that could result in potentially dangerous failures need to be identified in detail.

Characteristics of a Good FMEA
Identifies known and potential failure modes;
Identifies the causes and effects of each failure mode;
Gives each identified failure mode a priority number according to the probability and severity of its risk and the chance of detection before failure occurs; and
Provides for corrective action.

Table 4: Characteristics of a Good FMEA
Source: Abbott (1987)

2.6.1.2 Fault Tree Analysis

FTA is a deductive, top-down method of analysing system design and performance. The assessment starts with an unwanted top event and tracks the critical paths that led to it. All top events, or unwanted outcomes, such as a fire, are identified and combinations of events that can lead to them are displayed in a logic diagram that is the fault tree of its title. Events and gates are represented by symbols, and with AND/OR logic gates depicting where events may need to occur together or independently for the top event to happen.

By estimating the individual failure probabilities the top event probability can be calculated. If the unwanted top event is a failure that results in a potentially fatal electric shock this would be considered too high a risk and unacceptable and solutions would need to be found. The effect of a change in the system at the top event can then be calculated and the impact of alternative solutions measured. The technique can also be used to examine accident causation.

FTA helps identify and trace how failures occur but again the method is more suited to the designer and manufacturer of a product rather than to someone assessing the risk presented to the user and others at a later stage. FTA is not necessarily a high level tool but can be used as such.

2.6.1.3 Event Tree Analysis

ETA is claimed to be a relatively simple and highly adaptable method providing a logical model based on an accident sequence. It specifies a range of outcomes from an initiating event following a yes/no step-by-step process to determine the probabilities of the range of logically possible outcomes. The procedure is repeated for each event in each possible situation. This is the reverse of the process followed in Fault Tree Analysis that uses and/or logic gates tracing the events back to source.

ETA requires less input data than is necessary for FTA but also requires considerable training and expertise to apply, making FTA more suited to medium and high-risk procedures and ETA better where limited data are available. ETA is appropriate for all risk levels and requires only basic mathematical knowledge making it probably the most suitable Quantified Risk Assessment method for the non-specialist such as an officer seeking to rank the order in which complaints concerning unsafe consumer products need to be investigated. ETA may therefore be considered one of the more suitable risk assessment methods that could be employed by TSOs.

A general representation of the Event Tree incorporates three risk assessment techniques, Event Tree Analysis (ETA), Fault Tree Analysis (FTA) and Failure Modes and Effects Analysis (FMEA). FMEA identifies potential failure modes and some human errors and analyses their effect on the system being studied. FTA uses backward logic to identify both hardware and human error that when combined can contribute to a particular undesired outcome or Top Event. ETA complements FMEA by following the chain of events after a component failure. Event trees define

accident sequences that involve complex relationships between engineering safety systems constructed using forward logic.

The ETA method was devised initially to assess the protective systems of nuclear reactors and is based on binary logic in which an event is either deemed to have happened or not or a component has either performed successfully or has failed. It is now used with other techniques to decide what consequences follow a failure or undesired event. ETA is essentially the reverse of FTA in that ETA may start from the top event identified by FTA and systematically examine the potential consequences.

The Event Tree Analysis (ETA) or accident sequence method discussed above provides a simple and adaptable model. It specifies a range of possible outcomes from an initiating event. Yes/No answers provide the outcome probabilities. Each event is examined in each of its contexts. ETA is more suited to the non-specialist requiring only basic knowledge and ability and is suited to all levels of risk. It is therefore one of the most useful QRA tools available for general use.

Fault Tree Analysis (FTA) reverses this process using And/Or logic gates but demands a high degree of academic rigour and expertise demanding more detailed data. It is therefore more suited to medium and high-risk situations requiring greater effort and where more detailed information is available.

FTA and ETA provide frequency and consequence data but the most appropriate assessment type relevant to the risk has to be employed whilst recognising the subjective nature of such assessments.

2.6.1.4 What-if Method

The What-if method is an inductive technique for relatively simple applications. At each step during the operation of a machine, questions are formulated and answers supplied to evaluate the effects of component failures and other errors on the creation of hazards.

The use of checklists and breaking the work down to examine particular aspects of the operation of the machine are necessary steps in the evaluation. The suitability of the equipment, its design and controls as well as its safety features is thereby assessed.

What-if is another method to enable a better understanding of the machine and its hazards that is more appropriate for use at the development stage of the product.

2.6.1.5 The Delphi Technique

The Delphi Technique was developed by the Rand Corporation in the USA to enable geographically dispersed warfare experts to forecast military developments. A large group of experts is questioned in stages, each stage following on from a previously agreed position with additional information made available to each member. During the third or fourth step the anonymous questioning concentrates on those aspects for which no agreement has yet been reached in the process. Delphi is a forecasting method that is also used to generate ideas. It does not produce a result as such but can aid the decision making process.

Its use is restricted to a panel of experts, which can take a considerable time to arrange, and therefore not probably suitable in its present form for use in assessing the risks presented by the products and machines under discussion in this study.

2.6.1.6 MOSAR Method

MOSAR (Method Organized for a Systemic Analysis of Risks) claims to be a complete method of risk assessing a system, e.g. a machine, process, or installation, as a number of interacting sub-systems, in ten steps. A table is used to identify the hazards, hazardous situations and events. A second table provides the safety measures that are employed and their adequacy is studied with a third table taking into account their interdependency.

Accident scenarios are built up based on a study underlining the possible failures that are then sorted according to their severity. A further table, agreed by consensus, links the severity results with the objectives to be met by the safety measures and specifies the performance levels of technical and organizational measures that have to be achieved. The safety measures are then incorporated into a logic diagram/tree and residual risks are analysed using an agreed acceptability table.

MOSAR appears to be a suitable method for assessing risks in machines and consumer products but again as with most risk assessment techniques it is probably more applicable at the design and development stages rather than for use retrospectively for example after a hazard has been identified and there is a need to assess the risk presented by a suspect product.

2.6.1.7 Preliminary Hazard Analysis

PHA is another inductive method to identify at each stage of a particular system, sub-system or component, the hazards, hazardous situations and hazardous events that could lead to an accident. The method identifies the accident potential and qualitatively evaluates the degree of injury or damage to health. Proposals for safety measures and the results of their application are then provided.

PHA has to be updated during the design, building and testing phases to identify new hazards and make corrections where necessary.

Once again the method is aimed at the design and development stages of a product rather than looking at the hazards after the product has been made and supplied for use either at work or in the home.

2.6.2 Development

A synopsis of the risk assessment process and how it has been used in the assessment of workplace machinery safety is relevant to the study. How

this procedure could be applied to consumer products is also considered and an indication in current legislation that would benefit from a more objective approach to risk is examined.

A "*new approach*" to harmonising European law and standards was introduced by the European Council and Parliament acting in their joint capacity in 1985 [Council Resolution 86/C167/01]. This innovative step signalled a virtual end to reactive and prescriptive legislation that detailed precisely what requirements were to be met and how this was to be achieved and brought in a more pro-active targeted risk-based approach. The main purpose was however to reduce the technical and legal barriers to trade throughout the Union and promote the free movement of goods.

New Directives were based on Essential Health and Safety Requirements for workplace products and Essential Safety Requirements for consumer goods. Compliance could be demonstrated by satisfying relevant harmonized standards. Barriers to trade caused by differences in law and technical standards operating in each member state could thereby be overcome and applying the official CE mark to the product as a declaration of conformity would indicate compliance to the enforcement authorities throughout the European Union.

The Machinery Directive (Council Resolution 86/C167/01 7th May 1985) implemented in Great Britain under the Supply of Machinery (Safety) Regulations 1992 is primarily directed at the suppliers of machinery. Employers also have statutory responsibilities with regard to machinery. They are required to carry out a "*suitable and sufficient*" risk assessment on all work equipment and activities under the Management of Health and Safety at Work Regulations and ensure that the equipment provided is suitable for the job and conditions and provide training under the Provision and Use of Work Equipment Regulations.

2.6.3 Process

Risk assessment is a structured and systematic procedure for identifying hazards, evaluating risks and prioritising decisions to reduce risks to a

tolerable level. It helps determine the priority which should be given to different hazards and the selection of appropriate safety measures to deal with them and also, the safeguards, protection devices and systems of work that may be required depending on the level of risk involved.

Risk assessment is particularly important when deciding the tolerability of particular risks; it allows very low consequence with high probability events to be compared with high consequence low probability ones.

It is important to ask how likely the event is going to occur as well as considering its consequences in order to avoid excessively over protective decisions. Judgement must be structured and evidence-based and not the simple application of blanket prescriptions.

Complex quantified risk assessment (QRA) methods referred to by the HSE (1989) are by their nature time consuming and costly and probably not recommended unless that is they can add significant value to and greatly assist the eventual safety decisions that need to be made. If a case is to be made out to ban a product for example, sound reasoning must be employed. However, where risk levels are found to be high, radical solutions may be entirely justified.

The costs involved in providing a solution must always be considered, as resources are invariably limited and cost effective solutions to reduce the risk to a level below that which is intolerable, must be based on sound judgement. Further improvement will depend on the point of diminishing returns where additional expenditure will fail to provide any corresponding improvement in safety. It will then be necessary to justify the level that is claimed to be tolerable.

Where the consequences are high and data are incomplete a belt and braces approach may be justified but care needs to be taken to avoid an emotional 'knee jerk' reaction to hazards.

A risk assessment approach has been increasingly used over recent years to set priorities by government and official bodies including those who have a duty to enforce the law on product safety. They need to prioritise their work because of the limited resources available to them and are aware that some problems are more serious than others but have had until recently no objective way of quantifying the risk.

2.6.4 Official Use

Risk assessment is now an established feature of safety decision-making in Government, business and the professions although its application is still uneven according to the Inter-departmental Liaison Group on Risk Assessment, (ILGRA) HSE (1998). Practitioners should be able to demonstrate theoretical and practical competence in risk assessment the report states. However even ILGRA's work appears to have been curtailed recently following the retirement of its chairman and it is uncertain if the excellent work already done to promote the wider use of risk assessment in government departments will proceed.

2.6.4.1 Inter-departmental Liaison Group on Risk Assessment

Government usage of risk assessment techniques is considered in two reports published by the Interdepartmental Liaison Group on Risk Assessment (ILGRA). It stresses the need for government to have clear and consistent policies for regulating risk HSE (1998). Many major government departments have contributed to this piece of work but there does not appear to be any significant input into its deliberations by the DTI, which is ultimately responsible for ensuring the safety of consumer products although there is no longer a specialist unit devoted to the subject. It is reported to be "*generally informal and judgmental*" and used for the targeting and refinement of legislation and standard setting. "*Because risk assessment is not formalised, little consideration has been given to uncertainty and residual risk*" the report states.

The Central Deregulation Unit formerly part of the DTI and now in the Cabinet Office published its Guide to Risk Assessment following the

government's decision on 19 September 1995 that Ministers would be provided with risk assessments to assist them in making decisions on regulatory proposals.

There does not appear to be any formal application of risk assessment at the highest level as far as consumer product safety is concerned although its value in assisting decision making in other areas, such as the introduction of new legislation, seems quite well advanced.

2.6.4.2 Consumer Safety Unit

The Consumer Affairs Division of the DTI, now incorporates the department's responsibilities for product safety, and was represented on ILGRA but despite its commitment to publish a departmental policy on risk assessment, this is still awaited. At the time of writing it was also said to be "*carrying out a multi-disciplinary literature based review of the valuation of human life in the context of standards for consumer safety*".

The CSU was set up under Stacey in the Department of Prices and Consumer Protection in 1976 after responsibility for consumer safety was transferred from the Home Office. The Unit was required to promote the safety of the public in particular by ensuring the products they used presented no undue hazard in use as reported by the DTI (1980a).

Proposals were made to create an accident database to enable types of products involved in accidents to be identified so that appropriate action could be taken to deal with them by the authorities. Since then the Home Accident Surveillance System has produced twenty-three annual reports and the minister responsible for the HASS (2000) report said "*HAAS lies at the heart of accident prevention policy and is extremely valuable for making progress and pinpointing new problem areas*". Its future therefore appears reasonably assured as a key element in assessing the safety of consumer products.

At the date of this study no statement had been issued as to the future of the CSU, however from discussions with officials it is likely that it will be

absorbed within the Consumer Affairs Division of the Department of Trade and Industry and a person appointed to take overall responsibility for consumer safety.

Concerns were raised in 1995 when changes were proposed in the CSU with the number of staff being reduced to fifteen "*Consumer safety staff to be halved*" warned Dominic Kennedy in The Times, 20.10.95. Assurances have been given that there will be no reduction in the safety work carried out by the DTI when the department was contacted by 'phone and additional funding is being provided to generate greater involvement by consumer groups in promoting safety throughout the country.

2.6.5 Work equipment

Regulation 4 of the Provision and Use of Work Equipment Regulations 1998 (PUWER) requires that new work equipment is suitable for its intended use and location. Suppliers need to demonstrate through risk assessment that the machine is safe by design and users must ensure that residual risks from the machine are appropriately controlled. Suppliers of new machines must inform the users of any residual risks and the means by which they can be controlled for example by training or following set procedures.

PUWER came into force on 1 January 1993 and covers all industrial sectors, services, hospitals, universities etc. in Great Britain and also offshore oil and gas installations. The regulations placed general duties on employers and listed minimum requirements for work equipment dealing with selected hazards. Some of the important duties are listed in Table 5 below. Work equipment covers everything from hand tools to machines of all kinds as well as an integrated assembly line or bottling plant. Use includes starting, stopping, repairing, modifying, installing, dismantling, programming, setting, transporting, maintaining, servicing and cleaning.

Employers' duties
Ensure the equipment is suitable for the job;
Take into account working conditions and risks when selecting equipment;
Ensure equipment is used only for operations for which it is suitable;
Ensure that it is maintained properly;
Provide adequate information, instruction and training; and
Ensure the equipment complies with the relevant EC product Directives.

Table 5: Employers' Duties
Source: PUWER 1998

2.6.5.1 Machinery Directive

The Machinery Directive (89/392/EEC) details the Essential Health and Safety Requirements that must be satisfied in order to supply a machine in the European Union (EU). The primary purpose of European Directives is to enable products that comply with them to be allowed free movement throughout the European Union. Products must comply with more than one Directive where they fall within the scope. Electrical equipment for example must comply not only with the Low Voltage Directive (73/23/EEC) but with the Electromagnetic Compatibility Directive (89/336/EEC) also. The manufacturer affixing the CE marks to his product claims compliance. The Machinery Directive is implemented in Great Britain by the Supply of Machinery (Safety) Regulations 1992.

2.6.5.2 Risk Levels

The general approach to risk regulation by the Health and Safety Commission (HSC) industry wide is set out in the Health and Safety Executive, HSE (1992) Tolerability of Risk paper.

The following figure after HSE (1992) illustrates the levels of risk that are considered intolerable, acceptable and the area subject to qualification of tolerability or ALARP which is probably the area in which most problems will lie. This is where a risk/benefit analysis has to be carried out in order not to put the product user at too great a risk of incurring personal injury.

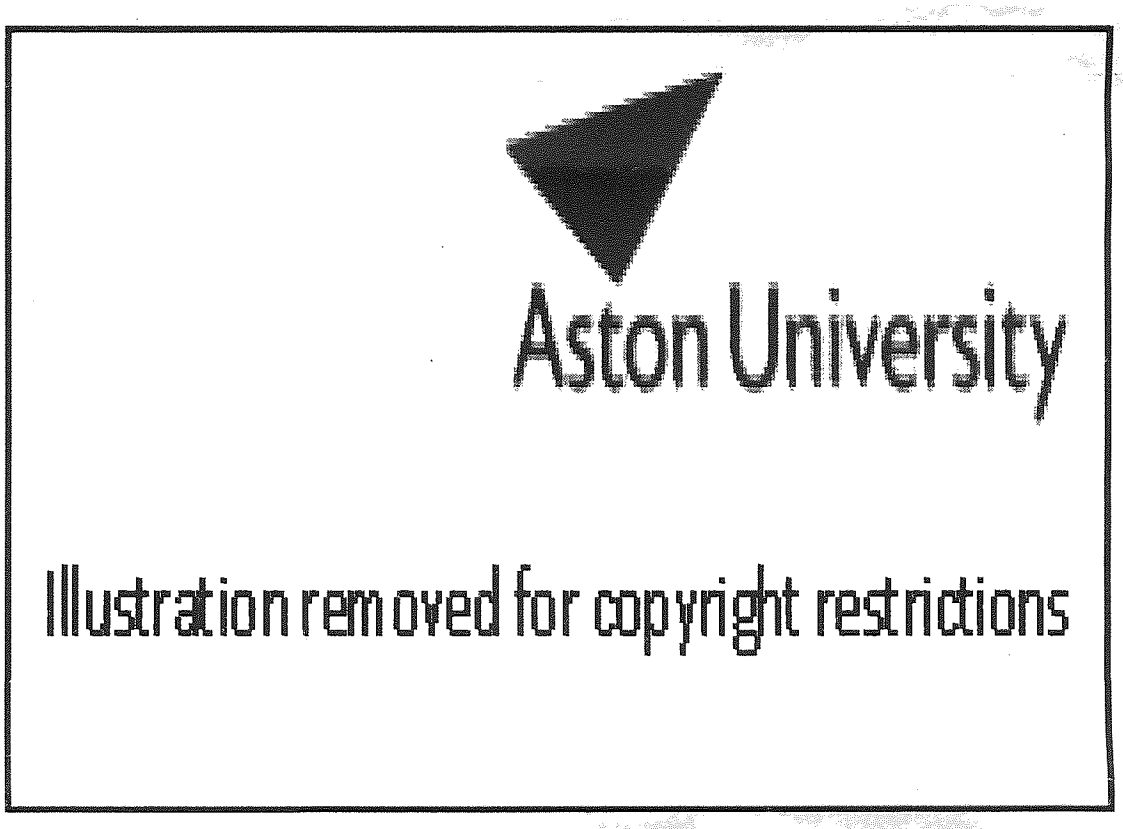

Figure 1: ALARP
Source: HSE 1994

The central tolerable region depends on risks being reduced to the level that agrees with the overall principle of what is reasonably practicable. This may include use of Personal Protective Equipment (PPE), warnings and specialist training in suitable cases and would be more acceptable in the workplace situation than for consumer products used in a domestic setting. It is likely that the tolerability levels will be lower as a result.

The boundaries between the respective areas would normally be negotiable between supplier or employer and the stakeholders, however here the law has to intervene in order to protect the interest of those

whose power is limited such as ordinary consumers and workers. Similar considerations must be applied when using cost-benefit analysis (CBA) balancing risk against utility.

Having assessed, or where appropriate, estimated a risk it is necessary to determine:
Whether it is so great or the outcome so unacceptable that it must be refused altogether,
Whether the risk is, or could be made, so small that no further precaution is necessary,
If a risk falls between these states, that it has been reduced to a level that is "*as low as reasonably practicable.*" (ALARP).

2.6.6 Consumer Products

Consumer products can be distinguished from products used in the workplace in several ways, they will usually be less robust and cheaper because they will not generally be intended for prolonged and demanding usage. They are also subject to a different legislation, the Consumer Protection Act 1987 and the Health and Safety at Work etc Act 1974 respectively. However, care has to be exercised in dealing with the products separately since there is evidence of migration according to Consumers' Association (2000a) between the category of consumer DIY products and those intended for professional use.

There is some evidence which I obtained during personal ad hoc interviews of workmen in London of migration in the other direction in that cheaper tools purchased at large retail outlets and intended for amateur DIY enthusiasts are now widely used by workmen carrying out building refurbishment work. Injuries caused by the use of inferior tools that fail have yet to filter through the accident recording system for action to be taken. This does suggest however that a uniform approach should be used to assess the risks presented by all products taking into account the likely user and requiring an indication on the product to warn the user

that a limited useful lifetime is to be expected. In both cases there should be an expectation that the product when it fails will do so safely.

2.6.6.1 Users

Ergonomics, the study of the consumer/product interface is of vital importance when considering safety issues but it isn't only the intended user whose interests have to be taken into account but those who because of lack of skill and knowledge or incapacity may be put at serious risk of injury. It is important that such risks are kept to a level that is a low as reasonably practicable. Regrettably, many standards do not deal with this aspect of product usage and indeed state that such users may not have been taken into account in the standard. It would be unfair to require manufacturers to take account of all types of product use including misuse and abuse and design their products accordingly but it is entirely reasonable for them to take into account the worst case scenarios and eliminate the hazard or reduce the risk to such a level that is reasonable taking into account financial and technical considerations.

2.6.6.2 Children

Research sponsored by the DTI was carried out into the use of domestic appliances by children DTI (1994) and the subject is currently being discussed by BSI's Consumer Policy Committee and the European Consumer Standards body (ANEC), the European consumer standards body, with regard to standards.

Children 7-14 were found to be significant users of gas and electrical equipment at home, usually unsupervised. 95% of children used televisions and 87% used video recorders unsupervised. The on/off switch, usually a remote control unit, should not present a problem for children but certain appliances do require knowledge of the product to be used safely. Microwave ovens are easy to operate, and a third of the children questioned were regular users, but it is important that they know how to use them safely. The study found that over half the children "*could not comment on how to keep safe when using a microwave*" and they were unable to relate this to the safety of eating food prepared in the

microwave oven. Burns in the mouth and on hands were recorded in the accident data as well as the "*explosion*" of superheated liquids.

Manufacturers must take this into account when designing products so that the risk children are exposed to is kept to a level that is as low as reasonably practicable (ALARP). Products do not necessarily have to be designed to withstand the type of robust use that some toys are subjected to during play, but where the product has been targeted at children such as "*child-appealing luminaries*" or bedside lamps, special considerations must apply. Similarly, nursery furniture must be made so as to take into account additional factors such as children's hands and fingers becoming trapped in folding mechanisms and surfaces being licked.

Just under half the 7-14 year old children questioned used electric toasters and kettles on a regular basis. With regard to toasters the report claims that "*children were well aware of the safety measures*" such as "*not touch if hot*"; "*not put fingers in*" and "*keep knives out of toaster*". There is considerable evidence that the sidewall temperatures reach dangerously high levels on many toasters and even inadvertent one-second contact would cause a burn to the skin. Criticism has also been made of the design of toasters slots according to DTI (1989) in that bread can be trapped thus encouraging the use of implements to release it with serious risk of electrocution and burns.

Other appliances that give rise for concern with regard to their use by children include electric hairdryers, food mixers and carving knives. There was a lack of awareness that it was unsafe to put the hairdryer down when hot and possibly therefore when still running, although keeping it away from water and too close to the user's hair was recognised. Keeping the air vents free of obstructions was not mentioned however.

The risk of children cutting their fingers whilst using food mixer/processors and electric knives must be considerable but the report found, of the relatively small number of children that used them, most recognised the "*need to keep fingers out of the machine and away from*

the blades" in the case of food mixers and concluded in the case of the use of small electrical kitchen products such as electric knives "*on balance, those that claim to use these appliances did so responsibly*".

Manufacturers may place too great a reliance on such reports and not strive to reduce the hazards in their appliances to a level that is as low as reasonably practicable. The report provides firm evidence however on the extent to which children, often unsupervised, use kitchen appliances. Lawyers will also use such evidence to help establish that their clients have taken all reasonable precautions to avoid committing an offence and therefore escape conviction for marketing an unsafe product. Standards do not address the use of such equipment by children but consumers bodies have asked that this be considered. Instructions were issued to the European standards bodies CEN and CENELEC by the European Commission but whether this will produce early results is doubtful.

2.6.6.3 Disabled

The importance of taking into account those users who suffer physical and mental conditions that may affect their safe use of products has only recently been recognised. Research commissioned by the DTI (1993c) into mental disability and consumer safety was based to a considerable extent on the Home Accident Surveillance System (HASS) data that does not provide the detail one would need to assess the problem adequately. The report concedes, "*Any real effects are probably completely masked by non-recording as the HASS clerks have not been asked, nor given guidelines, on recording an A&E patient's prior disability*". The conclusions reached by this report are therefore questionable and the extent of the problem is not properly quantified and the seriousness of shortcomings in product design not adequately addressed. The philosophy presently gaining support is that "*if it is right for one it is better for all*".

The Research Institute for Consumer Affairs (RICA) does not use mental impairment as a special needs assessment of consumer products tested for Which? Magazine but BSI's Education Department takes mental

impairment into account in its "*Design for People*" approach. The work of RNIB should also be considered but this isn't covered in the report.

Physical disability was the subject of DTI (1991) research. The report claims over 10% of the adult population of Great Britain have some physical disability and manufacturers, designers and standards authorities should be aware that households with physically disabled people are a significant proportion of the market for ordinary household appliances.

Once again the under reporting of accidents involving disabled people in the HASS (2000) database is commented on and the study accepts that it "*could well be wholly due to the under recording of disabilities*". Indeed there is no provision for such recording on the data sheets completed by the clerks who may only mention the fact in their general comments. Another reason for the apparent under reporting was that the design of products might unnecessarily limit their use by people with disabilities. It is claimed in the report that BSI is developing guidance books for designers each focusing on a different type of special need according to DTI (1991) but there is no evidence of this having been put into effect.

Chapter 3: Managing Product Safety

3 MANAGING PRODUCT SAFETY

3.1 Introduction

Managing the safety of products effectively is primarily a responsibility of government, specifically the Secretary of State at the Department of Trade and Industry who has to ensure that the necessary legislation and systems are in place so that the public is not put at undue risk as determined by the Consumer Protection Act 1987 (CPA). This benefits society as a whole because it is reasonable to presume that unsafe products are more likely to cause injuries and property damage than those that satisfy the safety requirements laid down by law.

The precise extent to which unsafe products contribute to injuries has not been firmly established but DTI sponsored research is being conducted at Nottingham University by Norris (2000) to look into this. The DTI has the greatest influence in managing product safety but the implementation of the product safety law, the CPA and its associated regulations is largely the responsibility of 205 autonomous local authorities.

The law and the manner in which it is administered largely determine how well the safety of products is controlled. Also, those who make and sell products that do not satisfy the safety provisions as interpreted by the relevant product standards, commercially disadvantage manufactures and suppliers of legally complying "*safe*" products.

Consumer safety as well as fair trading issues are therefore relevant but only the safety of products is dealt with in this study, however, all such matters have to be taken into account when carrying out a cost benefit analysis. Such analyses have been common practice in recent years when government considers introducing new controls and they can have an important impact on what will be considered acceptably safe with regard to products.

This Chapter looks at how the law regulates the safety of products, primarily for use in a domestic situation but also, for comparison purposes, those used at work. The study is primarily concerned with the safety of consumer products and therefore the legislation, procedures and overall system that is intended to achieve the level of safety required by consumer protection law is dealt with in more detail than that for workplace safety. CE marking, European Directives and safety regulations relating to consumer and workplace products are also considered to see how they contribute to improving product safety and harmonizing the law and technical standards throughout the European Union (EU).

Unpublished data provided by six city trading standards services has been examined in order to provide an indication of how product safety legislation is enforced in the large urban areas. My own involvement in providing statements for use in prosecution cases and government records of cases are also examined to identify trends in product safety enforcement activity and the products that are causing greatest concern.

How the law deals with products intended for the workplace is examined, in particular how it helps the Health and Safety Executive (HSE) through the Management of Health and Safety at Work Regulations deal with product safety in the workplace. Also, products intended for use at work and in the domestic situation are considered. The two approaches to ensuring safe products are then compared.

3.1.1 Development

In order to appreciate the current legal situation with regard to ensuring the safety of consumer products it is helpful to look briefly at how the law has developed in this area over the past fifty years. Traditionally, unsafe products have been dealt with as and when the need arose but a more holistic approach to product safety legislation is now apparent.

3.1.2 Early Product Safety Law

The Heating Appliances (Fireguards) Act 1953 is probably the first statute concerned specifically with product safety in this country. The introduction of this legislation followed a long campaign after numerous severe burns injuries and deaths had been caused because of unguarded fires, particularly those accidents that involved young children. The Act empowered the Secretary of State to require heating appliances to be fitted with fireguards when they were sold.

The publication of the Molony (1962) committee report on Consumer Protection presaged much of the law on safeguarding the consumer interest in this country and paralleled the introduction of the Consumer Protection Act 1961 which enabled the Secretary of State to require any class of goods to meet specified safety regulations. Previously it was necessary to introduce an Act to control each category of potentially hazardous product.

Historically the enforcement of product safety legislation has developed in a rather piecemeal fashion. Enforcement of the Consumer Protection Act 1961 was not made mandatory for example and this allowed varying levels of activity throughout the country. However, most weights and measures authorities took appropriate action when necessary to prosecute suppliers of offending goods. There was no power to remove unsafe goods from sale at that time and many unscrupulous dealers continued to trade in illegal products and run the risk of prosecution. The penalties imposed on offenders by the courts had only a limited deterrent effect, as did the common law duty of care owed by all suppliers of goods and very few civil claims for damages have been recorded.

Government published a Green Paper on Consumer Safety (Cmnd.6398) in February 1976 and the Consumer Safety Act followed in 1978. This enabled the Secretary of State to take immediate action to ban the supply of unsafe goods and made the enforcement of the safety legislation a mandatory duty for all weights and measures authorities.

This did not however prevent the widespread marketing of unsafe consumer goods particularly those that had been imported as my personal records show. Government eventually published a White Paper entitled "*The Safety of Goods*" (Cmnd.9302) in July 1984. The Consumer Protection Act 1987 which resulted from this introduced the general duty on all suppliers to ensure that their goods are safe and provided for much wider powers for enforcement officers.

Government ministers and civil servants appeared slow to react to the occasional reports of personal injury and even death being largely insulated from the public who lacked awareness regarding their legal rights in the early days of safety legislation. Since then, with the support of the media and consumer groups, there has been a greater emphasis on obtaining accident data, in carrying out research into specific problem areas and generally dealing with product safety issues more effectively. Politicians are also aware that a crusading media profile wins votes and safety issues have increasingly attracted public support.

It has been government policy over many years to rely on voluntary compliance with British Standards and recommendations with regard to safety and several important sets of regulations have been introduced including those dealing with toys, electrical equipment, oil lamps and heaters, perambulators and pushchairs, nightwear and cosmetic products.

3.1.3 Consumer Protection Act 1987

The safety of consumer products is now controlled under the CPA enforced by local weights and measures authorities usually through what are now entitled Trading Standards Departments. It is only in the last forty years that government has concerned itself directly with the safety of consumer products.

Early safety legislation including the Explosives Act 1875, the Fabrics (Misdescription) Act 1913, the Petroleum (Consolidation) Act 1928 and the Pharmacy and Poisons Act 1933 dealt only with particular aspects and

were not primarily concerned with the safety of the product user. The purpose of the Fabrics (Misdescription) Act 1913 for example was primarily to prevent the sale of materials falsely claiming to be flame resistant rather than to promote the safety of users of highly flammable materials that was the cause of serious concern at the time.

The legislation to date has been of the prescriptive kind detailing precisely what products must achieve with regard to safe performance. Safety regulations that dealt with oil lamps and oil heaters were particularly detailed for example covering everything from the stability of the product to the generation of carbon monoxide gas. Such regulations have largely been replaced by the General Product Safety Regulations 1994 which are based more on an assessment of the risk presented by the product.

3.2 Consumer Product Safety System

The Consumer Product Safety System illustrated in Figure 2 comprises elements that interact so as to produce a desired outcome. The principal elements discussed here include product safety law, safety regulations (and the Directives on which they are based) and standards. The system is best represented as a flow block diagram. The model also indicates where a risk assessment approach might be applied to beneficial effect and this is dealt with in Chapter 4.

In general, a system is a collection of elements and components both physical and abstract, interacting with each other in order to produce an agreed output, in this case safe consumer products. The product safety system developed here consists of organisations that are involved in ensuring that products are made in accordance with agreed specifications, perform effectively for a reasonable time as expected and most importantly, for the purpose of the present study, are safe to use. The criminal and civil law are featured in the model but their distinct and separate procedures must be recognised with regard to dealing with unsafe consumer products. It is argued by Jenkins (1997) in that article that the civil law places a higher burden on manufacturers in that their

products must be as safe as persons generally can expect them to be and if a defect in the product causes injury, this only has to be established on the balance of probabilities, the civil law test.

3.2.1 Product Safety System Model

The main elements of the system are identified in the model (see Figure 2 below) and their interactions are presented in the form of a simplified flow chart indicating the principal connections. Those elements of the model that might benefit from the use of a more objective approach to assessing the safety of the products using a risk assessment process are shown, namely, Trading standards, Government (DTI), European Commission (EC) and Producers, and the extent to which these benefits may accrue is discussed below.

3.2.2 Consumer Products

The principal aim of the system is to eliminate products that are unsafe. The point that triggers the activity therefore is when a user is injured by a product defect or a product is deemed to be unsafe. This illustrates the two parallel legal situations that arise, firstly the right of a person injured by a defect in a product to sue the producer of that product for damages under the product liability provisions of the CPA and secondly the duty on the TSS to prosecute suppliers of unsafe products and those who place such products on the market.

3.2.3 Standards Bodies

The consumers' interests in ensuring that high levels of safety are maintained in standards are represented by such bodies as the Consumers' Association, RoSPA, CAPT and the Consumer Policy Committee of BSI. Trade associations however contribute the main input into standards writing both at Member State level such as BSI and in Europe, the Committee for European Standardisation (CEN) and the Committee for European Electrotechnical Standardisation (CENELEC), and internationally through the International Standards Organisation (ISO). Their interests may not always reflect those of the product user and

commercial considerations such as the cost of additional safety measures and testing play an important part in the development of standards.

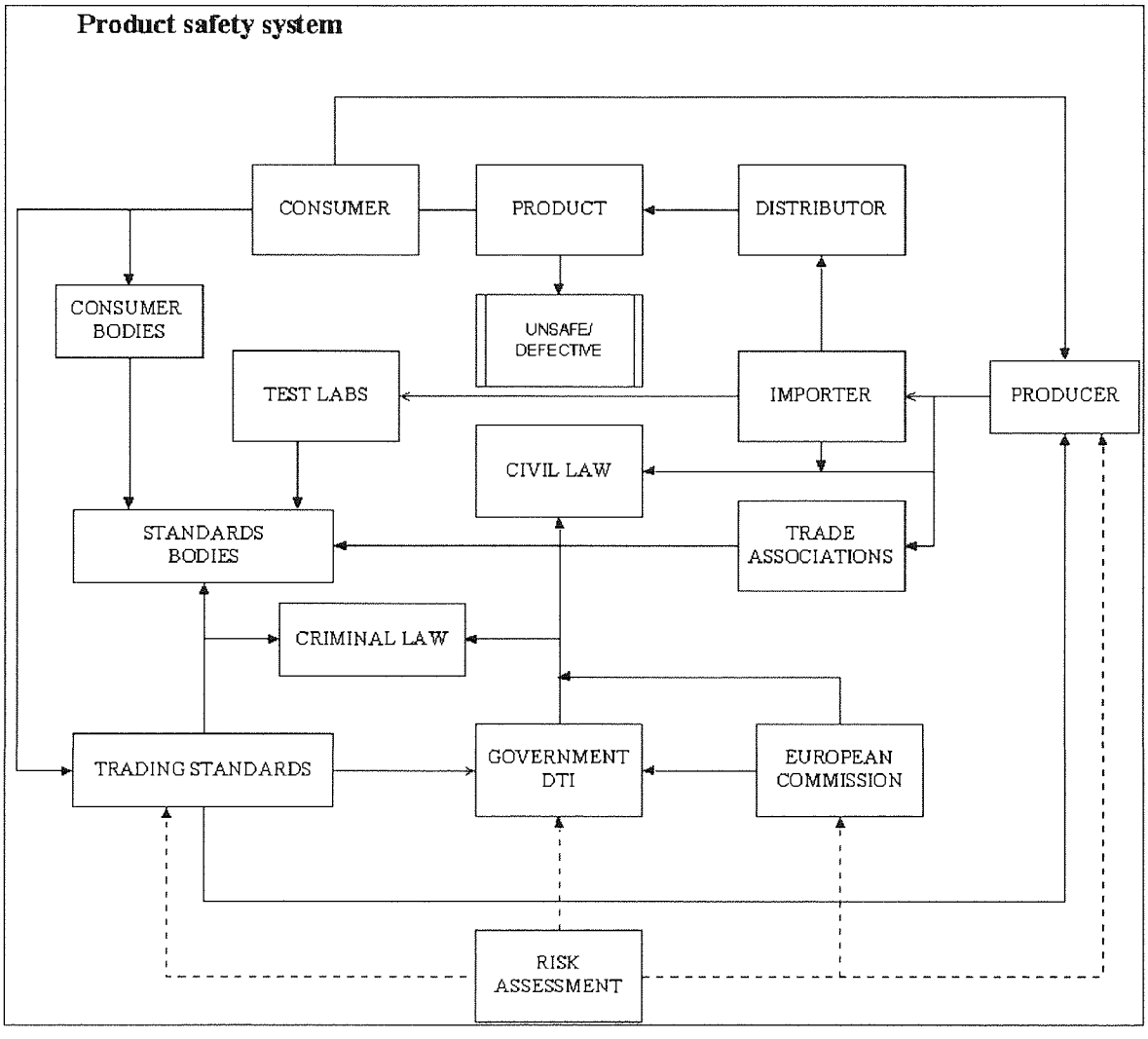

Figure 2: Product Safety System

3.2.4 Trade Associations

Producers, distributors and importers are often represented by trade associations when negotiating new standards and legislation. Although they are individually liable to persons suing for defects in their products that caused them injury and to the TSO who might prosecute them for placing an unsafe product on the market, collectively they can readily determine what they consider to be a reasonable level of safety required by the law as interpreted by the standards. The level of safety trade associations are likely to accept and advocate is that of any member who

considers it reasonable. This may not always reflect the level of safety that others wish to provide or the level that is reasonable in law.

3.2.5 Test Laboratories

The United Kingdom Accreditation Service (UKAS) provides a comprehensive list of those laboratories that meet its accreditation requirements having competent, qualified staff, suitable equipment, documentation and procedures to carry out the testing of products. There has been a decline in the representation of independent laboratory experts on standards technical committees such as BSI including BSI's own staff. The quality of standards is likely to diminish without such input but such a commitment may be difficult for test laboratories to justify on commercial grounds, standards writing being time consuming and non-remunerative.

3.2.6 European Commission

Directives are generated by the EC as directed by the European Parliament. Directives have to be implemented in Member States within two years of their promulgation. The EC issues mandates to the European standards bodies CEN and CENELEC to produce suitable standards to interpret the Essential Safety Requirements and in the case of products for use at work, the Essential Health and Safety Requirements. Publication of these standards in the Official Journal means that they have the status of Harmonized Standards and compliance with their requirements is deemed to satisfy the relevant Directives.

3.2.7 Government

The DTI is the government department responsible for ensuring the safety of consumer products and the Secretary of State has duties under the CPA to enable this to be achieved. A major part of the work now entails the transition of European Directives into domestic law and a series of such Directives has been introduced over recent years (Appendix 3).

3.2.8 Trading Standards

The CPA places a duty on local weights and measures authorities, the former title for the TSS, to enforce its requirements regarding product safety. The service receives complaints about unsafe products from the public and monitors the market to check that the safety requirements are being met. They provide the main official input into the product safety system under the criminal law and report their findings to government who monitor the overall effectiveness of the surveillance work.

3.3 Product Safety Law

The principal statute relevant to the safety of consumer products in Great Britain is the Consumer Protection Act 1987 (CPA). The Act enables the Secretary of State to introduce regulations and take immediate steps where necessary to remove a particular named product from the market by means of a Prohibition Notice. TSOs who enforce the legislation on behalf of the local authorities, on whom a duty is imposed under the Act, may also take immediate action when they have reasonable cause to suspect a product is unsafe by issuing a Suspension Notice.

Secondary legislation in the form of safety regulations specify the mandatory requirements that have to be met but standards, including those that are harmonized throughout the European Union listed in Appendix 4, although they are not mandatory, provide the best technical interpretation of the law. Since Britain entered the European Union product safety law has been based primarily on European Directives (Appendix 3), some of which are dealt with in this study.

3.3.1 Definitions

Certain definitions of words used are particularly important in this study and many of these are taken from the CPA and associated regulations. Three of the most important are dealt with here.

3.3.1.1 "Safe"

It is important to establish what the term "*safe*" means and essential to follow the legal interpretation relevant to the area of study to avoid any confusion. Section 19 of the Consumer Protection Act 1987 defines "*safe*" in relation to products *inter alia* as such that there is no risk, or no risk apart from one reduced to a minimum, that the goods, their use or assembly, whether immediately or after time, will cause the death of or any personal injury to, any person. The term is widely used throughout the safety regulations made under the Act. Regulations such as the Electrical Equipment (Safety) Regulations 1994 for example require electrical equipment to satisfy three conditions: they must be safe; be made in accordance with good engineering practice regarding safety; and must satisfy the safety objectives listed in the schedule to the regulations.

3.3.1.2 "Safe Product"

"*Safe product*" for those products not covered by specific safety regulations is defined in the General Product Safety Regulations 1994 [SI 2328] *inter alia* as any product which, under normal or reasonably foreseeable conditions of use, including duration, does not present any risk or only the minimum risks compatible with the product's use, considered as acceptable and consistent with a high level of protection for the safety and health of persons.

The information that must be taken into account by manufacturers, enforcement officers and the courts when assessing the safety of products includes the characteristics of the product, such as its composition, packaging, instructions for assembly and maintenance, its effect on other products, where it is reasonably foreseeable that it will be used with other products, the presentation of the product, the labelling, any instructions for its use and disposal and any other indication or information provided by the producer and the categories of consumers at serious risk when using the product, in particular children.

3.3.1.3 "Supply"

"*Supply*" is defined in Section 46 of the CPA as including selling, hiring and even lending or giving the goods away as a prize. However, to be caught under the provisions of the CPA all such transactions must be in the course of trade or business to be subject to the Act. The principal offence under the General Product Safety Regulations is Regulation 7 "*No producer shall place a product on the market unless the product is a safe product.*" This appears to restrict the supply to manufacturers and importers but probably goes much further to include others in the supply chain such as wholesalers and retailers. Case law will be needed to clarify this point.

3.3.2 Safety Regulations

Safety regulations do not have a common approach, having developed largely in a piecemeal fashion and so tend to deal with each product differently. The CPA and its predecessors do however specify what and how the Secretary of State can regulate products to ensure they are safe. Also, consumer products are not always treated differently from products intended for professional use for example. Some of the more important product regulations are summarised below and the link with the relevant European Directive is noted. A list of product regulations is provided in Appendix 2.

It is the regulations that must be observed in each of the Member States. Occasionally there will be anomalies when transposing the requirements of Directives into domestic law but in the event of any dispute it is the meaning as expressed in the Directive that will take precedence.

3.3.2.1 Electrical Equipment

Regulation 3 of the Electrical Equipment (Safety) Regulations 1994 [SI 3260] deals with electrical appliances that operate within certain voltage limits and reach an end user who could be an industrial or commercial consumer as well as a private individual. Equipment must satisfy three requirements, it must be "*safe*", made in accordance with good

engineering practice regarding safety and satisfy the safety objectives that are listed in the Schedule to the regulations. The regulations implement the Low Voltage Directive (73/23/EEC).

3.3.2.2 Gas Appliances

Regulation 4(1) of the Gas Appliances (Safety) Regulations 1995 [SI 1629] covers all gas appliances except those used in an industrial process carried out on industrial premises. All such appliances must satisfy the essential requirements and be safe. The regulations implement the Gas Appliances Directive (90/396/EEC).

3.3.2.3 Machinery

The Supply of Machinery (Safety) Regulations 1992 [SI 3073] is aimed primarily at workplace machinery but makes no distinction as to the end user. The regulations do not however apply to machinery where the risks are already covered or partly covered by other Directives. The effect of these regulations on consumer products is therefore very limited, particularly when the General Product Safety Regulations are taken into account.

However, there is provision for the enforcement of these regulations by weights and measures authorities in the case of machinery supplied for private use or consumption (Schedule 6, 3(a)) so there must be some areas where the regulations were thought to be relevant. The regulations implement the Machinery Directive (98/37/EEC).

These regulations are hazard based and address issues that should be considered elsewhere in other regulations particularly those that deal with consumer products such as Toy Safety and the General Product Safety Regulations (GPSR).

Machinery supplied for use in the workplace is often required to be safer than that supplied for consumer use according to Jenkins (1999). Excessively hot surface temperatures are permitted on many consumer

appliances that would not be permitted in workplace equipment for example.

Protection against mechanical hazards including stability and risks due to surfaces, edges and angles are also not covered adequately in other regulations or the standards that interpret them. Electrical and gas regulations deal with their primary hazards well but often miss mechanical hazards. The use of appliances should include cleaning them for example but there is little account taken of sharp edges and points on the casings of such equipment. Cuts and puncture injuries can result.

Noise is another hazard caught under these regulations but not covered by many consumer product safety regulations or standards. A reasonably foreseeable condition of use of a domestic washing machine includes a child opening a door and climbing inside. There have been incidents where this has happened and featured on BBC television's consumer programme "*Watchdog*". There is nothing in the consumer product standard or regulations that addresses this problem but if a worker in a factory managed to become trapped without any means of summoning help there would be a breach of the safety regulations.

The regulations also require machinery to be so designed constructed and equipped that the need for operator intervention is limited and where this cannot be avoided for the intervention to be carried out easily and in safety. Again, there is no similar requirement in regulations for consumer equipment.

Although warnings are considered to be the last resort after elimination of hazards and their control, they do provide a useful safety function. The machinery regulations address the residual risks and the use of warnings, which must be unambiguous and easily perceived, as well as a preference for readily understandable pictograms.

With regard to electrical safety, the regulations emphasise the need for the electrical safety requirements to be complied with where the machinery operates within the voltage limits. It also includes potentially dangerous electrostatic charges and requires the machinery to be so designed so as to prevent or limit its build-up and/or be fitted with a discharging system.

The regulations also deal with faulty connections where this can be the source of risk. They require that the equipment be designed in such a way as to make such dangerous connections impossible or failing this to have the pipes and cables marked with information. Of particular interest is the requirement to take steps to eliminate any risk of injury caused by contact with or proximity to machinery parts or materials at high or very low temperatures. The discharge of hot material must also be assessed and necessary steps taken to prevent it or render it safe.

With regard to fire hazard, machinery must be designed and constructed to avoid all risk of fire or overheating. Fires that start in domestic appliances are identified in the official statistics and regularly feature washing machines and televisions.

3.3.2.4 Toys

Regulation 3(1) of the Toys (Safety) Regulations 1995 [SI 204] defines toys as playthings intended for children under 14 years. Toys must satisfy the Essential Safety Requirements taken from the Toys Directive (88/378/EEC) and listed in a Schedule to the regulations.
The harmonized standard for toys EN 71 claims to be hazard based but it is only relatively recently for example that noise has been addressed in the standard and this after considerable opposition from manufacturers' representatives on the standards committees that I attended.

3.3.2.5 General Products

Regulation 2 of the General Product Safety Regulations 1994 [SI 2328] (GPSR) defines "*consumer*" as meaning *inter alia* a consumer acting

otherwise than in the course of a commercial activity. These regulations apply to all consumer products that are not subject to their own specific set of regulations such as electrical and gas appliances, toys and machinery for example. Products that are placed on the market must be "*safe products*" as defined by Regulation 2 in that under normal or reasonably foreseeable conditions of use they do not present any risk or only the minimum risks compatible with the product's use, considered as acceptable and consistent with a high level of protection for the safety and health of persons. Various factors have to be taken into account when reaching this decision including the composition, packaging and instructions for assembly and maintenance and its effect on other products. Also, the categories of consumers likely to be at serious risk when using the product, in particular children.

The term "*risk*" is particularly widely used in the GPSR not only in the definition of safe product but also in Regulation 8(1)(a) which imposes a duty on producers to provide consumers with sufficient information about their products so that the consumer can assess the risk. Regulation 9 requires distributors to pass on any such information concerning the risks presented by a product.

3.3.3 Product Safety Directives

In the field of product safety Directives the scope often includes domestic and workplace equipment. The Directives which are listed in Appendix 3, some of which are summarised below, include: Low-Voltage; Simple Pressure Vessels; Safety of Toys; Construction Products; Electromagnetic Compatibility (EMC); Safety of Machinery; Personal Protective Equipment; Gas Appliances; Hot Water Boilers; Medical Devices; Lifts; and Pressure equipment.

3.3.3.1 Low Voltage

The Low Voltage Directive (73/23/EEC) covers most electrical equipment designed to be used with a voltage between 50 and 1,000 volts (alternating current) and between 75 and 1,500 volts (direct current). It

provides for the equipment to be constructed following good engineering practice so as not to endanger the safety of people, domestic animals or property.

3.3.3.2 Electromagnetic Compatibility

The Electromagnetic Compatibility Directive (89/336/EEC) as amended by Directive 92/31/EEC covers almost all electrical and electronic appliances, equipment and apparatus. It requires appliances not to generate electromagnetic disturbance and to provide immunity from such disturbances.

Compliance with the Directive requires type testing of systems using specialised equipment. Tests include Emissions testing to BS EN 50081-2 and Immunity testing to BS EN 50082-2.

3.3.3.3 Machinery

The Machinery Directive (98/37/EEC) covers machinery, which is an assembly of linked parts or components, at least one of which moves, with the appropriate actuators, control and power circuits, etc joined together for a specific application, in particular for the processing, treatment, moving or packaging of a material.

Schedule 4 Machinery is machinery that is classified as posing special hazards and must be type examined and approved by a third party known as a Notified Body. Generally a Notified Body is a specialist company approved and monitored by the Health and Safety Executive to carry out such type approvals. A full list of such machines is given in Schedule 4 of the Supply of Machinery (Safety) Regulations 1992. Generally they are machines for working with wood and analogous materials and meat and analogous materials; presses, injection or compression plastics moulding machines; machinery for underground working; trucks for the collection of household refuse; and some devices for the lifting of persons.

3.3.3.4 Pressurised Equipment

The Pressurised Equipment Directive (87/404/EEC) as amended by 90/488/EEC became law in Britain in November 1999 under safety regulations. However, CE marking of pressurised equipment was not made mandatory until May 2002 and was optional in the intervening period. Not all pressurised systems will have to be CE marked; it will depend on the risk category into which they fall.

3.3.4 Product Standards

In order to comply with the appropriate Directives, the equipment should comply with the Harmonized European Standards mandated by the Directive, which gives it "*deemed to satisfy status*" and provides a rebuttable presumption of conformity with the law. Harmonized European Standards are technical standards prefixed by the letters 'EN' that have been accepted by the European standards bodies within the EEA. The use of EN standards is not mandatory but it implies conformity with the appropriate Directives.

Many standards used throughout Europe are harmonized versions of those developed originally by the British Standards Institution and other national standards bodies including those standards nominated by the French, German and Italian states. Standards achieve the status of being harmonized when they are accepted by the Commission as providing a satisfactory interpretation of Essential Safety Requirements and have been published in the Official Journal.

The European versions of the standards are now developed by the European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC) leaving national bodies little more to do other than nominate representatives to sit on European standards committees to develop new European standards and review existing ones. Some of the most important standards that are relevant to the present study which cover products for work and home use are listed in Appendix 4. It should be noted that because they are

subject to constant amendment and review, it is the latest published version that is relevant.

Although manufacturers through their wide representation on the technical committees drawing up the standards are made aware of any likely changes well in advance, the standard usually has a generous lead-in time from which date it will be effective. Although the standard is not mandatory and compliance with it is not a complete defence in law, the courts are likely to take such implementation dates into account when deciding on the merits of a case, particularly a "due diligence" defence.

Standards play an important part in setting a legally acceptable level of safety for products. Compliance with a harmonized standard, one approved by the CEN and CENELEC European standards bodies, provides a "*rebuttable*" presumption that the product will satisfy the legal requirements laid down in the Directives. Standards are drawn up in Great Britain in line with the recommendations in the "*standard for standards*" BS 0 parts 1, 2 and 3. The guidance documents now include the principles and procedures required for international and European standardization that accounts for the major part of the BSI standards work programme. A caveat is printed in the Foreword to all standards including BS0 stating, "*Compliance with a British Standard does not of itself confer immunity from legal obligations.*"

Although compliance with a standard provides an excellent defence against a charge for example that the product is not safe, a standard is not the law and its lesser status must be recognised.

The role and status of harmonized standards has been widely misunderstood because of the previously prescriptive nature of health and safety legislation and its relationship to standards as reported by Raafat (1999). Compliance with a relevant CEN or CENELEC harmonized standard is not mandatory but probably the most effective way to demonstrate that the Essential Health and Safety Requirements (EHSRs)

have been met. The alternative would be to carry out a robust risk assessment that deals with all relevant hazards and situations and their control. The harmonized standards should have been drawn up in line with the procedures laid down, including guidance on risk assessment EN 1050 Safety of machinery: principles for risk assessment and have been formally adopted and published by the European Commission in the Official Journal (OJ).

BS EN 1050 is an A-type standard providing a risk assessment framework and the range of hazards to be considered when considering the safety of machinery. It is reasonable to apply this framework to other product standards, particularly in the absence of any other guidance on their safety. Type B standards deal with techniques, principles or components applicable to a range of machines. B1 standards provide generic guidance such as safety distances to prevent danger zones being reached in EN 294. B2 standards deal with generic standards for safety systems such as two-hand controls and machine control systems. B-type standards are "*horizontal*" dealing with single issues relating to machinery safety. Type C standards deal with particular types or classes of machine and are known as "*vertical*" standards. Type-C standards must be read in conjunction with A and B-type standards.

Harmonized standards are drawn up by common agreement between the standards bodies notified to the European Commission and published in the Official Journal of the European Communities. The standards are required to be kept up to date with regard to technical progress and good engineering practice in relation to safety. There is a presumption of conformity with safety provisions if a product complies with such a standard unless the contrary is established; it therefore provides the manufacturer, employer or supplier of products with a rebuttable presumption of conformity. There is a safeguard clause to deal with shortcomings in such standards and where a deficiency is established its status can be withdrawn. Such a deficiency results in a mandate from the commission to the European standards bodies to deal with the

shortcoming in the standard. Such was the case with electrical and gas appliance standards and their failure to address the burn hazard. Loose hair on toys presented a choking hazard and excessive noise produced by toy cap guns and other toys wasn't addressed by the EN 71 standard and a similar procedure was adopted to deal with these shortcomings.

A list of harmonized standards is given in Appendix 4. It is likely that omissions such as those referred to above will become apparent over time particularly if a risk assessment approach has not been applied during their development. This presents the likelihood of failing to address all the hazards and in the case of electrical product standards for example, not placing sufficient emphasis on the non-electrical hazards.

3.4 Workplace Products

The Health and Safety Executive (HSE) control articles and substances intended for use at work under the Heath and Safety at Work Act (HSWA) that is enforced nationally by the HSE inspectorate and locally by Environmental Health Officers. The work of the HSE is reported each year and highlights such as the lowest figure for worker fatalities of 218 for 1999/2000 since the reporting system RIDDOR was introduced in 1986, is summarised in a further publication by HSE (2000).

3.4.1 Health and Safety at Work Act

Section 6 of the Health and Safety at Work etc. Act 1974 (HSWA) deals with the safety of products and imposes general duties on those who can ensure that articles and substances for use at work are as safe and without risks to health as it is reasonably practicable to make them before they are used and that articles are properly erected and installed. The Act also protects the public who may be injured by the actions of employers. Regulation 3 of the Management of Health and Safety at Work Regulations (MHSWR) requires every employer to make a suitable and sufficient assessment of the risks to the health and safety of his employees to which they are exposed whilst they are at work.

Section 6 of the HSWA was amended by the CPA to impose requirements on those who design, manufacturer, import or supply any article for use at work. They have a duty to ensure, as far as is reasonably practicable, that the article is so designed and constructed that it will be safe and without risks to health at all times when it is being set, used, cleaned or maintained by a person at work. "*Reasonably practicable*" is a term that balances the risks against the measures necessary to eliminate them. The duty is not therefore absolute. They must also carry out or arrange for the testing and examination of products and substances to ensure that the duties are complied with. Information to ensure continued safe use of the article must be provided and updated as necessary. They must also carry out or arrange for research to be carried out on the article to eliminate or minimise any risks to health or safety. Substances are similarly controlled.

Section 6(10) qualifies the requirement regarding the safety of articles to the extent that any lack of safety is acceptable if the circumstances of the case it relates to could not reasonably have been foreseen. This is less restrictive than the earlier requirement that the article or substance had to have been properly used.

Any person injured when not using the article or substance properly would still have a claim in tort but there would be a possible reduction in damages due to contributory negligence and no criminal offence would have been committed.

Also relevant to this study is section 15 of the HSWA that empowers the Secretary of State to make regulations including those that deal with dangerous substances such as the Chemicals (Hazard Information and Packaging for Supply) Regulations 1994 [SI 1347] (CHIPS). These regulations also cover dangerous substances supplied to the public and include requirements relating to the use of child-resistant closures for the packaging of particularly harmful materials.

3.4.2 Managing Health and Safety at Work

Risk assessments have to be carried out under the Management of Health and Safety at Work Regulations (MHSWR) 1999. Regulation 3 requires every employer as well as the self-employed to make a suitable and sufficient assessment of the health and safety risks to which workers are exposed. In addition employers must assess the risks to persons not in their employment arising out of or in connection with the conduct by them of their undertaking, thus extending a degree of protection to members of the public.

The MHSWR try to instil in employers the need to assess the risks their workers are exposed to and to have systems in place to tackle them effectively rather than prescribe specific courses of action that may have been appropriate in the past. This approach provides a continuing method of reviewing and improving safety systems within companies so that they address changes in materials and processes more quickly.

Employers must also demonstrate that machinery used by their employees is safe as required by the Provision and Use of Work Equipment Regulations 1998 (PUWER).

3.4.3 Law Enforcement

In England and Wales the decision whether to prosecute rests with enforcing authorities that must use discretion taking account of evidential test and relevant public interest taking into account the factors set down by the DPP in the Code for Crown Prosecutors. Prosecutors must ensure there is sufficient evidence to provide a realistic prospect of conviction and that prosecution would be in the public interest.

The primary purpose of the enforcing authorities is to ensure that duty holders manage and control risks effectively thus preventing harm but prosecution is an essential part of enforcement. Subject to the above, HSC expects that in the public interest enforcing authorities should normally prosecute where death was a result of a breach.

According to their Annual Report HSE (2000) during the year 1999-2000 185,496 regulatory contacts were made and officers of the HSE dealt with 35,000 incidents and complaints about unsafe working conditions. To ensure compliance with the law, 11,304 improvement and prohibition notices were issued and 223 informations laid prior to prosecution. During the year 218 fatal injuries to workers were recorded. In addition, a review of the gas safety regulations was being carried out and asbestos and welfare facilities were also receiving attention. Informations relate to each offence that a defendant may be charged with and so the number of cases would be lower than this. Taking into account the number of businesses that are subject to HSWA requirements, these surveillance figures may appear modest.

The general principles and approach the Health and Safety Commission (HSC) expects health and safety enforcing authorities, mainly HSE and local authorities, to follow are laid down. Those who take enforcement decisions are required to follow HSC's enforcement policy. In particular the main purpose of enforcement is as stated in Table 6 below

Purpose of Enforcement
Ensure duty holders take action to deal immediately with serious risks;
Promote and achieve sustained compliance with the law;
Ensure duty holders who breach health and safety requirements, may be held to account including bringing alleged offenders before the courts.

Table 6: Purpose of Enforcement
Source: Annual Report, HSE (2000)

The report states that enforcement is not undertaken to assist civil claims for compensation. To ensure a proportionate response to offences, inspectors may offer information and advice that may include warning employers they are failing to comply. Where appropriate, inspectors may serve improvement and prohibition notices.

It is recognised that formal cautions and prosecutions are important ways to bring duty holders to account for alleged breaches of the law. However, enforcing authorities are told they must strike a balance between investigations and mainly preventive activity.

Much of modern health and safety law is goal setting - specifying what must be achieved but not how it must be done. Approved Codes of Practice (ACOPs) give practical advice on compliance and have a special legal status. Compliance by another route would place employers under an obligation to show that their methods achieve the same objective.

HSC expects enforcing authorities to use discretion in deciding when to investigate or what action is appropriate and the Enforcement Concordat is cited. They state they "*believe in firm but fair enforcement informed by principles of proportionality, consistency of approach, targeting of enforcement action, transparency about how the regulator operates and accountability for the regulator's actions*".

Explaining these terms, proportionality means relating enforcement action to the risks, broadly including a source of possible harm, the likelihood of that harm occurring and the severity of any harm. Action should be proportionate to any risks to health and safety or to the seriousness of any breach including any actual or potential harm arising from the breach.

What is reasonably practicable to control risks involves judgement, taking account of the degree of risk and the sacrifice, money, time or trouble, involved to avert the risk. Unless the risk is insignificant in relation to the cost, measures must be taken and costs incurred.

Targeting ensures those whose activities cause most serious risks have attention paid to them. The nature and extent of the risks posed by operators should be prioritised with particular attention paid to management competence.

Consistency means taking a similar approach in similar circumstances to achieve similar ends but not uniformity. This may include liaison with other authorities.

Transparency helps duty holder to understand what is expected and what they have to do and not do, both mandatory and advisory. Keeping them informed with a copy of the HSC leaflet what to expect when a health and safety inspector calls.

Accountability means authorities must have policies and standards by which they can be judged and a mechanism to deal with comments and handling complaints.

HSC also say that it is not possible or necessary to investigate all issues of non-compliance uncovered in the course of preventive inspection or when investigating reported events, only the more serious circumstances and site investigation should be carried out of reportable work related deaths.

Selection criteria
Severity and scale of potential or actual harm
Seriousness of potential breach
Knowledge of duty holder's past performance
Enforcement priorities
Practicality of achieving results
The wider relevance of the event, including serious public concern.

Table 7: Selection Criteria
Source: Annual Report, HSE (2000)

3.4.4 Health and Safety Enforcement

Hibbert (1999) reported that there were numerous cases of manufacturers of machinery failing to comply with the Machinery Directive (98/37/EEC) and the associated standards. Sixty-nine European manufacturers were examined and many were found not to have issued a Declaration of Conformity for their products and of those that did, three were not translated into the language of the receiving country and nearly

a third were not in the specified format. Only two companies correctly referenced all the relevant Directives. It was acknowledged that there was a significant amount of non-complying CE marked machinery being supplied throughout the EU and that it was unlikely these matters would be identified and dealt unless there was an incident.

The HSE operations unit carried out a review of fatal accidents involving machinery over a six-year period. The results reported by Eaton (1999) showed that faulty design was a contributory factor in nearly a third of the 106 fatal accidents studied.

3.5 The Single Market

The primary reason for setting up the European Union was to enable the trade in products to proceed with fewer barriers, such as differences in laws and technical specifications that applied in Member States across the EU. The European Economic Area (EEA) is a further development in this concept consisting of the European Union (EU, formerly the EEC then the European Community, EC) and the European Free Trade Area (EFTA).

The countries of the EU are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and the United Kingdom. The members of EFTA are Iceland, Liechtenstein, Norway and, for standards drafting purposes only, Switzerland.

The European Single Market was created in 1992. The objective was primarily to remove barriers to trade throughout the EEA allowing companies free access to markets in all member countries without having to meet particular local requirements such as safety testing regulations, customs tariffs or contract conditions. This presented manufacturers with access to a market with a spending power even greater than North America.

New Approach Technical Directives provide for the CE marking of products and the CE Marking Directive 93/465/EEC lays down the requirements for

using the CE mark. The use of the CE mark implies that the manufacturer has complied with all Directives relating to his product. The New Approach Technical Directives in force through national legislation require specified products to be CE marked before they are placed on the market.

3.5.1 European Directives

In the period up to 1992, and subsequently, the European Parliament has enacted a series of measures intended to put the Single Market into practice. Some of these Directives have been aimed at removing barriers of a purely customs and excise nature, others have concentrated on transport arrangements to ensure the free movement of goods, while a series of Directives, produced under the heading "*New Approach Directives*", are intended to provide controls on products, with the principal objective being setting a 'level playing field' for product safety requirements across the European Community.

The Directives cover a wide range of product areas. One of the first to be implemented concerned the safety of children's toys. Subsequent Directives have included provisions for machinery, electromagnetic compatibility (EMC), personal protective equipment, medical devices, gas appliances and commercial explosives, among others. Also relevant is the "*Low Voltage Directive*" (LVD). Strictly speaking the LVD, which was first enacted in 1973, pre-dates the New Approach Directives, but subsequent amendments have given it a very similar function and legal structure, and the amendment which introduced the requirement to CE mark products recognised that the LVD should broadly be treated as if it were a New Approach Directive.

EU legislation in the form of Directives begins with the EU Council agreeing to proposals made by the European Commission. The EU Council comprises government ministers and officials of each Member State. The Directives set out certain provisions and Member States are obliged to incorporate them into national legislation by a given date usually no longer than two years after the Directive has been adopted. In order to

apply the CE mark to a piece of equipment it must comply fully with all the Directives relating to it.

3.5.2 CE Marking

The CE-mark on a product acts as a passport indicating to enforcement officers throughout the EU that the manufacturer is claiming compliance with the appropriate European Directives for his products.

An unintended side effect of the CE-mark according to Geisendorf (1995) has been that consumers perceive it to be an indication that the product presents no particular danger to them. It has been wrongly taken for a mark of safety or as having satisfied an independent quality assurance assessment similar to the BSI Kitemark or British Electrotechnical Approvals Board (BEAB) labelling schemes.

CE marking has developed directly from membership of the European Community and the need to ensure the free movement of goods across the borders of member states without hindrance caused by differences in technical standards or legislation that applied in many Member States.

From January 1995 all machinery had to be marked with the CE mark which was a declaration by the manufacturer that his product satisfied the health and safety requirements of the EC Machinery Directive 89/392/EEC

The "*new approach*" to harmonizing product safety law was introduced by the European Council in 1985 by the Council of Ministers Resolution dated 7 May 1985 (Official Journal 1985 C 136 4/6/85) to speed up the process of eliminating barriers to trade that had been hampered by Member States' diffidence in introducing the European-wide Directives.

This new approach departs from the conventional more prescriptive method based on detailed regulation of products in several ways. This approach to harmonizing product safety legislation throughout the European Community is summarised in Table 8: below

New approach to harmonizing product safety law
Broad safety requirements are laid down for particular groups of products;
All such products marketed in EU member states have to meet these requirements;
Technical interpretation of the law is detailed in voluntary harmonized standards;
The CE-mark i.e. the manufacturer's declaration must appear on each product;
The mark provides a presumption of conformity with the appropriate Directives.

Table 8: Harmonising Product Safety Law
Source: Official Journal 7 May 1985

The European Community changed the approach to certification and compliance with standards in 1985 by introducing the concept of "*New Approach Directives*". These Directives specify essential safety requirements for specific products or product types, a similar approach to the essential health and safety requirements under HSWA, and specify methods or procedures for assessing the conformity of products with the relevant requirements. The methods and procedures are presented in the form of "*Modules*".

Modules provide different routes by which conformity may be assessed. Such routes could involve assessment to ISO 9001, Quality Management Systems Requirements, or ISO 9002, Quality Systems Model for Quality Assurance in Production Installation and Servicing, and include the examination of documentation called Technical Files and the evaluation or testing of the product.

National governments were allowed but not compelled to nominate a body or organisation within the state to be the relevant authority for a specific

New Approach Directive. Such a body was to be known as a "*Notified Body*".

Certain new approach Directives refer to particularly hazardous products such as chain saws and electrical products. In such cases the Directives might require the involvement of a notified body to authorise the use of CE Marking. Other Directives permitted the manufacturer to apply CE Marking on his own initiative. In other cases a third party verification by, or under the auspices of, the Notified Body that did not amount to full independent testing or verification was permitted. Each New Approach Directive was intended to specify its own route to certification, including the available options.

In addition to the New Approach Directives, a Directive on CE Rules for the Affixing and Use of the CE Conformity Marking (93/68/EEC) known as the Amending Directive updated existing Directives, including the Low Voltage Directive, to bring them within the scope of the overall CE New Approach system. These changes came into effect on 1st January 1995 with a two-year period of grace.

European Directives have to be introduced into member states' legislation usually within two years of their adoption by the European Parliament. The main purpose is to eliminate technical and legal barriers to trade throughout the European Community.

3.5.3 Modular Method

The modular approach adopted by the Directives is a series of steps by which compliance may be demonstrated. As each Directive is drafted, appropriate modules are incorporated and as a result, routes to demonstrating compliance will vary, the most onerous requirements being reserved for products presenting the most serious consequences.

The modules to be included in a Directive are contained in Council Decision 93/465/EEC dated 22nd July 1993, "*Modules for various phases of the*

conformity assessment procedures." These modules are summarised in Table 9 below.

Modules
Internal Production control
EC Type-examination
Conformity to type
Production Quality Assurance
Product Quality Assurance
Product Verification
Unit Verification
Full Quality Assurance

Table 9: Modules for Directives
Source: Council Decision 93/465/EEC

3.5.4 Procedure

The manufacturer's approach to complying with the law must therefore follow the procedures summarised in Table 10 below

Procedures to be followed
Check the list of New Approach Directives to see which covers his product.
Look at the relevant Directive(s) to establish their requirements.
From the Directive find the route or routes available to establish conformity.
Check availability of a Notified Body with responsibility for that Directive.
Apply to Notified Body if Directive so requires.

Table 10: Route to Conformity
Source: Council Decision 93/465/EEC

Affixing and using the CE mark is controlled under the CE Marking Directive (93/68/EEC). The CE mark is a claim of conformity to all the obligations on manufacturers for the product by virtue of the Community Directives. The CE mark affixed to industrial products symbolises the fact that the person having affixed or responsible for affixing it has verified that the product conforms to all the Community provisions that apply to it.

Where the industrial products are subject to other Directives that also provide for the affixing of the CE marking the products are presumed to comply with the provisions of those other Directives. The CE conformity

marking must consist of the initials 'CE' in a prescribed form and must be affixed visibly, legibly and indelibly.

The primary purpose of CE Marking is the elimination of technical barriers to trade within the EEA to provide a level playing field for all suppliers. Extensive guidance has been produced by governments, the Commission, private companies and consultants including "*A practical guide to CE marking*" by Stubbs (2003) of Gravatom Engineering Systems. The CE Mark must be affixed at the end of production control and must be accompanied by the identification number of the notified body where appropriate. The manufacturer must affix the CE Mark or his agent established within the Community but in exceptional cases, the Directive may provide that the person who places the product on the Community market can affix the CE Mark.

3.5.5 Criticisms of CE Marking

The application of CE Marking has been the subject of some criticism, not least of which has been the claim by Geisendorf (1995) that consumers confuse the mark for an indication of safety. The Consumers' Association (1998) tested eighteen consumer products and found a battery charger, rotary fan, two food blenders, curling tongs and portable fan heater failed the minimum safety standards.

Their October 1998 report concluded at page 13 "*CE marking is failing*". "*At the moment, many manufacturers are unsure of what's expected of them under the scheme, importers can be unaware of their role, and many retailers don't know what the CE marking means.*" The Consumers' Association Research and Testing Centre (2001) followed this up with further tests on domestic electrical products early in 2001 and found that six out of the 17 tested had safety faults. This was recorded in their report on "Unsafe products" reference W.17918, in April 2001.

Problems also exist with regard to machinery for use at work where Raafat (1996) has noted that some suppliers do not supply documents to support their CE marking claims.

CE marking and compliance with statutory European requirements was reported by Raafat (1999) to be disappointing. Although the level and quality of risk assessment usage required by law was found to be poor in the established workplace machinery environment according to Raafat (1996) its use to assess the safety of consumer products appears to be even less well developed.

Employers have responsibility to ensure the safety of their employees under the Health & Safety at Work Act with respect to the machinery they provide for use at work but the self-employed product user and home improvement enthusiast for example will have to rely on civil law and the Consumer Protection Act 1987. The current study examines some of the products used by consumers over a twenty year period that have failed to satisfy the statutory safety requirements and compares the different approaches to product safety adopted under occupational and consumer legislation.

3.6 Monitoring the System

Of particular importance to this study is how the product safety system sometimes fails to meet its primary objective of ensuring that only safe products reach the consumer. A system fails if it does not meet some of the objectives set for it by its designers, participants or users or it produces other undesirable outputs. A certain level of failure has to be accepted in that there is a limit to the resources that can be employed to achieve this objective. It is therefore necessary to have a method to set an acceptable level and be able to apply limited resources effectively.

A product that causes unintended injury when used in a reasonable way clearly fails to meet the objectives set by the manufacturer of that product and the system that allows the particular product to reach the consumer

therefore fails. Products are part of a bigger system that can be said to include all consumer products manufactured and distributed in the UK. The product safety system Figure 2 includes all those organisations and procedures involved in the production, distribution and monitoring of products to ensure they are safe as well as those who set policy and promulgate legal controls.

The primary objective of the safety system is to ensure that only "*safe*" products reach the consumer and how best this may be achieved is open to question. As noted in the Consumer Law Bulletin (2001) an officially funded investigation is being carried out into how imported products can best be monitored. This suggests that deficiencies in the product safety system are beginning to be officially recognised.

Although much of the study has shown failures in the system there is a positive side to the application of legal controls on products and this followed the introduction of regulations governing the flammability of upholstered furniture. Applying the regulations has greatly increased the safety of consumers and led to a reduction in domestic fires and their often fatal consequences.

3.6.1 Effectiveness of the Law

The current and future prospective benefits of the 1988 Furniture and Furnishings Fire Regulations was assessed by the University of Surrey and the DTI (2000b) reporting their findings said that furniture fires had reduced considerably in the ten years since the regulations were introduced.

By 1997 they considered, the regulations are likely to have saved at least 710 lives, and this was a conservative estimate. The cost of the regulations to industry and those who buy furniture is put at between £15 and £20 totalling £22m to £30m per annum. The benefits are estimated at around £1.1bn or forty times the cost. Value of a life saved was based on an independent study.

A study by Ball & Soby (1995) looking at monetary value techniques concluded that there were many difficulties involved in this exercise leading to considerable uncertainty particularly with serious and fatal injuries. The effectiveness of other safety regulations has not been as thoroughly researched, however it is possible that similar safety benefits may have been gained by society.

3.6.2 Unsafe Products

Unsafe products can be grouped into various types, failures due to design, production, operation or maintenance. It is pertinent to note how each type of failure involves some form of human activity and therefore how important it is to address the product/user interface properly.

Another classification could include the speed with which the failure occurs from the instantaneous car crash to the more slowly acting but still potentially lethal environmental poisoning caused by faulty chemical plant.

User expectation of the safe performance of a product is also a relevant consideration. A light bulb which has been made to operate for 400 hours is a success as far as the manufacturer is concerned but a failure from the consumer's point of view when it no longer functions. Although this hasn't an obvious direct effect on safety, when bulbs have to be replaced the consumer often has to climb on steps or unsuitable furniture to perform this function with the risk of falling.

The expectation of consumers is a significant element when determining whether a product is legally safe. According to Section 3 of the CPA there is a defect in a product if the safety of the product is not such as persons generally are entitled to expect having regard to all the circumstances. If a defect results in injury to a person he may sue the producer of that product for damages without having to establish negligence on the part of the producer. These cost, convenience, expectation and safety issues

have therefore to be balanced and the law may have to be invoked to establish what is safe on the basis of what is reasonable.

3.6.3 Product Migration

The Consumer Protection Act 1987 as its title indicates, deals primarily with consumer products but there are problems in identifying what a consumer product is, particularly where a manufacturer intended his products to be used by experienced and trained persons. The development of consumer interest encouraged by TV makeover programmes in taking on more demanding DIY jobs in their own homes and hiring what would have been considered specialist tools and equipment has resulted in a blurring of the traditional work/home machinery divide. A study entitled "*Migration of professional products on the consumer market*", DTI, reference 727, 1999, funded by the DTI (1999a) looked into this phenomenon and reached some important conclusions particularly regarding the limitations in skill and training of consumers who were tempted to use more sophisticated equipment than they were capable of operating safely.

Other product areas in which hazards have been recognized in the workplace but not in the domestic environment include toys, video games and home/office equipment. Repeated use of computer screens for video games and home working raises similar concerns regarding repetitive strain injuries and visual impairment. The noise hazard has only recently been addressed in the EN 71 toy standard and it is suggested that manufacturers may need to look at their products more closely with these wider implications in mind.

According to Section 10(7) of the CPA a consumer product is considered to be one that has been purchased "*for private use or consumption*" but this definition applies only to the now largely superseded General Safety Requirement under Section 10 of the CPA. Reference has to be made to the specific safety regulations that deal with a particular range of products and to the General Product Safety Regulations 1994.

When the General Product Safety Directive is reviewed it is likely that products that may not have been intended by the manufacturer for consumer use but which find their way into the domestic setting and those products provided by retailers and suppliers of services such as exercise bikes in a gymnasium and supermarket trolleys will be covered.

3.6.4 Home and Work Safety Law Compared

Comparing the enforcement activities of the 205 independently run local authority trading standards services with that of the single national HSE poses difficulties although some general points can be made. Local authorities rely on inspectors, mainly TSOs, making test purchases and dealing with consumer complaints to meet their authorities' duties under the CPA to enforce the product safety legislation. HSE through the HSWA achieve compliance indirectly by relying on employers to comply with their duties under the law and taking action when offences are discovered. Both agencies appear to be more reactive than pro-active as far as enforcing the product safety legislation is concerned.

The approaches to achieving essential health and safety requirements under HSWA and essential safety requirements under CPA are similar by identifying the hazards presented by a particular activity or by a product and those who are identified as being responsible, employers in the case of workplace safety and suppliers in the case of consumer products, are required to reduce the risks to an acceptable level. This level is "*as low as reasonably practicable*" (ALARP) under the HSWA and to one that is reduced to the minimum risks compatible with the product's use, considered as acceptable and consistent with a high level of protection for the safety and health of persons under the CPA.

The agencies differ markedly in the way they apply the law including the penalties imposed for non-compliance. Two particular points of interest are noted with regard to the different approaches taken by the law between articles for use at work and consumer products: manufacturers

of work articles are required to carry out research into the safety of their products on a continuous basis which would entail a constant surveillance and attention to complaints and returns for example. They must also keep information relating to the safety of their products up to date and convey that to the user to ensure safety.

Research into the safety of consumer products is funded almost entirely by government rather than by industry and to date 144 reports have been published some of which have been referred to in this study and are listed in Appendix 1. There is no requirement either for manufacturers and suppliers to make consumers aware of safety problems with their products or to monitor the market. Changes to the current General Product Safety Directive in the form of a new Directive on general product safety were proposed as recorded in the Official Journal (2000) C 337/E, 28.11.2000. More information may be required to be provided to consumers in future so that they may be able to assess the risks presented by products.

The DTI (1999d) has proposed giving trading standards authorities new powers in relation to their enforcement work in particular to deal more effectively with rogue traders. The consumer affairs White Paper also referred to consumers being protected against unacceptable risks to their health and well-being and that risk assessment had to be the starting point for this.

The Local Government Act 1999 requires local authorities to carry out best value reviews of their functions and gives the Audit Commission (1999) powers to inspect compliance with this requirement. The OFT (1999) reports that consumer complaints that relate to health and safety are 4% of the total but nearly half of all the 900,000 complaints dealt with each year relate to defective or substandard goods and services.

3.6.5 Law Enforcement Study

A study was carried out into seven urban local authorities with regard to their product safety duties in connection with the requirement under the Local Government Act 1999 to review local authority services. I was invited to participate in Birmingham City Council's review of its Trading Standards Service. The data were examined for information that could help in the current research and set it into context within the overall scope of the department's functions. A list was compiled of the legislation enforced by the service and this is produced in Appendix 6.

The trading standards service has, in addition to its statutory enforcement duties, direct influence on both public and business interests. When major changes are made to national trading methods it is TSOs who the government calls upon to ensure that any transition runs fairly. The gradual introduction from 1965 of metrication into the weights and measures system used in trade, decimalisation in 1971 and even the transfer from purchase tax to VAT in 1972 were all supervised 'in the field' by the local authority TSOs. Conversion to the Euro when it comes will doubtless also be monitored by TSOs to ensure public confidence.

3.6.5.1 Core Cities

A Core Cities Benchmarking Group was set up by seven major city trading standards departments led by Birmingham City Council (2000) to compare their respective performance records. The cities involved were Birmingham, Bristol, Leeds, Liverpool, Manchester, Newcastle and Sheffield. The populations of these seven major conurbations totalled just under 4 million and their net expenditure on core trading standards functions came to around £7m. Expenditure on the service ranged from under £1 per head of population in Leeds (population 530,000) to just over £2.50 in Birmingham (population 1.014m). The total number of staff employed in Birmingham was 63 whilst 18 were employed on similar trading standards work in Sheffield.

3.6.5.2 Birmingham

Birmingham has an analytical and consultancy budget of almost £90,000 for non-food testing which would include the testing of consumer products for safety. The other six authorities averaged £20,000 for similar work.

Some 28,500 premises were liable to inspection in Birmingham and 11,500 in Sheffield in 1999 but the departments' officers visited only approximately 5,000 and 4,000 of these premises respectively.

3.6.5.3 Prosecutions

The number of prosecutions brought under all the legislation enforced by the trading standards services in the seven cities including trade descriptions and weights and measures provides a useful performance indicator for the trading standards service. Formal cautions provide another indicator. These are issued where it is likely that a case would succeed but the interests of the public are considered to be best served by ensuring the company or individual concerned will take appropriate action to remove or adequately reduce the risk to the public and not repeat the alleged offence.

Local Authority	Safety cases	All TS cases	Cautions
Birmingham	46	83	99
Bristol	0	9	7
Liverpool	5	264	26
Leeds	14	81	6
Manchester	8	107	32
Newcastle	6	22	4
Sheffield	0	3	1
Total	79	569	175

Table 11: Core Cities' Prosecutions 1999
Source: Birmingham City Council (2000)

Table 11 above, based on the Core Cities Special Project Group report, shows that Birmingham brought 83 prosecutions and issued 99 formal cautions in 1999 compared with 3 prosecutions and 1 caution in Sheffield,

an authority with just over half its population. During the same period Liverpool, Leeds and Manchester brought 264, 81 and 107 prosecutions respectively. Prosecutions under the safety legislation were 46, 0, 5, 14, 8, 6, and 0 respectively for the seven authorities, cases brought under the Trade Marks Act and Road Traffic Act being significantly more numerous.

The number of officers employed in the trading standards service in the seven core authorities during 1999 including managers was 203 of which 147 were law enforcement staff. The average number of cases brought under safety legislation per enforcement officer, excluding managerial staff and those without warrants, was 0.54 p.a. There were 569 prosecutions throughout the seven authorities making an average number of cases for all core functions, including product safety prosecutions, of 3.87 per enforcement officer in 1999 or 2.8 cases including managerial staff.

Formal cautions for alleged offences against all the legislation enforced by the service were issued on 175 occasions in the seven authorities, an average of 1.2 per enforcement officer. These results differ markedly from the Walsall Council officer's portfolio of cases quoted in Appendix 7 that shows he investigated and brought before the courts on average 6.4 cases each year during a ten year period and all the cases related to unsafe consumer products. The officer is known to me to have a special interest and detailed knowledge of product safety legislation and may be encouraged to pursue these investigations by his superiors. This might suggest that if other officers were similarly motivated and trained, they too could find similar quantities of unsafe products being sold that justified investigation. Such a disparity cannot be accounted for in terms of unsafe products being more widely available in one authority's area rather than another and demonstrates again the widespread differences around the country referred to by the Audit Commission (1999).

For comparison purposes, there are approximately 1,500 TSOs and 1,500 other enforcement staff working in the 205 local authorities in Great

Britain. Taking the ten-year period to 31.03.98 for which national prosecution figures are available, a total of 4,793 cases, the rate per 100 officers for safety prosecutions is just 16 p.a. It cannot be said therefore that product safety enforcement enjoys the high priority claimed for it.

3.6.5.4 Audit Commission

The Audit Commission (1994) study provides the national picture presented by the service. Once again product safety was identified by over 50% of trading standards services (TSS) as their top priority. This was followed by fair trading, food safety and consumer advice. The TSS estimated that the average amount of staff time spent working on product safety was just over 15%.

3.6.6 Prosecution Policy

An Enforcement Concordat has been promoted by the Cabinet Office that encourages prevention before prosecution and working with businesses to help them comply with the law. The Audit Commission (1994) found very different approaches to enforcement and there was no agreed view on which approach works best. As demonstrated in the prosecution data in Table 11 it appears that fewer prosecution cases are being taken to court. There is no reason to suppose however that there are fewer unsafe products on the market, quite the opposite appears to be true as the number of complaints and recalls and spot checks on imported products at the main ports referred to in this study have shown. Other demands made on the trading standards service may have reduced resources available to deal with unsafe consumer products and the trend for codes of practice for business rather than legislation that can be enforced through the courts further supports the move away from formal action.

The Core Cities study revealed reluctance on the part of many enforcement officers to accept compromise agreements based on arbitration instead of pursuing formal investigations leading to prosecution in the courts. The confrontational approach inherent in the British legal system in which each side mounts its case, calling on its own specialist

advisers where necessary, is long established and has much in its favour. It is entirely up to the court to decide on the merits of the case and the defendant has every opportunity to justify his actions. Reference to the inherent fairness of this system with regard to enforcement practice has been made previously by Jenkins (1995b). The procedures that officers have to follow in order to bring a successful prosecution are extremely demanding but many still pursue the formal enforcement procedures rather than settle for what they may see as a less effective remedy such as accepting assurances from prospective defendants that they will rectify any errors made and comply with the law in future.

Governmental trends over many years has been to deregulate and thereby relax trade controls on businesses. The DTI (1993b) published a code for enforcement agencies in line with its deregulation initiative. Such action may have contributed to the number of unsafe products on the market resulting in a significant proportion of the 2.8 million injuries sustained in domestic accidents as reported in the HASS (2000) data.

Whether a trading standards investigation proceeds appears not to be determined to any extent on the degree of risk presented to the public but rather on ad hoc reasons primarily dependent on resources. Alternative ways to deal with such complaints may be followed. Where there is little or no enforcement action, including proactive inspections and test purchasing of products, and where no supervising body determines what official action is appropriate in particular circumstances, there is no incentive for the TSOs to conduct time consuming, complex and expensive investigations but rather deal with the issues as expeditiously as possible. This may not result in the best course of action in the public interest and the safety issues raised are unlikely to be identified as having been brought to official notice with subsequent failures resulting in serious consequences that should have been dealt with earlier.

3.6.7 Feedback

There is no automatic feedback to product safety enforcement authorities, for example from those who investigate house fires as to the cause of a fire such as a faulty electrical appliance. There are a number of washing machine, dishwasher and television fires each year according to Home Office (2000) figures but no direct connection with the faulty product can be established, often because the appliance is beyond detailed examination after being badly damaged in the fire. It is possible that such products will exhibit common-mode failures that will result in several incidents over a period of time. Identification of such faults at an earlier stage and appropriate action, such as a public warning or product recall, could well have reduced the number of such accidents.

According to the Home Office (2000) Statistical Bulletin there were 58,284 accidental dwelling fires in 1999 in which 466 people died and around 14,600 were injured. The main cause of the dwelling fires is stated to be the misuse of equipment and appliances which increased by 15% over the previous year to 20,000 fires. Where there is a need for a Coroner's inquest into a fatality the investigation of the circumstances has to be thorough and under the supervision of the Coroner's officer, usually a policeman experienced in this area of work.

There is a limit however to the degree of forensic examination that will be considered necessary unless there are grounds for suspecting an offence has been committed, such as murder or arson. It is likely that where the circumstances indicate that a tragic accident has occurred such as leaving a chip pan on the hob that has ignited, a common cause of house fires, it may be thought that a more detailed examination may not be considered justified, partly because of the cost involved.

Almost 2,000 fires were identified as having started in electrical wiring and a similar number in washing machines in a year. Electrical wiring must be protected against overheating by an appropriate fuse. Overheating of the wiring occurs when there is a faulty fuse or where the fuse is too high a

rating to protect the conductor from the current being drawn through it. The insulation may also be substandard leading to the transmission of heat to adjacent flammable materials resulting in a fire.

Many examples of substandard plugs, cables and fuses have been identified in the past and prosecution action taken. However, it is reasonable to speculate that inferior products known to be available on the market may be involved in many of the dwelling fires reported by the Home Office (2000), the cause of which is unlikely to be revealed.

Product	Total fires	Fatalities	Non-fatal
Smokers' materials	6,083	132	2,119
Cooking appliances	34,263	68	6,945
Space heating appliances	2,442	40	611
Central heating	932	2	88
Electrical distribution	2,577	15	308
Other electrical appliances	6,168	23	1,064
Candle and naked flame	2,269	26	893
Unspecified	730	94	201
Total	58,284	408	12,555

Table 12: Sources of Ignition in Accidental Dwelling Fires 1999
Source: Home Office (2000)

3.6.8 Training

Another area that may need to examined further regarding product safety issues is the training of investigating officers. Officers have to pass either the Diploma in Trading Standards which route usually involves a suitable degree as a prerequisite. At a lower professional level, Assistant TSOs or Enforcement Officers are expected to possess the Diploma in Consumer Affairs which is a qualification in two parts, a general Part 1 and selected papers in various subjects including Consumer Safety in Part 2.

Considerable changes have been made in recent years to the training programme but as far as product safety is concerned there has been no requirement for officers to have any specific training in this area. Multi-

choice questions in the Diploma in Trading Standards allow a student to avoid having to study product safety and even the DCA qualification which has a specific paper on the subject in Part 2 does not have to be attempted by candidates. For a subject that is so highly rated in the priorities of the service, it would seem reasonable that product safety should figure in all such training courses.

The training of officers regarding product safety appears to have shortcomings therefore, resulting in less skill and confidence on qualification than is expected and presented in other areas of enforcement work such as fair trading and weights and measures. The need for continuing professional development of skills and knowledge with regard to product safety may also need to be addressed.

3.6.9 Prosecutions

There has been a considerable decline in the number of prosecutions brought by the TSSs as indicated above and witnessed by my personal involvement in their cases. An indication of the reducing trend in product safety activity, in particular the enforcement of the CPA, is in the number of statements requested from me as an expert over the past ten years.

The following Figure 3 shows the number of statements I provided for trading standards prosecution cases involving unsafe consumer products.

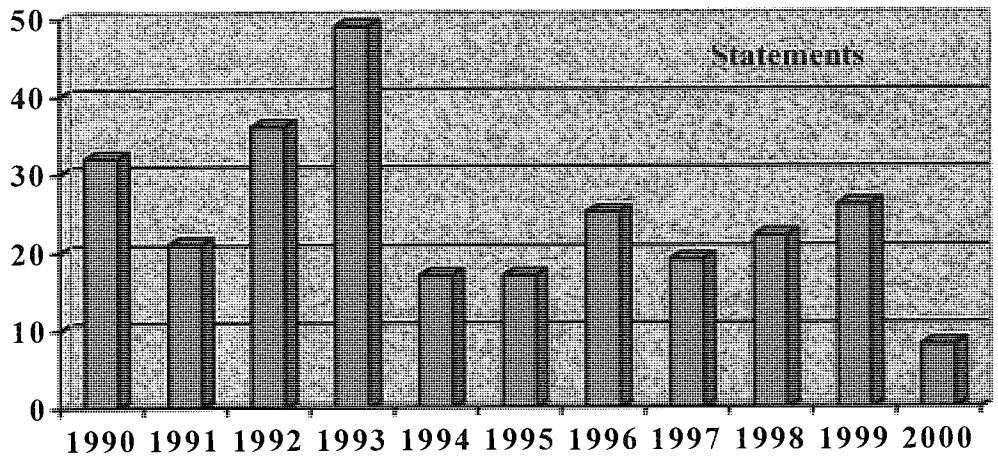

Figure 3: Statements of Expert Witness
Source: Jenkins Personal Files

Figure 4 below lists the authorities that asked for such support in connection with their enforcement work. The number of instances TSOs have asked me for statements has fallen from an average of 25 a year to only 8 in 2000. This suggests that either products are becoming safer or other action, such as issuing cautions, is being taken. My contention is that less formal action including issuing cautions and taking prosecutions is being carried out and this is to some extent supported above in the Core Cities study (see 3.6.5.1).

Although my statements represent only a small proportion of prosecution cases taken throughout the country, they probably indicate a reduction in the time officers are able to give to product safety matters generally.

The following provides an indication of the number of authorities that sought help from me during the period of my research and whose officers provided information to assist me in this study. Five of the seven local authorities in the West Midlands figure prominently in the list.

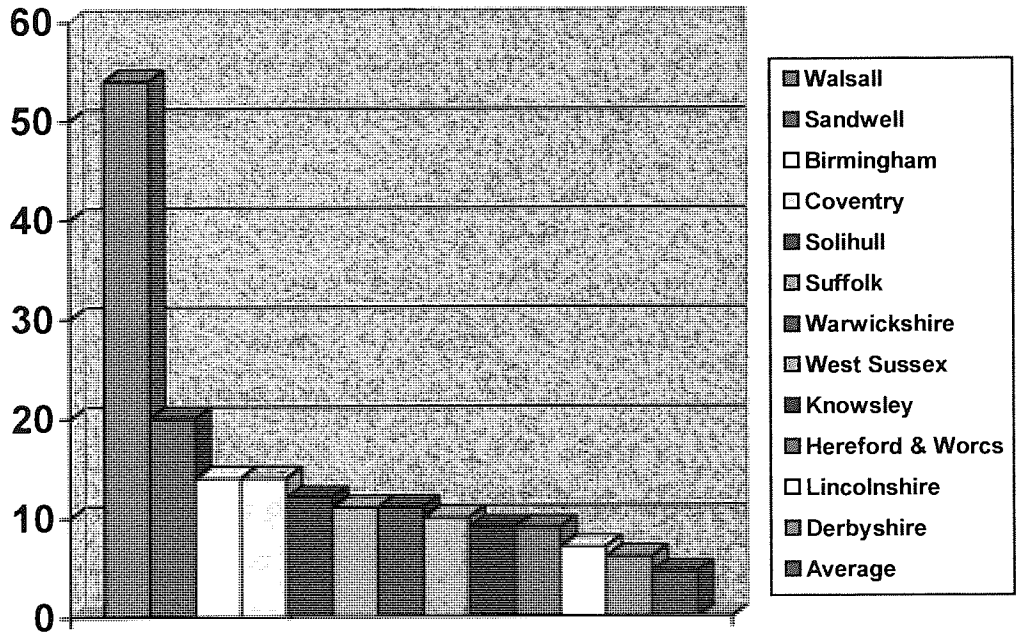

Figure 4: Instructing Authorities
Source: Jenkins Personal Files

The types of products that were the subject of prosecution action were also categorised to illustrate where some of the problem areas lay.

A leading testing and product assessment body, the Institute for Consumer Ergonomics, Loughborough withdrew its services from TSDs apparently for commercial reasons, which again suggests that resources available for safety work may have been reduced. Many local authority product safety budgets appear to be very low according to CIPFA (2000) the Chartered Institute of Public Finance and Accountancy report. There is no evidence that the number of unsafe products on the market is declining and the data produced in this study indicate that trading standards are unable to give as much attention to product safety as they did prior to 1994.

Prosecutions are very costly for local authorities to pursue and the HSE and deciding to pursue cases through the courts is not taken lightly or without the most careful consideration. Both trading standards and HSE have their own policies on bringing prosecutions and every effort has to be put into ensuring all relevant evidence is available in support of a charge if proceedings are taken. A prosecution does not determine whether a product is safe or not but rather who supplied that unsafe product or placed it on the market thus committing the offence. There are better ways of determining the safety of a product and taking appropriate action to reduce the risk to the public than prosecuting, but the law requires that offenders who have put the public at risk are charged and if found guilty, punished. The penalty and adverse publicity may also have a deterrent effect.

A situation in which a prosecution can fail in court, but not because the product was unsafe, is where a test by the authority bringing the case has not been carried out as specified in the standard. Evidence given in court and comments made to me by TSOs during discussions with them indicate that laboratories have been known to modify standard test procedures where they feel the results would not be affected. Such action would help

speed the process up and reduce costs. However, this is a dangerous practice as the court may well discover the departure from the agreed method when witnesses are cross examined and they will be reluctant to place confidence in evidence based on such tests.

Such a situation arose in Middlesbrough Cleveland where the person carrying out tests on safety film applied to glazing to improve its performance, admitted in cross examination in court to having adjusted the test procedures to accommodate the pieces of film which could not be applied to the size of glass panels specified in the standard. Although understandable in the circumstances, such a departure rendered the results unacceptable to the court and the case was dismissed. Evidence had already been provided to the court that such film would not have raised the performance of the glass panel to which it was attached to the level claimed for it, namely Class C of BS 6206 "Impact performance requirements for flat safety glass and safety plastics for use in buildings". Glass panels that had been treated with this film could not therefore resist the impact required by the standard which itself was based on the foreseeable situation of a child running into a glass panel, simulating conditions that could be experienced in the home or other locations where children are present. This performance recommendation appears in the Department of Health (1991) guidance notes to the Children's Act 1989 for glazed areas in nurseries, playgroups and similar locations where children are likely to be playing.

3.6.10 Defence

A person charged with an offence under the Consumer Protection Act for supplying goods that do not satisfy the safety provisions has a statutory defence if he can show that he had taken all reasonable steps to avoid committing the offence and had exercised all due diligence. This has been interpreted as having a system in place to check that products meet the statutory requirements and to ensure that these procedures continue to work satisfactorily.

Unfortunately this has no bearing on the degree of risk presented by the product in question and when a case is decided on the basis of such a defence having been established, it can convey the wrong impression that the product itself was in fact safe. Section 39 of the Act lays down the requirements that have to be met to achieve such a defence but needs to be established only "on the balance of probabilities".

There is much case law in this area but the overarching principle is that the person charged must show that he has done everything that is reasonable to ensure that the products he is responsible for, meet the statutory safety requirements. He can do this by obtaining assurances from his suppliers but this alone is not usually sufficient as was shown in 1983 Hicks v. Sullam appeal case reported by ITSA (1983). He may be expected to seek independent professional advice and have his products properly tested. Each situation may be different and larger organisations such as one with many high street outlets would be expected to do more than say a corner shop or one-man business. A reasonable number of products would need to be tested from a batch to ensure confidence in the results. BS 6001 Sampling procedures and tables for inspection by attributes, provides guidance on the requisite number of samples that need to be taken from a consignment for testing purposes.

Sampling

Monitoring products on the market is essential to ensure safety levels are achieved and fair-trading is maintained. Jenkins (1982) has long advocated, that statistically based sampling methods should be used more widely to ensure the safety of products imported into the UK and the European Economic Area (EEA) and to monitor those that are available on the domestic market of each member state. Official and some unofficial surveillance, by trade associations, researchers and consumer groups, is already carried out but there does not appear to be any formal statistically based sampling method employed for this purpose.

There are three basic approaches that can be employed when sampling, as shown in Table 13 below.

Sampling Method
100% inspection - often expensive, may not produce desired results
Ad hoc sampling such as spot checks or checks based on a percentage
Sampling methods based on the mathematical theory of probability

Table 13: Sampling

A 100% inspection rate is rare because testing often means damaging if not destroying the sample, but it does occur in the checking of moulded-on plugs for example where six parameters including electrical continuity and insulation are automatically tested for safety. Those plugs that fail any of the safety checks are isolated and automatically destroyed in the process. Random checks cannot be relied upon to give reliable results and may not provide the necessary information about the products but this is how many TSOs have to check products on a routine basis.

Some products cannot be checked reliably 'in the field' because the standard prescribes a sampling method to assess the performance of the production methods. This was the case with matches the standard for which was drawn up to assist manufacturers, providing continuous control testing during large-scale match production. It was virtually unusable by a third party because a large number of samples were required usually unavailable when checking small quantities in a retail outlet following a consumer complaint. A revision of the standard was introduced in 1990 BS 3795:1990 British Standard Specification for Matches following representations and the 1964 standard was withdrawn.

However, the match standard provides a useful basic guide on how surveillance checks could be carried out more effectively by the enforcement authorities. Although the sampling method based on probability, unlike 100% inspection, will not identify every faulty product the risks involved can be calculated and levels of confidence applied to the

batches being tested, the acceptable quality level (AQL). Electrical safety tests such as continuity and strength of insulation for example would require a high AQL because of the electrocution hazard with the likelihood of fatal consequences. Hazards that result in a low risk such as minor injuries would justify a lower AQL and therefore a speedier inspection process. Risk assessment would need to be applied in order to use the sampling frequency correctly.

Sampling has been used as part of the due diligence defence provided by Section 39 of the CPA by importers. P&M Supplies (Essex) Ltd. in their appeal against a prosecution brought by Devon County Council in 1991 and reported in the Criminal Law Review at 832 claimed to have checked 0.49% of their consignment of toys and that 18 out of the batch of 76,960 had been sent to external analysts for checking. None of the toys so tested had failed the appropriate tests. On appeal the court found against the defendants but the question of the adequacy of the sampling was not decided upon, as there was no evidence presented on the matter. The onus of establishing this was on the trader the court said. The sampling of one packet of crayons from a batch of 10,000 dozen was also considered insufficient in another case brought by Rotherham Metropolitan Borough Council v. Raysun (UK) Ltd (1988) 153 JP 37.

Sampling methods based on the theory of probabilities must be sufficiently robust to satisfy a court and previous experience in the Devon and Rotherham appeals indicates that judges and magistrates may not agree with statistics experts. It is clearly advisable therefore to follow the standard developed for statistical sampling purposes, BS 6001 wherever possible.

The acceptable quality level (AQL) approach can be used to calculate the risks involved and levels of confidence can be applied to batches of products being tested. Electrical safety testing for example such as confirming the continuity of electric current flow and the strength of the protective insulation provided would require a high AQL because of the

potentially fatal electrocution hazard. The number of items failing in a batch would therefore be extremely low for that consignment to be accepted. Hazards that resulted in a low risk on the other hand would only require a low AQL i.e. more samples being checked would be allowed to fail before the whole consignment was rejected.

Acceptable Quality Level

Manufacturers have to ensure that their products consistently meet the specifications they have set and quality control methods have to be used to this end based on ISO 9001 the international standard for quality assurance. The following illustrates how products and the potential harm they may cause can be shown to require greater attention because of the higher levels of risk presented.

Samples should be selected for testing in accordance with the requirements of BS 6001 at the appropriate inspection level. Performance requirements relate to the severity levels identified using a formal risk assessment. Thus the more serious the consequences of the failure the more demanding will be the acceptance levels that must be achieved by the samples being checked. The relationship between severity, the category of risk and AQL may be represented as shown in Table 14 below.

Severity	Category	AQL
1	Critical	0.0001
2	Serious	0.001
3	Major	0.01

Table 14: Severity Levels and AQL
Source: BS 6001 (1996)

The severity categories relate to the levels of safety previously considered with regard to risk. The AQL (only just acceptable quality) figures are for illustrative purposes only. For safety critical features the acceptance level would be no more than one defective product in a million. For major features no more than one failure in 10,000 would be acceptable.

Performance and appearance features that do not affect the safety of the product would permit a greater number of failures.

There is no suggestion that the manufacturer or supplier is allowed to supply any product that fails to meet the acceptance level. It is suggested that this level be set at the minimum required by the law with regard to safety and that level be classed as critical. Provided the system is set up to perform efficiently and the levels set are acceptable, any failures may be allowed under the due diligence defence i.e. the criminal law would not be breached. This does not however apply to civil damages in which every defective product causing injury could result in a successful claim if the facts can be established on the balance of probabilities.

3.7 Risk Assessment

The subject of risk assessment is dealt with in greater detail in Chapter 4 but some aspects of controlling the product safety system with reference to risk assessment will be considered here. To investigate how risk assessment may be used to promote the safety of consumer products it is necessary to examine the relevant principal legislation that affects its application. The law lays down minimum criteria that have to be met with regard to the safety of consumer products. It is essential that the law be complied with in order to set what society has, through the Parliamentary process, decided represents a reasonable level of safety for the consumer and provides a level playing field for product manufacturers and suppliers. Jenkins (1982) has long advocated the use of a risk assessment approach in this area, as a useful aid in achieving a more objective result that is acceptable to consumers, manufacturers and the courts.

The organisations include those that manufacture products, more commonly known in law as "*producers*" who employ designers, those who specify legal requirements, the Department of Trade and Industry (DTI) and the European Commission, those that draw up the voluntary technical standards both British Standards Institution (BSI) and the European standards bodies, to interpret the law and those who enforce the law, Trading Standards. Product safety law stems mainly from European

Directives that must be adopted by all member states and are best interpreted by adopting harmonized European standards.

How risk assessment may be applied to the main elements of the product safety system should be carefully considered as its benefits are potentially great. Some of those benefits are examined below.

3.7.1 Trading Standards

Trading standards could benefit from the wider use of a risk assessment approach in several ways, indeed the Audit Commission (1999) said, "*there is widespread acceptance that risk assessment is key to an effective trading standards service*". LACOTS (1994) issued guidance on risk assessment to local authorities looking at trading premises under four core areas of work: weights and measures, quality standards (including food), safety and fair trading. The scheme took into account production or usage risk, turnover, trader history and quality control systems in place. The Audit Commission found that over 70% of authorities had an ongoing risk assessment scheme but said it was carried out in an inconsistent manner. MAFF (1996) also introduced risk assessment criteria covering food premises and many authorities were using a combination of the two approaches to their monitoring of products and services.

The risk assessment approaches referred to do not deal with the risk presented by individual products that are brought to the attention of the authorities' officers. Initially on receipt of a complaint or viewing a suspect product on sale the officer could apply such an approach to ascertain a qualitative risk level that would help prioritise the cases he was investigating. Later in the investigation a more thorough quantitative risk assessment might be necessary in order to guide him, his superiors or legal department as to whether the matter warranted formal action. This might be a full-scale investigation with a view to prosecuting the offender or obtaining an agreement that corrective action would be taken to eliminate or at least reduce the risk to the public. The third level of risk

assessment would need to be a detailed quantitative study in order to present the case to court so that the seriousness of the offence could be properly ascertained and appropriate sanctions imposed.

It is necessary to consider how the product safety legislation is applied with regard to consumer products in order to examine where a risk assessment approach might be introduced. There are thirty-six Acts listed alphabetically in Appendix 6, from the Agriculture Act 1970 to the Weights and Measures Act 1985, which contain provisions imposed on businesses that most local authority trading standards services are required to enforce. A further twenty-three Acts contain requirements that are considered part of their remit to ensure fair-trading. The first opportunity for a risk assessment approach appears to be selecting from the list of legislation in Appendix 6 those laws that should be given priority status. The enforcement of the CPA would clearly be high on the list in view of the consequences of allowing unsafe products to be marketed and used by the public and the cost to the community of treating product related injuries. The cost to industry having to compete against suppliers of non-complying products would also be a factor in any cost/benefit analysis.

3.7.2 Government

Government adopted a risk assessment approach across departments, the Interdepartmental Liaison Group on Risk Assessment (ILGRA) but its activities are patchy and DTI is not prominent in its discussions. There is a need for such an objective approach particularly regarding the safety of consumer products so that appropriate resources can be allocated to dealing with the most serious matters. Historically the official approach has appeared to be reactive and sensitive to media pressure rather than a proper assessment of the risks presented by particular suspect products.

There is a need for consumers to be educated with respect to a better understanding of risk so that they may appreciate the unpopular decisions governments and officials sometimes have to take in order to address safety issues appropriately. It should then be easier for officials to justify not taking action in certain instances even though the circumstances

surrounding an event, such as a child choking on a small piece of DIY equipment left lying around the home, might have caused public outcry following extensive media coverage of the accident. A change in legislation or the introduction of new laws is frequently called for in such circumstances but the costs and benefits of taking what may be considered precipitate action may not be properly assessed.

3.7.3 European Commission

With a complex range of harmonisation laws to promote cross boundary trade in products and to a lesser extent but an increasing one in services, the Commission needs to assess the importance of legislation and its potential benefits to the Community's population. An objective approach can help offset any biases that may be introduced by individual Member States and factional interests.

3.7.4 Producers

The importance of manufacturers having an objective approach to assessing the risk to users of their products will become clear when the examples of failures are examined further, particularly those that have resulted in fatalities. Producers, if they have to defend themselves against criminal charges that their products failed to meet safety provisions laid down by the CPA, will need to establish a due diligence defence under Section 39 of that act. This will involve an assessment of the risk that their product presented to users along the lines suggested in Consumer Product Risk Assessment (CoPRA) outlined in Chapter 7 and presented in Appendix 14.

There is no legal obligation for manufacturers to carry out a risk assessment of their products but indirectly that is what is encouraged if the law is to be observed adequately. The defences in the CPA and requirement under the proposed amendments to the GPSD to monitor the market and alert the authorities to problems that have been discovered with particular products further emphasises the need to obtain a measure of the risk level.

3.8 Chapter Conclusions

The aim of the consumer product safety system is to prevent unsafe products reaching the user thereby reducing the risk of injury. The study has shown that there is considerable variation throughout the country in the way in which the CPA is being administered by the 205 local authorities that have a duty to enforce it. This is confirmed by figures provided by the Core Cities Study referred to in 3.6.5.1 above and the Audit Commission Report (1999) "Measure for Measure".

Not only do the authorities differ widely in their approaches to product safety, so also are the individual officers one of whom showed me his dossier of 640 prosecution cases over a ten years period, a rate 12 times that of the average officer in the six Core Cities. There are many unsafe products on the market that never come to official attention. How far they contributed to the 2.8 million product-related accidents resulting in medical treatment in the UK according to HASS (2000) is unknown but this largely hidden problem needs to be more closely examined if the resulting costs to the National Health Service is to be addressed.

This study suggests that enforcement of the CPA needs to be coordinated nationally or at least on a regional basis to achieve a more consistent and uniform service to all consumers and businesses in the country.

There are many aspects to the CE marking of machinery requirements two of which are of particular importance here, the Technical Construction File (TCF) and Risk Analysis. Both requirements have implications for consumer products in which area they should be more widely adopted, it is suggested.

The model indicates where a risk assessment approach could be used to advantage, when developing new products, setting statutory requirements, drafting standards and prioritising law enforcement work.

Standards – the identification of all hazards inherent in a product, including mechanical hazards, rather than the more obvious for particular

product types such as electrocution and gas explosion for domestic appliances.

Trading standards – the prioritisation of complaints and other information in order that the most serious risks are dealt with at the earliest opportunity. Quantifying the risk presented by particular products to justify appropriate action and to assist the courts to decide on the level of penalty to impose.

Government – an extension of the Interdepartmental Liaison Group on Risk Assessment (ILGRA) process to prioritise government work to maximise resources and reduce risks to the public.

European Commission – to enable risk reduction activities to be adopted to benefit the 300 million population of the European Community.

Producer – to encourage hazard elimination at the product design stage and reduce the risk to consumers to a level that is As Low As Reasonably Practicable (ALARP).

Chapter 4: Risk Assessment

4 RISK ASSESSMENT

4.1 Introduction

Risk assessment is the analytical stage of the risk management process. HSE (1997) has long promoted the development of procedures adopted within companies that they can employ to enhance their safe performance rather than the prescriptive approach imposed externally by the law that was previously used. A similar approach may well benefit manufacturers and others involved in ensuring the safety of consumer products, indeed the objective of the more recent "*new approach*" Directives and regulations is to satisfy essential safety requirements.

Risk assessment is an important stage in the management of risk and forms a central part of this study. There are many and varied methods to assess risks as demonstrated in the Literature Review, Chapter 2. One of the objectives of this research is to develop a method that would be suitable for use by enforcement officers, manufacturers and those who draft standards. By studying the wide range of approaches available and applying them to practical problems it was planned to produce a usable format incorporating the principal elements of a risk assessment method which could be used by those having an interest in promoting product safety.

The risks to life and the environment presented by chemical substances and other agents are increasingly being addressed and controlled, at least in the developed world, but products destined for consumer use, unlike those for use at work, do not appear to receive the same degree of attention with regard to managing the risks that they present. Risk assessment forms a major part of the present study and so its purpose and how it could be used to improve the safety of consumer products will be examined in some detail. Risk cannot be eliminated entirely when using any product but it can be managed so that the negative consequences, including personal injuries, are kept to a minimum. Risk can be assessed by looking at the severity of the consequences and the

likelihood of the event occurring. This provides an initial indication of risk level. Methods to reduce risk may then be considered and a second assessment of the risk made to give an indication of how safe the product will be after the reduction method has been applied. This may be termed the "*assessed risk*".

Costs and benefits must also be considered so that risks can be managed effectively at a reasonable cost. Legislation and standards require products to be made in such a way so as to reduce the risk they present to a tolerable level.

4.1.1 Risk Management

Risk assessment is at the core of a risk management approach to safety and provides the quantitative and qualitative information needed to guide effective and appropriate decision making.

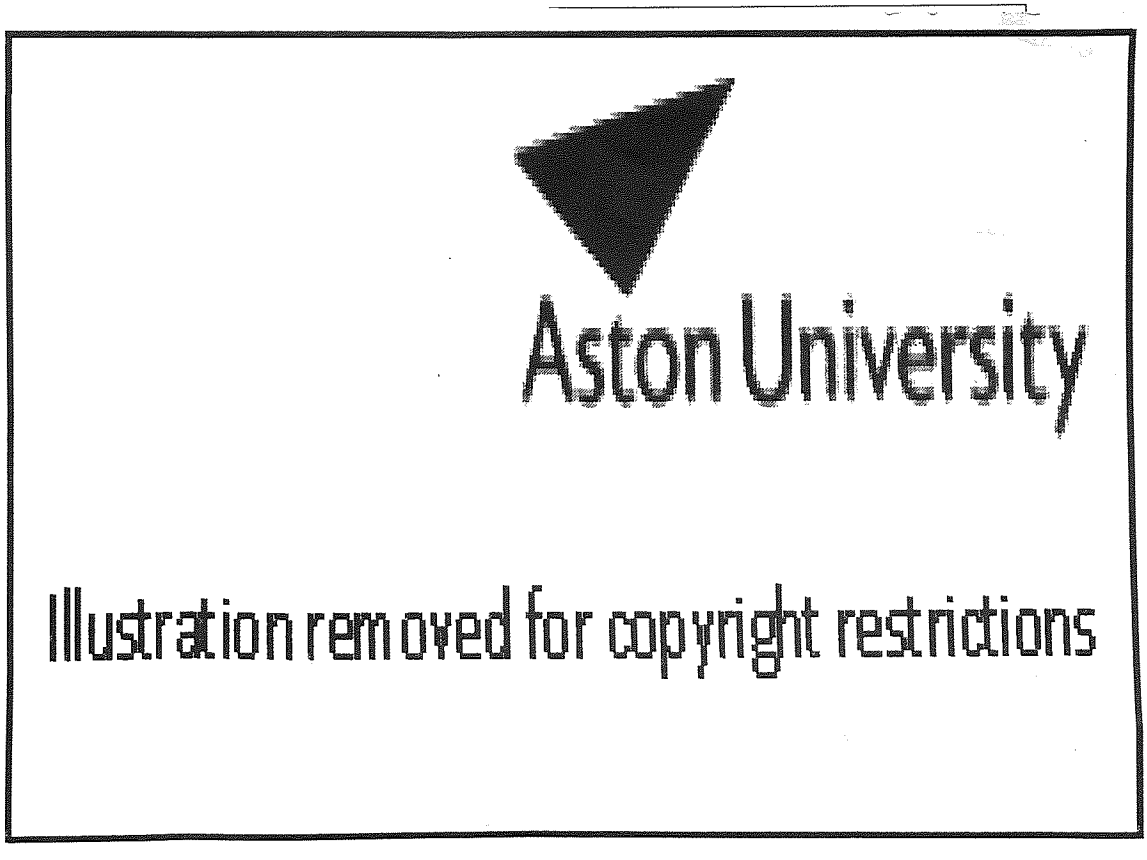

Figure 5: Risk Management Model
Source: Raafat 1989

The above diagram (Figure 5) is based upon that suggested by Raafat (1989) and illustrates how risk assessment fits into the overall management of risk. This study suggests that risk assessment could be used to considerable advantage in the areas of product manufacture, particularly design, drafting product standards and the law, including the prioritisation of enforcement work.

4.1.2 Principles for Risk Assessment

European standard EN 1050 "*Safety of machinery – Principles for risk assessment*" provides guidance for use when assessing the safety of machinery and because it was mandated by the EC and is officially recognised as supporting EU Directives, it has quasi-legal status. In the absence of a similar document the approach followed by this standard could be used it is suggested to assess the risks presented by consumer products. The stages listed in EN 1050 have been modified for the present purposes dealing with consumer products as follows:

[illegible]
Define the system activity
Identify the hazards involved in all the tasks involving the product, including foreseeable conditions of use and in appropriate cases, misuse
Analyse the consequences of risk
Estimate or measure the risk levels involved
Evaluate this level to determine the tolerability of risk

Table 15: Risk Assessment Basic Stages
Source: EN 1050

This approach is followed later to assess the risks presented by particular consumer products and is consistent with the Consumer Product Safety Risk Assessment process presented at the end of Chapter 8 Results.

4.2 Risk Assessment Process

Risk assessment is a structured and systematic procedure for identifying hazards, evaluating risks and prioritising decisions to reduce risks to a tolerable level. It helps determine the priority which should be given to different hazards and the selection of appropriate safety measures to deal with them and also, the safeguards, protection devices and systems of work that may be required depending on the level of risk involved.

It is suggested that when assessing the safety of consumer products questions such as those listed in Table 16 below based on HSE (1994) "*Five Steps to Risk Assessment*", should be asked.

What is the hazard?
Who is exposed to it?
How, when, where does this occur?
How can harm and failure happen?
What factors make this more or less likely?
What would be the nature and extent of the harm if they did occur?
How likely is it that harm will occur?
What is the risk level (trivial, low, medium, high, very high)?

Table 16: Steps to Risk Assessment
Source: Based on Five Steps to Risk Assessment HSE (1994)

The above list of questions was developed for the purposes of this study based on the HSE Five Steps to Risk Assessment that promotes a procedure for assessing safety in the workplace. The questions have been amended to make them relevant to product safety risk assessment.

The widely used criteria for evaluating risks is the HSE (1992) "*Tolerability of risk for nuclear power stations*" which sets the limit for maximum tolerable risk of a fatal accident to a worker in a hazardous industry at 1 in 1,000 per person per year and the maximum tolerable level of risk to a member of the public as 1 in 10,000 per person per year.

The level of acceptable risk is 1 in 1 million or below, per person per year in which no further action is considered necessary. The criteria deal mainly with fatal accidents but state that all risks should be reduced to a level that is "*As Low As Reasonably Practicable*" (ALARP).

No such tolerability levels have been set for accidents involving consumer products but the HSE guidance may be a useful approach for this purpose. Using the HSE (1994) guidance, basic stages of a risk assessment process can be developed as in Table 17 below. A list of all activities and methods involving the use of the product has to be compiled in a similar way to that carried out when assessing the safety of users of workplace machinery. This Job/Task analysis helps to explain the user/product interface by setting out the tasks that the user of the product undertakes to perform the function it was intended for.

[illegible]
Identify the potential hazards
Assess their frequency
Calculate their likely consequences
Assess the impact of these consequences
Calculate the level of risk
Determine the significance of these risk levels

Table 17: Risk Assessment Stages
Source: HSE (1994)

Such an analysis could include the loading of laundry into a washing machine, adding the detergent, closing the door, setting the programme and switching the power on followed by switching off and unloading. The hazards, if any, associated with each task must be noted and the likelihood and severity of harm estimated. Premature opening of the door by a child before the washing cycle has been completed and whilst the drum is in motion has to be considered for example. Failure of the interlock mechanism on a washing machine would greatly increase the risk of injury and such faults have been known to occur (see: 6.6.5).

Hazard Types
Mechanical – crushing, shearing, cutting/severing, entanglement, drawing in, entrapment, impact, stabbing, puncture, friction/abrasion, wear, fatigue.
Change in properties – strength, viscosity, toughness, etc.
Acceleration/de-acceleration – impact, instability, falling, storage.
Electrical/electronic – live parts (normal), (fault), earth, insulation, electrostatic, burns, arcing, overload, contaminants, lightning, water, noise, unexpected start-up, controls, software errors.
Ergonomics – mismatch, posture, exertion, repetition, mental stress, errors, behaviour, unfamiliarity, physiological, psychological effects, interaction with people, lack of skill, deviation from safe practice, fatigue, lifting, bending, twisting.
Fire/explosion – ignition sources, sparks, flames, hot surfaces, electrical, vapours, spontaneous combustion, storage, fire suppression, dust.
Pressure – high, low, vacuum, ruptures, leakages, explosion, implosion, surges, fluid ejection, vapour, hydraulics, pneumatics.
Heat/temperature – burns, scalds, radiant heat, severe heat, severe cold, inadequate heating/cooling.
Environmental/toxicity – asphyxiants, irritants, poisons, long-term exposure, carcinogens, corrosion, contamination.
Noise/vibration – loss of hearing acuteness, fatigue/tiredness, fatigue/material strength, equipment damage, stress (mechanical/personal) loss of balance, loss of awareness, interference with communications.
Chemical/biological/radiation – low frequency, radio frequency, infrared, visible light, ultra-violet light, radiation, reaction to/with chemicals, bacteria/viral, lasers.
Ventilation – concentration, toxicity, lack of fresh air, smoke.
Health – confined spaces, blood borne diseases, lack of first aid, unsanitary conditions, hazardous waste operations, etc.
Material handling – stacking, storage, lifting/bending/twisting, motor vehicle movement.
Ingress/egress – lighting, evacuation, materials storage, blocked/locked.
Slips, trips and falls – slips, reduced adhesion, loss of balance, loss of control, stairs/ladders, floor/wall openings.
External factors – work rules, peer pressure.

Table 18: Main Hazard Types[1]
Source: Derived from EN1050

Overheating of the electrical wiring would create a fire hazard and 2,000 fires involving washing machines have been recorded annually for several years, the latest figures available at the time of this study being 1949 such fires for 1999 according to the Home Office (2000).

[1] **Note**: User – is not only the intended user but children and the infirm also (see above); Task – an analysis of each operation of the product/appliance needs to be carried out; Hazard – identify all the hazards (see above); Failure mode – when and how the component or combination of components fails.

4.2.1 Identifying Hazards

The list of hazards given in Table 18 has been developed from checklists, in particular Annex A of EN 1050:1997, not all will be relevant in every case but it is useful to have a checklist to refer to so that one can ensure that they are all considered and nothing significant has been omitted from the risk assessment process.

4.2.2 Severity

Four levels of severity are chosen to represent the main consequences: These are catastrophic, serious, slight and minimal. The terms are explained in Table 19 below based on Raafat (1995) and his lecture notes.

[illegible]
Catastrophic - death or permanent disabling injury, illness, irreversible injury with permanent loss in activity;
Serious - sever injury, illness or damage, normally reversible, hospitalisation, out of action for one month;
Slight - slight injury, illness or damage, reversible, A&E or doctors visit for treatment, out of action for one week;
Minimal - no significant injury, illness or damage, first aid treatment, no loss of activity.

Table 19: Severity Levels

4.2.3 Probability

Although the terminology varies with regard to the likelihood of events, the following covers the most common four categories listed in Table 20 below based on Raafat (1995).

[illegible]
Probable - very likely or certain to occur;
Possible - might occur but not probable;
Unlikely - not likely to occur;
Negligible - remote.

Table 20: Probability

4.2.4 Risk

The principal factors to consider are the consequences or severity of the event and the likelihood of the hazard occurring. This can be represented as shown in Table 21 below based on Raafat (1995).

Severity	Catastrophic	Serious	Slight	Minimal
Likelihood				
Probable	High	High	Low	Negligible
Possible	High	High	Low	Negligible
Unlikely	Moderate	Moderate	Low	Negligible
Most unlikely	Negligible	Negligible	Negligible	Negligible

Table 21: Risk Levels

4.2.5 Remedial Action

When a risk level has been calculated there are three types of action that are necessary, the first where the risk is high is immediate, the next level is considered moderate and risk reduction measures must be started and completed as soon as circumstances permit. The low level risk is dealt with in due course and the negligible level of risk means no further action should be necessary as shown in Table 22 below based on Raafat (1995).

Remedial Action
Risk level unacceptable; reduce at the earliest opportunity
Risk reduction action started but risk level not acceptable until completed
Risk reduction methods to be introduced when circumstances permit
Risk is reduced to an acceptable level, no further action necessary

Table 22: Remedial Action

It has to be stressed that much of the consequential action found to be necessary might have been avoided at the initial stages. Any such action should follow the following hierarchical order to address each of the

hazards identified. The first step is to eliminate the hazard followed by measures to reduce the risk once again based on Raafat (1995):

Hierarchy of Action
Elimination of the hazard by design
Guarding against the hazard
Warning of the hazard
Training to avoid the hazard
Using Personal Protective Equipment (PPE) to protect against the hazard

Table 23: Hierarchy of Actions

4.3 Assessment

Two simple methods to measure risks involved when using products have been used for the purposes of this study - High/Low and Numeric. The activities involved in using various domestic products must be analysed and described in detail e.g. washing clothes, toasting bread, boiling vegetables, grilling sausages, and the various tasks identified and logged. This job/task analysis is time-consuming but necessary and has proved essential when monitoring the use of equipment in the workplace.

Anticipating how a product is actually used and what happens, rather than how the manufacturer intended his appliance to be used, is an important consideration although most manufacturers will have conducted user trials after carrying out a thorough task analysis themselves before marketing their products. I conducted an exercise on a major supplier's toys that had not yet been placed on the market to assess this approach.

4.3.1 High/Low Assessment

The hazards involved in each task were identified and assessed using the high/low or numeric scale procedure, to provide a prioritised listing for action. Targets were set to deal with each category of risk from immediate action to no action being considered necessary.

LIKELIHOOD			
HIGH			
MEDIUM		X	
LOW			
SEVERITY:	LOW	MEDIUM	HIGH

Table 24: High/Low Matrix

Task component: removing a slice of bread from an electric toaster
Hazard: burn

The product being assessed is a metal cased electric toaster. The sidewalls were found to reach a temperature exceeding 120°C and the bread slots are not designed to allow thin slices to be ejected easily thus trapping the bread. The task is therefore modified in that contact is more likely to be made with the hot metal surfaces of the toaster. A burn injury is likely to be inflicted in less than 1 second contact, a period of time which an older person in particular with reduced sensory levels and reactions is likely to need to retrieve the bread from the toaster.

4.3.2 Numeric Assessment Method

This method gives a numeric weighting to the likelihood and severity indices of the matrix based on a set scale of which there are many in use. A simple numeric assessment example is provided in Table 25 below,

[illegible]	Likelihood	Severity
1	Rare	No injury
2	Unlikely	Minor injury
3	Likely	Substantial injury
4	Very likely	Serious injury
5	Inevitable	Fatal consequences

Table 25: Numeric Risk Assessment

The product of the likelihood and severity determines the risk level. A rare but fatal injury would produce a risk level of 5 whereas an inevitable accident resulting in death would rate 25. Such assessments must not be carried out in isolation. The Precautionary Principle developed at the Foundation for International Environmental Law and Development by Cameron (1994), Director, King's College, London (FIELD) as well as the selection of risk control measures must be taken into account for example. The Risk Level achieved (1-25) should provide a similar but quantified indication of the risk to the earlier qualified High/Low Scale assessment.

4.4 Risk Assessment Methods

There are many hazard analysis and risk estimation methods available and most have been summarised in the literature review in Chapter 2. Three methods were selected to show how they could be used to assess the safety of consumer products. Firstly the Risk Calculator developed by Raafat (1995) at Aston University, secondly the Nomograph that was promoted by Hooker (1995) in New Zealand for use by enforcement officers there and thirdly the Risk Matrix that I presented for consideration by product safety enforcement authorities at a European Conference Jenkins (1995).

4.4.1 Risk Matrix

A simple matrix is used, with the probability of the hazard and the severity of its consequences along the axes to help identify the most serious cases warranting immediate action. I presented the risk matrix to a European safety conference on risk assessment, Jenkins (1995). It was based on an earlier matrix that my product safety team and I used to prioritise the investigation of suspect consumer products in the Safety Section of the former West Midlands County Council until it was disbanded in 1986. The European Commission were particularly interested in developing a unified system of assessing risk that could be used throughout the Community for the Rapid Exchange of Information on unsafe products by the authorities (RAPEX).

An estimate of the risk may be calculated producing results from 1 to 9 with the cells numbered 1 to 3 horizontally and vertically (see Figure 6). Those products, which present a high probability of causing serious injury, would be considered "*a serious, immediate and widespread risk*" and would have to be dealt with immediately. I recommended that these should be the subject of European Commission RAPEX notification procedure and a new lower level PRODLINK system be introduced for these and products in category B. This would enable enforcement officers throughout Europe to take appropriate action to deal with the unsafe product and remove or reduce the risk.

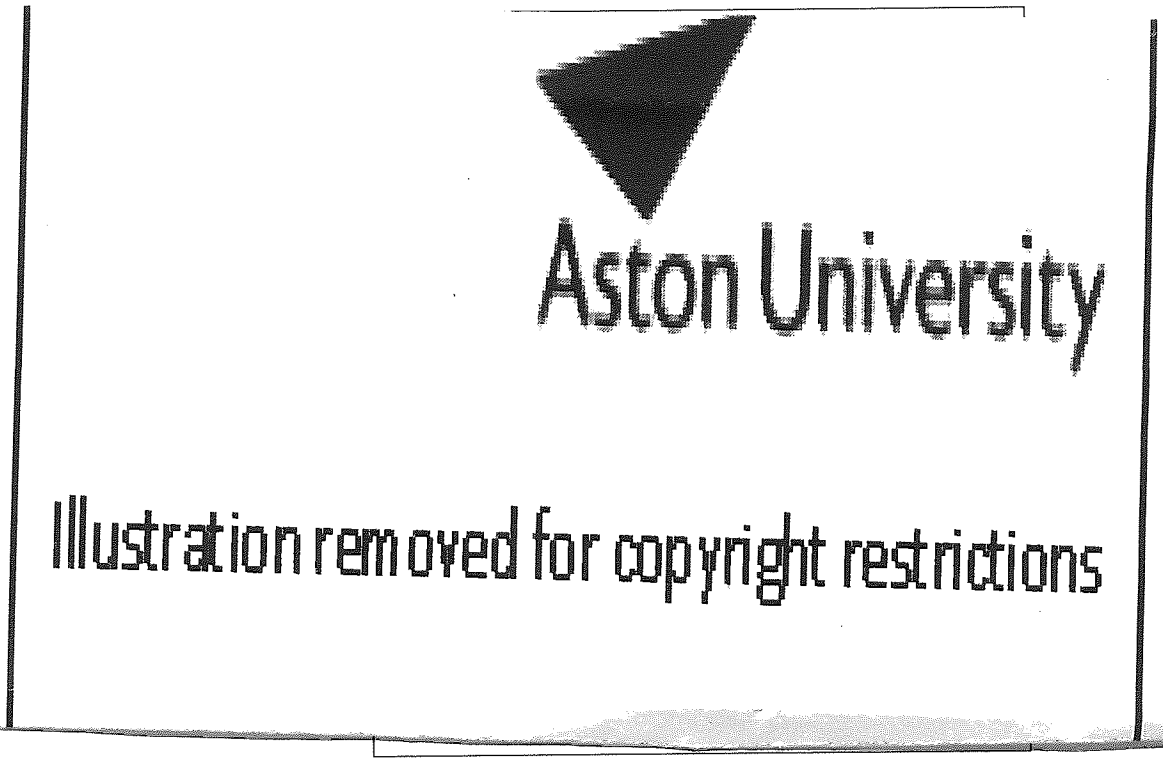

Figure 6: Risk Matrix
Source: Jenkins 1995

Products that fall within the area identified as C on the matrix would be classed as unsafe but requiring local action of a low level nature such as a notice in the shop warning of the increased risk involved in using that product. No widespread notification or official action would be appropriate in such cases.

The "*grey*" area between the two extremes, area B, is where the products are classed as dangerous but they don't present a life-threatening risk. This is where the PRODLINK notification system would apply to notify enforcement authorities throughout the European Community that action might need to be taken with regard to these products to reduce the risk to the public. It is important that only the most serious problems are referred through the RAPEX system to ensure those products have immediate and urgent attention throughout the Community.

4.4.1.1 RAPEX

An assessment of risk is implicit in the European Commission's RAPEX system, the Rapid Exchange of Information System introduced by a Council Decision 84/133/EEC of 2 March 1984 for the rapid exchange of information on dangers arising from the use of consumer products. The exchange of information on products liable to endanger the health and safety of individuals was finally enshrined in the Directive on general product safety [92/59/EEC]. It provides that when a Member State adopts emergency measures to prevent, restrict or impose specific conditions on the possible marketing of a product by reason of a serious and immediate risk presented by the said product to the health and safety of consumer, it shall inform the Commission.

When a serious and immediate risk has been identified the authority consults the producer or distributor to obtain information on the product and the nature of the hazard so it can take measures to ensure consumer protection while minimising interference with trade. When the effects of such measures extend beyond its territory, the Member State must inform the Commission immediately.

The rapid exchange system comes into operation when a product is shown to present a serious and immediate risk for the health and safety of consumers. This risk is to be assessed on a case-by-case basis by the national authorities but there seems to be little or no guidance on how this was to be carried out in practice. The presentation by me to the PROSAFE

conference in Stockholm in 1995 referred to earlier was intended to provide some guidance on how this could be achieved.

The RAPEX system does not appear to have been successful in helping to remove unsafe products from the European market and will be revamped when the revised General Product Safety Directive is introduced in 2004.

4.4.1.2 Risk Assessment Map

The risk matrix follows a similar approach to the Risk Assessment Map developed by Raafat (1995), on which Figure 7: Risk Assessment Mapbelow is based, in his introduction to risk assessment lecture notes except it is capable of a more precise assessment in that there are five probability levels and four categories of severity in Risk Assessment Map method. The severity categories and probability levels suggested by Raafat are given below.

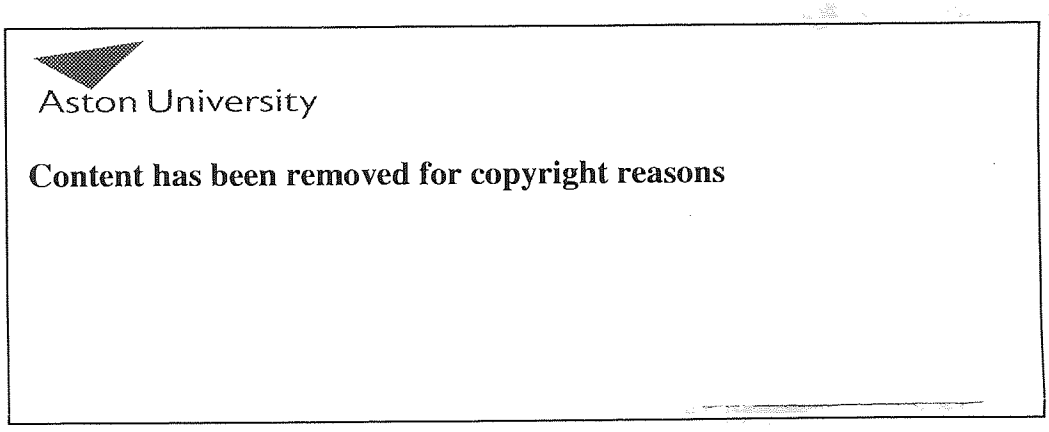

Figure 7: Risk Assessment Map
Source: Raafat (1995)

RP 1, 2 and 3 relate to the risk priority levels respectively i.e. high, medium and low risk that will help determine the appropriate action that is needed to mitigate the hazard.

The first factor that is considered is the severity of the consequences of product failure that can range from minor injuries to catastrophic ones that are life threatening. The categories used by Raafat are from I to IV, minor to catastrophic.

[illegible]	[illegible]	Description
I	Minor	Functional failure of part of machine or process – no potential for injury
II	Critical	Failure will probably occur without major damage to system or serious injury
III	Major	Major damage to system and/or potential serious injury to personnel
IV	Catastrophic	Failure causes complete system loss and/or potential for fatal injury

Table 26: Severity Categories
Source: Based on Raafat (1995)

The likelihood of the event occurring is then considered and this can range from improbable to frequent. Five levels A to E are follows:

[illegible]	[illegible]	[illegible]	Individual failure mode
A	10^{-1}	Frequent	Likely to occur frequently
B	10^{-2}	Probable	Will occur several times in life of an item
C	10^{-3}	Occasional	Likely to occur sometime in life of an item
D	10^{-4}	Remote	Unlikely but possible to occur in life [of an item]
E	10^{-5}	Improbable	So unlikely that occurrence may not be experienced

Table 27: Probability Levels
Source: Based on Raafat (1995)

Combining the severity of the harm with the probability of it occurring produces a risk level that can be used to prioritise whatever action is considered necessary in the particular circumstances being examined. Allocating a level may be subjective to some extent and most assessors

will not have the benefit of medical training. Guidance is therefore needed here

4.4.1.3 Severity of Harm

Two methods of classifying injury levels have been referred to in the study the Abbreviated Injury Score (AIS) based on the Association of the Advancement of Automotive Medicine system for assessing impact injury severity and the severity categories presented by Raafat (1995).

AIS Score	Injury
1	Minor
2	Moderate
3	Serious
4	Severe
5	Critical
6	Unsurvivable

Table 28: Abbreviated Injury Scale
Source: Association of the Advancement of Automotive Medicine

For the purposes of this study the AIS (1990) and severity categories were modified to provide a simplified version from trivial risk resulting in a minor bruise to an intolerable risk presenting life-threatening consequences. The five levels were then accorded a score.

[illegible]	Level	Likelihood	Score	Risk
Bruise	1	Improbable	0 – 1	trivial;
Abrasion	2	Remote	>1 <4	low;
Fracture	3	Occasional	4 <9	moderate;
Major	4	Probable	9 <16	high
Life threatening	5	Frequent	16 - 25	intolerable

Table 29: Risk Results
Source: Based on Association of the Advancement of Automotive Medicine

The likelihood of the harm occurring ranges from improbable to frequent and in the absence of specific guidance in the area of consumer product safety, Raafat (1995) has been used as a basis for this assessment.

10^{-1}	Frequent	Likely to occur frequently
10^{-2}	Probable	Will occur several times in life of an item
10^{-3}	Occasional	Likely to occur sometime in life of an item
10^{-4}	Remote	Unlikely but possible to occur in life [of an item]
10^{-5}	Improbable	So unlikely that occurrence may not be experienced

Table 30: Risk Assessment
Source: Raafat (1995)

4.4.2 Risk Calculator

The risk calculator was developed by Raafat (1995) at Aston University to "*provide a tool for rapid screening of risks in order to focus attention on risk levels which are intolerable*". It was primarily based on the Normogram introduced in British Standard BS 5304:1988 on machinery safety to compare several types of risk including individual, societal, economic and environmental risks. It is similar in approach to the New Zealand Nomograph (6.5.2.3) developed by Hooker (1995), which is used to make an approximation of the risks presented by consumer products.

The first stage in the use of the risk calculator is to estimate the probability level of the hazard. This will fall within the scale 1 in 10 to 1 in a million i.e. 10^{-1} to 10^{-6} from frequent to extremely remote. The next estimate is the percentage of time a person is exposed to the hazard, which may be from continuous to very rare or, in %age exposure time, 100% to <1%. A line drawn between these two points strikes the vertical tie line. From this point a final line is drawn through the consequences line with positions ranging from "*multiple fatalities*" the most serious to "*insignificant*" the least serious consequence. This line then crosses the risk level at a point corresponding to A, B, C or D i.e. High, ALARP and Low risk respectively.

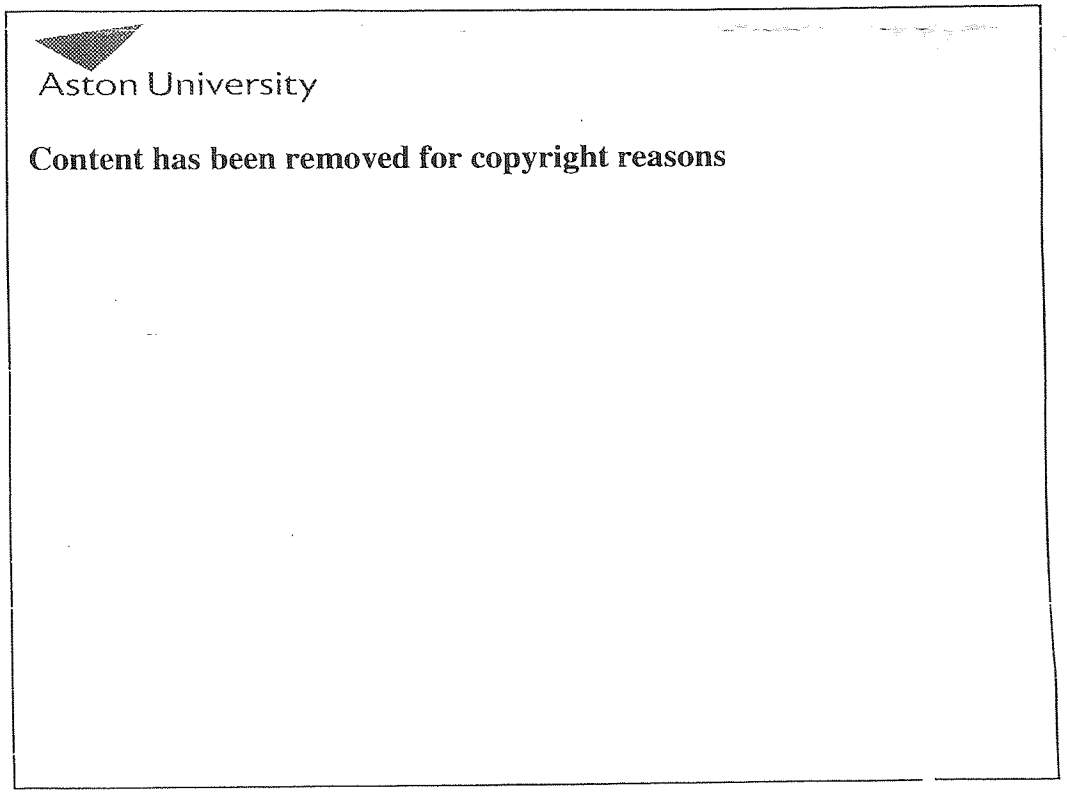

Figure 8: Risk Calculator
Source: Raafat (1995)

The risk level is divided into four general categories as shown in Table 31 below.

Risk Level
High risk (A) – level of risk unacceptable, cannot be justified;
Substantial risk (B) – level of risk to be reduced to a level as low as reasonably practicable (ALARP);
Moderate risk (C) – risk is tolerable if cost of reduction would exceed the improvement gained. This risk level also falls into the ALARP region; and
Low risk (D) – the level of risk is broadly acceptable and no further precautions should be necessary.

Table 31: Risk Levels 1
Source: Raafat (1995)

The risk calculator requires considerable care when deciding the values to be ascribed to the three variables, probability of hazard occurring, exposure to hazard and the consequences. It can only provide a risk level that is, as its alternative name suggests, an estimate or approximation of the actual risk being assessed for initial priority setting purposes. However the risk calculator could make a useful technique for TSOs to rank the risks presented by the suspect consumer products they may be investigating.

The resulting categories determined the action that needed to be taken with regard to the product therefore as summarised in Table 32 below.

High risk – intolerable and not justifiable on any grounds;
Substantial risk – level of risk should be reduced so far as is reasonably practicable;
Significant risk – tolerable if the cost of reducing the risk exceeds the benefit;
Low risk – broadly acceptable no further precautions being necessary.

Table 32: Risk Levels 2

4.4.3 New Zealand Nomograph

A risk assessment technique that was developed to assist those who enforce the product safety legislation in particular is what I have called the New Zealand Nomograph that was promoted by Hooker at the New Zealand Ministry of Consumer Affairs. Use of the Nomograph is illustrated below which is based on a paper presented by Hooker (1995). The example given is of the assessment of a witch's hat which was the subject of a prosecution, the charge being that it failed the General Product Safety Regulations 1994, and how it is easy to obtain different results where for example the probability of the hazard occurring is considered by one assessor to be remote and by the other unlikely. The final risk assessment result of "*virtually non-existent*" reached by one assessor cannot however be accounted for.

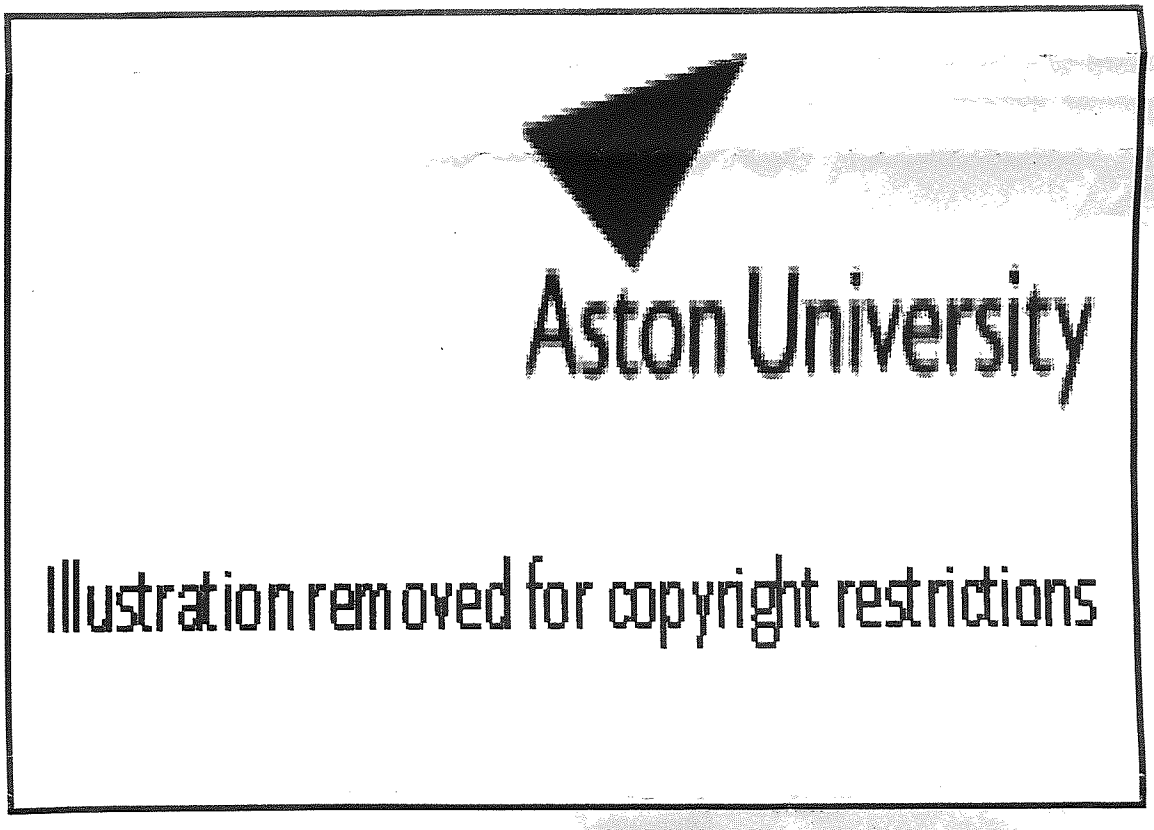

Figure 9: Risk Assessment Nomograph
Source: Hooker (1995)

The following risk factors are dealt with in the Hooker (1995) Nomograph:

Maximum potential injury – injury to user or other person and property damage;
Probability of hazard occurrence – likelihood that hazard will be realised;
Hazard recognition – cognitive realisation to enable avoidance;
Availability – of the product including frequency of use and exposure to hazard.

Table 33: Risk Factors
Source: Hooker (1995)

Maximum potential injury is weighted to reflect its greater importance over the other factors and the category of maximum possible injury has been changed to "*death*". The other categories, critical, severe, serious, moderate and minor remain the same but it must be remembered that those who are making the estimates are not normally medically trained. In addition, although the Nomograph has been widely used in New Zealand and found to provide useful results, it is open to unreliable variation if its layout is altered which could provide erroneous assessments.

Also, although the four factors that are considered in the assessment process are important, there are others that should be considered such as the avoidance of a hazard and the speed with which it occurs. Another important factor is the type of user such as children. Children's products and those with which they come into contact pose a particular problem for designers, manufacturers and those who enforce the safety laws.

The risk factors that Hooker (1995) uses in his Nomograph are the maximum possible injury, the probability of hazard occurrence, hazard recognition and availability. These terms are explained briefly below as they appear in his paper and discussed by Harber (1998).

Maximum possible injury

This they claim is based on the Abbreviated Injury Scale but modified by the Ministry for Consumer Affairs (MCA) to suit the purposes of the Nomograph. Assessing the level of injury particularly by non-medically qualified persons is open to error because of its subjective nature.

Probability of hazard occurrence

The probability of the hazard occurring is again difficult to specify precisely but reference may be made to accident data such as HASS. However as emphasised in the standard concerning principles of risk assessment EN 1050 "*the absence of an accident history, a small number of accidents or low severity of accidents shall not be taken as an automatic presumptions of a low risk.*"

Hazard recognition

This is the risk factor that takes into account how likely it is that a person would recognise the hazard present in the product. Such recognition would reduce the consequences in that appropriate avoiding action could be taken. Emphasis is placed on the perception of adults rather than children because they are expected to safeguard them from the hazards.

Availability

The availability of the product is the forth risk factor considered by the Nomograph but this is normally only used when sufficient information has been obtained from the manufacturers and suppliers as to the number of units involved. This could take some time, hence the need for an initial indication of risk.

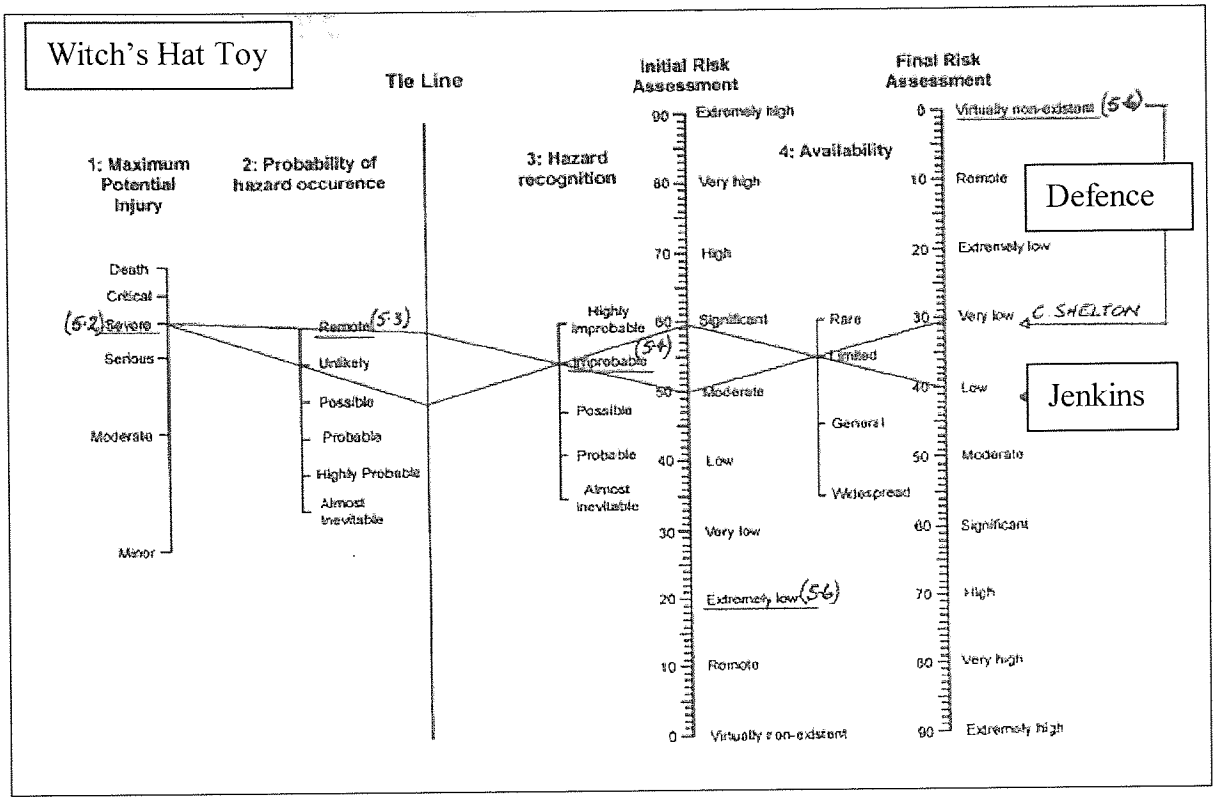

Figure 10: Nomograph Example
Source: Evidence given by Jenkins based on Hooker (1995)

Assessing the risk presented by a Witch's Hat toy

The case involved a Halloween Witch's Hat with flammable synthetic hair attached to its brim. The hat was marked "*not recommended for children under 7 years of age*". It was therefore assumed that the manufacturer considered it suitable for children seven years and over, that is up to 14, and as such it would have fallen within the definition of "*toy*" defined in Regulations 3(1) of the Toys (Safety) Regulations 1995 as "*any product or material designed or clearly intended for use in play by children of less than 14 years*".

The toy hat should have satisfied the Essential Safety Requirements including that relating to flammability. In accordance with Schedule 2.2(a) of the Regulations "*toys must not constitute a dangerous flammable element in the child's environment*". Toys must therefore be composed of materials, which, with regard to their flammability satisfy the following criteria.

Toys – Flammability Alternatives
Do not burn if directly exposed to a flame
Are not readily flammable
If it does ignite, burns slowly
Are treated to delay the combustion process

Table 34: Toys - Flammability
Source: Toys (Safety) Regulations, 1995

The toy safety standard EN 71 provides the recognised tests to assess flammability, which laboratory reports confirmed the hat failed to achieve.

The maximum potential injury following accidental ignition is likely to be a burn, which can be considered "*severe*", indeed both experts in a recent case assessed it as such (Defence expert's statement clause 5.2).

In the case of the Witch's Hat one expert considered the probability of the hazard occurring to be "*remote*" (Statement clause 5.3) whilst the other, Jenkins, thought the burn caused by igniting the flammable hair to be "*unlikely*".

There was no warning in this case to aid hazard recognition. Many toys that are considered unsafe for younger children, because of small parts on which they may choke for example, are marked in accordance with the EN 71 toy safety standard "*not suitable for children under 36 months*". Both experts agreed that recognising the burn hazard was "*improbable*" (Defence Expert's statement clause 5.2) which should have resulted in an initial risk assessment of "*significant*" (Jenkins) and "*moderate*" (Defence expert) rather than "*extremely low*" (Defence expert's statement clause 5.6).

Both experts agreed that the availability of the Witch's Hat would be "*limited*". Jenkins estimated the final risk presented by the product as "*low*". Following the statement of the expert called by the defence; his assessment would have read "*very low*" rather than the "*virtually non-existent*" (Defence expert's statement clause 5.6) that actually appeared in his statement.

It is questionable whether the case merited prosecution action as the subsequent assessment showed that the risk was low or very low. However, the product was considered to be a toy and therefore particular requirements with regard to its flammability should have been satisfied. It is likely that further challenges will be made by defendants in future when charged with offences against specific regulations to require the prosecution authorities to justify their action. I suggested that an assessment of the risk presented by a product will always be required when a prosecution is brought under the General Product Safety Regulations 1994 because they do not specify particular requirements other than that the product must be a "*safe product*" as defined in Regulation 2(1) when it is placed on the market.
The definition "*safe product*" contains three references to risk thus emphasising the importance of the concept when assessing the safety of products.

4.5 Applying Risk Assessment

When assessing the safety of products, many factors have to be considered, not only the product itself but the user and the environment in which the product will be used. The contribution of ergonomists to the development of modern consumer products has been considerable and a better understanding of the product/user interface has enabled designers to eliminate many hazards and reduce the risks of those that remain. We have to take into account the widest cross section of user types in particular those that do not have the experience and skills necessary to operate products in a safe manner to avoid injuring themselves.

Children and the handicapped have to be given special consideration in particular where products are specially made for their use such as toys. Other products are clearly designed to be attractive to children and similar considerations should be applied.

When a level of risk has been determined and found to be unacceptable, corrective measures need to be introduced to reduce the probability of the hazard occurring. There are three ways to reduce the risk level, reduce the likelihood of the event occurring, reduce the consequences if the event occurs and thirdly, both measures taken together.

By improving the reliability of the product the likelihood of a negative event is reduced and reducing the consequences of the event also lead to a reduction in the risk. Such corrective action could include design changes, improved guarding of moving parts and better guidance on the safe use of the product. Any such changes that may be introduced to deal with hazards must not create new problems and another hazard analysis procedure must be undertaken before the product can be accepted. Even when the risk is found to be acceptable it is necessary to maintain a constant review to ensure that the current situation doesn't change such as the introduction of new legislation or an amendment to a relevant standard.

An acceptable event or risk level is often difficult to determine and it is necessary to apply the guidance provided by the law in the form of safety regulations and the interpretation of the requirements published in the voluntary standards to reach a decision. What is reasonable with regard to safe performance may have to be determined by the courts where injuries have occurred or the product is deemed to have failed a safety provision under the Consumer Protection Act 1987.

4.5.1 Consumer Products

It may be appropriate to adopt many of the principles and procedures for assessing the safety of consumer products found in the PD 5304:2000 the safe use of machinery document. The entrapment and entanglement hazards are present in washing machines for example where the door provides access to the spinning drum during the washing cycle. This has been identified as a hazard in one of the failure cases reported in this study (8.3.7).

Non-mechanical hazards must also be considered and the guidance document identifies sources of danger due to access to the machinery, involving slips and trips perhaps caused by leakage of liquids that result in falls and dangers presented by obstructions and projections. Electrical and chemical hazards must also be taken into account.

The assessment of risk has to take the two principal factors into account, the severity of foreseeable injuries and the probabilities of their occurrence. Where high risks are involved, a more formal and systematic method of assessment has to be used. The designer is expected to be able to avoid these hazards by a suitable choice of methods. Entanglement can be avoided perhaps by reducing speed of movement and projections by the choice of smooth polished surfaces. Access to and the stability of machinery is also important.

4.5.2 Product Design

An important stage in the development of a new product is as Cross (1994) advocates "*to clarify the design objectives*". The Objectives Tree Method can be used to achieve this and may be useful in specifying what is required more precisely rather than in the case of the rather vague design brief for a domestic appliance that it must be safe and reliable. This brief could be expanded to cover the issues listed in Table 35 below.

Design Brief
Low risk of injury to operator
Low risk of injury to those who may come into contact with it
Safe surface temperatures
Ease of operation
Clear warnings and operating instructions
Over-temperature cut-out
Over-power cut-out

Table 35: Design Brief
Source: Based on Cross (1994)

Such an approach should identify all the hazards, perhaps by using a checklist, so that no hazard is missed. Modifications have been found to be necessary where such an approach has not been adopted or where it has only used in a selective or limited way. Any such changes often involving retrofitting are expensive to make and take considerable time to effect putting the user at greater risk of injury and the producer and supplier at risk of litigation.

4.5.3 The Precautionary Principle

The principle provides useful guidance on how risk assessment could be applied. The European Commission adopted the "*Precautionary Principle*" as referred to by Cameron (1994) on 2nd February 2000 (Commission of The European Communities, Brussels, Com (2000)). The principle should form part of the approach to risk analysis and management.

Although it is more likely to be used to address current concerns involving environmental safety, BSE, GM and food safety issues, its application in promoting health and safety has considerable potential. Most importantly the fair and transparent application of the principle to serious safety issues may well gain much needed public understanding and support. Media publicity concerning the excessive influence of multinational companies and political and commercial bias in decision-making, whether real or perceived, appears to have damaged public confidence in obtaining

a fair, impartial and objective decision on many sensitive safety issues over recent years.

The old adage "*An ounce of prevention is worth a pound of cure*" is now supported by the new principle developed initially to deal with environmental issues. Where there are reasonable grounds for concern that the risks presented by a product for example are not consistent with the high level of protection required by law, appropriate action is justified even when absolute scientific proof is absent.

The application of the principle to address safety issues is to be welcomed where science is unable to provide conclusive proof so that appropriate preventive measures can be put in place to reduce avoidable and unnecessary risks to the public.

[illegible]
Proportional to the chosen level of protection;
Non-discriminatory in its application;
Consistent with similar measures already taken;
Based on an examination of the potential benefits and costs of action or lack of action (including, where appropriate and feasible, an economic cost/benefit analysis);
Subject to review, in the light of new scientific data; and
Capable of assigning responsibility for producing the scientific evidence necessary for a more comprehensive risk assessment.

Table 36: Precautionary Principle
Source: Based on Cameron (1994)

The principle supports the proactive approach to safety and is consistent with the use of risk assessment techniques to assist in more objective decision-making by providing a structured and reasoned framework for action.

4.5.4 Risk Assessment Exercise

The subject of this exercise were toys supplied by a leading retailer, the Early Learning Centre, that sources its products in the Far East, particularly China, but who carefully control the specifications and quality from their headquarters in the UK. This wide range of toys had not been marketed prior to my examination, which was to assess whether a risk assessment approach might eliminate any hazards not already identified and addressed. Documentary proof was provided confirming that the toys were made in accordance with the toy safety standard EN 71 and satisfied the essential safety requirements of the Toys (Safety) Regulations 1995. Factory production in China was checked by agents on site and by periodic visits by the quality control staff from the UK headquarters of ELC.

A simplified risk assessment was developed to encourage the wider use of the technique by TSOs, manufacturers, distributors and others who were contacted during the course of the study. This is based on the Risk Matrix referred to in Figure 6 above and deals with the main elements severity and likelihood which are categorised below.

Severity of injury - low, medium, high; and
Likelihood of occurrence - low, medium, high

This was then used to produce a risk category of:

A = acceptable - action in due course
B = tolerable - action as soon as possible
C = intolerable - action required IMMEDIATELY

A hazard checklist was drawn up based on EN 1050 Annex A to ensure as far as possible that all hazards and failure modes and foreseeable use conditions had been covered. The EN 1050 hazard checklist is summarised in Appendix 8 from which the following list of hazards were identified for the purpose of this study.

Hazard Type	Reference Number
Mechanical	1
Shape	1
Velocity – kinetic energy	1
Shearing	1.2
Drawing-in	1.5
Puncture	1.7
Friction	1.8
Electrical	2
Thermal	3
Noise	4
Vibration	5
Radiation	6
Materials and substances	7
Chemical	7.1
Hygiene	7.3
Ergonomics	8
Combination of hazards	9
User instructions	26

Table 37: Main Hazard Types
Source: Based on EN 1050

To trial the method, the following 25 toys were subjected to the preliminary risk assessment process in June 2000. Toys were provided the Early Learning Centre, and were pre-production samples. There was an opportunity therefore to modify the prototypes prior to the main shipment being made from the factories in China.

Most of the unacceptable hazards had been eliminated in advance of the exercise through the use of design specifications following the principle of complying with the Essential Safety Requirements in the Directive and the harmonized standard EN 71.

Toys examined for the purpose of the risk assessment exercise are listed in Table 38 below together with the category of risk they were assessed to be.

Toy	Risk category
1st piano	B
Activity walker	A
Ball pool/pit;	A
Bath toy accessories	A
Bee soft ride-on	A
Climbing frame and tunnel	B
Dolls house and furniture	B
Harry the helicopter	A
Inflatable ball pit	B
Inflatable padding pool fire engine	A
Jungle bouncy castle;	B
L&S jungle gym	B
Mini baby car	A
Picnic table and deckchairs;	B
Plastic shape sorter	A
Pop-up playhouse	A
R/c car mad bull	A
Ring stacker (wooden)	A
Roller shape sorter (wooden)	A
Sewing machine	B
'Shakin' tractor	A
Snorkels and masks	A
Space station toy	A
Spaceship bouncy castle	B
Wooden toys (various)	A

Table 38: Risk Assessment of Toys

Four of the toys that were assessed are identified below with notes on the assessments carried out for illustrative purposes. None of the 25 toys assessed was found to present a serious risk but it is likely that most hazards would have been removed and dealt with prior to my inspection. Only the relevant hazards that needed to be addressed are noted below.

Ring Stacker (wooden)

The Ring Stacker consists of a collection of six multi-coloured wooden rings that can be stacked on a central pillar. The hazards that could be identified related to the shape of the toy and the dimensions of the smaller parts in particular which presented a choking hazard. The rounded edges of the toy were considered necessary to reduce the risk of injury after falling on it during play.

Hazard Category (ISO/TR)[2]	Hazards	Comments
1.0	Mechanical	
	Shape	Ball at least 45mm diameter to eliminate choking hazard; Smallest ring 45mm diameter maximum; Breathing hole to be considered to reduce risk of choking
1.7	Puncture	Upright component 25mm diameter with a rounded top; Rounded cone or oblong shape would be better; Base curved to reduce puncture hazard following impact on falling

Table 39: Ring Stacker Toy

SEVERITY	Low
LIKELIHOOD	Low
RISK CATEGORY	A = Acceptable

Roller Shape Sorter (wooden)

The Roller Shape Sorter consists of variously shaped wooden objects that can be inserted into a container though similarly shaped openings.

Hazard Category (ISO/TR)	Hazards	Comments
1.0	Mechanical	
	Shape	Size of parts increased to reduce choking hazard, cylindrical part 45mm diameter
1.7	Puncture	Rounded corners to reduce injury following impact
7.0	Materials and substances	Analysis of wood to confirm no toxic hazard.

Table 40: Roller Shape Sorter

SEVERITY	Low
LIKELIHOOD	Low
RISK CATEGORY	A = Acceptable

[2] See Appendix 8 for complete hazard list

Picnic Table and Deckchairs

The toy picnic set consisted of two folding wooden chairs and a folding table. The table and chairs are set up for use and fixed in that position using two locating hooks.

1.0	Mechanical	Hook both sides of chair provides redundancy in event of one failing or deliberately not used thus preventing sudden unexpected collapse; Table stability to be improved, spacers will add to base width
1.2	Shearing	Spacers to be fitted to reduce risk of injury following collapse; Joints to be glued and pinned or riveted; Dowels to be fluted to improve adhesion;
1.5	Trapping	Table to have spacers to reduce finger trapping; Simple locking mechanism for table to be considered;
26	Instructions	Instructions to be improved using simple words and phrasing; Warning to be affixed to side of chair to ensure hook is tightened securely prior to sitting.

Table 41: Picnic Table and Deckchairs

SEVERITY	Medium
LIKELIHOOD	Medium
RISK CATEGORY	B = Tolerable

Jungle Bouncy Castle

The Jungle Bouncy Castle consists of inflatable plastic tubes fixed together in the shape of a toy castle on which children play. Both the company's and national accident data HASS (2000) were consulted for information on the type of injuries sustained when children use such products.

Hazard Category (EN 71 Pt 1)	Hazards	Comments
1.0	Mechanical	Ground pegs will make castle more secure; 3 cross beams give way to provide soft landing surface.
	Shape	Ramp needed from front to floor level; Ergonometric data to guide wall height, e.g. centre of gravity of 8 year old; Wall now more rigid and can be used as handrail; Introduction of "*snake*" feature will reduce tripping/trapping.
26	Instructions	No more than three users at a time recommended - to be emphasised; Age limit e.g. 3-8 years to be considered.

Table 42: Jungle Bouncy Castle

SEVERITY	Low
LIKELIHOOD	Medium
RISK CATEGORY	B = Tolerable

4.5.5 Risk Exercise Summary

Following upon the individual assessments made of each of the 25 toys, the appropriate action was advised to be taken depending on the risk level. In most cases the risk was acceptable and any modifications could be made when convenient. However the category B as in the case of the Jungle Bouncy Castle example requires action to be taken as soon as possible consistent with cost implications.

The exercise illustrated the value of a basic risk assessment approach and in particular the use of a hazard checklist when examining such products. Because the EN 71 Toys standard is not strictly hazard based it is likely that compliance with the standard alone would not necessarily mean that all hazards were addressed adequately.

4.5.6 Examples for Assessing Risk

The following electrical components in widespread use were also examined to establish whether a risk assessment carried out at their design stage might have identified the hazards and quantified the risks and thus by making the necessary modifications earlier would have prevented the serious and sometimes fatal injuries that resulted from their use.

4.5.6.1 Electric Kettle Flex

The electric kettle flex is an example of where a risk assessment approach applied at the design stage of the product might have speeded corrective action in the form of a "*cordless*" product or one with a power cable which is coiled or shortened so as not to hang over the worktop edge.

In the early eighties when jug kettles became popular it was found that numerous scalding injuries were occurring to young children who had pulled on the power cord hanging over the worktop edge. 80% of the 60 kettle scalding cases studied in the official report on domestic thermal injuries involved the child "*grabbing or pulling on the flex of the kettle, typically where the flex was hanging over the edge of a fridge or worktop*" according to the DTI (1983) report.

Following a meeting at the DTI Consumer Safety Unit in which manufacturers and consumers were represented, flexible cables on many household electrical appliances were reduced in length from one metre to 0.75m and then to 0.7m to take into account the scalding hazard that had been identified. Manufacturers including Swan of Birmingham then concentrated on the development of "*cordless*" kettles that have since gained in popularity. The new design allows the kettle to be placed on a separate base which houses the power cable and therefore removes the danger of cables hanging over the kitchen worktop edge.

Had a risk assessment approach been adopted at the design stage and when the kettle standard was being developed, it is more likely that the scalding hazard and the risk that cables presented to young children would have been addressed.

4.5.6.2 13Amp 3-Pin Plugs

Another example where a risk assessment approach at the design stage of most domestic electrical appliances might have resulted in them being supplied complete and ready to use rather than exposing the user to the risk of electrocution, is the fitting of plugs. The fitting of plugs to electrical appliances was made mandatory following an eight-year campaign led by RoSPA. No longer are consumers expected to make the appliance usable by having to fit a plug to its terminals.

This provides an example of how the legal and commercial expectations of consumers' technical abilities differ. The standard BS 1363 prescribes precise specifications for the fitting of the conducting cable to plugs that cannot be satisfied by an ordinary consumer when attempting to fit a plug to the terminal wires of an appliance at home. BS 1363 is primarily intended for plugs fitted to cables in the factory.

Homecheck safety schemes organised by many local authorities in the 1980s confirmed the high level of faulty plugs in use in dwellings throughout the country and the apparent inability of many consumers to wire their plugs up correctly Jenkins (1990b). The standard specifies torque settings for the terminal screws to provide a good electrical connection in the plugs for example and it is unlikely that such equipment would be available in the majority of homes.

The electrocution hazard presented by an incorrectly wired plug and the inability of consumers to fit plugs correctly was not properly addressed when the standard was being written. Such failures have resulted in many fatal electrocutions, not only the persons wiring the plug but those who made accidental contact with live parts as a result of badly wired plug. Failure to use the cord clamp to secure the cable inside the plug casing was found to be a common fault resulting in tension being applied to the conductors causing complete or partial disconnection. The incorrect connection of the conductors had resulted in several fatal electrocutions including one in Swindon and another in Walsall and the recall of a number of domestic electrical appliances as reported by Jenkins (1992).

An eight year campaign led by RoSPA eventually persuaded government to introduce a statutory requirement to have all domestic electrical appliances supplied complete with a properly fused and fitted plug under the Plugs and Sockets (Safety) Regulations 1994. The media, including BBC Watchdog and the Mail on Sunday supported the change in law. The death of a young woman in Walsall whose partner had wired her washing machine plug incorrectly and at whose inquest I gave evidence, was featured on television and the Minister invited to respond. A governmental report by the Department of Prices and Consumer Protection, predecessor of the DTI (1977) stated, "*The connection of the flexible cord to a plug by an unskilled user is fraught with danger. This year's report includes seven deaths due to loose earth wires in plugs*".

From a study of the product safety files at RoSPA dealing with the fitted plugs campaign it can be seen that government, the DTI, and the trade associations including the Association of Manufacturers of Domestic Electrical Appliances (AMDEA) and the Electrical Equipment Installation Equipment Manufacturers Association (EIEMA), accepted the principle of fitted plugs but manufacturers were resistant to change because of the additional costs involved. This was their position unless the fitting of plugs to all appliances was made mandatory which would protect them from unfair competition by those companies who did not fit plugs to their equipment. Unfortunately government were pursuing a policy of de-regulation at the time and did not appear to want to introduce any further controls on industry. This dichotomy led to considerable delay in implementing the mandatory requirements regarding plugs and was only resolved following a fatal electrocution involving a faulty plug which attracted national publicity, most notably on the BBC Watchdog programme.

4.5.7 Product Life Cycle

Consideration must be given by designers and manufacturers to all the stages through which the product will progress from its conception to its

eventual disposal. The following table is based on PD 5304:2000 the guidance on the safe use of machinery published by BSI.

Product Life Cycle
Assembling the product where appropriate and setting up
Installation of product
Care of the product
Cleaning the product
Storing the product when not in use
Simple maintenance, including cleaning
Repair, where this is intended to be carried out by the consumer
Decommissioning, rendering it safe pending disposal
Disposal at end of life

Table 43: Product Life Cycle
Source: Based on PD 5304:2000

The use a consumer product is likely to undergo through its lifetime must be considered, including the conditions and stages of use that may differ from that intended by the designer and manufacturer to the less obvious types of use that could be considered quite legitimate, particularly if the user is a child.

4.5.8 Conditions of Use

The type of use the product is to be put to must also be considered in detail. This should take into account intended and foreseeable conditions of use throughout its lifetime. The following table provides the typical range of uses to which a consumer product may be subjected during its lifespan.

Conditions of Use
Normal intended use as envisaged by the designer;
First use when instructions may not have been studied;
Subsequent use taking into account familiarity and speed;
Foreseeable conditions of use;
Supervised use where this is considered necessary;
Playing with the product, where this is reasonably likely;
Misuse or unintended use but not serious abuse;

Table 44: Conditions of Use

Foreseeable use is of particular concern to the designer and manufacturer when considering the safety of a consumer product but this has to be imaginative and include all types of user of the product particularly children and even this may not be the type of use the product may be subjected to in service. Even abuse of the product must be considered at the design stage and the design should be such that the consequences of failure are kept as modest as possible commensurate with cost and technological feasibility.

4.5.8.1 Foreseeable Misuse

BS0 the standard for standards states, "*When describing the risks arising from misuse, unexpected or concealed hazards should be given particular emphasis and explicit instructions for safe use given. If use or misuse by young children, the aged or the disabled is considered likely, any additional risks should be brought to the user's attention*". It is preferable for products to be so designed and constructed so as to anticipate foreseeable misuse as far as is reasonably practicable.

4.5.8.2 Defects

The use of risk assessment techniques can help set the level of acceptable failures for a production system so that important safety factors are not missed or underestimated and are given proper attention. The objective

should be for zero defects as far as safety is concerned but where this is not possible, the efforts made to this end will provide evidence that all reasonable steps have been taken.

Where defective products find their way onto the market it is likely that the numbers involved will be very small and where such products cause injury or property damage that risk has to be borne by the consumer who will be entitled to sue for damages. It has to be accepted that with modern mass production methods there will inevitably be an occasional faulty product but the system should ensure that the number of such products is kept to a minimum. The producer's risk is reflected in the proportion of products that exceed the safety requirements and controls are needed to ensure that this is not excessive either.

Persons injured by faulty products may sue the manufacturer for damages but because the risk of an unsafe product being released onto the market is so low if the proper procedures are followed, it should be possible to insure against the consequences quite easily.

4.5.8.3 Product Users

Product risk assessment must include the user of the product and the uses to which the product is likely to be put, including misuse, particularly by children and those with disabilities, both mental and physical. The following definitions may seem arbitrary but have some basis in law and these or similar ones will be needed to guide manufacturers.
Because their vulnerability in terms of knowledge, experience as well as mental and physical abilities it is necessary to look at the use of products by children and the infirm in particular. Several studies DTI (1994) and DTI (1991) have been carried out in this area that can be used as a basis for further examination of the hazards involved.

The following list of product users has been drawn up for illustrative purposes by the author and identifies the wide range of user types that have to be considered. Many products will be accessible to several types

of user and special considerations may have to be taken into account by their product designers including anthropometrics data DTI (1995b) and (1998a).

Product Users
Child: up to the age of 14.
Young child: up to three years (36 months).
Youth: between the ages of 14 and 18.
Consumer: all persons experienced and expected to use products with reasonable care
Disabled: both physically and mentally but not severely impaired as to need constant supervision.
Passer-by: the uninvolved stranger or neighbour who should also be considered.
Trained: those who have undergone some specialist training.
Untrained: i.e. most consumers.
Worker: a person employed and therefore subject to protection under the HSWA.
Installer: sometimes the consumer but usually a trained person
Dismantler: occasionally the consumer but often a specialist.
Repairer: sometimes the consumer where simple replacement is involved
Maintenance worker: trained person.
Carer: visitor to consumer's premises.
Other user: visitors, including friends, relatives and children.

Table 45: Product Users

A handbook was published by the DTI (1997a) to encourage the design community to make ergonomics evaluation part of the design process at the earliest possible stage.

Manufacturers must also accept children may use their products and take this into account at the design stage. DTI (1994) records children between seven and fourteen regularly using electrical products such as TVs, VCRs, kettles, PCs, microwave ovens, hairdryers and toasters unsupervised. However, the EN 60335 standards specifically exclude such consideration. Under sevens were also recorded as using cookers, food

processors, washing machines, tumble dryers, irons, vacuum cleaners, hairdryers, lawnmowers and lawn trimmers. The BSI Consumer Policy Committee has also raised its concerns over the standards not addressing what happens to products in many domestic situations.

Page (1995) states that the majority of injuries are caused by the effects of an external energy source on the body. Such energy sources that can impact on the body are primarily radiation, chemical, electrical and mechanical, both potential and kinetic. Consumer products have increased in both numbers and complexity and since more products are powered, the potential to inflict injury is undoubtedly increased.

4.5.8.4 Operator Error

A baby's bath seat is used as an example to illustrate the consequences of not following manufacturer's instructions that are clearly displayed on the product as recommended by the European standard EN 13822. At the West Hertfordshire Coroner's inquest in St Albans on 9 June 1999 into the death of a baby in a bath, I gave evidence citing 55 instances in which children under five had drowned in baths over a ten-year period to the end of 1998. RoSPA recorded the figures in their drowning database based on press reports. Several incidents involved bath seats and evidence given to the court by carers, usually the mother, was that she had left the child in the bath for a brief moment just to answer the door or 'phone or to fetch clothing.

The USA Consumer Product Safety Commission (CPSC) confirmed this problem reporting that they had recorded 69 babies drowning in baths in which bath seats and rings were involved during the period January 1983 to November 2000. As a result they were considering a petition to ban them on the basis that "*Baby bath seats present an unreasonable risk of injury and death to children. Each year at least eight babies die as a result of drowning associated with bath seat use*" reported by the CPSC (2001).

The question arises as to whether such a product is inherently unsafe and should be banned or acceptable provided it is used as intended. The warning not to leave a child unattended is required by the standard to be marked conspicuously and permanently on the seat but this is clearly not sufficient to prevent a recurrence of these tragedies because the carer is tempted to leave a child 'just for a moment'.

A risk assessment of the product identifies the worst consequence as being death by drowning and the frequency with which this could occur as being low. The risk level would therefore be significant and need to be addressed by measures that were at least as compelling as the temptation just to leave the child 'to answer the door'. If as seems likely the product will continue to be sold and not banned by the authorities, the warning may need to be strengthened and be provided at point of sale stating that "*5 babies drown in baths every year in the UK – NEVER leave your child alone in the bath*".

The design of the bath seat may also need attention so that a baby cannot easily free itself from the seat. Climbing out of the seat and squeezing through the apertures are methods of escaping from the seat and the CPSC report also found seats tipped over because their suction pads were not effective. Overcoming these problems would cause considerable trouble not only to the seat manufacturers but also to the authors of the standard who would need to apply meaningful safe performance criteria that could be assessed.

4.5.9 Law Enforcement

Trading standards officers and other enforcement officers in the EU have also adopted risk assessment in principle but there is little evidence of formal widespread usage in practice. A presentation I made to a conference in Stockholm as reported in Product Safety Enforcement News (1995) demonstrated the use of risk assessment to assess the safety of products which brought the process to the attention of delegates who included representatives of the product safety enforcement authorities

throughout Europe. Hooker presented the New Zealand Nomograph was presented at the same conference.

More recently Harber (1998) has produced a report on risk assessment and developed it further through the Best Value Partnership programme instigated by the Local Government Act 1999. The counties of Worcester, Gloucester, Warwick and Oxford participated in developing a project on risk assessment under the "*Crossing the Boundaries*" initiative.

4.5.10 Standards

The use of risk assessment in standards is now widely accepted but primarily in specifications for workplace machinery. Such an approach is recognised in the "*standard for standards*" BS 0 (2000). In Part 1 at Clause 4.3 "*Quality of life*" it states:

Standardisation should aim to enhance the quality of life by improvements in health, safety, security, comfort, convenience and environmental protection. Where health, safety and security are concerned, standardisation should aim to identify hazards and reduce associated risks. Environmental protection should include the conservation of natural resources as well as reduction of harmful effects of manufacture and other activities.

This approach gains further support in the informative Annex B.3 of the standard entitled "*Methodology for drafting standards involving health and safety*". Committees are recommended to use a structured approach when developing standards and are referred to the following machinery standards that provide a basis for the risk assessment approach as in EN 292:1991 Safety of Machinery (now BS EN ISO 12100:2003).

The standard advises that the following stages listed in Table 46 below may be appropriate for each risk assessment process.

Risk Assessment Process
Identify the hazards inherent in the product or process;
Consider the effects that these hazards can have: injury, damage;
Assess the risks of the hazards causing harm;
Decide what risks are acceptable, i.e. the level of safety required;
State the actions that need to be taken to eliminate or reduce the risks.

Table 46: Risk Assessment Process
Source: EN 292-2

This basic aim can only effectively be achieved by carrying out a risk assessment of the product for which the specification is being drawn up. In the fifth point it should be emphasised that elimination of the hazard is the primary objective and only when that is not feasible for economic or technical reasons is it appropriate to move on to reducing the risk by some effective means.

The approach advocated in BS 0 with regard to assessing risks has not been followed in recent draft standards circulated for public comment. This is particularly important where standards are written for products that can be used both at home and work. Product migration is a recognised phenomenon and some recent research has been carried out sponsored by the DTI (1999).

Of particular concern is the issue of excessively high surface temperatures found on many household appliances e.g. cooker doors and sides of toasters. Consumer representatives from RoSPA Jenkins (1999) and the Consumers' Association (2000), who noted a reduction in the outer wall temperatures of toasters from a maximum of 170°C when tested in 1996 to 79°C in 2000. They called on manufacturers to follow the guidance provided by the standard BS EN 563:1994, "*Safety of machinery - Temperatures of touchable surfaces - Ergonomics data to establish*

temperature limit values for hot surfaces" regarding safe working temperatures.

Standards are regularly being amended and revised and a rolling programme is adopted for this purpose. A draft standard at the time of writing that followed a risk assessment approach, at least identifying the hazards and demonstrating how they are addressed, is the draft standard prEN 13683:1999 Garden equipment - Integrally powered shredders and chippers – Safety. Annexe A of the standard provides a table listing the hazards including mechanical, electrical and thermal and details where the standard deals with them. Such machines can be classified as work equipment or for DIY use at home so it is particularly important that the workplace requirements are satisfied. A risk assessment approach is however not the norm for consumer product standards.

Another standard, BS 4163 (2000) "*Health and safety for design and technology in schools and similar establishments – Code of practice*" acknowledges the risk assessment approach but does not develop it in any detail. In addition to the harmonized standards many draft standards do not appear to have benefited from a risk assessment approach with the result that not all hazards will have been addressed. It is important to ensure that standards are as comprehensive as possible because they represent the technical interpretation of what the law requires. When standards are given "*deemed to satisfy*" status this will become increasingly important.

It is likely that the technical committees involved in the drafting considered that the hazards they decided to address were obvious and that other matters may be insignificant in the context and their consideration might cause confusion and delay.

There are indications however that failure to adopt such an approach can lead to important safety issues being ignored, such as the kettle lid that falls off when being poured, the toaster that burns your hand when its

sides are touched, the cooker hood that melts over a gas hob and the electric iron whose base plate melts when its thermostat fails. All such deficiencies in the respective standards have had to be corrected much later and at considerable cost, not least of all to those who have been injured in the meantime.

As a participating observer during the period of this study, I had first hand experience of how standards were being developed to help reduce the frequency and severity of product-related accidents by sitting on many British Standards technical committees and even chairing one such committee. The experience gained confirmed the importance of standards as probably the best way to interpret legal requirements but their failure to follow a risk assessment approach.

I have recommended the widest use of risk assessment techniques when developing standards for consumer products in correspondence between Jenkins (1996a) and BSI Consumer Policy Committee (CPC) between 1996 and 2000, to parallel the approach used for workplace machinery standards. Further work has been planned with the support of BSI's CPC on risk assessment in standards and a working group is being set up in which I have been invited to participate.

4.5.11Machinery

The Health and Safety Laboratory (HSL) developed a machinery risk assessment (MRA) methodology for designing machinery HSL (2000). However, MRA has been criticised in that it does not allow for the easy incorporation of health effects, the original remit being to consider hazards from moving parts. As the HSL review found, there is now considerable activity and interest in the use of risk assessment in the machinery sector where it has not been traditionally used in the past. There is still evidence that there is a need for comprehensive practical guidance for the application of risk assessment to machinery by designers.

HSE' s approach to controlling risk HSE (1995) is based on HSE (1992) TOR, The Tolerability of Risk from the Nuclear Power Stations. Tolerability does not however mean acceptability. It refers to the willingness to live with a risk to secure certain benefits and in the confidence that it is being properly controlled. HSE (1993) develops some of the issues in the TOR document.

The harmonized standard dealing with the safety of machinery EN 1050 "*Safety of machinery – Principles for risk assessment*" provides guidance to technical committees, designers and others who have to deal with hazards on how to carry out risk assessment in order to meet the essential safety requirements of the Machinery Directive. It follows EN 292 Safety of Machinery's three basic steps as set out in Table 47 below.

Define limits of the machinery which should include intended use and the consequences of reasonably foreseeable misuse
Hazard identification
Risk estimation

Table 47: Risk Assessment - Basic Stages
Source: EN 292

When following the EN 292 Machinery standard procedures it is necessary to define the limits of the consumer products and equipment under examination, including intended use and the consequences of reasonably foreseeable misuse in order to assess the level of safety provided.

The Machinery Directive 89/392/EEC consolidated with amending Directives as 98/37/EEC and the associated standard EN 292 is followed by the international standard ISO 12100. The International Organization for Standardisation and International Electrotechnical Committee ISO/IEC Guide 51 1999 provides guidelines for the inclusion of safety aspects in

standards and provides some good risk assessment basics including definitions.

4.5.12 Reliability

Manufacturers of the relevant components being examined should have available to them reliability data sufficient to estimate the probability of failure of each component so that the overall probability of failure of the system, such as the washing machine illustrated above may be calculated with a reasonable degree of accuracy. However, it must be remembered that system reliability design does not necessarily take operator error into account. It is therefore up to the designer to minimize the possibilities of inadvertent operation and to make correct use and maintenance of the system as straightforward as possible.

Thirteen major sources of failure rate data are listed by Smith (1997) for example, including the US Military Handbook 217 which covers electronic components such as microelectronics, lasers, resistors, inductors, lamps and fuses. Hecht & Fragola (1977) reviewed the reliability databases for a conference on product liability. Using such figures the overall failure probability can be assessed. Component manufacturers will have their own reliability data in support of their products that will be available to their customers for them to determine the overall performance objective they are seeking to achieve.

4.5.13 Risk Control Strategy

Risk control measures should follow the hierarchical sequence outlined in Table 48 below starting with attempts to eliminate the hazard and, where that cannot be achieved, by reducing the risk to a level that is as low as reasonably practicable (ALARP).

The use of warnings and instructions, although an important factor in promoting the correct and safe use of consumer products, when more effective means such as design improvements are not available, should be

considered as a last resort rather than the first, and invariably easier and cheaper, option.

Risk Control Strategy
Eliminate the hazard;
Choose a lower risk alternative;
Separate the hazard from those likely to be affected;
Reduce the number of people exposed to the hazard;
Reduce the frequency of exposure to hazard;
Use protective equipment;
Take other appropriate remedial action.

Table 48: Risk Control Strategy

The last two should be treated as temporary measures whilst more permanent and effective means can be found to remove or reduce the risk. Residual risks have to be assessed as well and judged on the basis of what is reasonably practicable.

When a hazard cannot be eliminated or avoided other measures for reducing the risk of injury should be sought e.g. reducing the scale of injury, providing safeguards and safe working practices as recommended by the Safe use of machinery PD 5304:2000. Also, the order of priority is determined by reliability so safeguards come before safe working practices.

All the phases in the life of a machine must be taken into account and these may usefully be adapted for consumer products to include the supply of products from the manufacturer or importer, their installation in the dwelling, the setting up stage to ensure it is working correctly and the periodic maintenance checks and cleaning that will be necessary.

Phases of machine life
Transport
Installation
Commissioning
Operation start up and shut down
Setting or process changeover
Cleaning
Adjustment
Maintenance
Decommissioning and dismantling.

Table 49: Phases of Machine Life
Source: PD 5304 2000

Further factors may be added in the risk assessment process to cover relevant issues such as the number of people exposed to the event. The frequency of exposure, type of user e.g. child, and the ease with which a safer alternative can be provided and cost considerations must also be taken into account if the process is to be comprehensive.

4.6 Chapter Conclusions

The many risk assessment methods referred to suggest that they have been developed to deal with specific issues at a particular time. It might therefore seem unnecessary and even confusing to produce yet another method but the requirements of enforcing the law on product safety suggest that such an approach would be beneficial. No doubt the originators of the earlier methods propounded similar arguments. There is a basic approach adopted by most methods that attempts to address and quantify what appears a largely uncontrollable situation and enable those who are required to manage that particular system to do so with some degree of confidence that their actions are being effective.

It is recognised that the Nomograph was developed for such a purpose and it would have a significant part to play but officers seem to need a simpler, more direct format when they are first confronted with information on a dangerous product so that they can make a reasonably accurate but quick assessment of the situation to determine whether it merits immediate urgent attention. Later in the investigation a much more sophisticated assessment would be needed to convey more precisely the extent of the risk that is presented by a particular product, for example to the court.

Having studied the risk assessment process, examined several risk assessment methods in detail and taken into account the many others referred to in my Literature Search Chapter 2, I have devised a method that may be used by enforcement officers to assist them in their product safety law enforcement work. The Consumer Product Risk Assessment method (CoPRA) is presented at the end of Chapter 8 Results.

The numerous examples of failed consumer products referred to in this study demonstrate that the efforts made, often by large reputable companies, to eliminate hazards in their products or at least reduce the risks presented to an acceptable level have often not been successful. This suggests that the standards that help them interpret the law have failed to deal with all the relevant hazards adequately. The explanation is either the standard has ignored the hazard entirely, for example scalding from a kettle when the lid falls off whilst being poured (see 6.4.2.9 below), or not addressing the hazard effectively as illustrated in the example of a child trapping a finger in a spring loaded toy (see 6.5.3.2).

Chapter 5: Methodology

5 METHODOLOGY

5.1 Introduction

The methodology chosen for the study is in two stages, firstly the compilation and execution of the questionnaire involving local authority enforcement officers and secondly the selection and analysis of material relevant to the study from my personal files and those which I hold at RoSPA in connection with my role as their Product Safety Adviser.

5.2 Preparation

To obtain the broadest perspective on unsafe consumer products on the British market it was decided that the study would be in two parts, firstly a questionnaire to obtain details about the products being investigated and methods used by TSOs and secondly data about products that had been the subject of official action by enforcement officers. The records of consumer products that were the subject of complaints dealt with by TSOs and recorded by the OFT and product recalls were also studied but they often provided insufficient information on which to base detailed conclusions. Personal files were therefore used to supplement the data.

As a participant observer in the research I recognised that bias could affect my collection of the data and it was important therefore to ensure that this was carried out as objectively as possible. Account was taken of Hamel (1993) who warned of the potential subjectivity in such data collection and Saunders (2000) who deals with the subject of participating observer status at some length. I decided to become a complete participant in the research in order to obtain the most useful responses from interviewees. Although the purpose of the questioning was not discussed in detail with the participants beforehand, I considered that the Trading Standards Institute's code of professional conduct, to which I was subject and duly followed, would not permit me to divulge anything that would detrimentally affect the interests of the profession.

Acting as a participant observer, preliminary discussions, which constituted the pilot study referred below, were held over a six-month period in 1995 with manufacturers' and retailers' representatives, lawyers and officials on the subject of product safety and how effectively they considered the law was being applied. The findings were recorded in Notebooks 1 and part of Notebook 2 during the six months from July 1995 to the end of December 1995.

5.2.1 Sources

It was decided to concentrate on the actions and opinions of TSOs and to engage the attention of enforcement officers by enabling them to obtain ready access to me for my advice and assistance with their inquiries. It was recognised that I was just one source of information on product safety to which officers had access. Besides their own personal and in-house expertise, officers could also approach their professional body TSI, the co-ordinating body LACORS, BSI, testing laboratories, consultants, lawyers and the DTI for information and advice.

Several of the companies who had instigated recalls during the period and some who had been prosecuted were asked for their views, particularly as to how they had assessed the safety of their products. The Department of Trade and Industry (DTI), the Trading Standards Institute (TSI), the Local Authority Coordinating Body on Regulatory Services (LACORS) and the Royal Society for the Prevention of Accidents (RoSPA) were informed about the proposed research.

Most of the other data were obtained from cases in which I was involved as an expert witness for the prosecution or where a statement had been requested from me about a suspect product. Some useful information was also obtained from product liability cases in which I was involved.

To quantify the problem of unsafe products it was also necessary to examine official publications, documents and reports and other sources and extract relevant information concerning the products. Accident data,

complaints, prosecutions and product recalls provided a basis for this part of the study.

To judge whether a risk assessment approach might have helped designers address the hazard more effectively with regard to those products that were subjected to recall action particular products were selected from the RoSPA recalls database that I had developed. A similar exercise was carried out with respect to products that were the subject of prosecutions with which I was particularly familiar because of my personal involvement in those cases (see: Case Studies Chapter 6 p.231).

5.2.2 Setting

In my capacity as Product Safety Adviser to the Royal Society for the Prevention of Accidents (RoSPA) since 1986 reporting to the Director of Safety Policy, I have received many enquiries about unsafe products. Many of the 205 local authorities employing the TSOs and other enforcement officers who assisted me with my questionnaire were members of RoSPA and therefore entitled to some practical information and assistance. However, more detailed work would have necessitated a fee being charged by RoSPA. It was decided to use this opportunity to obtain the information needed for the study.

The enquiries were specifically logged with a view to ascertaining the proportion received from enforcement officers and during the five-year period from 01.01.96 to 31.12.00 a telephone questionnaire (Annex 11) was used. Enquiries from all sources including trading standards were recorded in chronological order in fifteen notebooks. The results are detailed in the log of enquiries in Table 55 below (Chapter 6).

For the self selecting participants to provide answers to the questionnaire it was important to ensure that they could readily approach me in my capacity as Product Safety Adviser to RoSPA for help on product safety matters.

5.2.3 Access

The methodology used for this study included, as part of the preparation, confirming me as a well-known and credible expert in the field and accessible to potential participants, mainly TSOs. This was achieved partly by publishing articles in the officers' professional journal, "*Trading Standards Review*", renamed "*TS Today*" and in the RoSPA journal "*Care in the Home*" now "*Staying Alive*" (Appendix 9) which, as members of RoSPA many of them would also receive. Also by presenting papers at conferences and participating in training sessions during which the benefits of using a more objective risk assessment approach to product safety, including surveillance work was emphasised.

The importance of a more proactive, preventive approach to product safety, now more widely employed with regard to machinery used at work was also stressed. It was hoped that these more novel ideas would encourage greater interest in modernising the approach but as the results demonstrate in Chapter 7 it was the more pragmatic support in the form of advice and expert evidence that was requested which would assist the officer directly in answering the problems they were faced with. This was usually a consumer who had complained about the safety of a product they or their children had been using.

5.2.4 Recognition

To establish the extent to which risk assessment was being used in practice by enforcement officers it was helpful to be invited to address TSOs. I accepted all invitations and made presentations to TSOs, including a Trading Standards Institute training course at the Sherlock Holmes Hotel, London on 02.10.00 where an attempt was made to assess the use of risk assessment techniques by officers.

I was also asked to advise a TSO who was carrying out a study into how risk assessment, in particular the Nomograph technique, had been developed and used in New Zealand. A meeting took place at RoSPA in Birmingham on 19.01.98 and subsequently when the report was studied a

fax message was sent on 10.12.99 on the Harber (1998) report noting in particular one of the cases cited about which I had personal knowledge.

This lack of detailed knowledge of a particular case which only those with an intimate involvement with it would have had, resulted in an incorrect assessment being made because an important factor, the recognition of the hazard, had been incorrectly applied in the calculation. Although it represented only a small element of the report and is not a criticism of its author, it highlighted the danger of not having all the relevant information applicable to a particular product or not interpreting the information correctly that distorted the final result.

Many officers were also likely to know me as a source of information and advice on product safety matters and this standing was reinforced by regular contributions to their professional journal and by presenting papers at various meetings. During the period covered by the research over fifty articles by me were published in the journals most relevant to those with a specialist interest in product safety law, namely the Institute of Trading Standards Administration's Trading Standards Review, now TS Today, and RoSPA's quarterly journal Staying Alive. Some of these articles are listed in Appendix 9. Very little useful feedback was forthcoming from the articles directly although it is likely that their regular appearance encouraged officers to recognise where further assistance might be found to assist them in their product safety investigations thus indirectly assisting the research.

I am known to officers to have specialist knowledge of product safety issues having been the Consumer Safety examiner in the Trading Standards Institute's Diploma in Consumer Affairs for more than twelve years and a former Principal TSO specialising in product safety until the demise of the Metropolitan County Councils in 1986.

I also made a presentation on the use of risk assessment techniques at a conference in Stockholm on 12.05.95 organised by Product Safety

Enforcement Europe (PROSAFE) and supported by the European Commission. Delegates attended it from Member states that were responsible for product safety law enforcement.

Having received some support from enforcement officers to use the risk assessment approach, particularly in the UK, I made follow-up presentations on 13.05.97 at a Conference on Law and Best Practice held at Church House, Westminster and on 22.05.97 at Jarvis Penns Hall, Sutton Coldfield, Birmingham. An invitation was also accepted from the East Midlands Region Coordinating Group on Trading Standards (EMCOTS) to speak at a meeting on 19.01.98 in Cambridge to establish how far the techniques had been adopted in practice.

It was hoped that findings from the research would provide an indication of where improvements might be made to the product safety system itself in order to reduce the number of unsafe consumer products on the market. These and other matters are noted for further research.

5.2.5 Pilot Study

Informal interviews, in person, by telephone and by Email were carried out with people involved in the field of product safety including enforcement officers, individual consumers, consumer representatives, manufacturers, suppliers, defendants and lawyers to examine areas of interest and concern that could be relevant to the study. Every opportunity was taken during the latter half of 1995 to ascertain how the many participants in the product safety system, as presented in Chapter 3, assessed products for risk. At that time there was little evidence of any widespread objective assessment being carried out by manufacturers, designers, suppliers, officials, lecturers or lawyers.

Following the six-month study, summarised in Chapter 6 Data, it was decided to concentrate enquiries on TSOs and other product safety enforcement officers employed by the local authorities. It was thought that their work in particular could benefit greatly from the application of a

risk assessment approach. Prioritising products for immediate attention and assessing the risk level presented by those products to convince their superiors as to the appropriate course of action, and where necessary the courts, would improve efficiency and ultimately reduce the number of unsafe products made available to the public.

5.3 Ethics

Ethical considerations were taken into account from the start of the study in that the sensitive information that would be required could only be obtained if confidentiality was to be assured. Reference was made to Robson (1993) where useful guidance is provided for researchers in Appendix 3 of that book. According to Jobber and O'Reilly (1996) assurances given regarding confidentiality increases the response rate for questionnaires and my preliminary enquiries suggested it would be beneficial in this particular case.

To some extent the information required had to be obtained covertly but the purpose of the study was considered to be for the general good and therefore particular sensitivities were not considered paramount. As a Fellow of the Trading Standards Institute and subject to its code of professional practice I feel that I have observed those strictures. It was not considered necessary to obtain the permission of individuals, companies and authorities to refer to information that was made available during court hearings and otherwise in the public domain. However, where it was considered necessary, agreement was obtained from those responsible to use the information provided in furtherance of the research.

5.3.1 Confidentiality

It was evident from early in the research that to obtain the detailed and accurate information needed it would be difficult to conduct formal interviews attributing comments to particular persons, companies or authorities. Compromises therefore had to be made but fully consistent with the accuracy and truth necessary to provide valid conclusions.

Considerations of commercial confidentiality, loyalty, professionalism and personal career prospects, issues raised during discussions, would prevent the identification of individuals but the names of some of the companies and local authorities were provided on a non-attributable basis. The official responses on many of the subjects raised during discussions, such as the detailed procedures employed to ensure compliance with the law, the availability of funding for research and testing, the level of complaints, the standard of training, the efficiency and helpfulness of colleagues, locally and nationally, and criticisms of other bodies differed considerably from those comments made in private to me.

5.3.2 Information

It is appreciated that any information has to be reliable if it is to be of use in such a study. Investigations to obtain information in accordance with the rules of evidence and the conduct of research both depend on participants being willing and freely able to provide details and give opinions without fear of untoward consequences, whether perceived or real. I concluded that there was much of value affecting product safety that was not fully revealed or that could be used in the study that would be worth closer scrutiny at a later date. This included the performance of test laboratories for example, which is a matter for the United Kingdom Accreditation Service (UKAS) who are required to supervise the activities of their approved laboratories.

Manufacturers and suppliers were reluctant to admit to having made or supplied unsafe products or to have the results of independent tests or settlements in court made public. Calls made to telephone "*Help line*" numbers that appeared in recall notices in the press and discussions with several representatives of the companies concerned often resulted in denials that the products in question were unsafe but rather that the company was being particularly careful. This was despite the notices being headed "*Warning*" or "*Safety Notice*". Unfortunately such notices appear more as an advertisement for the company concerned rather than an admission of failure. Also, there is no requirement to specify the

nature of the fault or the risk presented to the public. Contrary to the responses received and in view of the difficulty in obtaining details of the problems it was decided to treat all the products as unsafe because of their appearance in a safety recall or warning notice.

5.3.3 Limitations

During the course of the enquiries, solicitors required assurances that details of awards made for damages following injuries caused by defective products could not be made public as a confidentiality agreement was part of the settlement with the company concerned. However, a record was compiled during the course of the study in the form of a recalls database covering a four-year period to December 2000 demonstrating that unsafe products had been marketed in substantial numbers as listed in Appendix 10.

5.4 Questionnaire

The primary purpose of the questionnaire used for the research study was to find out if any formal assessment of the risk presented by consumer products was being used by enforcement officers in local authority trading standards services.

5.4.1 Participants

It was considered particularly important to obtain feedback from officers who were enforcing product safety legislation, but at the exploratory stage it was found difficult to gain the detail and personal views and experiences that were thought necessary to draw useful conclusions. Although it was difficult to overcome the resistance of officers to discussing matters with someone outside the service I had become more widely recognised as an expert witness providing over 300 statements, lecturing on safety and writing in the TSO's professional journal and therefore seen as perhaps sympathetic to the enforcement process. This eventually provided the opportunities needed without compromising the statutory restrictions on disclosure of information under section 38 of the Consumer Protection Act 1987 (CPA) which is likely to inhibit access to

such data by those outside the service. *"A person shall be guilty of an offence if he discloses any information which was obtained by him in consequence of its being given to any person in compliance with any requirement imposed by safety regulations"*.

Local authorities have a duty to enforce the Consumer Protection Act 1987 (CPA) under Section 27(1)(a) and to employ Trading Standards Officers (TSOs) and other suitably qualified persons to carry out that function. TSOs, it was thought, would need to prioritise their enquiry work to determine what level of attention was needed to deal with a product safety problem. This could range from having a discreet word with a shopkeeper advising how to correct a minor infringement to a full scale investigation with a view to bringing a prosecution for a serious breach of a safety provision under the Consumer Protection Act 1987 (CPA). The enforcement officer would also have to demonstrate the seriousness of the case, including the risk presented to the public, to his superiors to obtain approval to institute proceedings, and later in the Magistrates' Courts. Risk assessment was therefore considered to be particularly pertinent to their activities.

According to the Audit Commission (1999) there are approximately 1,500 TSOs and 1,500 other officers employed by the 205 local authorities, who could be asked to investigate a complaint from a consumer concerning an unsafe product or carry out other enforcement duties such as inspecting business premises and goods and making test purchases of products. Because of their unique involvement in product safety these 3,000 officers were identified as potential participants in the research.

Information recorded by local authority departments responsible for enforcing the consumer product safety law was examined. TSOs deal with a wide range of complaints from the general public and have a duty to carry out comprehensive market surveillance to check that products satisfy the statutory requirements relating to quality, quantity, description and price as well as to ensure compliance with safety requirements. A list

of the legislation enforced by many Trading Standards Services is produced in Appendix 6.

5.4.2 Complaints

For the purposes of the research it was decided to obtain an indication from the front line staff of the types of products that were causing the public greatest concern as reflected by the complaints they had to deal with and their personal experiences of the work itself. This part of the study was included in the informal telephone interviews taking the form of a questionnaire with officers in local authorities that were investigating cases involving unsafe consumer products. The interviews formed part of a discussion about a particular safety issue and were primarily at the instigation of the officer who was seeking advice and information. The questions were asked over a five-year period to 31 December 2000 and included enquiries about their approaches to product safety investigations, particularly the use of risk assessment to prioritise their work.

The responses were noted as were other relevant issues raised by the officers. Further insight into the administration of the law was also obtained through the questions but these were limited by the limited time available for the interview and were of a general nature and were agreed to be "*off the record*" so that any responses would not present difficulties for the interviewee.

5.4.3 Format

Some experience of using a questionnaire approach in relation to trading standards had been obtained prior to the study. A questionnaire dealing with enforcement issues was previously sent to 128 Trading Standards Departments, Jenkins (1990). This provided a useful indication of how to obtain information in this way. Just under half responded and of those a quarter said they had experienced problems with the six month time limit permitted for safety investigations to be completed, but a similar number did not experience any such difficulties. This more formal approach provided a response from the managers of the service although officers in

the field had regularly complained to me privately that they did not have sufficient time to complete complex investigation work.

Other problems were also reported by the departments, including laboratory testing of samples and the lack of independent experts witnesses. The limited resources available to carry out enforcement work was also cited. Of particular interest for the present study was the identification of problems associated with the subjective nature of assessing safety. Also, the unreliable nature of some test laboratory reports led to cases being withdrawn and generally inhibited their law enforcement work. Despite a good response level to the questionnaire, it was decided to conduct more personal one-to-one telephone interviews with officers 'in the field' to obtain what was hoped would be more meaningful feedback. In addition the number of authorities had increased by over 50% from 128 to 205 following local government reorganisation making direct access more problematic.

The questionnaire developed for the current study is in two parts, the first dealing with the product or safety issue that was the subject of the enquiry and the second part covering some of the procedural matters involved in enforcing the law, with the additional opportunity to provide further comments. Around half the participants indicated reluctance partly, it was stated, because of time pressures, to answer more than the four questions in the first part of the questionnaire, which demanded little additional effort or time, but the resulting answers were considered to be the more important.

The data were recorded in notebooks that were used for all other enquiries received during the period and were later extracted and analysed. Additional records were kept of the specific comments made by officers that were considered relevant to the study.

A questionnaire (Appendix 11) was drawn up recognising that, after the information provided by the pilot study, not all participants would be

willing or able to provide answers to all the questions. It was necessary to ensure that at least the first three questions were answered and the remaining four were considered helpful but not essential to the study. The type of product and the nature of the hazard followed by whether any risk assessment approach had been used by the officer or if he was aware of it by his colleagues. The time necessary for the whole process was calculated to lie between 5 and 10 minutes with a mean not exceeding 7.5 minutes. RoSPA was already obliged to provide information and assistance to its members which would take approximately 5 minutes so the additional 2.5 minutes was not considered unreasonable in view of the potential benefit of having useful responses to the questions.

The following questions were selected to identify the types of products and failures that were concerning officers and to establish whether they were using any formal means of categorising the complaints based on an assessment of the risk presented to the public.

The Questionnaire is reproduced in Appendix 11 and covers the seven questions listed in Table 50 below.

What product or issue is the subject of your enquiry?
What is the nature of your enquiry?
Do you use a formal risk assessment procedure?
Is there a specialist in product safety in your department?
Are there enough resources to carry out investigations?
What, if any, problems inhibit effective action?
Any other comments?

Table 50: Questions

Responses from the questionnaire are produced in Chapter 6 Data and the findings analysed in Chapter 7.

Chapter 6: Research Data

6 RESEARCH DATA

6.1 Introduction

The research data are presented in three parts:

1. Sources
2. Questionnaire
3. Case studies

Information about unsafe consumer products has been obtained from the following four sources in Table 51.

Sources of Information
Complaints – Trading Standards reports to the OFT.
Accident data - HASS
Prosecutions – DTI reports to Parliament.
Recalls – RoSPA database.
Product liability cases – RoSPA files.

Table 51: Sources of Information

Complaints from the public about unsafe products are taken from the 850,000 general consumer complaints made to the Trading Standards Service in one year.

Enforcement activities, including prosecutions, reported to Parliament by the Secretary of State every five years under the Section 42(1) of the Consumer Protection Act 1987 are examined.

The product recalls are taken from a database I developed for RoSPA covering the four years to the end of 2000 presented in Appendix 10.

Several product liability cases for which I provided reports have been selected as examples from my RoSPA files.

The telephone questionnaire is reproduced in Appendix 11, the responses are recorded below and analysed in Chapter 7.

[illegible]
Products and Hazards
Risk Assessment
Administration
Enforcement Issues

Table 52: Questionnaire Responses 1

The case studies are used to illustrate the wide variety of products involved in domestic accidents and the range of hazards that can and often do lead to actual harm, sometimes with fatal consequences. The cases are divided into three categories:

[illegible]
Expert witness statements
Major companies' product failures
Personal files on product failures

Table 53: Case Studies
Source: D W Jenkins personal files

The consumer products listed in the prosecutions and recalls data in Appendices 4, 5 and 6 that had been involved in voluntary, official and other remedial action during the period of the study were examined. I have been collecting information on recalls since 1988 largely based on notices in the press. Most of the data detailing prosecutions were taken from my files concerning cases that TSOs had invited my assistance with and for which I had written reports as an expert witness. Because of the

confidential nature of the information not everything was made available to me but in all cases the hazards could be identified and the risks to the public assessed with a reasonable degree of accuracy. This meant that a meaningful assessment could be made in the majority of cases in order to prioritise the problems and provide guidance as to the appropriate action that was needed to mitigate them.

Several products were subjected to more detailed study and are provided as Case Studies.

The reduction in prosecution cases for example may suggest that products on the market generally comply with the safety requirements laid down, but if little or no official sampling and testing is carried out, as appears to be the case, such problems will not be revealed. Heavy metals such as lead and cadmium in paint used on toys and nursery products for example will not be discovered unless complaints are followed up by a systematic sampling and testing regime. It is recognised that they present a serious toxic hazard particularly to young children but the effects and consequences are not manifest immediately.

The records of complaints, recalls and prosecutions studied provide useful data on the kinds of products that had received official attention or been subject to complaint and the manner in which those products had failed. The mode of failure was looked at with a view to assessing whether the failure could or should have been anticipated by the manufacturer at the design stage. An indication of how failures were assessed and preferably anticipated is provided in the examples given in Chapter 6. It is clearly advisable in the case of the hundreds of products referred to here, for manufacturers to examine their products more closely during their development in order to eliminate as far as possible similar failures when the products are put into use.

6.2 Sources

6.2.1 Complaints

Data were obtained from the official OFT records based on complaints received by TSDs and passed to them and published in the OFT quarterly journal "*Fair Trading*". For the quarter ending 31 March, OFT (2000) reported that a total of 227,180 consumer complaints had been recorded for example. A national total of 850,000 consumer complaints a year represent a substantial demand on local authority TSD resources. Around 4% of the total could be directly attributable to complaints about the safety of products rather than services or a combination of both.

Attempts were made to extract similar data from industry but initial approaches were met with reluctance to admit that they had problems. The only figures that were obtained were piecemeal and not considered to be representative. Formal procedures for dealing with complaints have only recently been recognised by the development and a new British Standard (1999) on Complaints Management Systems developed to assist businesses. It is reasonable to conclude therefore that many companies do not have a formal procedure in place for dealing with complaints. Even less likely is it that such information will find its way back into the system in order to correct it. Several examples were examined which supported this view. Other than the information provided by TSOs, much of the data used in this study are therefore already in the public domain.

Information relating to specific types of products was extracted from the data, separating the details relating to products from complaints relating to services. These data were further refined to extract only those complaints recorded as having been made on the basis of safety. From this it was possible to identify which products were causing the greatest problems for consumers.

The trading standards service deals with over 850,000 complaints each year. This estimate is based on "*Trends in consumer complaints 52 OFT, London - complaints from Q2/1994 to Q4/2000*". This does not mean

merely logging the complaints, but sorting out the underlying problems usually to the satisfaction of consumers and traders alike. Occasionally, further action has to be taken by way of prosecution or formal caution.

Although complaints about unsafe products represent only 4% of the total, around 30,000 unsafe products are dealt with by trading standards departments each year. Consumers are encouraged to complain to the shop where they bought the product, so the complaints recorded probably represent only a small proportion of the true extent of the problem. TSDs have increased in number from around 165 to just over 200 units following local government reorganisation.

Defective and substandard goods and services account for half the 850,000 complaints and selling methods for just over a quarter. A third of the complaints involve household goods and appliances and the remainder, second hand cars, car repairs and servicing.

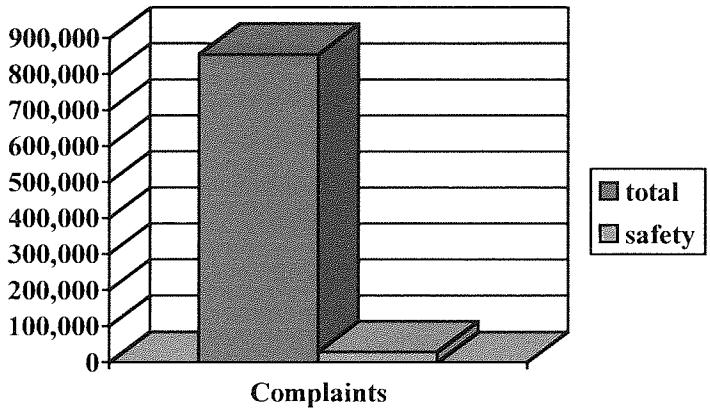

Figure 11: Complaints
Source: OFT (2000a)

Figure 11 shows the approximate number of complaints about goods and services dealt with by TSDs and reported to the Office of Fair Trading (OFT) each year over a five year period. Around 4% of these were found to be about the safety of domestic consumer products.

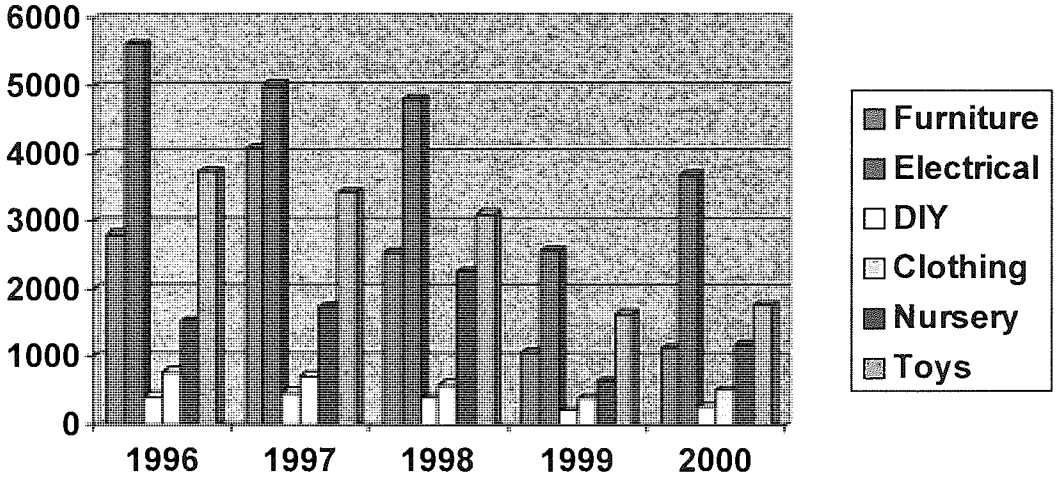

Figure 12: Product Categories - Complaints

Certain product types that were the subject of complaints, excluding those where the safety of a service was in question which accounted for up to half of the total number of safety complaints, are given in Table 54 below. Product codes are those that appear in the OFT reports.

Product	Codes	1996	1997	1998	1999	2000	Total
Furniture, and Upholstered pictures etc.	AD/AE	2798	4080	2539	1070	1123	11610
Radio, TV, other electrical goods, Major appliances	AG/AH	5600	5011	4817	2566	3694	21688
DIY materials and tools	BJ	411	467	405	207	262	1752
Clothing, clothing fabrics /Footwear	CA/CB	780	719	595	401	512	3007
Prams, buggies, push-chairs, nursery furniture	CG	1536	1753	2270	642	1175	7376
Sports goods, toys, games, camping equipment	FF	3731	3421	3103	1640	1783	13678
Total		14856	15451	13729	6526	8549	59111

Table 54: Product Categories
Source: OFT (2000a)

Product codes changed in 2000 - radio, TV and audiovisual equipment was separated from personal computers, large white goods and major fixed appliances. Toys and games were also separated from sports goods, hobbies and camping equipment.

The figures raise questions for which there seems to be no obvious explanation other than possible improvements in product design or the introduction of new legislation and standards resulting in a significant reduction in the number of complaints during 1999 and 2000.

6.2.2 Accident Data

As to the extent of the problem caused by unsafe products, they are involved in, if not always directly responsible for, an estimated 2.8 million accidents in the home each year according to the official accident database HASS (2000). There is no precise indication of the proportion of accidents caused directly by unsafe products but estimates of between 8% according to the DTI (1980a) and 25% by Baker (2000) have been suggested. What constitutes a defect in a product is imprecisely defined in the product liability provisions of Part 1 of the Consumer Protection Act 1987 at section 3(1). It is largely subjective, namely there is a defect in the product if the safety of the product is not such as persons generally are entitled to expect, having regard to all the circumstances. The expectations of the public are likely to depend to some extent on the risk they will accept with regard to the safety of a product.

Perhaps surprisingly, the relationship between product defects and injuries has not been examined in detail, the causal relationship having been estimated at up to 25%. Recognising this deficiency, the Department of Trade and Industry has sponsored research into the subject that is to be undertaken in 2001 by Nottingham University, Norris (2000).

Following a study sponsored by the Consumers in Europe Group into the Product Liability Directive, Jenkins (1995a) concluded that there was a

general lack of awareness about product liability law and that the provisions were being used only infrequently in litigation.

Also, anecdotal reports indicated that many settlements were being made out of court thus hiding useful data. This conclusion was based on a questionnaire that was completed by 29 organisations, five trade associations, two consumer bodies, nineteen trading standards departments and three test laboratories.

6.2.3 Prosecutions

No national record of prosecutions involving the supply of unsafe products is maintained by the DTI and these data will not be collected from individual local authorities until nearer the deadline for the Minister's next five-yearly report to Parliament, that is for the period ending 31st March 2003. There is no national database of civil product liability cases either according to the answer provided by the Minister to a Parliamentary Question No.981572 on 24.03.99.

Of the nearly five thousand prosecutions taken by Trading Standards Departments over the ten-year period to 31.03.98 the main categories were identified as electrical equipment, toys and furniture. *"Other"* includes products subject to their own specific safety regulations such as cosmetic products, gas appliances and fireworks but not included in the main categories. The introduction of the General Product Safety Regulations 1994 meant that all consumer products deemed unsafe are now subject to prosecution action.

Prosecutions brought under the Consumer Protection Act are not required to be reported to the Office of Fair Trading unlike other trading standards legislation such as section 70 of the Weights and Measures Act 1985 and the Trade Descriptions Act 1968 where there is a statutory duty to do so. The data on cases are therefore not very reliable. The first five yearly report by the minister DTI (1988) recorded only 897 prosecutions under

the safety regulations but that was immediately after the introduction of the Consumer Protection Act 1987 on 1 October 1987.

Also, officers recorded some of their successful cases in a confidential publication published by the Institute of Trading Standards Administration (ITSA) now the Trading Standards Institute (TSI) that circulated around the officers and local authorities. From these records a sudden fall in the prosecution rate from 95 cases in 1988 to only 48 reported in 1994 was noted Jenkins (1994).

TSDs provide details of their enforcement work to the OFT in the form of a "*return of legal proceedings*" and information on action taken in respect of unsafe goods found on the market to the DTI. There does not appear to be any statutory requirement placed on local authorities to report their prosecutions under the CPA to central government departments or agencies. This lack of a formal procedure may result in under-reporting such cases.

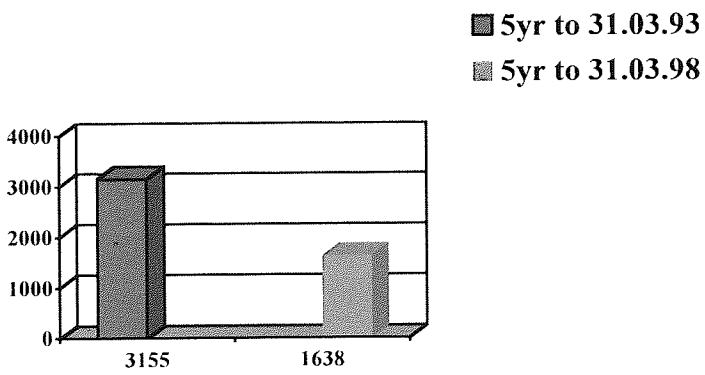

Figure 13: Prosecutions
Source: DTI (1998) and (1993a)

Figure 13 shows the number of prosecutions brought by trading standards departments during the two five-year periods reported to Parliament by the Secretary of State in the DTI (1988) report, 3155, and the DTI (1993a) report, 1638 cases respectively. The average number of cases has fallen from 631 per annum in the first five-year period to only 327 in the second.

Figure 14 provides a breakdown of the products that featured most frequently in the 4793 prosecutions brought by trading standards departments during the two five-yearly periods.

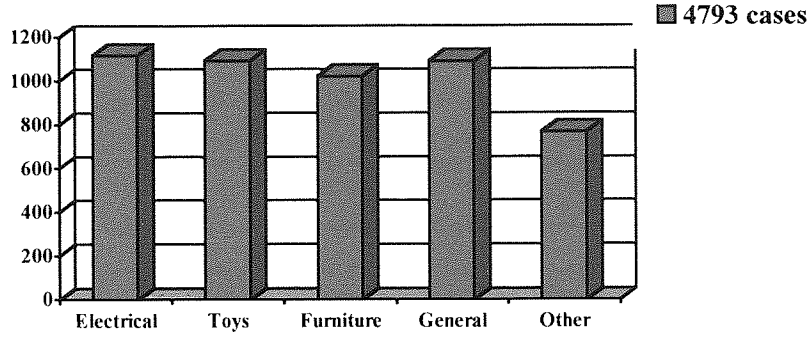

Figure 14: Product Categories - Prosecutions
Source: DTI (1998) and (1993a)

The current research relies on an understanding of what the law requires in particular with regard to consumer products. The law represents the minimum level of safety to which the consumer is entitled, but frequent prosecutions and civil cases demonstrate that the law is not always observed. Also, the level of enforcement varies considerably throughout the country as indicated in this research (see above) and supported by the Audit Commission Report (1999) Report "*Measure for Measure*". It is recognised that support for any course of action recommended in this study will be greatly enhanced if it can be demonstrated that it is soundly based on a reasonable application of the law.

The law should provide the overall incentive for manufacturers and suppliers to ensure that their products are safe. Breaches can lead to penalties being imposed by the courts in the form of fines, currently a maximum of £5,000 for most offences. Although it is rare for the maximum penalty to be imposed it is potentially substantial particularly for a small business in that it can be applied to each offence. Such penalties are low in relation to those that are imposed for offences under the HSWA.

However, damages, costs as well as the seizure and destruction of offending items and the detrimental affect on producers and distributors' reputations must also be taken into account when assessing the full impact of formal action such as prosecution.

According to official DTI (1998) (1993a) records referred to above, 4,793 prosecution cases were brought under the safety provisions by trading standards authorities during the ten year period ending 31st March 1998 as reported to Parliament. 95% of these cases were successful and fines imposed during the last five-year period averaged just over £600 for each case. A decline of nearly 50% in prosecution cases during the second five-year period should be noted.

During the period many Suspension Notices were also issued preventing the supply of suspect products, and Forfeiture Orders were obtained through the courts, allowing dangerous products to be disposed of. The next Ministers five yearly report to Parliament is due for the period up to 31st March 2003.

All the prosecutions taken by departments nationally in which I was involved as an expert witness were examined. The categories of product and hazards that were dealt with in these cases were identified and the declining trend in prosecutions over the period was recorded. Cases brought during the two-five year periods that were reported to Parliament by the Secretary of State were also recorded although details of these cases were not available.

A selection of unsafe consumer products was taken from more than 200 consumer products presented to me during the ten years for an opinion as to their safety. These examples are the case studies referred to in Chapter 7 and provide a useful indication of the types of product and range of hazards that result in safety problems.

Further examples have been taken from cases investigated by an officer based in the Midlands whose experience investigating product safety cases is widely recognised within the profession. Enquiries made of many other TSOs around the country indicated that this particular portfolio of cases exceeds any other officer.

The officer was responsible for initiating 91 prosecutions over a fourteen-year period ending December 2000. During the ten-year period of this research he was responsible for investigating a total of 64 cases. Many of the cases I was asked to provide an expert witness statement for and therefore had particular knowledge of the details of the products involved. Although no general conclusions can be drawn from one officers' portfolio of cases it is valid to claim that the successful prosecutions demonstrate that the various products were unsafe as determined by the regulations and that they were being supplied on the British market.

Whether all the cases warranted such action could be questioned, particularly as such investigations are expensive in terms of resources and demands made on the service, particularly the investigating officer. Such judgements are made by senior personnel within the departments in consultation with their lawyers and possibly elected representatives serving on the relevant council committee.

Following recent changes in the administration of the service i.e. local government reorganisation, the number of cases involving unsafe consumer products that officers have said they are investigating has fallen. This does not have a bearing on the number of unsafe consumer goods on the market, but it is known that the demands on the service are increasing and that other duties may take precedence including those relating to food standards.

These latter duties largely relate to labelling and ingredients as well as statutory declarations on food rather than safety that is dealt with by

Environmental Health Officers (EHOs). EHOs are now, following local government reforms, often to be found in the same department as TSOs.

6.2.4 Recalls

Jenkins (1988) started to list product recalls for RoSPA in 1988 and called for an official national database to be set up that was accessible to the public. A list of recall notices published in the press by suppliers and manufacturers warning consumers about dangers presented by their products is provided in Appendix 10 covering the four year period November 1997 to December 2000.

Simpson (1998) produced a report on recalls and the DTI later funded some research into the subject. The need for such recall action was acknowledged by Abbott (1991) and the Consumers' Association (1993). The research commissioned by the DTI (1999b) was published in the form of a Consumer Product Recall good practice guide *for businesses to take corrective action to safeguard consumers from unsafe products*. A follow up report was also published by the DTI (2000c) to answer the question why more products that were known to be unsafe had not been recalled by the businesses responsible. The report recognised that its findings lacked rigour and were open to question, presumably by RoSPA and the TSI who they reported had recorded far more examples of unsafe products that should have been recalled than were the subject of such action. The recall data from RoSPA was also used in research into product recalls again funded by the DTI (1999c).

A revision of the General Product Safety Regulations 1994 will be necessary following the amendments to the General Product Safety Directive and this will entail the setting up of an effective recall system throughout Europe. The use of risk assessment to quantify the exposure of consumers and others likely to be effected by unsafe products will then become essential with the aim of making decisions based on an objective assessment as far as possible.

Records of product recalls were kept by me starting in 1988 and a database was later created for the purposes of the research part of which is reproduced in Appendix 10. From this, examples were taken at random to show how risk assessment could have been carried out at the design stage of the faulty product to prevent the failure and the need to withdraw it from the market.

The number of recalls helps quantify the extent of unsafe products on the market. I collected recall data for over twelve years after writing an article on the subject for RoSPA's journal Care in the Home (now Staying Alive). I concluded that Recalls would be better controlled when the General Product Safety Regulations were amended and a more formal procedure adopted following the revision of the Directive. There is a clear need to warn the public about unsafe products and how they can limit their exposure to the hazard and reduce their risk. In certain cases it will be appropriate for such products to be taken off the market immediately, for which special powers already exist in the form of Suspension Notices and Notices to Warn. The Trading Standards Institute has sponsored research into product recalls Simpson (1998) and the government has also published a guidance document for businesses DTI (1999b).

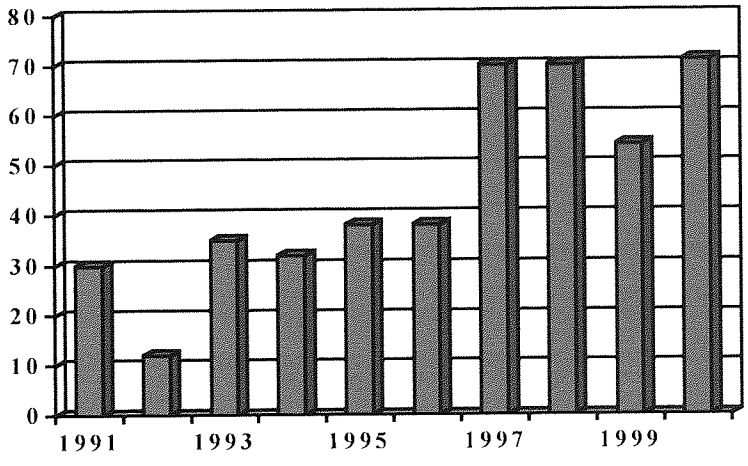

Figure 15: Product Recalls
Source: RoSPA recalls database

Figure 15 above shows the number of recalls for the ten years to the end of 2000 a total of 450. This is taken from the RoSPA database. The list

excludes road vehicles and food, other than that which has been contaminated by glass particles or metal fragments.

The current frequency exceeds one product recall a week in the UK. The decision to instigate a Recall is not taken lightly; it is an expensive procedure, sometimes costing millions of pounds. It is reasonable therefore to conclude that the products involved represent a significant risk to users that could result in litigation. RoSPA's recalls database only includes non-food products, other than physical contamination such as broken glass or metal fragments, and it does not include vehicles.

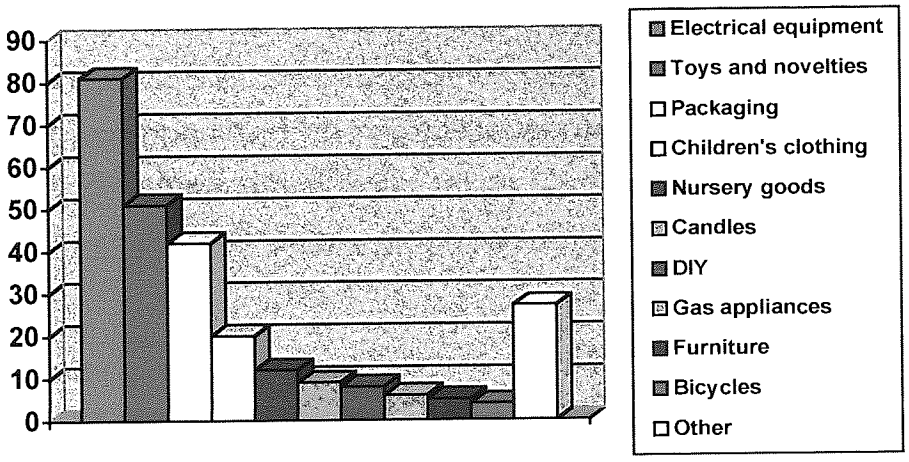

Figure 16: Product Categories - Recalls

Figure 16 above shows the categories of consumer products recalled over the four years ended 31.12.00 totalling 265 recalls. Electrical equipment figured most prominently with 81 recalls identifying an electrocution hazard in the majority of cases followed by fire. Toys and novelties featured in 51 recalls that dealt with the choking hazard presented by small parts that were easily detachable by a child. Most of the 42 packaging recalls followed the discovery of contamination by glass particles and metal fragments. A choking hazard caused by small parts becoming detached featured in many of the children's clothing that were the subject of a recall notice as well as strangulation from excessively long cords.

A list of retailers and manufacturers who have recalled their products reads like a Who's Who of the business world. However it doesn't appear to have damaged their reputations, indeed there are indications that they may have been enhanced because people feel they are taking safety seriously, and of course recall notices unfortunately still read more like advertisements!

Many of the recalls could have been prevented, saving businesses millions of pounds and removing the risk to thousands of people. The records show that the number of consumer products recalled from the UK market increased by 50% from 1997 and continues at a rate of 65 a year. There is no apparent reason for this trend other than perhaps a gradual recognition by companies of the risk of legal consequences, both criminal and civil, if appropriate action is not taken to mitigate the danger to the public presented by their unsafe products.

6.2.5 Product Liability Cases

Strict liability for the safety of products was introduced into British law under Part 1 of the Consumer Protection Act 1987 as required by the Product Liability Directive (85/374/EEC) and came into effect on 1 May 1988. This development followed recommendations made by the Royal Commission on Civil Liability, the Pearson (1978) report some ten years earlier. Strict liability removes the need for an injured person to establish that the manufacturer of the product that caused the injury had been negligent.

Unsafe consumer products feature in a number of civil cases but fewer than one might expect following the introduction of the new provisions that removed the need for the litigant to establish fault on the part of the producer, importer or "*own-brander*". During discussions with lawyers involved in the current study it was evident that many still felt it necessary to establish at least a degree of negligence on the part of the company being sued even though this was no longer necessary.

All that was needed was to convince a court on the balance of probabilities that the product complained of was made by the defendant and contained a defect that had caused an injury to the client. It is probably difficult to change such a traditional approach adopted over many years and there is perhaps some residual need to demonstrate to the court some wrongdoing by the defendant that had resulted in the injury.

Despite claims often made in the media that British consumers are following American litigation frenzy, research carried out by the National Consumer Council (NCC) (1995) reported that in 1984 only 26% of a sample of accident victims considered claiming damages, only 14% consulted a solicitor and only 12% recovered compensation. The report estimated that only 10% of accident victims considered claiming compensation however serious the injury.

The NCC commissioned a survey of a sample of 2,000 people and found that around 3% of respondents or a person they knew had been injured by a faulty product, other than a motor vehicle, in the previous three years. This equates to a figure of 600,000 people injured in one year. Approximately 2.8 million people were injured in accidents at home according to the latest data HASS (2000) indicating that around one in five or 20% of accidents are likely to have been caused by an unsafe product.

The secondary evidence used in this section consists of 156 civil cases in which I provided reports on behalf of RoSPA for clients to the end of 2000. 98 involved consumer products that were claimed to have been the cause of personal injuries for which the victim was suing for damages.

Most of the cases involved electrical appliances but toys, furniture and structural parts of dwellings including doors, stairs and glazing also featured prominently.

The products that were the subject of injuries resulting in claims for damages either against the landlord or the producer of the product are categorized in Figure 17 below.

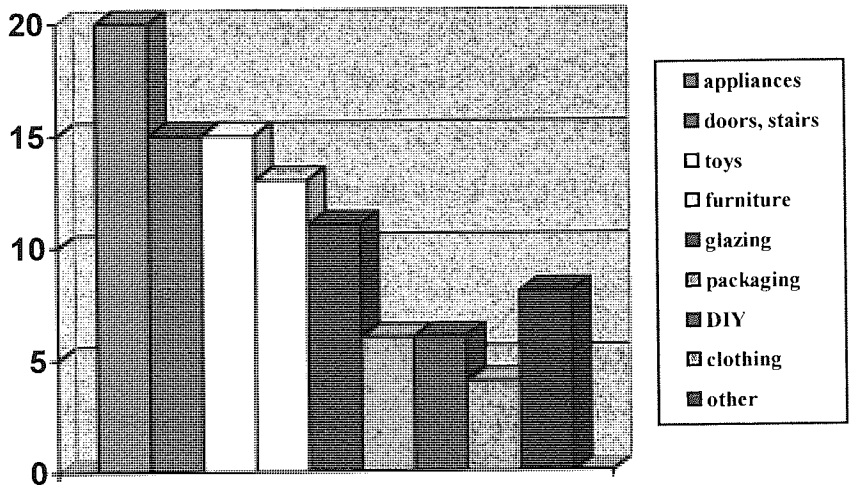

Figure 17: Product Liability Cases
Source: RoSPA Product Safety Files

Faults found in the 20 appliances included contact burns from excessively hot surfaces of electric cookers. Constructional features of the home included products such as doors, stairs and flooring, accounted for the next most frequent injury cases alongside toys.

Most of the toy cases involved eye injuries caused by relatively sharp edges making contact with a child's face. A toy helicopter the blades of which rotated at speed but without protection and a "*Flying Angel*" toy that again was activated by means of a pull cord and launched into the air both caused serious eye injuries. Both were unpredictable in their flight and continuous, unsupervised use put anyone in the vicinity at risk of injury.

Several furniture cases involved bunk beds from which children had fallen. It was very helpful to have safety regulations, the Bunk Beds (Entrapment Hazards)(Safety) Regulations 1987 (SI 1337) and a standard on which to

base the safety assessment. Two of the bunk beds failed to satisfy the specification with regard to their constructional features increasing the likelihood of a child falling from the top bunk.

Glass featured in 11 cases, most involving glazed panels in doors. A child ran after her friend not realising that the door had closed in front of her. She suffered serious lacerations to her leg and hand when the ordinary annealed glazed panels broke. The council who were the landlords had an improvement programme to replace all such panels with safety glazing, as recommended by RoSPA, to the level now required under the Building Regulations 1991 for new dwellings.

Unfortunately the scheme was not based on any assessment of the risks presented by the dwellings and the location where the accident happened was where most families with young children were housed. I pointed this out in my report to Arnison, solicitors of Penrith who instructed me on 11.12.97. This together with the steep approach to the doors, a bank down which children were known to run, indicated that the council could have acted with greater care to ensure the safety of their tenants.

Packaging and DIY accounted for six cases each. Cuts caused when opening tins and glass bottles shattering resulted in claims against the respective producers. A garden rotavator produced serious injuries when the operator fell over whilst turning and the blades continued to rotate cutting his legs. The size and power of the machine suggested that it was unsuitable for an amateur gardener to use without proper training and suitable protective equipment.

Two of the clothing cases involved anoraks with long cords that had become caught in the doors of moving vehicles. Another case involved a highly flammable cotton bathrobe that ignited when the wearer was boiling a kettle on her gas stove. Although the circumstances were fraught with danger and should have been avoided, it was decided to

assess the rate of spread of flame as the burns were so severe and the speed of ignition so rapid.

Unlike children's nightwear, such garments are not required to be treated with flame retardants but the rate of spread of flame was found to be three times this level which indicated that it was unsafe and unsuitable for such use.

Burns resulting from inadvertent contact with hot parts of electrical appliances accounted for several cases. The parts in question were not working parts of the equipment and were sufficiently exposed as to present a risk of injury particularly to young children and older persons.

The manufacturers should have used risk assessment at the product design stage in each of the cases quoted above to eliminate the hazards that resulted in the injuries described.

6.3 Questionnaire

The telephone questionnaire is reproduced in Appendix 11, its preparation and use are explained in Chapter 5, Methodology and the results are analysed in Chapter 7.

6.3.1 Records

As described in Chapter 5 Methodology, records were kept over a period of five years in fifteen notebooks. These records included all enquiries received in my capacity as the Product Safety Adviser to RoSPA during that time which totalled 19,500. The enquiries from enforcement officers therefore represented 8% of the total and it was these 1,589 that provided the responses to the questionnaire. A summary of the results recorded in the log is given below.

The records in notebook 1 includes 148 enquiries received from TSOs and other enforcement officers during the initial six month trial period up to the end of 1995 during which time the approach, in particular the

questionnaire, was tested. The number of enquiries received from this source was 1,589 representing 8% of all enquiries received by me over the five-year period from all other sources. These other sources included the media, members of RoSPA, manufacturers, consumers, lawyers, consultants and colleagues.

6.3.2 Logged Enquiries

[illegible]	Period	[illegible] Enquiries
1 and 2 (part)*	07.95 – 12.95	148
2 (part)	01.96 – 02.96	29
3	02.96 – 07.96	120
4	07.96 – 10.96	161
5	10.96 – 01.97	99
6	01.97 – 06.97	159
7	06.97 – 11.97	114
8	11.97 – 04.98	133
9	04.98 – 10.98	135
10	10.98 – 03.99	105
11	03.99 – 07.99	87
12	07.99 – 12.99	93
13	12.99 – 04.00	110
14	04.00 – 08.00	132
15	08.00 – 12.00	112
Total	**01.96–12.00 (5 years)**	**1589**

Table 55: Officer Enquiries

* Pilot study period

I received the 1,589 enquiries in person at RoSPA during the five-year study period ending 31.12.00. The enquiries were logged over a period of 100 hours per month from 01.01.96 to 31.12.00. The enquirers were self-selecting participants in the study. Although the total number of respondents represents just over half of all enforcement officers in the country and is therefore arguably a valid cross-section was achieved for the purposes of the study, a number of enquirers called more than one time. This was however considered unlikely to affect the results and be

considered representative of officers' views and experiences of the subject.

Responses to the questionnaire were reported in four parts as shown in Table 56.

[illegible]
Products and Hazards
Risk Assessment
Administration
Enforcement Issues

Table 56: Questionnaire Responses 2

During the study 1,589 respondents provided answers to the first three questions. No record was kept of those who declined to answer any of the questions but the co-operation of officers was almost universal.

1. What product or issue is the subject of your enquiry?
2. What is the nature of your enquiry?
3. Do you use a formal risk assessment procedure?

A total of 380 interviewees gave answers to all six questions which included providing information regarding the level of product safety activity and enforcement work carried out within their departments and whether they had benefited from any of the DTI product research papers, HASS reports or other papers on the subject.

[illegible]	[illegible]
Part A only	1,589
All questions	380
Total respondents	1,589

Table 57: Summary of Responses

6.3.3 Products and Hazards

Questions 1 and 2 (N = 1,589)

Question	Answer
1. What product or issue is the subject of your enquiry?	See table below
2. What is the nature of your enquiry?	See table below

The categories of products mentioned most frequently during the period when the telephone questionnaire was in use are given in the table below together with the hazards as identified by the officer or the complainant.

Product categories and hazards

[illegible]	Hazard	Number	%
Electrical appliances	Electrocution, fire	140	8.80
Toys and novelties	Choking, sharp edges	116	7.30
Glass and glazing	Sharp edges	90	5.66
Child transport nursery products	Entrapment, stability	84	5.29
Furniture	Flammability, entrapment	67	4.22
Children's clothing	Burns, strangulation	46	2.89
Lighters	Fire	42	2.64
Fireworks	Fire, explosion	36	2.27
DIY tools, equipment, PPE	Sharp edges	34	2.14
Cooking equipment	Heat, toxicity	27	1.70
Gas appliances	Fire, toxicity, explosion	21	1.32
Other	Various	886	55.77
Total		1589	100.00

Table 58: Product Categories and Hazards

6.3.4 Risk Assessment

Question 3 (N = 1,589)

[illegible]	Number	%
No	**1,416**	**89**
Yes	22	1
Unknown	151	10
Total	1,589	100

6.3.5 Administration

Questions 4 and 5 (N = 380)

	Answer	Number	%
4. Is there a specialist in product safety in your department?	No	318	84
	Yes	23	6
	Unknown	39	10
	Total	380	100
5. Are there enough resources to carry out investigations?	No	258	68
	Yes	34	9
	Unknown	88	23
	Total	380	100

6.3.6 Enforcement Issues

Questions 6 and 7 (N=380)

6. What, if any, problems inhibit effective action?	See comments below
7. Any other comments?	See comments below

The comments provided by those interviewees who answered all the questions were categorised under three headings - resources, support and procedures.

1. Resources	74	19.5
2. Support	123	32.4
3. Procedures	183	48.1
Total	380	100.0

6.3.6.1 Resources

The respondents referred to the lack of adequate resources to carry out the necessary testing and follow-up action frequently. The lack of adequate finance was a particular constraint on effective enforcement work it was felt by several contributors. The risk of their authorities having to pay compensation if a product turned out not to breach the safety rules was mentioned in particular.

Many officers appeared very pressed for time and claimed to have had little opportunity to research the product they were investigating as thoroughly as they would wish. There was a need for access to specialists in the field of product safety generally but the depth of knowledge required to support a formal investigation meant that they would need to have the best expert available if they were to pursue a case through to prosecution.

Pressures of other work such as food standards and counterfeit goods meant that the time spent on pro-active inspection and sampling of products on the market was extremely limited.

The following comments were made:

We don't have enough staff and resources to do the job properly.
Our finances are stretched too far to give sufficient attention to safety work.
Full-scale investigations are too costly and time consuming we have to compromise.
A mistake can result in my authority having to pay compensation.
Money set aside for safety work is quickly eaten up.
I don't have time to read all I should about product safety.
We don't have time for routine inspection and sampling work.

6.3.6.2 Officer Support

Support for the officers includes the availability of expert advice and testing facilities as well as information including accident data, standards and product research. When carrying out an investigation into the safety of a product, an officer will place considerable reliance on the relevant standard for that product. Other information that is important such as the many DTI funded research documents (Appendix 1) are seldom consulted and many officers were unaware of the HASS accident database. The following comments were made:

Test houses charge high fees and take too long to report.
We get a poor response from test houses, excessive costs and delays.
I've had several reports with incorrect results from test labs.
I only use documents specific to the investigation e.g. the standard.
I'm not aware of the HASS accident database or DTI research.
HASS doesn't give any details of the brand of product I'm investigating.

6.3.6.3 Administrative Procedures

The area that caused greatest concern for the officers was the general procedural conditions under which they had to perform their duties. There are many inhibitions to taking formal action such as pursuing a prosecution when a product has been found to breach safety regulations.

Several officers raised the issue of having to follow a more laid back approach to importers, manufacturers and suppliers of dangerous products than they thought appropriate in the circumstances. Every alternative to formal prosecution action had to be considered which often meant that products were still being sold long after tests had shown they were dangerous.

Criticisms on Administrative Procedures
There are too many codes of practice and soft options for unscrupulous traders.
There's not enough attention paid to prosecution work nowadays.
The enforcement concordat undermines effective prosecution work.
There are too many distractions such as the latest government-auditing scheme.
There's more pressure to carry out non-safety work such as food and counterfeiting.
There's not enough backup or encouragement for proper safety investigations.
Big companies invariably challenge your findings and recommendations.
More cases are challenged nowadays creating additional demands.
There is always an expert on the other side to disagree with your expert.
The importance of enforcement work is not appreciated nowadays.
More satisfaction and kudos doing other work such as counterfeit goods.
There are easier and more straightforward areas for investigations than product safety.
We do what we can but there is no real monitoring of what we do.
Complainants seem happy that we have at least done something to help them.
More efficient ways to resolve safety problems should be found.

Other areas of work often take precedence over product safety it was claimed such as food standards, counterfeiting and for the larger combined trading standards and environmental health departments, health and safety.

It was stated that safety enforcement was much more demanding of officers' skills and effort than many other areas of their trade control work. Without what some claimed to be adequate training and support there was a reluctance to choose product safety work where there was constant demand for action to be taken in other areas.

The comments above were made by officers in connection with what I have classified as administrative procedures. They indicate a degree of dissatisfaction with the way in which they are required to carry out their important functions in ensuring that consumer products on the market are as safe as the law requires.

6.4 Case studies

The data presented here include twenty-three consumer products selected from the 272 cases listed in Appendix 5 for which I provided an expert statement in support of a prosecution. Details of the cases are summarised in the table and analysed in Chapter 7.

Products from a large manufacturer and distributor are also featured to demonstrate how even the most reputable and well-known companies can still produce and supply unsafe products that can cause serious injury.

The third category of cases is taken from my files and includes products that have been recalled from the market and public warnings issued by producers and suppliers (Appendix 10) and cases taken from an officer's portfolio (Appendix 7).

The case histories are analysed in Chapter 7 under the headings of the relevant European Directives on which the British safety regulations under the CPA are based.

05.90	Walsall	1. Vacuum flasks	Eros	Hot liquid	Prosecutions successful (15)
11.90	Hereford & Worcester	2. Toy crystal set	Peter Pan Playthings	Toxic (copper sulphate)	Prosecution - £2000 fatality
01.92	Greenwich LB	3. Wave machine	The Wave Company	Electrical	Prosecution, live parts
08.92	Gloucester	4. Cooker hood	Magnet	Electrical/hot surface	Prosecution succeeded
03.93	Walsall	5. Oven cleaner	Jeyes Kleenoff	Toxic substance	Prosecution TDA –"*no fumes*"
05.93	Solihull	6. Cool touch cooker	New World	Hot surface	Prosecution TDA surface temp
12.93	Solihull	7. Food blender	Philips	Sharp edges, hot liquid	Prosecution - injury
05.95	Lancashire	8. Gas fire	Robinson Willey	Toxic (CO)	Prosecution – CO fatality
07.95	Gwynedd	9. Electric jug kettle	Hinari	Hot liquid	Prosecution failed
02.96	Warwickshire	10. Exercise skier	Alpine X country	Toxic (asbestos)	Asbestos in brake pads
03.96	Walsall	11. Electric plug/ cable	Aashima UK Ltd	Electrical	Prosecution failed
06.96	Stockton on Tees	12. Safety film for glass	Bonwyke Ltd	Sharp edges	Prosecution failed

07.96	Newcastle	13. Garden slide	ELC	Entrapment	Prosecution – fatality
09.96	Hereford & Worcester	14. Electric toaster	Salton	Hot surface	No formal action - Surface temp.
07.97	Newry & Mourne	15. Bath mat	Neptune	Loose surface	Prosecution failed
05.98	Tower Hamlets LB	16. Novelty lighters	Test purchase - various	Ignition	Prosecution succeeded
09.98	Sandwell	17. Glass shelf	Homebase	Sharp edges	Prosecution – injury
10.98	Walsall	18. Panic bolt	Yale	Escape failure	Failed 22N – Modified
01.99	Birmingham City	19. Anglepoise lamp	HHS Trading	Hot surface	No formal action noted
03.99	Wirral	20. Bunk beds	Montreal	Unstable, entrapment	Prosecution - £2.5k
07.99	Liverpool	21. Baby walker	Petite Star Products	Unstable	Suspension notice failed
08.99	Stafford	22. Luggage straps	Astro	Kinetic energy release	Prosecution - eye injury
11.99	Gloucester	23. Folding mattress	Lidl	Flammability	Prosecution succeeded

Table 59: Prosecution Cases

6.4.1 Expert Witness Statements

The above cases for which I provided statements as an expert witness, registered in the Law Society's Directory of Experts, were selected for closer examination to see whether an assessment of the risk presented by the various consumer products had been used or could have been used to advantage. This is considered in the next chapter in which the data is analysed. The companies involved in these investigations by TSOs will no doubt have learnt lessons and modified their management processes accordingly including those cases where the prosecutions failed.

The cases also revealed other information that is analysed and discussed in Chapter 7. The cases are listed chronologically and will be dealt with in that order below. A brief explanation of the column headings is provided first.

6.4.1.1 Date

The cases are listed in the above table in chronological order and were selected to provide a cross section of different types of products and hazards over the ten-year period to the end of 1999. The number of requests for statements declined markedly over the period as shown in Chapter 3 Managing Product Safety but these examples are considered to present a reasonably wide and varied selection of consumer products.

6.4.1.2 Local Authorities

The local authorities ranged from County Councils to London Boroughs including the Metropolitan Borough Councils. Authorities in the West Midlands where I am based at RoSPA's headquarters, particularly Walsall were well represented in this selection as in the total number of 272 statements issued to enforcement officers over the period. A list of the 62 instructing authorities is provided in Appendix 13.

6.4.1.3 Products

Twenty-three products were considered sufficiently unsafe to warrant prosecution of those who produced and/or supplied them. Popular everyday consumer products are included that are widely available.

6.4.1.4 Defendants

Several leading companies are listed in the table including Magnet, Philips and Hinari showing that even the most prestigious companies can produce products that fail the minimum safety levels laid down by law. It is relevant to point out that those prosecutions that succeeded would have done so despite the defence of due diligence having been put forward on behalf of the defendants. This suggests that their internal control systems were less efficient than they should have been.

6.4.1.5 Hazards

A wide range of hazards is included in the list including electrical, hot surfaces and mechanical. Several products were involved in fatal accidents, carbon monoxide poisoning from a faulty gas fire, strangulation following entrapment in a toy slide and poisoning from a toy chemistry set that contained copper sulphate.

6.4.1.6 Action

Prosecutions listed were usually successful although five cases failed to convince the Magistrates beyond reasonable doubt. Details are provided below but it is likely that further evidence to support the claim that the product was unsafe and unacceptably so would probably have been useful to the court in many instances. Such a service might be provided by the use of risk assessment that would give a degree of objectivity to the claim to support the other evidence, usually test reports and the opinion of an expert.

It is interesting to note the use of the Trade Descriptions Act 1968 to deal with some of the unsafe products. It is an offence to apply a false trade description to goods for supply. The courts accepted the claim that a

cleaning product produced "no fumes" when it clearly did and about which a complaint had been registered as an offence. Also, to describe a cooker as "*cool touch*" when it produced surface temperatures that could cause a burn injury if touched was also taken as a false trade description. These cases pre-dated the General Product Safety Regulations 1994 and demonstrated the need for the 'catch-all' provisions where products were not adequately covered by existing legislation.

Most of the cases for which I had provided a statement resulted in charges being laid and the prosecutions usually succeeded. The remaining cases were dropped usually following an agreement with the defendant company to take appropriate action to reduce the risk, usually by modifying the product involved or removing them from sale.

6.4.2 Products

Details of the products involved in the cases cited above are summarised below including those where accidents resulted in serious and fatal injuries. Others are dealt with as case studies. The examples are typical consumer products widely available on the market and supplied through various outlets from mail order to large multiple retail establishments.

In Chapter 7 the data are analysed in relation to the relevant Directives and their assessed risks. The products in question all have to satisfy specific legal requirements based on European Directives. Brief details of the products involved in the cases are given below.

6.4.2.1 Vacuum Flask

A vacuum flask was stored upright in the back of an estate car close to where a child was sitting. Some of the hot contents escaped from the flask and scalded the child. Following complaints several authorities conducted tests on various vacuum flasks that were found to fail the tests prescribed by the standard. The court agreed that failure to meet the standard particularly with regard to securing the contents of the flask rendered the product unsafe.

6.4.2.2 Toy Crystal Set

A child kept a container of her Peter Pan Playthings toy crystal set near her bed and drank some of the liquid during the night by mistake. She died from copper sulphate poisoning. Such toys, including chemistry sets, are now better controlled following guidance provided by the European Standard EN 71 which requires the use of safer alternative substances as well as better packaging and marking.

6.4.2.3 Wave Machine

This novelty item was intended for wall display portraying an image of flowing water. The electrical wiring was protected by only basic insulation and live parts were accessible without the use of tools increasing the risk of electrocution. The product failed the Electrical Equipment (Safety) Regulations and the court convicted the defendant company.

6.4.2.4 Cooker Hood

The electrically operated hood was fitted above a gas hob following the instructions supplied. The purchaser noticed after a short period of use that the plastic housing had overheated and distorted exposing basic insulation and wiring. A complaint was made to the retailer who replaced the product with an identical hood. When the same fault occurred the consumer approached the trading standards service that prosecuted the company. The hood had been tested by the company against the standard and had passed. The tests in the standard had been drawn up using an electric hob that did not replicate the conditions when it was used over a gas hob. As the cooker hood was not restricted for use with an electric cooker it was deemed to fail the requirements of the regulations in that it was not safe. The earlier failure should have alerted the suppliers and manufacturer to the problem so their claim to have taken all steps to avoid committing the offence could not be sustained.

6.4.2.5 Oven Cleaner

Contrary to the claim on the packaging the cleaner produced toxic emissions during use and was reported to the local authority who prosecuted. Although the levels of emission were considered not to be life threatening and the duration of exposure was limited there was clearly a justified claim that the description was false to a material degree and the company was convicted of the offence.

6.4.2.6 Cool Touch Cooker

Excessively high surface temperatures have featured frequently in the media over many years and the example of a toaster is given in the case studies that detail the historical development of the issue. Manufacturers of the New World brand used the cool touch description presumably to take advantage of the publicity surrounding the problem but the temperatures they achieved could not be considered safe, another description applied to the cooker by the manufacturer which was refuted by Dr Lawrence (1992) of the Burns Research Group, Birmingham. The standard on which the company based their defence BS 5386 did not provide a safe temperature limit. The court agreed that a false trade description had been applied and convicted the company.

6.4.2.7 Food Blender

A Philips Standmixer blender model HR 2811 was the subject of a complaint that subsequently resulted in a prosecution being brought against the company. A sample of the product was submitted for an ergonomic assessment that produced a report Page (1993) that criticised the design of the blender. The risks were not reduced to an acceptable level and the operating instructions and warnings were found to be confusing. The report stated that the design enables users to incorrectly assemble the product. The court agreed with the charges brought and convicted the company.

6.4.2.8 Gas Fire

An elderly gentleman had a new gas fire installed; correctly by a CORGI registered fitter after his old one had been condemned for safety reasons. He died from carbon monoxide poisoning soon afterwards. The fault did not lie with the installation but in a defect in the design of the fire itself.

After using his new fire for some days, he found it easier to operate it by pulling the 3-pin 13 Amp plug out of its socket to close the fire down at night. This stopped the electric fan extracting combustion products along a horizontal pipe to an outside wall, a novel design. This in turn should have activated a "*cut-out*" valve to turn the gas supply off.

However, the valve failed to close properly and the fire continued to burn after he had retired for the night. This used up all the air and produced the poisonous carbon monoxide gas CO that killed him. Giving evidence at the trial I said that it was a foreseeable condition of use that the plug would be pulled out to turn the fire off, as this was a simple way to turn the fire off and on and was not cautioned against in the operating instructions. The manufacturers should have anticipated this and incorporated a back-up means to ensure that in the event of valve failure, the gas fire was rendered safe; it would fail to a safe condition.

The Recall Notice shown in Figure 18 below was published in the Daily Mail 09.02.95 by the manufacturer and modifications were carried out on the fires previously sold.

Figure 18: Gas Fire – Recall Notice
Source: Daily Mail, 09-02-95

Gas appliances are subject to strict controls and when sold must satisfy the Gas Appliances (Safety) Regulations 1995 enforced by trading standards officers. Approved Bodies such as British Gas have to certify all gas appliances and components and monitor their production so that unsafe designs are not allowed onto the market.

A prosecution was brought by Lancashire County Council Trading Standards Department and the trial took place on 18 January 1996 at Blackburn Magistrates' Court against Robinson Willey Ltd. of Liverpool. The manufacturers of the fire were charged with causing a Blackburn heating firm to possess for supply a Turbo Gas Fire which was a dangerous product in contravention of the General Product Safety Regulations 1994.

Tests were carried out on the fire in-situ and at the Health and Safety laboratories at Buxton. The solenoid valve that was essential to the safe functioning of the fire was found to stick intermittently in the open position when the power supply was disconnected. It was suggested that the likely cause of this was the phenomenon known as magnetic remanance that caused the valve armature and end stop to remain in contact thus preventing an effective seal.

Further investigations showed similar faults had occurred when the same type of fire was tested by British Gas in 1991 required for approval purposes but no further action had been taken at that time. Robinson Willey sought to put the blame on the valve manufacturer Sperryn Gas Controls but they claimed the fire manufacturer had not told them that their valve was to be used as a safety device.

The fire manufacturers tried to blame the valve manufacturer, misuse by the user and to establish a due diligence defence by demonstrating that the fire had been tested for compliance with the appropriate British Standard and that all components also met safety standards and were made by a company with BS 5750 quality assurance accreditation. The Magistrates nevertheless found the case proven and imposed a fine of £2,000 and awarded costs of £20,000 against the company.

6.4.2.9 Electric Jug Kettle

Figure 19: Electric Jug Kettle

The designer of this Hinari jug kettle omitted to check what would happen when the kettle was being poured. The lid fell off! An elderly gentleman in North Wales scalded himself the first time he used it. He took it back to his local Asda supermarket where he bought it, but they dismissed his complaint saying, "*All their products meet the safety standards*". It did, but there was no requirement in the standard to ensure a lid would remain in place when the kettle was being poured.

Background

Giving evidence at the trial I said the kettle failed two of the three safety requirements in the regulations, it was not "*safe*" as defined in section 19 of the CPA and it did not satisfy the safety objectives in Schedule 3 of the Electrical Equipment (Safety) Regulations 1994 [SI 1994 No.3260]. The only one of the three requirements it met was that it satisfied the kettle standard that was clearly defective in this respect. The defence expert kept one hand on the lid when he demonstrated the pouring action. Unfortunately the court accepted that the defendant had acted reasonably. The defendant established a defence that they had taken all reasonable precautions and exercised all due diligence. This is a matter for the Magistrates to decide on. Following representations to BSI on behalf of RoSPA, the standard now has a test for kettle lid security. However there are many similar kettles still in use as there was no product recall or public warning issued.

Although this case, and a similar one taken a few months later, did not succeed it provides a good example of where the designers' and manufacturers' responsibilities lie and how far a standard has to go to ensure that products that satisfy the specification are legally "*safe*". The standard is not a legal requirement and yet compliance with it provides an excellent defence, the argument being that those who developed the standard would have taken all the hazards into account.

6.4.2.10 Exercise Skier

The CSA Alpine Cross-country Skier Model E270 was found to have twelve small chrysotile white asbestos pads located behind adjustable tension knobs. The use of asbestos in consumer products is strictly regulated under the Asbestos Product (Safety) Regulations 1985 as amended in 1987 most forms being banned. Chrysotile was eventually prohibited in products from 24 November 1999 under the Asbestos (Prohibitions) Regulations 1992.

6.4.2.11 Plug and Cable

The moulded-on 3-pin 13 amp plug and cable failed to meet the requirements of the standards in that the insulation was not as thick as specified and there was no fuse provided. The defendant claimed that he had not supplied the product and the court accepted that the prosecution had not established this to their satisfaction. The case was dismissed. It is not known what happened to the plug and cable sets.

The importance of power plugs and the now mandatory requirement for all electrical appliances to have them fitted is detailed in Jenkins (1990b) and (1992) which also discusses the RoSPA campaign that culminated in the safety regulations being introduced.

6.4.2.12 Safety Film for Glass

Questions had been raised concerning the effectiveness of safety film to be applied to glass. In particular, whether the claim made on the packaging was correct in that it raised the performance of the glass to which it had been applied to that of 'safety glass'. Samples of the film were submitted to the test laboratory to assess its performance. It wasn't possible to apply the film to the test samples of glass and the dimensions had to be modified to accommodate the different dimensions. During the second day of the case the judge called a halt because he felt the results were fundamentally flawed in that the procedures laid down in the standard had not been followed precisely. The case was dismissed and the manufacturer later claimed that the court had vindicated his company and confirmed his product rendered the glass to which the film was applied 'safety glass'.

6.4.2.13 Garden Slide

A child was playing alone in the garden near an Early Learning Centre slide. She climbed up the side of the slide on its supporting legs and became trapped by the neck between a vertical and an angled cross member. Her injuries proved fatal. The slide failed the mechanical and physical requirements in the Essential Safety Requirements of the Toys

(Safety) Regulations because it presented a significant risk of injury. The company, under new management, introduced a more effective mechanism to deal with such emergencies.

6.4.2.14 Electric Toaster

Tests carried out on the Salton Harmony toaster Clift (1996) showed that the side panels reached temperatures of 200 degrees Celsius that medical evidence; Lawrence (1996) said could cause burns.

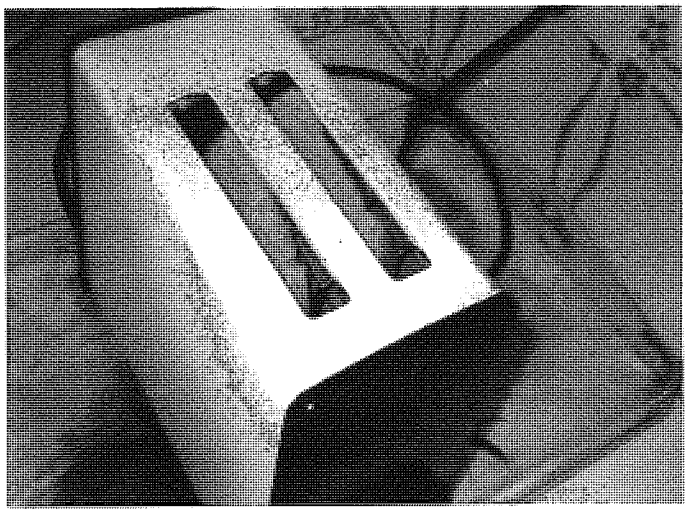

Figure 20: Electric Toaster

Background

The toaster featured in Figure 20 above was purchased in 1982 and an identical model was still available at the time of writing. Its sidewalls reach such temperatures that contact for just one second is sufficient to cause a burn. Consumer bodies, including RoSPA, have campaigned for many years to have non-working surface temperatures reduced to safer levels for toasters and other appliances Jenkins (1999).

Bassett (2001) of the Consumers' Association held a seminar where the issue was discussed at length and the European standards bodies have now been instructed by the Commission to address the issue. This is contained in Commission Opinion 2000/C 104/07 ruling that the surface temperature burn hazard must be addressed by the standard EN 60335-2-9 toasters, grill roasters.

Although temperatures are unlikely to be reduced to an acceptable level in the near future, the current compromise level of 90 degrees Celsius above ambient is still far too high. At least manufacturers should now be fully aware of the problem and will be obliged to deal with it, either by using heat resistant materials or improving the insulation. It is likely however that the standards committees will permit the use of warnings on the appliance and in the instructions.

The poor design of the bread slots in this and similar toasters is indicative of the lack of attention paid to safety. The top edge of the bread is easily caught inside the toaster encouraging the use of knives to extricate it, with potentially serious results. This problem was identified in the government report on design trends DTI (1989) and yet still persists with many toasters available on the market and in use today.

6.4.2.15 Bath Mat

An elderly person had slipped on a bath mat when stepping into the bath to take a shower. Tests had to be developed to assess its performance, as there was no British Standard available. The rubber suction cups on the mat were found to lose their adherence properties when a force was applied at an angle simulating a heel being placed on it.

The court was not convinced that the case had been proven beyond reasonable doubt and dismissed the charges. A request was made to BSI to develop a standard for bath mats but this has not been proceeded with at the time of writing.

6.4.2.16 Child-Appealing Lighters

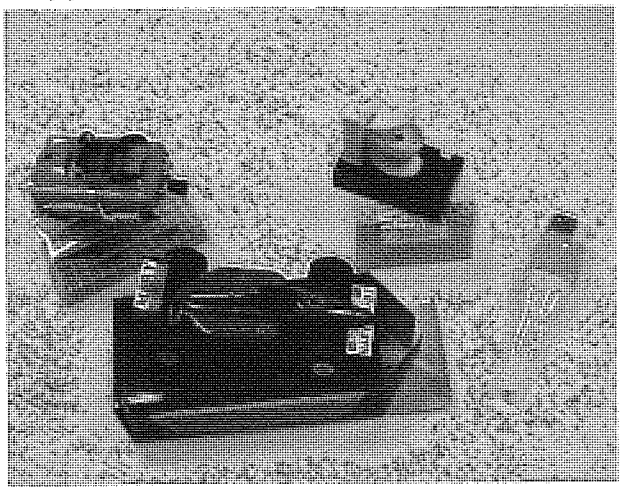

Figure 21: Child-Appealing Lighters

These novelty LPG lighters look like toys and if left lying around will attract the attention of young children with disastrous results. The USA's Consumer Product Safety Commission made it illegal to sell lighters that were not child-resistant. Research has shown that this has resulted in a significant reduction in house fires caused by children playing with lighters Smith (2000). The mandatory standard became effective 12.07.94 and it has been estimated that in 1998 there was a reduction of 4.800 fires and 130 lives were saved as a result.

In addition to the child-appealing nature of such lighters great concern has been expressed over the safety of cheap disposable plastic lighters. Many have been found to fail the performance standard BS 6908 and the harmonized version EN 29994:1990, equivalent to ISO 9994.2. Leaking fuel chambers, excessive flame height, unpredictable flaring and failure to extinguish were all faults that were identified Jenkins (1996).

6.4.2.17 Glass Bathroom Shelf

The next example of an unsafe consumer product involves a 4mm thick piece of annealed glass sold by a large DIY company for installation as a shelf for fitting above a bath in a domestic bathroom.

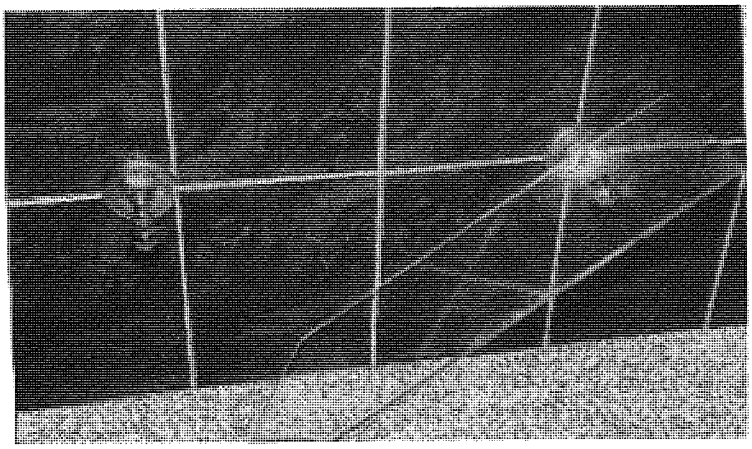

Figure 22: Glass Bathroom Shelf

Background

On 5 November 1998, following a five day trial, Homebase Ltd were fined £5,000: and ordered to pay costs of £11,555: by Warley Magistrates for supplying an annealed glass bathroom shelf. Sandwell Metropolitan Borough Council's Trading Standards Service brought the case and I was asked to provide the expert evidence by the prosecution.

The Court decided that the glass shelf failed to satisfy the General Product Safety Regulations 1994 because it was not a "*safe product*" as defined by the regulations. The regulations require producers and those who import goods into the Community to place only safe products on the market.

The company were aware that a 3-year-old child had been seriously injured when one of their shelves had broken when she was in the bath. The shelf remained on sale for several months despite the company having received a report by RoSPA's Product Safety Adviser, myself, stating that in my opinion it was unsafe.

Annealed glass shelves of this design should not be used in bathrooms as there is a significant risk of serious injury if just a modest force is applied to its surface. There are over 90,000 accidents in bathrooms in the UK every year, many of them relating to falls. The glass would break quite easily it was claimed, particularly in view of the lack of any protection of

the edges and the off-centre positioning of the supporting brackets which would induce greater stresses than if it were more uniformly supported.

Although there is no specific standard regarding shelves of this size (BS 7449 deals with glass panels $0.06m^2$ and over, this shelf measured $0.055m^2$). This and other glazing standards recommend safety glazing in such a location and should have been consulted.

It was disappointing to note that the companies involved did not take immediate action by suspending the sale of the product even when they had an expert opinion questioning its safety and a complaint that a serious injury had been caused by one of their products. It was claimed in defence that they were awaiting their own expert's report on the product. There are probably still many thousands of such shelves still in use in people's homes and neither Homebase Ltd nor the suppliers and producers of similar products have alerted the public to this problem and to take appropriate action.

It is likely that a claim for damages could have succeeded against Homebase Ltd and the producers on behalf of the 3-year-old child who was injured by the glass shelf and any other victims in a similar situation.

Unfortunately as with many cases the Court's decision is not entirely clear in that reference was made to the lack of adequate fixing and assembly instructions supplied with the glass shelf. The company could still argue therefore that suitable instructions would render their product acceptably safe. I would dispute any such interpretation and would encourage all producers and suppliers of consumer products to adopt a proper risk assessment strategy.

6.4.2.18 Panic Bolt

Panic bolts enable exit doors in public buildings open quickly in an emergency. Some bolts that were the subject of a complaint to the TSS

were found to be difficult to operate and when tested failed to release at forces well in excess of the 22 Newtons specified in the standard.

6.4.2.19 Anglepoise Lamp

A lamp on adjustable arms incorporating a magnifying glass and light source that is clamped to the edge of a table enabling the user to carry out delicate model building and needlecraft work. Mirrors that increase its surface temperature surround the bulb. It also protrudes from its housing and will be the first part to make contact with any adjacent surface. The lamp assembly was found to collapse slowly under its own weight and the hot bulb made contact with flammable materials.

The lamp was featured on BBC Radio 4 You and Yours programme and referred to RoSPA after the listener's local Trading Standards Service could not help. A second TSS was then invited to assist.

6.4.2.20 Bunk Beds

Nursery furniture is subject to the General Product Safety Regulations 1994 but the particular hazard regarding bunk beds was recognised some years ago when several fatalities were recorded in which children had become trapped between parts of the beds and been strangled. This hazard is dealt with under the Bunk Beds (Entrapment Hazards)(Safety) Regulations 1987 (SI 1337) and a standard is available on which to base the safety assessment.

The cases referred to here involve bunk beds from which children had fallen that were investigated by TSOs. Two bunk beds failed to satisfy the specification with regard to their constructional features including the height and positioning of the guardrail, thus increasing the likelihood of a child falling from the top bunk.

6.4.2.21 Baby Walkers

A series of prosecutions was brought by Liverpool Trading Standards Department involving a number of brands of baby walker that had failed

the requirements of the relevant standard. Charges were brought under the General Product Safety Regulations 1994. EN 1273 is now the accepted European standard drawn up by CEN technical committee CEN/TC 252, which like the BS committee CW/41 that drafted the standard on which these prosecutions were based BS 4648, has a strong manufacturer representation. It is very unlikely therefore that any requirement in the standard could not be readily complied with by all manufacturers. Despite this many leading manufacturers of baby walkers had failed several of the requirements in the standard.

Liverpool issued a press release after news of the failures was featured in the media. The defendants sought a Judicial Review and the decision went against the authority because under the procedures laid down in the CPA had they taken the route of applying a Suspension Notice on the baby walkers this would have allowed the defendants an opportunity to appeal. The press release effectively did the same thing as the Suspension Notice would have but denied the defendants their full rights. This surprising judgement seemed to ignore the fact that non-complying and therefore unsafe products were still on the market and available for use by the public.

6.4.2.22 Luggage Straps

Walsall Metropolitan Borough Council took several prosecutions against suppliers of elastic straps with metal hooks that detached suddenly with considerable force often in the direction of the user's face. Serious eye injuries were reported including one that resulted in death. The Australian authorities encouraged the drafting of a standard that is now well established and used to assess the performance of the straps. The use of such straps to secure luggage on car roofs appears quite common and failure could result in a serious road accident should the load be dislodged whilst the vehicle is on the highway.

6.4.2.23 Folding Mattress

Gloucester County Trading Standard brought a prosecution against a supplier of mattresses that failed the flammability tests. The mattress failed the flammability requirements of the Furniture and Furnishings (Fire)(Safety) Regulations which were introduced following a series of fatalities in fires, many involving foam furniture.

Part of the defence evidence was that there were no such regulations anywhere else in Europe and that this country was therefore out of step and in breach of the European Treaty that demands the free movement of goods unimpeded by local technical and legal barriers. The Magistrates were not convinced by this argument. I pointed out in evidence that there were rules throughout Europe under the GPSD that prohibited all unsafe products. Tests had demonstrated that this mattress had failed the flammability performance tests so spectacularly when tested by a recognised UKAS laboratory, as demonstrated on videotape, provided ample support for the prosecution case.

This case demonstrates the disparity in safety provisions throughout the European Community and the need to extend the harmonisation process more effectively.

6.5 Major Companies' Failures

6.5.1 Introduction

Two major companies' names appeared several times in my case files on unsafe consumer products, Philips and Mothercare. In view of their status as a leading manufacturer and distributor it was felt that these particular case studies might reveal some useful information for the purposes of the study. If it could be demonstrated that such companies failed to achieve the highest performance levels with regard to ensuring the safety of their products, it may be reasonable to suppose that less well-managed and resourced companies are even less able to do so.

Consumer products made and supplied by two major companies, Philips and Mothercare, provide some useful examples of how problems have been addressed in the past and where improvements in the procedures might be considered particularly through the use of a risk assessment approach to safety at the product design stage. Many other examples are provided in the appendices to this study where recalls have been made (Appendix 10) and prosecutions brought (Appendices 5 and 7).

6.5.2 Philips

Philips the international electronics company based in the Netherlands make a large range of products including domestic appliances. The company employs 320 people at 15 locations in 14 countries dealing with all its design activities in which human factors, or ergonomics, plays a major part according to Martel (1998). It is often difficult to obtain precise details of product failures, as many manufacturers are understandably reluctant to accept that mistakes have been made and details about civil cases and trading standards prosecutions are not recorded officially nor the information made generally available.

The following three cases are examples of prosecutions brought against Philips and demonstrate where a risk assessment approach could have been applied to the product concerned at the design stage, so avoiding the official action that was found to be necessary in the public interest.

6.5.2.1 Food Blender A

A case involving a Philips product was brought by Solihull Metropolitan Borough Council at the end of 1993. The Philips Standmixer blender model HR 2811 was subjected to an independent ergonomic assessment and the company was convicted of the offence that it was not safe.

6.5.2.2 Food Blender B

Worcestershire County Council TSD dealt with a complaint about a Philips Twister Blender Model HR 1737 the contents of which had spilled during use. It appears in the table at number 7. A prosecution was brought by

the authority under the Electrical Equipment (Safety) Regulations 1994. I provided an expert witness statement Jenkins (2001) and concluded the blender was not safe. Regulation 5 requires such products to satisfy three conditions, namely, they must be safe, be made in accordance with good engineering practice regarding safety; and satisfy the safety objectives in the schedule to the regulations.

The harmonized European standard that is recognised as setting an acceptable level of good engineering practice regarding safety, BS EN 60335-2-14 was approved by the European Standards body CENELEC on 2 July 1996. Clause 3 of the standard requires the appliance to be constructed so that in normal use it functions safely so as to cause no danger to persons or surroundings, even in the event of carelessness that may occur in normal use. The inadvertent separation of the jar from the blade unit during use resulting in spillage of hot liquids and the exposure of sharp blades demonstrates that this requirement was not met. Clause 7.12 states that instructions for use must be supplied with the appliance so that it can be used safely. The instructions supplied with the Philips Twister failed this requirement in that the jar and blade unit could separate inadvertently in use and the scalding hazard and how to prevent it was not mentioned.

It is clear that there was inadequate assessment of the risks presented by the blender at the design stage and that failure would have been made manifest during user trials. The standard should also have anticipated inadvertent separation and included a requirement to ensure that under test conditions this did not happen. This illustrates the dilemma faced by committees who draft the standards as to how far they should go to ensure the product could be used safely. They might argue that such matters are the responsibility of the designer. Unfortunately, the standards are used to justify inadequacies in design as was illustrated in the jug kettle case where the lid fell off when being poured. That standard has since been amended to incorporate an appropriate requirement.

The company pleaded guilty to the charges so there wasn't an opportunity to test any defence they might have put forward regarding due diligence. Contesting the case might also have resulted in adverse publicity for the company that might also have affected their decision. Costs and fines against Philips Electronics UK Ltd totalling £20,000 were imposed.

6.5.2.3 Cooker Hood

The Whirlpool/Magnet cooker hood is the subject of the prosecution referred to above at 6.4.2.4 and is number 4 in the list of cases.

Many Philips' appliances started to bear the Whirlpool name from 1992. Gloucestershire TSD received a complaint that a self-assembled Whirlpool/Magnet cooker hood fitted above a gas hob had overheated and its plastic panels had melted exposing electrical components. The customer had complained to the store where the product was purchased and had been given a replacement that predictably produced the same results. Dissatisfied with this a formal complaint was registered with the local TSD. The court was told that the cooker hood satisfied the standard when tested over an electric hob but there was no requirement to test it over a gas hob. This appeared to be the basis of the defence. In evidence Jenkins (1992) said that the unit was unsafe because it had been fitted in accordance with the instructions and there was no statement that it should not be used over a gas hob. The court agreed but the defendants appealed the case. The High Court rejected the appeal and confirmed the Magistrates' Court decision. Fines and costs totalling £22,000 were imposed.

6.5.2.4 Plug and Socket Connector

The brand name Philips appeared on plug and cable sets used to connect appliances to the mains. The conducting wires inside the cable had broken down caused by flexing at the point where the cord entered the plug moulding, resulting in overheating and a short circuit. The connectors were the subject of a complaint originating in the Republic of

Ireland and were sent to the technical committee PEL/23 of BSI that deals with standards on plugs and sockets.

A plug manufacturer member of that committee agreed to carry out appropriate tests on them. They reported to the committee that the connectors were counterfeit and they were returned to me for appropriate action to be taken. Philips was informed that their name appeared on the plug and cable sets and their legal department offered to investigate. After some considerable time had elapsed and several requests for information had not produced a response, Philips stated the samples "*had been lost*" Jenkins (2001a).

No indication was given that anything further would be done to investigate what appeared to be a serious safety issue, albeit, as they claimed, not of their manufacture. However, Philips's legal department offered to look into any other similar cases that came to light in the future.

6.5.2.5 Product Recalls

Three Philips products listed in Appendix 10, jug kettles, load speakers and cordless 'phones, were the subject of recalls after faults were found which presented a risk of electrocution to the users. .

6.5.3 Mothercare

Mothercare are a leading distributor of children's products with outlets in many countries. The company has recalled several products from the market after discovering faults in them. Two products that came to my attention were examined with a view to discovering whether a risk assessment approach at the design stage might have prevented the subsequent problems experienced.

6.5.3.1 Coseytoes

Their Coseytoes product was an infant's fleece-lined cotton bag attached to a pushchair by means of an elastic strap. The strap was in two parts fixed together using a metal hook and loop. Iman Abouzaid, twelve years

old, was attempting to fix the strap when it recoiled suddenly and the hook struck him in his eye.

The company resisted the claim for damages in 1990 and again when the victim, who continued to have treatment for his eye injuries, resurrected the case before his 18th birthday. The company appealed against the court's decision in favour of Mr Abouzaid and sought leave to appeal to the House of Lords. This was rejected and Mr Abouzaid was finally awarded £36,000 some 10 years after the accident.

6.5.3.2 Stack-a-Hat Toy

Leicestershire TSD received a complaint that a child's fingers had been caught in the Jack in the box toy. Although the injuries were not serious the department investigated and brought a prosecution against Mothercare for supplying an unsafe toy. As expert witness called by the prosecution I stated that the finger-trapping hazard should have been eliminated at the design stage.

The basis of the defence centred on the fact that the toy satisfied the toy safety standard EN 71-1 which did not address the hazard of finger trapping in such cases but only when the weight of the child was likely to create a risk of serious injury as in a ride-on toy. Clause 4.10.1(d) deals with parts moving against each other but not unless the toy can bear the weight of a child and is capable of injuring a child's fingers. A gap between 5mm and 12mm is considered to represent a finger-trapping hazard. The gap in the toy was within the trapping range and had indeed caused an injury but because the standard didn't cover such a situation and the injury sustained was not serious the prosecution failed. The standard is defective in this respect that it does not address the finger-trapping hazard adequately and it is questionable whether the extent of the injuries sustained should have had any bearing on the decision.

6.6 Other Product Failures

A cross-section of products that I have dealt with during the course of this research which have been involved in accidents has been selected from my personal files in order to see whether a risk assessment approach might have been helpful in addressing the problems raised.

The following examples illustrate various defects in consumer products that have led to serious and even fatal consequences. A selection was made from the cases listed in the appendices representing a range of products and hazards but invariably involving children as these probably present the greatest challenge to designers of safe products.

The failures indicated that it was very unlikely that the manufacturers of the products in question had carried out any formal risk assessment. The same was very likely true of the officers who had received and investigated the complaints. However, occasional reference was made to risk assessment and there have been signs that the process is finding favour with manufacturers more in the hope that it will provide them with a defence in law against prosecution and civil action than a recognition of its worth.

A risk assessment and analysis has been carried out on each product that has failed. A Failure Modes and Effects Analysis (FMEA) and Fault Tree Analysis (FTA) show how such techniques can usefully be employed at the design stage to prevent defects being allowed to be present in the product when it is eventually put into use.

6.6.1 Smoke Alarm

An example of misuse, which has had disastrous consequences, is that of the smoke alarm. Seven children died in a house fire in Wrexham in August 1995 when it was found that the smoke alarm complying with EN 54-2 standard and fitted by the local council did not have a battery. Evidence given by myself at the Inquest conducted by John Hughes, Coroner for South Clwyd on 24.11.95 included the statement that fire

statistics Home Office (2000) showed that over recent years in a house fire, people were three times more likely to survive if a working smoke alarm was fitted.

6.6.2 Dishwasher

An inquest into the death of Mark Rockingham aged twelve years was held at the Court House Kettering on 3rd July 1997. After hearing all the evidence, HM Coroner Mrs Anne Pember returned a verdict of Accidental Death.

The circumstances surrounding the accident as reported by Miss Richardson (1997) were that Mark's mother was opened the dishwasher to retrieve a breadboard on which to prepare some sandwiches. At the time the dishwasher was fully loaded and the wash cycle completed, the clean items were waiting to be put away. As Mark moved out of his mother's way, he tripped and fell towards the dishwasher impaling himself on a large carving knife protruding from the cutlery basket with its blade uppermost.

HM Coroner commented, "*Perhaps it would be prudent for dishwasher manufacturers to stipulate that no long bladed knives should be placed in the cutlery basket*" and "*it might be possible to install a separate compartment where they could be laid horizontally*".

I reported the case findings to the British Standards committees responsible for the dishwasher standard and the Consumer Policy Committee OC/11/9. The details of the accident used in this study are a reliable record of the events as given at the inquest and confirmed by personal correspondence between myself, the Coroner and with BSI.

6.6.3 Cooker Pan Support

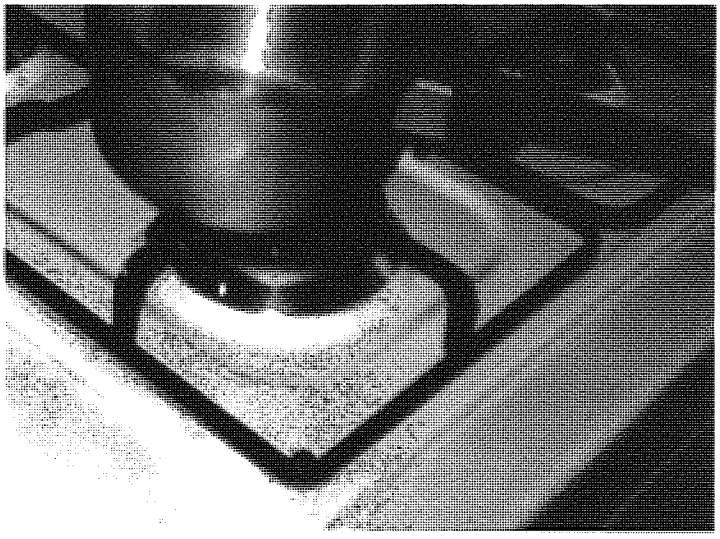

Figure 23: Cooker Pan Support

Saucepan sizes and pan supports are not standardised, which can lead to pans tipping their contents of hot liquids causing injuries. Although the Gas Appliances Safety Regulations 1995 [SI 1995 No.1629] and the standard for Domestic Cooking Appliances Burning Gas Fuel BS EN 30-1.1 are required to address this issue, more needs to be done to provide a safer design for pan supports and other fittings.

Preventive action

There is therefore a need for greater attention to be paid to the design of the pan supports and consideration should be given to integrating the specifications for pans with the dimensions of the supports. This will involve collaboration between the relevant standards technical committees, those dealing with gas cookers and cooking utensils.

6.6.4 Child-Appealing Lamp

The lamp illustrated in Figure 24 below was clearly intended for use by children, indeed the box is marked "*children's lamp*". It operated at the standard domestic 240V rating and the lampshade comprised flammable fibrous materials. Products designed for children, as in this case, must be capable of being used safely by children.

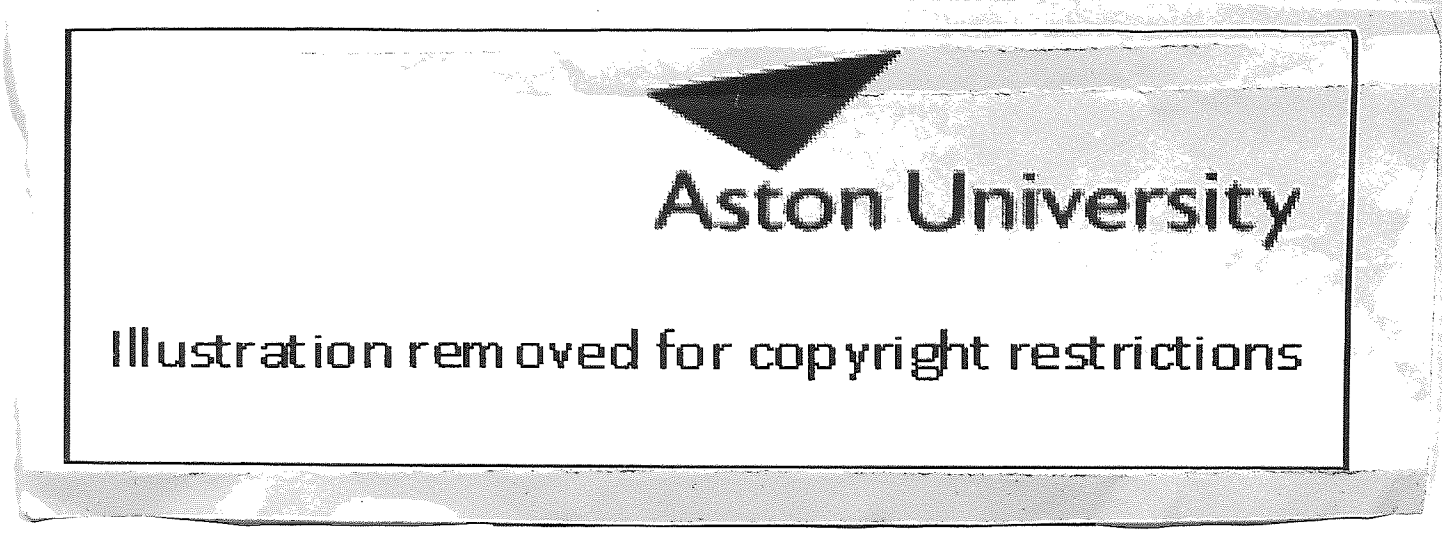

Figure 24: Child-Appealing Lamp

The lighting industry has accepted that such lamps should operate at a reduced voltage, 24V rather than 240V but they should also consider all likely conditions of use and ensure that the lamp is also stable for example. Also, there is an increased risk that the lamp may overheat because a child may not realise the implications of covering the top of the shade and the use of an over-temperature cut-out should at least be considered.

Preventive action

The bulb holder should be of a type that prevents direct access to the conductors. The material used for the lampshade must be resistant to ignition and flame spread and the shade firmly supported to prevent contact with the heat source. The 240v rating should be transformed down to 24 volts and a low energy 20-watt maximum lamp used.

6.6.5 Washing Machine

In addition to the fire hazard, 2,000 fires started in washing machines in UK homes in 1999 Home Office (2000), and the electrocution hazard dealt with in the standard, mechanical hazards must also be considered.

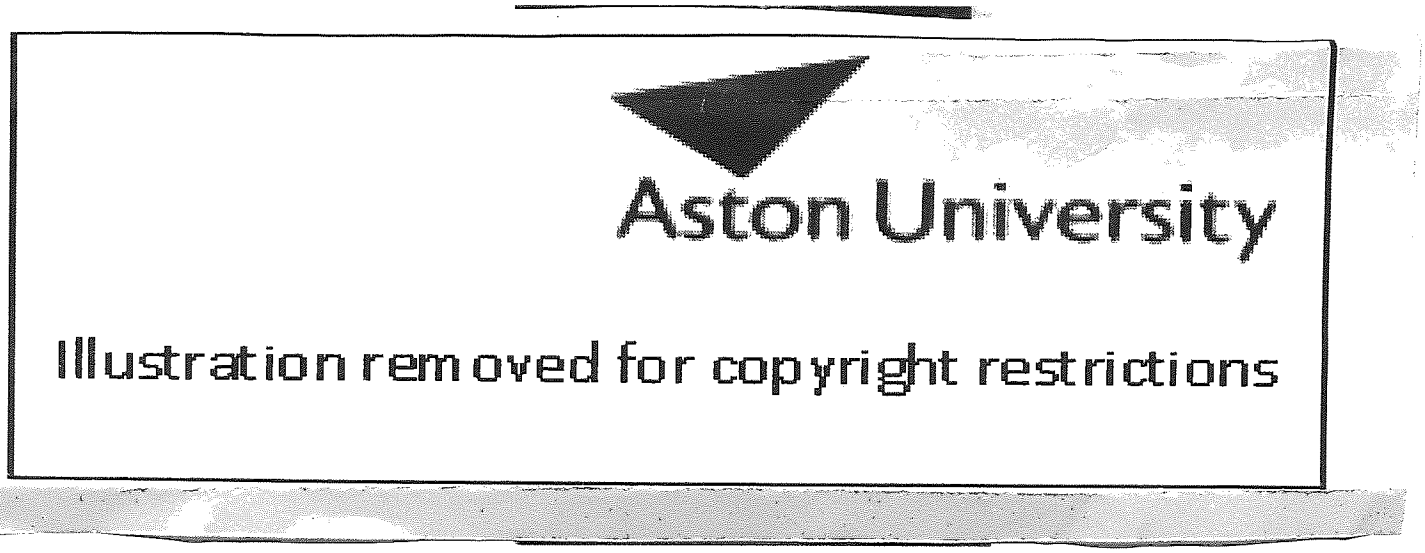

Figure 25: Washing Machine

Background

The subject of fires in washing machines was addressed in a DTI (1995) report which said the causes were likely to be the overheating of internal wiring, connections, resistors, timers and motors and that caused by friction of cables against moving parts. The ingress of water and detergent acting on the wiring was also put forward as a possible cause. It is questioned whether the standard has addressed these non-electrical matters adequately.

The TV programme "*We Can Work It Out*" featured the Merloni washing machine. I was told that several doors had been opened in mid-cycle by young children, trying to retrieve their soft toys and favourite clothes, resulting in serious injuries. The information was passed to trading standards and with their agreement to a TV researcher. Callers to the programme revealed that this wasn't an isolated incident and that the company had known the problem for some considerable time. They eventually published a recall warning and a working group set up by BSI to look at the requirement for washing machine door interlocks. It was a fatal electrocution caused by a faulty plug on a washing machine in Walsall that helped RoSPA's successful campaign to have plugs fitted to all electrical appliances before they were sold to the public.

Preventive action

The effectiveness of the interlock mechanism needs to be thoroughly checked at the pre-production stage to ensure that the door will not open until after the washing cycle has been completed and this function must perform effectively throughout the foreseeable lifetime of the machine.

6.6.6 Dishwasher

An inquest into the death of Mark Rockingham aged 12 was held at the Court House Kettering on 03.07.97 following which HM Coroner Mrs Anne Pember returned a verdict of Accidental Death.

The circumstances surrounding the accident Richardson (1997) were that Mark's mother was preparing sandwiches and opened the dishwasher to remove a bread board. At the time the dishwasher was fully loaded and the wash cycle had been completed, the clean items were awaiting storage. As Mark moved out of his mother's way, he tripped and fell towards the dishwasher impaling himself on a large carving knife which was in the cutlery basket with the blade pointing upwards, as recommended in the operating instructions.

HM Coroner commented, *"Perhaps it would be prudent for dishwasher manufacturers to stipulate that no long bladed knives should be placed in the cutlery basket" and "it might be possible to install a separate compartment where they [knives] could be laid horizontally"*.

The Coroner's verdict and comments were sent to the relevant British Standards committees, including the Consumer Policy Committee OC/11/9. A *"risk assessment approach at the design stage of the dishwasher i.e. identifying all the hazards, the potential for harm, including cutting caused by sharp knives, and reducing the associated risk, would have made such an error less likely"* Jenkins (2000a).

The technical committee accepted that "*mechanical aspects have not been fully covered*" in the standard BSI (2000). Follow-up enquiries made of the technical committee responsible for the dishwasher standard after the dead boy's father had contacted me showed that none of the suggestions made had been taken up. It may be however that the manufacturer in question will have taken notice of such a complaint and although not accepting responsibility directly, could incorporate changes in the designs to eliminate future problems of this kind. An acceptance of a design defect at the time would leave a manufacturer open to civil and criminal legal action, an admission he would probably be advised not to make.

Preventive action

The Coroner suggested that the cutlery basket on dishwashers might be re-designed so that knives could be loaded horizontally. This appears a sensible suggestion that I put to the BSI.

6.6.7 Child's Anorak

The anorak in Figure 26 was involved in a fatal accident when a nine-year-old schoolgirl caught the cord in a 'bus door. Despite the efforts of her mother and brother she was dragged under the 'bus wheels and killed.

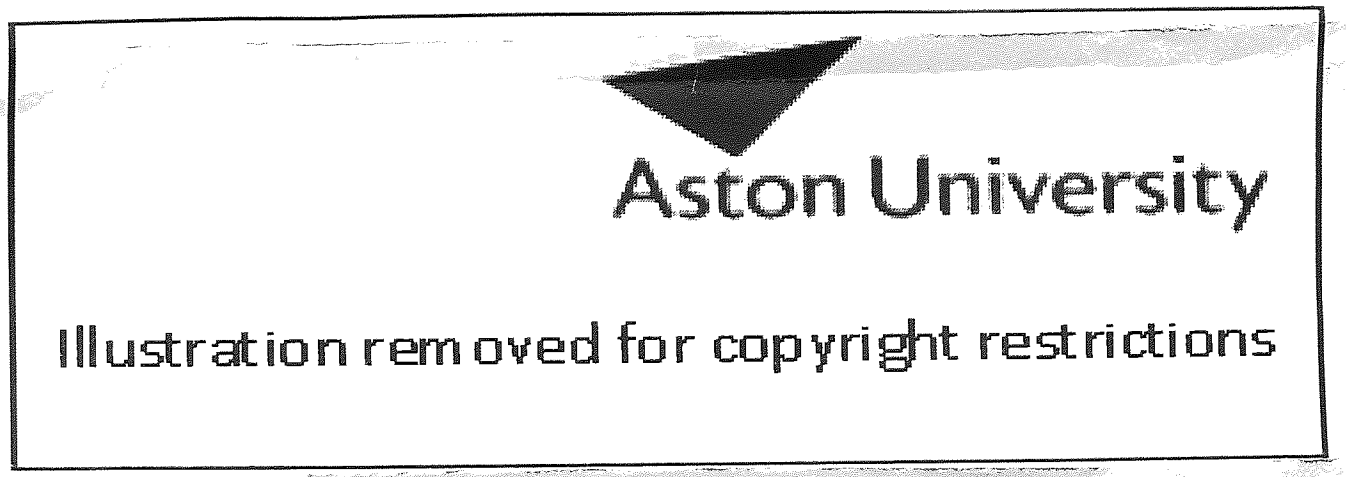

Figure 26: Child's Anorak

The family's solicitor asked for a report and provided me with the defendant company's records. This information revealed that their user trials had found that cords had been trapped in bicycle wheels and were too long. The court awarded the mother substantial damages but she still hasn't come to terms with her daughter's death in such a harrowing and yet simple way. There have been at least three similar fatal accidents.

On behalf of RoSPA I proposed to BSI that such mechanical hazards should be addressed in a standard to provide guidance to clothing manufacturers and this has now been published as BS 7907:1997 Code of practice for the design and manufacture of children's clothing to promote mechanical safety. I have also been consulted by Arcadia the large retail store group about the safety of their products.

Preventive action

Reducing the length of the cord and thus limiting the likelihood of it becoming caught has been recommended. Following the new standard BS 7907 should prevent a recurrence of the fatal accidents and near misses experienced in recent years.

6.6.8 Child's Chair

Figure 27: Child's Chair

Background

The 3-inch metal rod that attaches the seat to its frame protrudes downwards presenting only a minimal risk normally. However, this is a child's chair and a young boy fell onto the metal rod when playing with the chair upside down. Fortunately his father applied pressure to the wound in his neck and the child survived the experience following hospital treatment.

This provides a good example of how designers must consider the foreseeable conditions in which particularly children may use their product. The manufacturer recognised the danger and modified all subsequent products but claimed there was no way he could have anticipated such an accident.

Table-mounted chairs, known as hook-on chairs in the USA, have also caused concern. At least there is a standard now so there is less risk of a child falling and being injured, but the design is still flawed in our view.

Table-mounted chairs, baby walkers and bath seats are three products RoSPA continues to warn the public not to use.

Preventive action

Any product intended for use by children should be examined carefully with regard to foreseeable conditions of use including an element of misuse. Corrective action can often be taken if not to eliminate the hazard at least to reduce the risk significantly. In this case the end of the bolt could have been shortened and rounded so that any impact would not have resulted in a penetrating wound but in minor cuts and bruising only.

6.6.9 Child-Resistant Closure (CRC)

Figure 28: Child-Resistant Closure - Mandatory

Background

A two-year-old died when he gained access to the methadone in this bottle prescribed for his father, a heroin addict. The official report on the CRC described it as "*child-proof*". I had to point out that such containers were only "*resistant*" to being opened by children.

It is important to correct such a widespread misunderstanding so that the valuable contribution CRCs have made to reduce childhood poisonings is not compromised and people are made aware of their limitations.

RoSPA has advised that all products that require CRC packaging be placed out of reach and out of sight of children at all times. It isn't generally recognised that when assessing the effectiveness of CRCs a proportion of the test panel of children are allowed to open the containers.

Preventive action

The CRC has become more widely used on domestic substances such as household bleach that do not present the same degree of risk as the classified dangerous substances and medicines. However there is a misconception in many people's minds that the closures are childproof which of course they are not.

An example of the voluntary use of a CRC is the packaging of bleach for Tesco illustrated below. One of the leading UK manufacturers of bleach, Domestos, resisted using CRCs on its containers preferring to support consumer education programmes including campaigns run by RoSPA.

Almost all the market has now changed to using CRCs on their bleach even though the formulation falls below the 5% concentration level considered harmful. There appears to be a perceived improvement in safety rather than any actual benefit thus promoting both supplier and manufacturer image.

6.6.10 Child-Resistant Closures – Voluntary Use

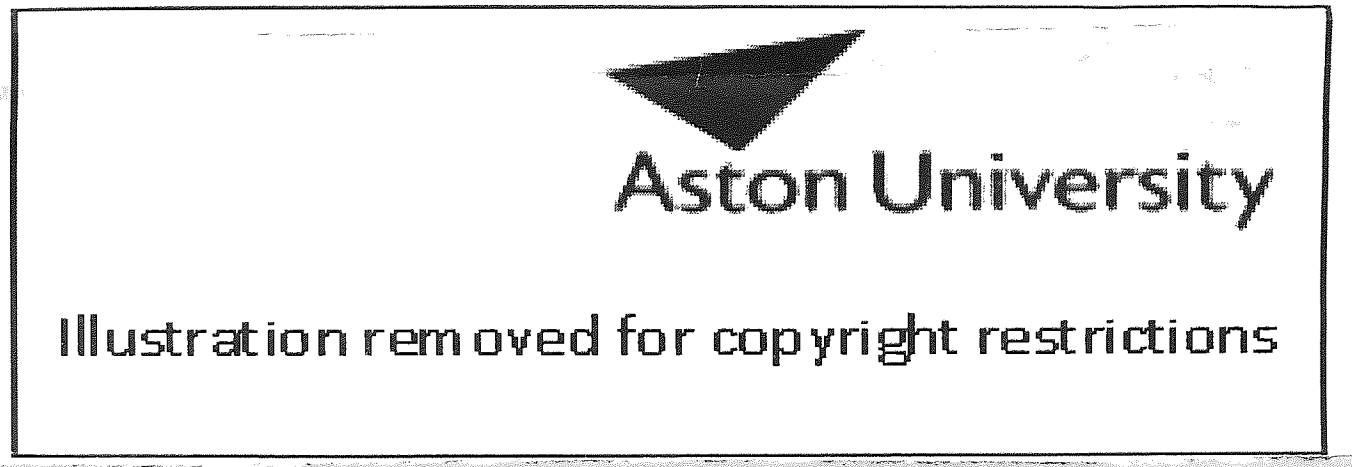

Figure 29: Child-Resistant Closure – Voluntary

CRCs have prevented many children from being killed by preventing access to analgesics but their effectiveness has been widely exaggerated. The packaging itself is not at fault but public misunderstanding of its capability does bring it into question. A better understanding of its limitations should prevent misuse and make people more amenable to following RoSPA's guidance to carers to keep all domestic and garden chemicals and cleaning agents as well as medicines out of sight and out of reach of children, preferably in a locked cabinet.

Chapter 7: Data Analysis

7 DATA ANALYSIS

7.1 Questionnaire

The data collected from the questionnaire is produced in Chapter 6. An attempt is made here to draw some conclusions from those findings that might indicate the extent to which a formalised risk assessment process was being used by officers enforcing the product safety legislation.

In addition, the views that were expressed by the officers who participated are examined to try to discover any underlying features that might illustrate further to my current understanding how the enforcement system works in practice and how it might be made to function more effectively if any identified problems were to be addressed.

7.1.1 Analysis of Responses

A quarter of the respondents answered all seven questions but for the purposes of the study the most important question was "*Do you use a formal risk assessment procedure?*" which was answered by all 1,589. 89% said "*No*" that they did not use a formal risk assessment procedure.

The number of respondents who said they used a formal method to assess the risk presented by products they were investigating prior to conducting their enquiries was 22 representing only 1.38% of the 1,589 who answered the question.

Of the officers questioned, 151 (10%) were uncertain whether the approach they used could be considered a risk assessment one but indicated that an assessment of some kind was made, which some described as a 'gut feeling' about the product based on experience, but almost 90% said they used no such method. It can be estimated therefore that seven out of eight products complained about for reasons of safety are not subjected to any form of risk assessment.

The most likely scenario, as explained by several officers, is that the department receives a complaint and if a manager considers the facts warrant taking it further, it is allocated to an officer with instructions to investigate. Questions of cost and available resources are a major factor in this decision as confirmed by the issues raised by many officers and discussed further below. The officer will then obtain sufficient evidence to justify a particular course of action and will submit a file to his manager with a view to instituting proceedings where appropriate as in the cases cited below, usually against the supplier of the unsafe product. Occasionally there is a requirement for a senior officer to obtain the approval of the appropriate local authority committee.

The lack of adequate resources figured prominently in the responses, as did the increasing pressures on the service, particularly the wide range of activities officers were required to be expert in. Difficulties in obtaining objective answers to questions of safety and the lack of available experts in the fields involved in many of their investigations was also noted as was the reliability of test houses and other sources of help and information. Issues relating to management and training were also raised.

Several of the comments reiterated criticisms that were voiced some years previously when Jenkins (1990) carried out another investigation to examine problems encountered by the enforcement authorities because of the six-month time limit imposed on them to bring cases before the courts. Failure to meet the six-month deadline meant that cases had to be dropped without any positive result being obtained.

Delays were often encountered because of the need to obtain independent expert opinion and detailed test reports and sometimes because the defendant company did not wish to cooperate in the investigation.

The responses show there had been no perceptible improvement in the situation faced by officers over the intervening ten-year period.

Product	Hazard	Number	%
Electrical appliances	Electrocution, fire	140	8.80
Toys and novelties	Choking, sharp edges	116	7.30
Glass and glazing	Sharp edges	90	5.66
Child transport nursery products	Entrapment, stability	84	5.29
Furniture	Flammability, entrapment	67	4.22
Children's clothing	Burns, strangulation	46	2.89
Lighters	Fire	42	2.64
Fireworks	Fire, explosion	36	2.27
DIY tools, equipment, PPE	Sharp edges	34	2.14
Cooking equipment	Heat, toxicity	27	1.70
Gas appliances	Fire, toxicity, explosion	21	1.32
Other	Various	886	55.77
Total		1589	100

Table 60: Products and Hazards

Electrical equipment and toys again featured prominently in the products being investigated by officers often following complaints that they were unsafe. More than half the products could not be categorised because of the large number of different types of product on the market, over 900 product types being listed in HASS (2000).

The hazards identified in the data cover a wide range of potential and, in the case of investigations following accidents, actual harms including electrocution, choking, flammability, explosion and poisoning.

Issues	Number	%
Resources	74	19.5
Support	123	32.4
Procedures	183	48.1
Total	380	100.0

Table 61: Issues Raised

Nearly half of the issues raised by officers (see Table 61) concerned problems with administrative procedures. Many officers experienced

problems taking formal action such as pursuing a prosecution when a product had been found to breach safety regulations. Several mentioned having to follow what they thought a more relaxed approach to importers, manufacturers and suppliers of dangerous products than was appropriate in the circumstances primarily because of the requirement to follow the government's enforcement concordat. Alternative action to prosecution and Suspension Notices was considered which often meant that products were still being sold long after tests had shown they were dangerous.

Other departmental work often took precedence over product safety such as food standards and counterfeit goods. Appendix 6 lists the many Acts most TSOs are required to enforce. Safety enforcement was also considered more demanding and time consuming than many other areas of trade control work and managers did not always take this into account.

Respondents referred to the lack of resources to carry out product testing and follow-up action. Also, authorities may have to pay compensation if an officer has issued a Suspension Notice on a product which later turns out not to breach the safety provisions and this it was felt undermined some of the enforcement work. An importer could distribute products from the Far East for example without submitting them for testing.

An officer might ask for confirmation that the products had been assessed for safety and an out of date foreign laboratory report might be produced. If the officer has reasonable cause to suspect the products are unsafe, perhaps because of an accident with one that he is investigating, he may suspend their sale. If subsequently the product satisfies the requirement of being a "*safe product*" the authority may have to compensate the company for any loss incurred.

The authority is frequently put in a dilemma where it needs to take firm and speedy action to remove dangerous products from the market and yet confirmatory tests and expert opinion may take several months to obtain. Several officers provided similar anecdotal data.

The lack of expert advice and the variable quality of test reports suggests that enquiries need to be undertaken to establish why this is seen as a problem. There were questions about the ready access to information relevant to particular investigations including accident data, standards and product research. It appears DTI funded research documents (Appendix 1) are seldom consulted and many officers were unaware of the HASS accident database.

Many officers said they had little opportunity to research the product they were investigating thoroughly enough. They valued access to specialists in the field of product safety but the defence always appeared to be able to produce an expert to counter whatever the prosecution claimed.

7.1.2 Analysis of Enquiries

The participants were more likely to be enforcement officers active "*in the field*" rather than senior managers in those departments but it was clear from their responses that the level of knowledge concerning product safety varied considerably. Some had limited and a few no knowledge of accident data, standards or DTI research for example, whilst many clearly had considerable expertise in the product safety field and only required my support in the form of an expert statement for use in court.

The 1,589 enquiries received during the period represents 318 enquiries annually or 26.5 per month equivalent to approximately one every four hours when I was available at RoSPA to take telephone calls from the officers. These enquiries were found to represent around 8% of the total number of 19,500 product safety enquiries received and dealt with in person during the five-year period by me in my capacity as Product Safety Adviser to RoSPA. The remaining 92% were enquiries concerning product safety and related issues received during the five-year period from other sources including lawyers, consumers, the media, manufacturers, suppliers and RoSPA members and staff.

Where a particular product could be identified from the enquiry its category was recorded but where a general safety issue was the subject

of the enquiry that related to several products or categories, that information was noted separately. Of the 1,589 enquiries received during the five-year period, 886 just over half the enquiries involved the numerous types of product other than those categorised above. It was noted that over 900 product types are listed in 23 categories of consumer products involved in domestic accidents reported in HASS (2000). The eleven categories recorded in the table account for almost half of the enquiries received and provided a good indication of which types of product had caused the authorities greatest concern.

7.1.3 Safety Issues

The 1,589 enquiries included 110 enquiries that related primarily to a particular safety issue rather than just one product and these are listed in the table below. These seven categories of enquiry included 22 positive responses to the officers having used a formal risk assessment approach when conducting their investigations. The problem of excessively hot non-working surfaces of mainly electrical appliances was the most frequent type of enquiry recorded followed by recalls and risk assessment which were classified as medium frequency on this small sample of all product safety investigations conducted by officers over the five year period.

Although the number of specific safety issues referred to during the five-years was low, it did provide an indication of some of the subject areas that were causing officers concern (see Table 62). I am known through my presentations at meetings and writings to have particular views about the first three issues that were likely to have resulted in questions being asked on these particular topics. It also suggested that some officers were starting to examine risk assessment as providing a more objective approach to their product safety investigations. It is likely that the officers would be more likely to discuss enquiries about other safety issues with relevant persons at the DTI, medical advisers or with other colleagues rather than with me.

Enquiries concerning safety issues

	Safety issues	Number	Frequency
1	Surface temperatures	51	High
2	Recalls	25	Medium
3	Risk assessment	22	Medium
4	Accident statistics	4	Low
5	Enforcement	3	Low
6	Testing	3	Low
7	CE Marking	2	Low

Table 62: Safety Issues

7.2 Case studies

To examine how a more objective approach might be applied to assessing the safety of consumer products at the design stage, examples were taken from my personal files and those for which I am responsible at RoSPA. These secondary data were compiled to primarily to assist the courts decide whether those products had failed a statutory safety provision and their supply was therefore illegal or had a defect in them.

The examples were also useful for the purpose of ascertaining whether a more objective approach to assessing safety could have been followed. The examples were selected on the basis that the products presented significant failings in terms of safety and were made widely available to the public. The products failed in use and revealed shortcomings in manufacture and design that probably in most cases could have been avoided had a more objective and consistent approach to safety been observed at an early stage in the product's development.

Attempts were made to quantify the overall problem of unsafe consumer products on the British market using the most reliable data, many of them officially recorded, including complaints, recalls and prosecutions. It was not practicable to examine all 668 examples identified in the data presented in this study so particular cases were selected. To limit the findings to a margin of error of 5% it was necessary to take a sample of

140 from the population of 234 products subjected to a recall using the method presented by Saunders (2000a). The recalls were numbered from 0 to 233 as they appear in Appendix 10 and samples selected at random following guidance provided by Saunders (2000).

Following the same format, a sample size of 178 was taken from the population of 334 products that were the subject of witness statements and prosecutions. The statements and prosecutions were numbered from 0 to 333 as listed in the Appendices 5 and 6.

An examination of the data and the cases sampled that resulted from this exercise led to this approach being abandoned because many of the products identified in the recalls for example did not include sufficient detail on which to base any meaningful conclusions. Recall notices are not mandatory, although amendments currently being made to the General Product Safety Directive are likely to require such action by producers and suppliers in future. The form of the recall notice is not prescribed so the necessary information to undertake an assessment of the risk presented was not available. A fundamental shortcoming in many of the recall notices studied was a statement as to what exactly was the fault in the product that warranted the action being taken.

It was decided therefore in view of the lack of detailed information to use as wide a range of examples as possible from the files for which relevant data was available. These examples are listed as cases selected for analysis in Table 63 below.

1. Vacuum flasks	Hot liquid	General Product Safety Directive	Not a *"safe product"*
2. Toy crystal set	Toxic (copper sulphate)	Toy safety Directive	Chemical; general principles
3. Wave machine	Electrical	Low Voltage Directive	Not *"safe"* fails safety objectives & standard
4. Cooker hood	Electrical/hot surface	Low Voltage Directive	Not *"safe"*; fails safety objectives
5. Oven cleaner	Toxic substance	Trade Descriptions Act 1968	False trade description
6. Cool touch cooker	Hot surface	Trade Descriptions Act 1968	False trade description
7. Food blender	Sharp edges, hot liquid	Low Voltage Directive	Not *"safe"* fails safety objectives & standard
8. Gas fire	Toxic (CO)	General Product Safety Directive	Not a *"safe product"*
9. Electric jug kettle	Hot liquid	Low Voltage Directive	Not *"safe"*; fails safety objectives
10. Exercise skier	Toxic (asbestos)	General Product Safety Directive	Not a *"safe product"*
11. Electric plug/ cable	Electrical	Plug and Socket Safety Regs.	Failed safety regulations and standards
12. Safety film - glass	Sharp edges	General Product Safety Directive	Not a *"safe product"*
13. Garden slide	Entrapment	Toy Safety Directive	Physical and mechanical; general principles
14. Electric toaster	Hot surface	Low Voltage Directive	Not *"safe"*; fails safety objectives
15. Bath mat	Loose surface	General Product Safety Directive	Not a *"safe product"*
16. Novelty lighters	Ignition	General Product Safety Directive	Not a *"safe product"*
17. Glass shelf	Sharp edges	General Product Safety Directive	Not a *"safe product"*
18. Panic bolt	Escape failure	General Product Safety Directive	Not a *"safe product"*
19. Anglepoise lamp	Hot surface	Low Voltage Directive	Not *"safe"* fails safety objectives & standard
20. Bunk beds	Unstable, entrapment	General Product Safety Directive	Not a *"safe product"*
21. Baby walker	Unstable	General Product Safety Directive	Not a *"safe product"*
22. Luggage straps	Kinetic energy release	General Product Safety Directive	Not a *"safe product"*
23. Folding mattress	Flammability	Furniture Flammability Regs.	Failed safety regulations and standards

Table 63: Analysis of Cases

* Legislation and Directives are listed in Appendices 1 and 2 respectively

7.2.1 Analysis of Cases

The Directives appropriate to the particular product that was the subject of a prosecution are listed in Table 63 above. Each Member State has had to introduce the requirements of these Directives into its own domestic legislation. The safety regulations that apply in Britain are given in Appendix 2 listed in alphabetic order by the name of product controlled.

Two products in the table are controlled by regulations that are specific to Britain, plugs and sockets because of our 13 amp 3-pin system that doesn't apply elsewhere in Europe and the furniture flammability regulations that are unique to this country. Another departure from using regulations that transpose Directives is where an offence involves a false trade description. The two cases cited involve a claim that an appliance was "*cool touch*" when it was not and where the statement "*non-toxic*" was made and fumes were produced when the product was being used.

The 23 cases listed above included those for which I provided statements and were selected from the 334 listed in Appendices 5 and 6 for closer examination to identify the breaches against the relevant Directives and legislation. Also, with the benefit of risk assessment to find out if such an approach might have better addressed the risks presented by the various consumer products. The companies will no doubt have learnt lessons from the experience of being prosecuted and modified their management systems following the cases including those where the case against them failed.

The 272 statements issued for prosecution purposes during the period were in relation to specific consumer products. Toys, electrical equipment and nursery products figure prominently in the list. These are categorised as follows in Table 64 below.

Product Categories	Number
Toys and novelties	73
Powered appliances – electrical and gas	33
Nursery products	31
DIY	27
Food containers	25
Glass and glazing	18
Children's clothing	13
Furniture	11
Kitchen utensils	7
Other – lighters, candles, fireworks, luggage straps etc.	33
Total number of expert witness statements	**272**
Number of instructing authorities	59
Average number of statements per annum	25

Table 64: Product Categories

Year	Cases
1990	32
1991	21
1992	36
1993	49
1994	17
1995	17
1996	25
1997	19
1998	22
1999	26
2000	8
Total	272
Average	25

Table 65: Annual Frequency

The number of statements I have been asked to produce over the ten-year period fell to only eight during the final year as shown in Table 65 above. This would either suggest that there were fewer unsafe products

identified by TSOs that warranted official action or that there was a reduction in enforcement activity, possibly by the use of alternative approaches to dealing with unsafe products such as advising the manufacturers, suppliers and importers of the faults founds and encouraging them to make improvements.

7.2.2 Directives and Hazards

The following Directives cover most consumer products on sale in this country. For the purpose of the present study they are used to demonstrate how they aim to control the safety of various products by prescribing essential safety requirements, in the case of the Machinery Directive, essential health and safety requirements and essential requirements are laid down in the construction products and appliances burning gaseous fuels Directives.

The essential requirements are specified in an annex to each Directive.

Directive
Low-voltage equipment 73/23/EEC
Toy safety 88/378/EEC
Construction products 89/106/EEC
Machinery 89/392/EEC
Gas burning appliances 90/396/EEC
General product safety 2001/95/EC

The Low Voltage Directive (LVD) preceded the "*New Approach*" introduced under the Single European Act of 1986 amending the EC Treaty to overcome difficulties in reaching unanimity following the expansion of the Community. Article 100a (now Article 95) provides for the approximation of provisions in Member States to facilitate the free movement of goods within the internal market. The "*New Approach*" is based on establishing essential requirements and requiring products within the scope of the Directive to meet those requirements. Where the requirements have been met and other provisions satisfied the product is deemed to satisfy those requirements unless the contrary can be established.

The products involved in the cases cited above are examined below identified by their name and the order in which they appear in the table. Some products were involved in accidents that resulted in serious and even fatal injuries. The examples are common, everyday consumer products with well-known brands that are widely available and supplied through various outlets from mail order to large multiple retail establishments.

The hazards dealt with by the relevant Directives are identified and the products and circumstances surrounding the case are described followed by an assessment of the risk presented.

7.2.2.1 Electrical Equipment

Low-voltage equipment Directive 73/23/EEC

[illegible]
Information to ensure safe use
Made to ensure safe assembly and connection
Protection against physical injury or other harm by electrical contact or otherwise
No dangerous temperatures, arcs or radiation
Protection against non-electrical dangers
Insulation must be suitable for foreseeable conditions
Protection against external influences
Must meet mechanical requirements
Resistant to non-mechanical influences in expected environmental conditions
Protection from foreseeable conditions of overload

Table 66: Principal Elements of the LVD

The LVD is enacted in British law as the Electrical Equipment (Safety) Regulations 1994 [SI 1994 No.3260]. The principal elements of the safety objectives that have to be met for electrical equipment as required by the LVD and reiterated in these regulations are given Table 66above.

Consequences of Failure to Comply
Incorrect use of the equipment leading to injury caused by shortcomings in or the absence of information supplied with the equipment to ensure safe use.
Electrocution, burns and fire caused by inadequate design of the equipment to ensure its safe assembly, connection and use.
Burns and fire caused by contact with accessible non-functioning parts of the equipment and ignition of flammable materials in the vicinity.
Cuts, bruises, crushing, pinching and trapping caused by accessible sharp points and edges, unstable equipment and the movement of its parts.
Electrocution, burns and fire caused by inadequate insulation of live parts of the equipment.
Electrocution caused by tracking of current following the build up of dust particles and moisture.
Electric shock caused by sudden power surge.

Table 67: Consequences of Failure to Comply

Additional requirements

In addition to having to satisfy the safety objectives outlined above, electrical equipment that is subject to the LVD must also be "*safe*" which is defined in the Electrical Equipment (Safety) Regulations, and be constructed in accordance with good engineering practice in safety matters in force in the Community. This is largely dependant on the equipment being properly installed and maintained and used in applications for which it was made.

Good engineering practice in safety matters in force in the Community can be best interpreted as meaning made in accordance with the appropriate harmonized European Standard in the EN 60335 series. The relevant standards are listed in Appendix 4.

Article 9 of the LVD provides a safeguard clause for authorities to impede the otherwise mandatory free movement of CE marked electrical equipment if they have evidence that indicates that the equipment has failed a safety provision or there is some shortcoming with the standard.

Wave machine

This novelty electrically powered decorative item intended for display on a wall portrayed an image of flowing water the effect being generated by a small rotating fan. The electrical wiring was protected only by basic insulation and live parts were accessible without the use of tools greatly increasing the risk of electrocution. The product failed the Electrical Equipment (Safety) Regulations and the court convicted the defendant company.

The Wave machine, number 3 in the table, failed several of the principal elements of the LVD including lack of protection against physical injury or other harm by electrical contact and the insulation was not suitable for foreseeable conditions. The equipment also failed the requirement to be "*safe*" and to be made in accordance with good engineering practice in safety matters as represented by the relevant standard.

Risk assessment

The electrical hazard present in the product was likely to be realised when a person made contact with the novel picture. Basic insulation was all that was used to separate the live parts from being touched and in several places it was possible to touch the live parts directly. Because the severity of the harm was so great i.e. a fatal electric shock, the opportunity for contact to be made although likely to be low was not a major factor.

This risk was estimated to be unacceptably high and immediate attention such as removing similar items from sale, if necessary by emergency measure including the authority issuing a Suspension Notice, was considered appropriate in this case.

The assessed risk level supported the move to prosecute the supplier of the products to act as a deterrent to others who were prepared to put their customers at risk of serious and potentially fatal injury.

Cooker hood

The electrically operated hood, number 4 in Table 63 above, was fitted above a gas hob following the instructions supplied. After a short period of use the plastic housing overheated and distorted exposing basic insulation and wiring. The same fault occurred with a replacement hood and the trading standards service decided to prosecute.

The tests in the standard had been drawn up using an electric hob but not when it was used over a gas hob. As the cooker hood was not restricted for use with an electric cooker it was deemed to fail the requirements of the regulations in that it was not safe. The earlier failure should have alerted the suppliers and manufacturer to the problem so their claim to have taken all steps to avoid committing the offence could not be sustained.

Seven of the requirements of the Low Voltage Directive (LVD) as summarised in Table 68 below were breached:

Breaches of LVD
Information to ensure safe use
Made to ensure safe assembly and connection
Protection against physical injury or other harm by electrical contact or otherwise
No dangerous temperatures, arcs or radiation
Insulation must be suitable for foreseeable conditions
Protection against external influences
Must meet mechanical requirements

Table 68: Breaches of LVD

Although it could be claimed to have satisfied the requirement to be made in accordance with good engineering practice in safety matters as represented by the EN 60335 standard, it was not "*safe*" nor did it satisfy the principle elements of the safety objectives as outlined above.

Background

A self assembled Philips-Whirlpool/Magnet cooker hood fitted over a gas hob overheated and its plastic panels distorted exposing live parts. An assessment of the risk presented by the product taking into account the circumstances surrounding the incident indicated that the risk level was sufficiently high to warrant immediate attention including statutory proceedings.

The customer had followed the installation instructions and experienced similar overheating problems when using the gas hob under two cooker hoods. In its defence the company told the court that the cooker hood satisfied the appropriate standard. However the standard EN 60335-2-31 only required such hoods to be tested over an electric hob.

There was no requirement at the time to test it over a gas hob but the product was marketed for use above both types of hob. In evidence Jenkins (1992a) said that the unit was not safe because it had been fitted in accordance with the instructions and there was no warning that it should not be used over a gas hob. The court agreed.

Risk assessment

There was the potential for the product to cause a fatal electrocution if contact was made with the live parts exposed after the heat from the gas hob had distorted the plastic housing of the extractor hood. The operating switches were located in the area where the heat affected the casing and this is where the basic insulation and live parts were exposed.

[illegible]
Hazards: fire, electrocution
Severity: fatal electrocution
Frequency: moderate
Risk Level: significant

Table 69: Risk Assessment - Cooker Hood

The authority were justified therefore in pursuing a prosecution and could have demonstrated how unacceptable the risk was thus confirming that the equipment did not satisfy the requirement in the regulations that it should be "*safe*". The defendants sought leave to appeal to the High Court because they could show that their product satisfied the current standard and that they felt they had done everything to avoid committing an offence. Their application was refused.

Food blender A

A Philips Standmixer electric blender model HR 2811, number 7 in the table, was the subject of a complaint that resulted in a prosecution being brought against the company. A sample of the product was submitted for an ergonomic assessment that produced a report Page (1993) that criticised the design of the blender. The risks were not reduced to an acceptable level and the operating instructions and warnings were found to be confusing. The report stated that the design enables users to incorrectly assemble the product. The court agreed with the charges brought and convicted the company of committing the offence.

Food blender B

Worcestershire County Council TSD received a complaint about a Philips Twister Blender Model HR 1737 the contents of which had spilled during use. A prosecution was brought by the authority under the Electrical Equipment (Safety) Regulations 1994. I provided an expert witness statement Jenkins (2001) stating the blender was not safe. Regulation 5 requires such products to satisfy three conditions, namely, they must be safe; be made in accordance with good engineering practice regarding safety; and satisfy the safety objectives in the schedule to the regulations.

The harmonized European standard that is generally recognised as setting an acceptable level of good engineering practice regarding safety is BS EN 60335-2-14 approved by the European Standards body CENELEC on 2 July 1996.

Clause 3 of the standard requires the appliance to be constructed so that in normal use it functions safely so as to cause no danger to persons or surroundings, even in the event of carelessness that may occur in normal use. The inadvertent separation of the jar from the blade unit during use resulting in spillage of hot liquids and the exposure of sharp blades demonstrates that this requirement was not met. Clause 7.12 states that instructions for use must be supplied with the appliance so that it can be used safely. The instructions supplied with the Philips Twister failed this requirement in that the jar and blade unit could separate inadvertently in use and the scalding hazard and how to prevent it was not mentioned.

It is clear that there was inadequate assessment of the risks presented by the blender at the design stage and that failure would have been made manifest during user trials. The standard should also have anticipated inadvertent separation and included a requirement to ensure that under test conditions this did not happen.

This illustrates the dilemma faced by committees who draft the standards as to how far they should go to ensure the product could be used safely. They might argue that such matters are the responsibility of the designer. Unfortunately, the standards are used to justify inadequacies in design as was illustrated in the jug kettle case where the lid fell off when being poured. That standard has since been amended to incorporate an appropriate requirement. The hazard checklist provided by EN 1050 (Appendix 8) would have helped to address these anomalies and quantify the risk presented.

The company pleaded guilty to the charges so there wasn't an opportunity to test any defence they might have put forward regarding due diligence. Contesting the case might also have resulted in adverse publicity for the company that might also have affected the decision. Costs and fines against Philips Electronics UK Ltd totalling £20,000 were imposed.

Electric toaster

Tests carried out on the Salton Harmony toaster Clift (1996), number 14 in the above table, showed that the side panels reached temperatures of 200 degrees Celsius that medical evidence Lawrence (1996) said could cause burns.

Risk assessment

Inadvertent access to the sidewalls of toasters by children and the elderly is very likely and because of the very high temperature levels that are reached and the short contact time necessary, burn injuries are likely. Although the injuries are not life threatening the toaster should be designed so as to mitigate this as far as possible.

The very high temperatures in excess of 100 degrees Celsius reached by the side walls of the toaster would cause burns to the hands if touched only for a short time, children and the elderly being most at risk being more sensitive to heat and their slower response rate. A burnt hand would be the top event and the sequence leading up to that would involve making contact inadvertently with the sidewall of the toaster.

Preventive action

Improved insulation and/or separation and the use of heat resistant materials should reduce the temperatures that toasters reach. The standard should set an upper limit which is no higher than that permitted for workplace machinery.

Electric jug kettle

An elderly gentleman scalded himself the first time he used his new jug kettle, number 9 in the table. Asda supermarket where he bought it dismissed his complaint saying, "*All their products meet the safety standards*". However there was no requirement in the standard at that time to require the lid to remain in place when the kettle was being poured. Presumably, the designer of this Hinari jug kettle omitted to check what would happen when the kettle was being poured.

Giving evidence at the trial I said the kettle failed two of the three safety requirements in the regulations, it was not "*safe*" as defined in section 19 of the CPA and it did not satisfy the safety objectives in Schedule 3 of the Electrical Equipment (Safety) Regulations 1994 [SI 1994 No.3260]. The only one of the three requirements it met was that it satisfied the kettle standard that was clearly defective in this respect.

The defence expert kept one hand on the lid when he demonstrated the pouring action. Unfortunately the court accepted that the defendant had acted reasonably. The defendant established a defence that they had taken all reasonable precautions and exercised all due diligence. This is a matter for the Magistrates to decide on. Following my representations to BSI on behalf of RoSPA the standard now has a test for kettle lid security. However there are many similar kettles still in use as there was no product recall or public warning issued.

Although this case, and a similar one taken a few months later, did not succeed it provides a good example of where the designer and manufacturer's responsibilities lie and how far a standard has to go to ensure that products that satisfy the specification are legally "*safe*".

The standard is not a legal requirement and yet compliance with it provides an excellent defence, the argument being that those who developed the standard would have taken all the hazards into account.

Risk assessment

All members of the family use such kettles in every home on a regular basis. The exposure to any risk involved in its use is therefore high but scalding from discharged boiling water would hopefully not often be severe. The problem occurred on the first occasion it was used and was possibly caused by an expansion differential between the more solid and ribbed plastic lid and the tubular section forming the top of the jug in which it sat. The pouring of boiling water against the lid dislodged it

allowing the water to escape to the side of the spout. A reasonably alert user might have returned the kettle to the vertical without further amiss but a person without quick reflexes and judgement might have discharged even more boiled water.

The lid being insecure and falling off the top of the kettle whilst pouring hot water which would tend to flow more quickly would lead to spillage and possible scalding injuries. The top event here is scalding following the lid of the kettle being suddenly dislodged and the hot contents spilling around the receptacle being filled. The sequence of events once again is predictable and should have been anticipated by the manufacturer.

Preventive action

The resulting failure of the lid to remain reasonably secure during the pouring operation indicates that thorough pre-market testing had not been carried out on the kettle. Such an obvious failure should have been the responsibility of the designer but it was necessary for the standard to be amended in order to address this deficiency. More rigorous bench testing would have identified the fault.

Dishwasher

In the tragic case of Mark Rockingham, the Coroner made the suggestion after the event and with the benefit of advice that the storage arrangements for knives in dishwashers should be changed so that blades were not protruding from the basket in an upwards direction in such a manner that would lead to a similar accident following a fall. Despite this helpful suggestion the BSI technical committee did not move to amend the standard EN 60335 2-5 immediately although it did concede that mechanical hazards may not have been adequately dealt with.

The top event was the impaling of the 12 year old on a large carving knife protruding from the cutlery basket in the drop down door of the dishwasher. It is a foreseeable condition that the door would be left in the open position whilst unloading the dishwasher and that knives would

therefore present a cutting and penetration hazard. Instructions provided by the manufacturer recommended that knives be placed with their handles downwards to ensure efficient cleaning of the blades. Mark tripped and fell onto the knife and suffered fatal injuries. Falls in the kitchen are quite common with some 40,000 requiring medical treatment each year in UK based on the HASS (2000) data, often caused by objects left lying on the floor and slipping on spillages.

Unfortunately for many who suffer the consequences of domestic accidents, top events such as the one described in a Fault Tree Analysis (FTA) may not be considered at the design stage, perhaps because the consequences are considered so unlikely. Although falls in the kitchen are quite common, the consequences of the body making contact with other objects may not be seen as relevant to the designers of domestic products. Indeed, they may not consider that they are responsible for such eventualities and standards may support them by not taking such matters into account.

This raises an important issue and dilemma for standards writers as to how far designers' responsibilities extend and how far specifications have to go to cover all relevant safety and performance criteria adequately. A proper risk assessment should have included the cutting and puncture hazard and the consequences that would have resulted in an alternative arrangement for knives such as that suggested by the Coroner.

A "*risk assessment approach i.e. identifying hazards and reducing associated risk, if used as recommended, would have made such an omission less likely*" Jenkins (2000a). It was accepted by the committee that "*mechanical aspects have not been fully covered*" in the standard.

Risk assessment

A mechanical hazard of this type would have been identified had a proper risk assessment been applied at the design stage. The drop down door that is common to many designs of dishwasher presents an opportunity

for obstruction leading to a fall. Floor surfaces in kitchens are often wet and slippery which increases the risk. The door is likely to be left open for some time whilst being loaded and unloaded. The cutlery basket is often sited in an exposed position and knives tend to be loaded with their blades protruding upwards. Although the frequency for harm to occur may be low the consequences as in this case could be fatal.

Analysis

With the drop down door open and cutlery basket exposing sharp objects, anyone making contact could suffer injury. The top event was the knife blade protruding upwards from the cutlery basket in the open dishwasher onto which the boy fell. The sequence of events leading up to the tragedy are unusual but highly predictable considering the circumstances detailed at the inquest, the drop down door being open and the normal arrangement of the cutlery.

Washing machine

Failure of the interlock meant that access was possible to the moving parts of the machine as shown in the data in Chapter 6. This requirement was introduced many years ago when people were injured having tried to withdraw clothes from spin dryers before the drum had stopped rotating. There is also a significant risk for young children who it was found in this case were able to open the door whilst the machine was operating.

Manufacturers have to consider that it is not possible to prevent access to such appliances by young children particularly with some modern kitchen layouts and design their products accordingly. Fortunately, the injuries are not usually life threatening although there was a possibility of amputation in at least one of the cases reported.

Analysis

When the interlock mechanism fails, the door can be opened with the fast moving drum still in motion exposing the mechanism to limbs of children and others who do not appreciate the danger of making contact with it

resulting in personal injuries. The top event in this case would be particularly serious injuries to a child. The purpose of the interlock was to prevent access by users of such machines to the moving parts until the drum had come to rest. This protective measure became even more important when it was realised from accident reports that inquisitive children were being exposed to the mechanical hazards.

Event Tree Analysis (ETA)

ETA begins with an initiating event such as a component failure. If left unchecked this could result in a serious accident leading to personal injury and property damage. The consequences of that undesired and unintended event are followed through the various pathways provided by the branches of the tree and assigned a probability of them occurring. The result is a list of possible consequences of the initiating event in which each chain of events has an associated probability. An overall level of risk can then be assigned to the process and appropriate avoidance action taken to address the hazard.

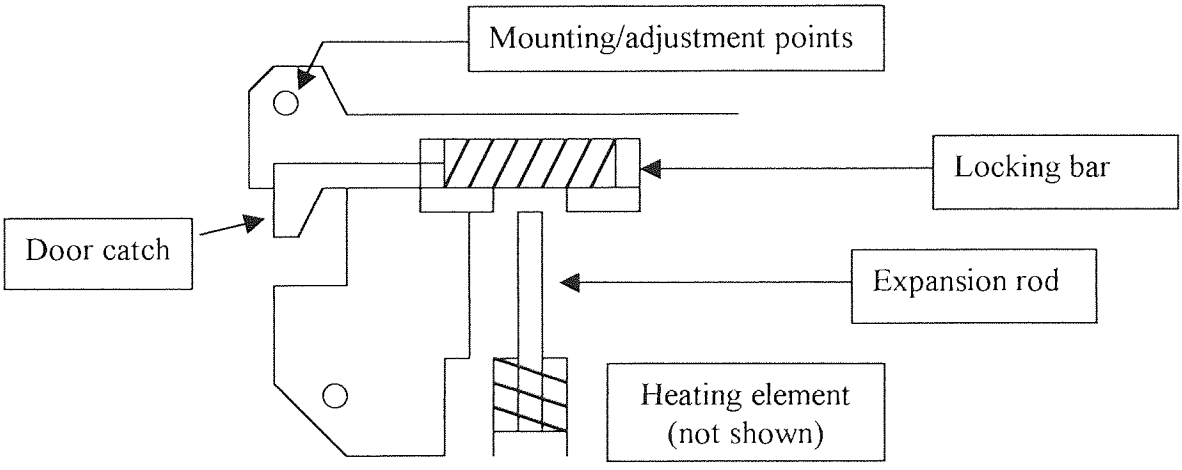

Figure 30: Washing Machine Interlock

A general diagrammatic representation of a protective interlock mechanism on a washing machine door to prevent access to its moving parts during operation is illustrated in Figure 30 above. A failure in the Merloni washing machine mechanism is referred to in the Chapter 6 Data.

The fault in the washing machine was found to be the interlock mechanism and in particular the door catch that had not located itself securely enough to prevent the door opening before the washing cycle had been completed. Following the initiating event i.e. the door opens in mid-cycle allowing a child for example to reach inside and injure its arm, the detector either senses that the cycle is not complete or it doesn't. If the detector succeeds, the next line of defence is the water sensor, which will detect whether the washing cycle is complete or not.

If the water sensor is effective the next stage to examine is the control mechanism i.e. the door handle and whether it will open or not. This provides the last line of defence.

Event Trees

The probability that failure will occur at each point is given by the respective P value and success by 1-P. Because partial failures are difficult to identify the tree is simplified so that each event point has only two results denoting total success or failure.

Each probability is dependent on the previous event having occurred and the end point is the product of all probabilities. In the example of the washing machine door that opened before the wash cycle was complete, this initiating event will have a probability of occurrence of PA. If the heating element fails the locking bar will not operate to secure the door catch. The door catch may fail because the latch doesn't make positive contact which may be caused by excessive wear taking place between the two components or in the final event, the fixing points not being properly secured.

Child-appealing lamp

Some electrical products are clearly intended to be attractive to children. If they were toys they would have to operate at a maximum voltage of 24

V and it is reasonable to expect the same of such products. That they present an electrical hazard even for adult use is even more serious.

Risk assessment

The hazards readily identified are electrocution and burns following overheating and fire generated by combustible materials. The product is to be used by young unsupervised children in their own bedrooms and must therefore be intrinsically safe and anticipate misuse conditions.

Analysis

Overheating of lampshade resulting in fire would cause personal burn injuries, possibly fatal, and property damage. The top event would be a fire and/or electrocution from exposed live parts with a predictable series of events leading up to the injury and damage.

Anglepoise lamp

Process Description
Table mounted lamp on adjustable arms incorporating a magnifying glass and light source for model building and needlecraft.
Potential and actual faults:
Mirrors that increase its surface temperature surround the bulb.
The bulb protrudes from its housing and will be the first part to make contact with an adjacent surface.
The lamp assembly collapses slowly under its own weight.
The hot bulb makes contact with flammable materials.
Use including foreseeable use:
Method of use illustrated on packaging and in instructions.
The lamp collapsed onto flammable materials being worked on by an elderly person who had fallen asleep.

Table 70: Anglepoise Lamp

Hazards

The hazards presented by the lamp are fire and burns.

Who could be harmed?

The person using the lamp is likely to be burned or harmed by the ensuing conflagration.

The user may be an elderly or infirm person carrying out needlework or building models.

Others in the vicinity, family, neighbours could be affected by fire and smoke.

Severity

With a hot bulb in contact with flammable materials a fire could result.

Ignition of materials leading to a fire could result in loss of life.

Contact with the hot bulb could cause a burn.

Score: severity level – high 4

Likelihood

The lamps were supplied by mail order through a catalogue.

The numbers involved were not considered to be high.

Opportunities for the product to cause a fire are considered low.

It is unlikely that the light would be switched on when the user was not present.

The user, even if drowsy, would smell the charring well before ignition took place.

There should be ample warning of the risk of ignition therefore.

Avoidance action could be taken such as moving the heat source away from flammable material and disconnecting the power source

Score: likelihood level - 2

Risk level

Severity x likelihood = 4 x 2 = 8

Moderate

Action

Reduce risk to a level that is ALARP.

No formal action was taken although a case could have been made out.

The suppliers were informed and agreed to take appropriate steps.

Comment

Appropriate steps were probably taken in the circumstances.

No formal risk assessment had been carried out.

7.2.2.2 Toys

Toy safety Directive 88/378/EEC

The Essential Safety Requirements (ESR) for toys are summarised below and have to take into account their condition *"when used as intended or in a foreseeable way bearing in mind the normal behaviour of children"* [Article 2(1)]

The ESR provides a useful hazards checklist for toys:

Consider Principle
Physical and mechanical
Flammability
Chemical
Electrical
Hygiene
Radioactivity

Table 71: Toys Directive Hazards

The requirements can be summarised as follows:

Physical and mechanical:

Must have requisite mechanical strength and stability

Risks from accessible edges, protrusions, cords, cables, fastenings to be reduced as far as possible

Risk of physical injury from moving parts to be minimized

Toys and parts for children under 36 months to be of such dimensions to avoid swallowing or inhalation

Toys, parts and packaging must not present a risk of strangulation or suffocation

Loss of buoyancy or support on water toys to be reduced as far as possible

Easy escape from inside toy
Braking on ride-on toys without risk of ejection or injury for user or third parties
No unreasonable risk of physical injury for users or third parties from projectile toys
Toys with heating elements to have no hot surfaces that can burn or escaping liquids or gases unless essential for proper functioning.

Flammability:
Toys must be composed of materials that do not burn when exposed to an ignition source or if they do ignite they extinguish when source is removed or burn slowly at a low rate or are treated to delay combustion.
Such materials must not lead to the ignition of other parts of the toy
If the toy contains dangerous substances (67/548/EEC) e.g. chemical games, model assembly, photography, it must not contain substances that may become flammable due to the loss of non-volatile flammable components
Toys must not be or contain explosives, except for percussion caps for which special requirements apply (Annex I point 10)
Toys must not contain substances which when mixed may explode

Chemical:
Toys must not present health hazards or risks of physical injury by ingestion, inhalation or contact with the skin, mucous tissues or eyes
They must comply with legislation covering dangerous substances
The bioavailability per day from toys must not exceed specified limits for antimony, arsenic, barium, cadmium, chromium, lead, mercury, selenium.

Toys must not contain toxic substances or preparations within the meaning of Directives 67/548/EEC and 88/379/EEC in amounts which may harm the health of children using them. A substance may be permitted if it is essential to the functioning of the toy e.g. chemical games and photography. At all events it is strictly forbidden to include, in a toy, dangerous substances or preparations if they are intended to be used as such while the toy is being used.

Electrical:

Voltage must not exceed 24 volts

Insulation and mechanical protection to be provided to prevent electric shocks

Surfaces of electric toys must not cause burns if touched

Hygiene:

Toys must be designed and manufactured to meet hygiene and cleanliness requirements to avoid risk of infection, sickness and contamination.

Radioactivity:

Toys must not contain any radioactive element or substances like to be detrimental to a child's health. Council Directive 80/836 Euratom shall apply

The hazards addressed by the Essential Safety Requirements are therefore:

Physical and mechanical – such as the presence of sharp points and edges that could inflict a wound or abrasion.

Flammability – the presence of flammable materials which if permitted to make contact with a source of ignition could result in burns injuries being inflicted on the child.

Chemical – toxic substances if ingested or otherwise absorbed over time could result in poisoning. Bioavailability limits are prescribed for known toxic substances.

Electrical – electric shock. The voltage is limited to 24 volts maximum to reduce the risk of electrocution.

Hygiene – the need to be able to clean the toys is a safety requirement.

Radioactivity – radioactive substances are prohibited.

Toy safety

Toys probably present one of the greatest challenges to designers and manufacturers in that foreseeable use is difficult to ascertain and they are

charged with producing safe toys "*bearing in mind the normal behaviour of children*". Specific hazards that need to be addressed are identified in the Toys (Safety) Regulations 1995 [SI 1995 No.204] i.e. the Essential Safety Requirements in line with the Toys' Directive [88/378/EEC].

The harmonized toy standard BS EN 71 best interprets the Essential Safety Requirements and independent and authoritative proof of compliance with the standard is important. However, compliance does not of itself confer immunity from legal obligations but it provides the best method. It provides a safety benchmark below, which no toy should fall.

Comment

A risk assessment approach is better able to deal with hazards created by novel features, new materials and foreseeable conditions of use that fall outside the scope of the standard and identify those hazards not yet covered by the standard. The toy must meet all the requirements detailed in the standard BS EN 71. To ensure production continues to meet the required level, appropriate quality control measure must be employed at the manufacturing stage and again prior to distribution with constant surveillance carried out and attention paid to returns and complaints.

Although the list of hazards provided by the Essential Safety Requirements appears to cover all likely eventualities, it may not be as comprehensive as it should be and as the Toys Directive intended. Noise for example was not considered to be a hazard until the matter was drawn to the attention of the European Standards Body CEN and the Commission. I raised the issue of noise as a hazard that had not been addressed by the standard at a BSI technical committee meeting TCM/15 Jenkins (1990a) to no avail and later Axelsson (1995) drew CEN and the Commission's attention to this deficiency stating "*Many noisy toys intended for use by children emit sufficiently intense noise to be a source of noise-induced hearing loss in children*".

This hazard has now been addressed in the safety standard for toys EN 71. However, had the hazards been more precisely detailed in the standard with suitable measures to address them including elimination there would be less likelihood of a new product being developed that presented a hazard that was not adequately dealt with by the standard.

Toy crystal set

A child kept a container of her Peter Pan Playthings toy crystal set near her bed over night and drank some of the liquid by mistake. She died from copper sulphate poisoning. Such toys, including chemistry sets, are now better controlled following guidance provided by the European Standard EN 71 which requires the use of safer alternative substances as well as better packaging, information and marking.

The Toys Directive stipulates in relation to the chemical hazard that:

Toys must not present health hazards or risks of physical injury by ingestion, inhalation or contact with the skin, mucous tissues or eyes,
They must comply with the legislation covering dangerous substances,
The bioavailability per day from using toys must not exceed specified limits for antimony, arsenic, barium, cadmium, chromium, lead, mercury, selenium,
Toys must not contain toxic substances or preparations within the meaning of Directives 67/548/EEC and 88/379/EEC in amounts which may harm the health of children using them. A substance may be permitted if it is essential to the functioning of the toy e.g. chemical games and photography. At all events it is strictly forbidden to include, in a toy, dangerous substances or preparations if they are intended to be used as such while the toy is being used.

The general principles that:
The degree of risk is to be commensurate with the ability of the user and supervisor,
A minimum age is to be specified where appropriate, and

Labels and instructions should identify risks and how to avoid them, were breached as were those requirements relating to the chemical hazard presented by the toy as detailed above.

The toy therefore failed the Essential Safety Requirements with regard to the chemical hazard in that it presented a risk of physical injury by ingestion and the risk was not commensurate with the ability of the child to deal with it appropriately.

Garden Slide

A child was playing alone in the garden near an Early Learning Centre slide. She climbed up the side of the slide on its supporting legs and became trapped by the neck between a vertical and an angled cross member. Her injuries proved fatal. The slide failed the mechanical and physical requirements in the Essential Safety Requirements of the Toys (Safety) Regulations because it presented a significant risk of injury. The company, under new management, introduced a more effective mechanism to deal with such emergencies.

Stack-a-hat toy

The Mothercare toy had been the subject of a complaint following a minor injury to a young child. The jack-in-the-box type toy appeared to breach the Essential Safety Requirements of the Toys Safety Regulations in that when the toy emerged from its box it presented a pinching hazard for a child's fingers. The local TSS prosecuted the retailer for supplying a toy that failed the safety regulations.

Experts on both sides using the Nomograph referred to in Chapter 4 carried out risk assessments. The different risk levels obtained by the experts demonstrated the weakness in the process that is often too subjective in nature. There was however sufficient expertise appearing for the defence, including the chairman and several other members of the BSI toy safety committee for the district Judge to find the company not guilty. It was not possible to prove the case "*beyond reasonable doubt*".

Once again it may be considered that the product was legally safe because the court had failed to uphold the charges.

Had the case been brought on behalf of the injured child for damages however, it would have only been necessary to establish it on the balance of probabilities. The same product would therefore be deemed to be safe and unsafe but against the different criminal and civil legal tests.

Use of risk assessment

The company concerned had many experts on call to assist them in ensuring that their products were safe in addition to their own in-house staff and testing facilities. However, the use of risk assessment had not yet been taken up in a fully structured way as far as could be ascertained at the time of writing. Being one of the leading companies in its field it is likely that its systems are superior to many others and provide a state of the art level of performance which other companies will hopefully follow.

The use of the toy safety standard EN 71 is essential and it is claimed to be hazard based. However there is a problem with having two types of standard A and B, horizontal and vertical, both in one document and it would be worth examining how the standard could be better presented in order that all the hazards are addressed specifically and the many individual products that need particular attention, dealt with separately. Failure to adequately address the finger trapping hazard in the toy safety standard EN 71 has already been referred to in this study.

7.2.2.3 Machinery

Machinery Directive 89/392/EEC

The Essential Health and Safety Requirements (EHSR) relating to the design and construction of machinery and safety components are mandatory. The following hazards are based on the list provided in Annex A of harmonized European Standard EN 1050:1996 Safety of machinery - Principles for risk assessment.

Hazards
Mechanical
Electrical
Thermal
Noise
Vibration
Radiation
Harmful materials and substances
Ergonomics
Combination of hazards
Start-up, over-run, over-speed
Safe braking
Speed variation
Power failure
Control circuit failure
Fitting errors
Break-up
Falling or ejected objects or fluids
Stability, overturning
Slip, trip, fall

Table 72: Hazards

7.2.2.4 Construction Products

Construction Products Directive 89/106/EEC

Essential Requirements
Mechanical resistance and stability
Safety in case of fire
Hygiene, health and the environment
Safety in use
Protection against noise
Energy economy and heat retention

Table 73: Essential Requirements

7.2.2.5 Gas Appliances

Gas burning Appliances Directive 90/396/EEC

The Directive covering this type of product on which the safety regulations are based is the Gas burning appliances Directive 90/396/EEC. As noted below, it deals with the information to be supplied with gas appliances to ensure safe use but the hazards listed did not adequately deal with the case referred to below, hence the decision by the prosecuting authority to bring charges under the General Product Safety Regulations 1994. The gas fire that resulted in a fatal CO poisoning is therefore dealt below under the General Product Safety Directive.

Gas Appliances Directive
Information
Gas release
Ignition
Combustion
Energy use
Temperatures
Hygiene

Table 74: Gas Appliance Directive

Cooker Pan Supports

Scalding injuries are recorded in HASS (2000) data and some are caused when cooking utensils are dislodged from the gas hob. A closer inspection of the pan supports suggests that they present a hazard that has not been addressed by the cooker standards even thought the Directive requires attention to be paid to this aspect of safe performance.

Risk assessment

The hazard most easily identified is scalding from hot liquids discharged from cooking utensils that become unstable and tip their contents. There is a recognized problem of young children grabbing saucepan handles and being injured and RoSPA has recommended that handles be turned away

from the outer edge of the cooker hob and that the back burners be used wherever possible.

Although strict guidance exists to keep children out of the kitchen, there are many situations in which this is not always possible particularly with the design of modern open-plan housing and space saving methods. The frequency of exposure particularly of young children to the hazard should be low but the consequences of spillage are very serious and can cause permanent damage. There is a greater need to safeguard those who have little or no influence on the hazard or are able to control the risks.

Analysis

Scalding injuries resulting from the tipping of the saucepan on the unstable pan support is the most likely top event in this case. The events leading up to this are quite easily anticipated, liquid being heated in the pan and the protruding handle being contacted, perhaps inadvertently, causing it to tip. Although carers are warned always to keep children out of the kitchen, the accident data reveal that they are often in that location and suffer more than adults the consequences of such events.

Gas Fire

The Directive covering this product on which the safety regulations are based is the Gas burning appliances Directive 90/396/EEC. The Directive deals with information supplied with gas appliances to ensure safe use but the hazards covered do not deal with the case referred to as number 8. The prosecuting authority therefore decided to bring charges under the General Product Safety Regulations 1994 based on the GPSD and the analysis therefore appears below under the GPSD.

7.2.2.6 General Products

Products that are not specifically covered under their own Directive are subject to the General product safety Directive 2001/95/EC. Producers are obliged to place only safe products on the market as required by the General Product Safety Regulations 1994.

"Safe Product"
"any product which, under normal or reasonably foreseeable conditions of use including duration and, where applicable, putting into service, installation and maintenance requirements, does not present any risk or only the minimum risks compatible with the product's use, considered to be acceptable and consistent with a high level of protection for the safety and health of persons, taking into account the following points in particular:
(i) the characteristics of the product, including its composition, packaging, instructions for assembly and, where applicable, for installation and maintenance;
(ii) the effect on other products, where it is reasonably foreseeable that it will be used with other products;
(iii) the presentation of the product, the labelling, any warnings and instructions for its use and disposal and any other indication or information regarding the product;
(iv) the categories of consumers at risk when using the product, in particular children and the elderly.

Table 75: Safe Product
Source: General Product Safety Regulations 1994

The following are examples of products that have been the subject of official action based on the requirements of the GPSD as introduced into British law by the General Product Safety Regulations 1994.

Vacuum Flasks

A vacuum flask, number 1 in the table of cases above, was stored upright in the back of an estate car close to where a child was sitting. Some of the hot contents escaped from the flask and scalded the child. Following complaints several authorities conducted tests on various vacuum flasks that were found to fail the tests prescribed by the standard.

The court agreed that failure to meet the standard particularly with regard to securing the contents of the flask rendered the product unsafe.
Vacuum flasks are subject to the General Product Safety Regulations 1994 that implement the General Product Safety Directive. They must therefore

be "*safe products*" as defined. The circumstances of the complaint and the subsequent confirmatory tests show that these flasks under foreseeable conditions of use, i.e. being filled with hot liquid and stored upright in the back of a car, presented more than a minimum risk, they leaked their hot contents and that was not consistent with the high level of protection for the safety of persons taking into account the characteristics of the product.

Although an assessment of the risk presented by the vacuum flask would probably place it at the lower end of the scale the level of risk was unacceptable in that leakage should not have occurred and there was a performance standard that was invoked to support this view.

Gas Fire

The Directive covering the gas fire, number 8 in the table, on which the safety regulations are based, is the Gas burning appliances Directive 90/396/EEC. As noted above that Directive deals with the information to be supplied with gas appliances to ensure safe use but the hazards listed did not adequately deal with the case referred to here, hence the decision by the prosecuting authority to bring charges under the General Product Safety Regulations 1994 based on the GPSD.

Background

Despite the procedures laid down to ensure the safety of users, a gas fire properly approved and made by a reputable company was supplied and correctly fitted and yet caused the death of a person and was deemed by the court to be dangerous. The safety system failed with disastrous consequences and the issues raised need to be addressed as a matter of urgency in order to ensure that there is no repetition.

The coroner was reluctant to accept the assurances he was given that the gas fire was safe and invited the Lancashire Trading Standards Department to carry out their own investigations that resulted in the manufacturers being convicted by the Blackburn Magistrates.

The standard used at the time to check the safety of gas fires failed to ensure that there was a back up in the event of the failure of a vital component. Failure of the valve led to a catastrophic failure that resulted in death.

Risk assessment

Following the procedures recommended for machinery in EN 292 the Safety of Machinery standard we must define the limits of the fire so as to include intended use and, what is particularly important in this case, the consequences of reasonably foreseeable misuse.

The hazards identified are fire, explosion, poisoning and mechanical. The last two may not have been given the degree of attention as the more traditional hazards of fire and explosion will have done for gas appliances.

Failure to ensure that the valve would always operate in the event of a power interruption demonstrated a major shortcoming in the design of this fire. A vital issue that was not adequately considered was the way the fire could have been used particularly when turning it on and off. An ordinary consumer would have little or no appreciation that there was a significant difference between turning the fire off using the controls as instructed or pulling the plug out of its socket which appeared to have the same effect. It is also likely that this would be the preferred method of operating the fire because it was simpler. The valve was not sufficiently reliable to have been used as a final safety cut-out and its failure rate as accepted in court, though suitable for less onerous conditions, made it dangerous to use for this purpose.

Although the manufacturers acted responsibly when the fault was brought to their attention by the fatal accident, they had reason to believe that they had exercised all due diligence to avoid committing the offence of supply a non-complying product. The law permits the supply of dangerous products if the defendant can show on the balance of probabilities that he had acted reasonably in this way.

There is a misconception in such cases dismissed in this way that the product involved has been found to be acceptably safe by the court.

Failure of the cut-off fail-to-safe valve led to continued combustion of gas without adequate ventilation resulting in the spillage of products of combustion including carbon monoxide, which is poisonous. The sequence of events in this case resulted in the build up of poisonous carbon monoxide gas, which killed the victim. The combination of factors was described in detail as this followed a Coroners' inquest. It is likely however that many situations possibly with better ventilation in the house would not have led to such a disastrous result but rather to the lesser symptoms of headaches and nausea because of the lower levels of carbon monoxide reached. The sequence was however a natural progression in the circumstances and a fatality was inevitable. Further deaths might well have occurred had action not been taken immediately to warn the public and have the gas fires modified.

Preventive action

The use of a risk assessment approach at the design stage of the fire would have identified the conditions that led to the fatal result in this case. User trials could have shown that there would be a preference for using the wall plug as an easier means of controlling the fire rather than the more complicated method intended by the manufacturer. Not only the cognitive process but also the physiological conditions should have been considered. Older persons often lack dexterity and will seek out methods to reduce the physical demands made on them by products.

In a workplace environment the machine operator would have been given detailed instructions in how to operate the equipment safely. There is no such obligation on installers of gas appliances in the domestic setting. The fitter would have to be CORGI registered by law but it is doubtful whether he would have been capable of transferring the essential safety instructions necessary to an elderly person to ensure that the product was

used in a safe manner. In this case there was a fault in the fire but had the user followed the operating instructions the faulty component would not have been called upon to function as frequently as it did thus increasing the opportunities for a serious failure to occur.

Exercise Skier

The CSA Alpine Cross-country Skier Model E270, number 10 in the table, was found to have twelve small chrysotile white asbestos pads located behind adjustable tension knobs. The use of asbestos in consumer products is strictly regulated under the Asbestos Product (Safety) Regulations 1985 as amended in 1987 most forms being banned. Chrysotile was eventually prohibited in products from 24 November 1999 under the Asbestos (Prohibitions) Regulations 1992.

Risk assessment

It is possible that asbestos fibres from the tension knobs could be released into the atmosphere when the exercise skier was being used. Because the inhalation of even small quantities of asbestos can produce long-term health damage and premature death, the risk level is likely to be significant. The actual mechanism by which the fibres would be made available to be breathed in the atmosphere and the frequency of exposure is secondary to the existence of the asbestos. Unless the asbestos is permanently sealed off and can never be exposed to inhalation it is unlikely that its presence would be acceptable now that the health effects are so widely known.

Safety Film for Glass

Questions had been raised concerning the effectiveness of safety film to be applied to glass, number 12 in the table. In particular, whether the claim made on the packaging was correct in that it raised the performance of the glass to which it had been applied to that of 'safety glass'. Samples of the film were submitted to the test laboratory to assess its performance. It wasn't possible to apply the film to the test samples of

glass and the dimensions had to be modified to accommodate the different dimensions.

On the second day of the case the judge called a halt because he felt the results were fundamentally flawed in that the procedures laid down in the standard had not been followed precisely. The case was dismissed and the manufacturer later claimed that the court had vindicated his company and confirmed his product rendered the glass to which the film was applied 'safety glass'.

Bath Mat

An elderly person had slipped on a bath mat (case number 15 in Table 63 above) when stepping into the bath to take a shower. Tests had to be developed to assess its performance as there was no British Standard available. The rubber suction cups on the mat were found to lose their adherence properties when a force was applied at an angle simulating a heel being placed on it.

The court was not convinced that the case had been proven beyond reasonable doubt and dismissed the charges. A request was made to BSI to develop a standard for bath mats but this has not been proceeded with at the time of writing.

Novelty Lighters

Lighters of this type, at number 16 in the table, are highly attractive to children, indeed they look like toys. They are quite easily operated particularly by children who tend to copy adults. Lighters are often left lying around so there will be many opportunities for access. The consequences of failure, accidental or playful ignition of flammable materials is very serious and many domestic fires have been caused by children playing with lighters according to the DTI (1997).

There are an estimated 1220 fires resulting in 19 deaths and 260 injuries in Europe each year caused by children playing with lighters.

Risk assessment

Accidental ignition of flammable materials by a child playing with the lighter could lead to burns injuries and property damage with the potential for loss of life. Ignition of curtains or bedding causing widespread conflagration would be the top event, the lighters being left around the home being particularly attractive to children because of their novel shapes.

Preventive action

Cheap disposable LPG lighters and those that are deemed to be particularly attractive to children should be provided with a child-resistant mechanism similar to that devised for the American market and which has been mandatory there since 1984 with beneficial results.

Glass Bathroom Shelf

The purpose for which the glass shelf, number 17 in the table, was intended was to support cosmetic and similar products for use in a bathroom. The illustration on the packaging left no doubt as to its intended function and appropriate location above a bath. It is common practice to have a shower unit fixed to the wall above a bath and to be able to stand in the bath in order to take a shower. This would bring the user into close proximity with the glass shelf.

Risk assessment

The injuries sustained in this case were life threatening as the young girl lost a considerable amount of blood when she came into contact with the shelf, which broke. Fortunately her father applied first aid but such prompt action cannot always be guaranteed. Ordinary thin annealed glass breaks into sharp pointed shards and in this instance fell onto the victim's thigh causing a large cut. Falls in the bathroom are common and the natural instinct would be to grab something to help prevent it. In this case the child merely leaned on the shelf it is claimed but even modest pressure would have resulted in failure because of the 4mm thin glass and

the manner in which it was supported by its two brackets fixed against the wall above the bath.

The instructions did not warn against such use indeed the illustration on the packaging showed its location in exactly the same position as the father had positioned it. An adult might have anticipated such an occurrence but all members of the family, including the young and elderly, use showers sited over baths. Such usage must be taken into account at the design stage.

The failure mode is breakage of glass and its effects are lacerations. The study of events leading to the failure, in this case the top event being the laceration of a child's leg, seems obvious in that the positioning of a piece of relatively thin annealed glass above a bath would result in catastrophic failure. It is common practice to fit showers over baths and the resulting contact with the glass shelf would increase the risk of failure with sharp edged shards falling down onto the unprotected body of the victim.

Preventive action

The use of ordinary annealed glass in such a location is potentially dangerous and a product of this sort should have used less hazardous materials such as plastics, wood or safety glazing. The edges could have been protected and the shelf mounted more securely but the choice of a more suitable material is vital in this case.

Panic Bolt

The purpose of the panic bolt, number 18 in the table, was to enable an exit door in a public building to be opened quickly in an emergency such as a fire. A complaint was received that some new panic bolts appeared difficult to operate and samples were obtained for testing. A standard was used as a basis for testing the panic bolts and a force of 22 Newtons maximum was specified. The bolts failed to release at forces well in excess of the 22 Newtons and the local authority decided to bring a prosecution.

Risk assessment

Safety devices are particularly important products that need to operate properly in an emergency situation. Personal Protective Equipment (PPE) covers many types of protective product for use in the workplace and at home and is subject to safety regulations based on the PPE Directive. The importance of such products is therefore well recognised.

In the event of an emergency such as a fire breaking out in a club attended by young people for example it is essential that they are able to escape from the building as quickly as possible. That is the purpose of the panic bolt, which also provides security against unauthorised access. Failure to operate could lead to multiple deaths in the ensuring conflagration.

Luggage Straps

Several prosecutions were taken against suppliers of elastic straps with metal hooks, which detached suddenly with considerable force often in the direction of the user's face. Serious eye injuries were reported including one that resulted in death. The Australian authorities encouraged the drafting of a standard that is now well established and used to assess the performance of the straps. The use of such straps to secure luggage on car roofs appears quite common and failure could result in a serious road accident should the load be dislodged whilst the vehicle is on the highway.

Smoke Alarm

An example of misuse, with a disastrous outcome, involved a smoke alarm. Seven children died in a house fire in Wrexham in August 1995 when it was found that the smoke alarm was not fitted with a battery.

The cost of batteries is a significant factor particularly in a low-income family and there is an understandable temptation to use them to power other products such as toys, the user probably fully intending to replace the battery as soon as possible or when convenient.

There are indications that despite a high level of alarm fitting there is a considerable proportion of inactive alarms in use Jenkins (1994a).

Nuisance triggering of smoke alarms is also a well-known problem, which causes people to remove the battery as a temporary measure whilst the inadvertent smoke generated during cooking is dissipated.

Risk assessment

Failure of a warning device designed to alert occupants to a fire in their home denies the occupants the opportunity of making a quick exit from the building. Many victims of fire die from smoke inhalation. The risk level is therefore high in that the consequences of failure are death. The number of opportunities for the alarm to perform its function is relatively high in that there were 58,284 fires in dwellings in 1999 according to the Home Office (2000).

Corrective action

Alternatives to the use of 1.5 Volt household batteries have been considered including a specially designed battery, which could only be used in, smoke alarms. Unfortunately this idea failed to attract sufficient commercial sponsorship.

Mains operated wired-in alarms that remain operational even during a power failure are therefore preferable and this is now a requirement for new dwellings under the Building Regulations 1991. Smoke alarm manufacturers have considered using long life dedicated batteries which cannot be used in other products to overcome such misuse but this has not achieved any commercial success.

Coseytoes

The Mothercare Coseytoes product referred to in Chapter 6 did not provide the degree of safety that the GPSD requires because it presented a risk to the user under foreseeable conditions of use that was not reduced to a minimum as required in order for it to satisfy the requirement of being a "*safe product*" under the GPSR.

Risk assessment

A risk assessment carried out at the design stage would have identified the hazard inherent in the sharp metal hook and the potential energy likely to be released when stretching the elastic strap when it was released suddenly. There were no instructions on how to fit the product to the pushchair and no warnings given as to the possible consequences of sudden failure. The consequences were likely to be serious if contact is made with the eye of the person fitting the Coseytoes or the occupant of the pushchair.

The hazard could have been eliminated had the method of fixing been better. The elastic strap should have been in one piece and terminated with a rounded plastic loop fixed to the opposite side of the Coseytoes.

Child-Resistant Closures

Advice to carers regarding any toxic chemical and drugs is to keep them out of sight and out of reach of children. The more dangerous products are required to be stored in containers with CRCs to reduce the risk of a child getting access to them in the event of the product coming into their possession inadvertently.

Risk assessment

Child resistant closures are required to be used for the packaging of solid dose analgesics and dangerous substances that are classified as toxic, very toxic or corrosive under the Dangerous Substances and Preparations (Safety)(Consolidation) Regulations 1994 [SI 1994 No.3247].

The closures are subject to performance requirements that determine how effective they are with respect to being resistant to being opened by children. However 10% of the test panel of children is permitted to open the closure. Access to the dangerous substances can result in fatal consequences. Such closures cannot be totally effective therefore and one either has to isolate the child from the container or make the closure more effective.

Many elderly people find such closures difficult to open and the standard requires that 90% of the test panel are able to do so, but they are tempted to store dangerous substances in open or less secure containers. This is a foreseeable condition of use but presents a serious risk for young children in such circumstances such as when visiting grandparents who have not stored their medicines and chemicals safely. The consequences are so serious that access to the harmful substances needs to be restricted and this is often a matter of information and encouragement.

Analysis

Failure of the closure is the ability of a child to gain access to the contents despite a CRC being fitted. The contents are invariably potentially fatal to children, e.g. solid dose analgesics such as aspirin, paracetamol, medicines and drugs. The child swallowing the dangerous substance would be the top event and leaving the container in view and accessible to a child would be the sequence leading up to this.

Child's Chair

Manufacturers of children's products have to take particular care and in the example quoted in Chapter 6 this was not the case in this instance that almost led to a fatality. The application of a risk assessment approach should have drawn attention to the puncture hazard presented by the protruding bolt.

Risk assessment

The means of attaching the chair to its supporting frame is not common although the use of protruding pieces of metal in furniture has been the cause of complaint for some time. The way in which the product is used is the pertinent factor in this example, the designer having not taken account of the tendency of children to play with objects and treat them as toys. It is necessary to take this into account when designing products for children.

Although the bolt was not sharp as determined by the test in the toy standard, because it was rigid and well supported at the time of the accident and the force of impact was substantial, there was sufficient energy generated to result in a penetrating wound.

Analysis

The protruding bolt, which makes contact with a body part during use, can result in a penetrating wound. The top event was the boy's body becoming impaled on the protruding metal bolt but the sequence leading up to this were less likely to be anticipated in that the chair had to be inverted to expose the hazard. Knowing that the chair was aimed at children, the manufacturer should have anticipated all possible configurations, which is what "*children playing*" should encourage one to do.

Child's Anorak

Another area in which particular care must be exercised is in the design and manufacture of children's clothing. Long cords on jackets have resulted in several fatalities when they have been trapped in doors of moving vehicles. These accidents resulted in the development of a BS guidance document for clothing manufacturers BS 7907.

Risk assessment

The use of long knotted nylon cords which are more for decoration than function has been prevalent in the past. The opportunities for such cords to become caught in the doors of vehicles are high as is the vehicle moving without the driver realising the danger. This has resulted in the wearers falling under the wheels or being dragged along with fatal consequences.

Analysis

A long strong nylon cord becoming caught up in some object or mechanism could lead to injuries if that object or mechanism moves. Once again the top event that led to the tragic outcome is predictable in

that long nylon cords particularly with knotted toggle ends can easily become caught and when the object is a moving vehicle that has been the case in at least three fatal accidents, the outcome is likely to be very serious.

7.2.3 False Descriptions

The Trade Descriptions Act 1968 has proved useful in dealing with a wide range of abuses including false claims that a product is safe when it can be shown not to be. Such claims made in the cases cited below resulted in prosecutions being brought against manufacturers who had initiated the false trade description to enhance the prospects of selling their products.

Oven Cleaner (5)

Contrary to a claim on the packaging the oven cleaner, number 5 in the table, produced toxic gas when used and became the subject of a consumer complaint after ill effects were suffered following inhalation of the fumes. The local authority prosecuted. Although the levels of emission were not life threatening and the duration of exposure was minimal there was still clearly a justified claim that the description was false to a material degree and the company was convicted of the offence.

A prosecution was brought under the Trade Descriptions Act 1968 for applying a false trade description. Such products are subject to the General Product Safety Regulations 1994 implementing the GPSD.

Cool Touch Cooker

Excessively high surface temperatures have featured frequently in the media over many years and the example of a toaster is given in the case studies that detail the historical development of the issue. Manufacturers of the New World brand cooker, number 6 in the table, used the cool touch description presumably to take advantage of the publicity surrounding the problem but the temperatures they achieved could not be considered safe, another description applied to the cooker by the manufacturer which was refuted by Dr Lawrence (1992) of the Burns

Research Group, Birmingham. The standard on which the company based their defence BS 5386 did not provide a safe temperature limit. The court agreed that a false trade description had been applied and convicted the company.

7.2.4 Plugs and Sockets

The Plugs and sockets safety regulations apply throughout Britain because the 13 Amp 3-pin wiring system is not used elsewhere in the European Community. This country therefore has been given authority to specify the requirements for these products.

Attempts have been made to harmonize the plugs and sockets throughout the world and in particular throughout the European Community but such moves have met with considerable resistance, the high cost of the changeover being a major obstacle.

7.2.4.1 Plug and Cable

The moulded-on 3-pin 13 amp plug and cable, number 11 in the table, failed to meet the requirements of the standards in that the insulation was not as thick as specified and there was no fuse provided. The defendant claimed that he had not supplied the product and the court accepted that the prosecution had not established this to their satisfaction. The case was dismissed. It is not known what happened to the plug and cable sets.

Jenkins (1990b) and (1992) provides details of the RoSPA campaign to have all electrical appliances supplied complete with a fitted plug correctly fused. The culmination of the campaign was the fatality of a young woman in Walsall after suffering a shock caused by a badly wired plug on her washing machine. Such incidents were not uncommon but the risk had not been properly addressed. Once again it is not only the person who was responsible for the hazard who is put at risk but anyone who comes into contact with the product. The risk level in such a situation is very high, the consequences being fatal and the opportunities for the harm to be realised are frequent.

7.2.5 Furniture and Furnishings

The Furniture and Furnishings (Fire)(Safety) Regulations 1988 are also unique to Great Britain and were introduced following the high level of fire deaths involving foam furniture.

Folding Mattress

The folding mattress involved in this case, number 23 in Table 63 above, failed the flammability performance standard and therefore presented a risk of fire to the user and those in the vicinity of its use.

The ease of ignition and rate of flame spread are the two principal criteria in assessing flammability performance and the mattress failed on both counts. A common scenario is an elderly smoker falling asleep and a cigarette continuing to smoulder resulting in ignition of surrounding flammable materials. One must take into account the consequences of such a situation not only for the person immediately affected but others in the same building whose lives are also put at risk. The risk level is therefore increased for this reason and in this case was unacceptably high.

It is reasonable that all such products should undergo an assessment of their flammability even if there is no specific requirement laid down by regulations to do so.

7.2.6 Analysis of Complaints Data

In Table 54 complaints about unsafe furniture were seen to fall by two-thirds between 1996 and 1999. Toys represented most of the products in their category previously grouped with sports goods but there was a 50% reduction in complaints about unsafe toys between 1998 and 1999 for no known reason. Complaints about prams and buggies fell to a third of the 1998 level in 1999.

Trading Standards Departments throughout Britain provide information about complaints they have received and dealt with four times a year to the Office of Fair Trading (OFT). The data are then published by the OFT in their quarterly journal Fair Trading and provide an indication of the number of complaints and the types of trading activity and products that have been the subject of consumer dissatisfaction during that period. Around 850,000 complaints are recorded each year in this way based on "*Trends in consumer complaints 52 OFT, London – complaints from Q2/1994 to Q4/2000*".

An examination of the data showed that around 4% of the complaints related specifically to complaints about the health and safety aspects of products. Although the proportion of product safety complaints is comparatively low it still represents around 30,000 such cases each year. However, some complaints about particular products may be duplicated because several people to their local trading standards services around the country will have reported the fault. The numbers involved however are still significant.

Most complaints concerning unsafe products will have been referred directly to the retailer and manufacturer rather than be reported officially to the TSD. Such information is not made available and only becomes known outside the company concerned when it is obtained in the course of a formal investigation into a particular case by a TSO or when revealed as required in a civil case.

It is a commonly held belief that British people do not complain about unsatisfactory products and services. This supposition is challenged by Johnson (1998) who found that the majority of people he studied who were dissatisfied with services, did complain and also took other action depending on how upset they were. His research did not cover products per se but officially recorded complaints published by the OFT running at 850,000 a year represents a significant level of dissatisfaction.

Complaints procedures have not until relatively recently been dealt with in a systematic way, and this has generated the need for a new standard BS (1999). In the USA there is a statutory obligation on companies to notify the Consumer Product Safety Commission of any significant safety issues concerned with a product. Failure to notify can result in a substantial penalty. It is hoped that a similar requirement will be introduced into European legislation so that the authorities and the public can have an early warning of potential dangers.

For the purposes of this study, a selection was made of many unsafe consumer products from the 1,589 enquiries received from TSOs and other sources by me for my comments acting in my capacity as safety adviser over a period of five years ending 31st December 2000. The nature of the failure and the approach adopted by the investigating officer were recorded in my notebooks.

The purpose was to ascertain the extent to which any formal risk assessment had been applied to the investigation. It is known that local enforcement authorities adopted risk assessment but only to identify retail premises that required visiting more frequently than others and guidance was provided by LACOTS.

It is important however to assess to what extent risk assessment had been used "*in the field*" for the purpose of assessing the safety of particular products. Discussions with many officers over the five-year period provided an indication of the extent to which the technique was being used when dealing with unsafe consumer products.

7.3 Officer Portfolio of Product Safety Cases

A list of one enforcement officer's prosecutions is given in Appendix 7. Toys and electrical equipment figure prominently and a range of hazards is identified many of which have potential fatal consequences.

Product type	Hazards	Number
Toys	Choking, toxic	27
Elastic luggage straps	Eye injuries	16
Electrical equipment and appliances	Electrocution and fire	15
Food containers	Scalding	9
DIY	Impact, eye injuries	8
Furniture	Fire	6
Writing equipment	Choking, toxic	6
Gas appliances	Burns, fire, explosion	2
Other domestic products	Impact	2
Total		91

Table 76: Portfolio of Cases
Source: R.W.Deakin, Walsall Metropolitan Borough Council

A number of cases were brought against several manufacturers and suppliers of luggage straps following a fatal accident and the production of a new standard on which to base an assessment of the product.

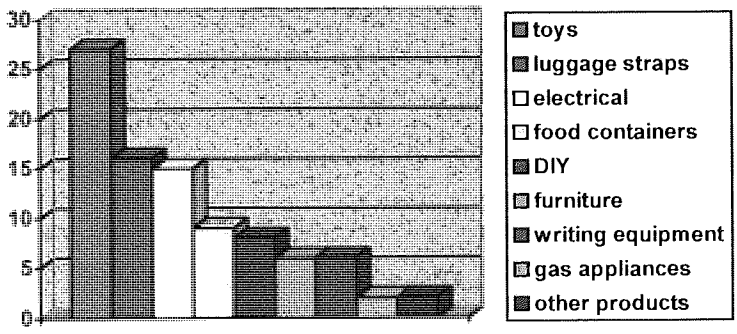

Figure 31: Product Categories - Cases

Toys and electrical equipment figure prominently in the cases brought by the officer in this authority. Such action usually follows a complaint from a local resident that a particular product has been involved in an accident. Also, a case may result from the officer making a test purchase during his inspection visits to business premises in the area and having the samples tested against safety standards to check compliance with the law.

The average number of product safety cases at 6.4 per annum for ten years is probably the highest in the country for one officer. In Chapter 3 the variation in enforcement practice around the country as reported by the Audit Commission (1999) is discussed. It does suggest that there are many products on the market that fail to comply with the legislation but they do not come to the attention of the authorities until a serious accident occurs. They widespread availability of non-complying consumer products must have a bearing on the number of product related accidents that result in injuries treated in A&E Departments but the extent to which this is related is not clear. How serious the safety issues are cannot be gauged from the available evidence but the lack of use of any risk assessment process prior to, during and following investigations may not result in resources being used most effectively.

7.4 Discussion

7.4.1 Defendants

Many of the defendant companies who were prosecuted by the trading standards service are substantial businesses supplying large numbers of products to the public. They include Hinari, Homebase, Magnet, Philips, Robinson Willey and Salton. All pleaded not guilty but were nevertheless convicted by the Magistrates' Courts. The defendants claimed to have a statutory defence under section 39 of the CPA in that they had taken all reasonable steps and exercised all due diligence to avoid committing the offence with which they had been charged, i.e. supplying an unsafe product or one that had failed the safety provisions.

7.4.2 Hazards

The hazards in the selected examples of unsafe products include toxicity, electrocution, burn and cutting, demonstrating the wide range of potential harms consumer products can present.

7.4.3 Action

The Trade Descriptions Act 1968 was used to deal with several unsafe products. It is an offence to apply a false trade description to goods for

supply. A claim that a cleaning product produced "*no fumes*" when it did and about which a complaint had been made was supported by the courts. Also, describing a cooker as "*cool touch*" when its surface temperatures could cause a burn injury if touched was also accepted as a false trade description. These cases pre-dated the General Product Safety Regulations 1994 and demonstrate the need for the 'catch-all' provisions where products were not adequately covered by existing legislation.

Most cases for which I provided a statement resulted in charges being laid and prosecutions succeeding. However, five failed to convince the courts that charges had been proved "*beyond reasonable doubt*". The remaining cases were dropped usually following an agreement with the defendant company to take appropriate action to reduce the risk, usually by modifying the product involved or removing them from sale.

7.4.4 Risk Assessment

No formal assessment of the risk presented by any of the products was carried out prior to the decision to investigate and in most cases proceed with a prosecution. Of particular concern are the cases that failed and the waste of scarce resources that would have been incurred. The use of an objective means of assessing the risk might have assisted the court in reaching a different decision although experience has already shown that defendants can also use risk assessment techniques to their advantage.

The safety of the product in question is only one aspect of a case. The primary purpose of a prosecution is to establish who committed the offence of supplying the illegal unsafe product. Failure to convict the defendant is often taken as an acceptance by the court that the product involved was indeed safe even when this has been established. Also, there are other issues that have to be taken into account when deciding on the appropriate course of action such as the record of the company concerned and their attitude to the failure of their product and what action they proposed to take to reduce the risk to their customers.

Two of the cases cited, the plug and cable set and the jug kettle could have been better presented with an assessment of the risk they presented to the user. The plug and cable set reduced the level of safety considerably although the risk of fire and electrocution was not immediate. Although the actual number of units supplied was not known it was thought to be modest.

There was no serious and immediate risk to the user therefore and the matter could have been dealt with by removing all such stock from sale and warning potential users and those who had already purchased the product. In the case of the scalding hazard presented by the jug kettle, every time the kettle was poured the lid was likely to fall off and boiling water surge from the spout.

7.5 Evaluating Risk Assessment Methods

Many risk assessment methods have been cited in this study both in Chapter 2 Literature Search and Chapter 4 Risk Assessment. Each method has its own merits and has been developed for a particular purpose. The nearest method that approaches what enforcement officers probably need is the Nomograph developed by Hooker (1995) for the Ministry of Consumer Affairs. Although there has been some support for the use of risk assessment its progress in this country has been limited so far.

7.5.1 Reliability

During the course of this research it was noted that a number of similar methods to those already cited including the Nomograph were being developed that appeared to distort the findings and reduce the assessed risk to a level below that which would obtain had the Nomograph been correctly applied. Such approaches if not properly monitored may undermine confidence in risk assessment and allow unsafe products to continue to be supplied.

It is important therefore that officers can rely on a quick, simple but reliable risk assessment method. Such a method was developed during the course of this study and is discussed below and presented at the end of Chapter 8 Results entitled Consumer Product Risk Assessment (CoPRA).

7.5.2 Nomograph Limitations

All risk assessment methods are dependent on an objective assessment of various criteria. A degree of subjectivity often has to be employed but this should be done with minimal effect on the outcome and be stated in the conclusions. Those making the assessments are often not medically qualified for example to judge the consequences of a particular hazard being realised. Problems also exist with regard to the information that is available. Enforcement officers have to make swift but accurate judgements and cannot wait until all the necessary data are available.

One of the examples used in the Harber (1988) report on the Nomograph risk assessment method concerned an electrocution hazard presented by a novelty light bulb in the appeal case Hicks v. Sullam. The conductors inside the lamp cap made contact internally with its metal casing making the casing and fitting live presenting a risk of electrocution. This was dealt with in the appeal case Hicks v. Sullam QBD 4th February 1983 reported in the Monthly Review, ITSA, (Vol.91, Page 122). The fault was far less obvious therefore than, as assumed in the report, the more common situation of a conductor wire protruding through the solder connection on the base of the bulb which was visible to the user when it was being inserted into the lamp holder. Recognition of the hazard therefore was extremely unlikely and no avoiding action could have been expected on the part of the user. The incorrect assumption, though understandable, significantly underestimated the risk and demonstrated how vulnerable to error the process could be if incorrect data were used in the assessment.

7.5.3 Risk Assessment Standard

This example and that of the Witch's Hat demonstrate the limitations inherent in even the best method available, providing a warning that it should be used with considerable caution, perhaps using other means of assessing the risk presented by a particular product particularly when the level of risk is likely to be high and the consequences significant. The initial and final risk assessment figures that the Nomograph gives suggest that there is a greater degree of precision than in fact can be provided.

This example illustrates some of the problems, which the technique of assessing risks using the Nomograph present, particularly the subjective nature of the estimates that have to be made. The prosecution has to establish that an offence has been committed "*beyond reasonable doubt*" and the court dismissed the charge presumably because the burden of proof was not discharged. It is the first case to my knowledge that a risk assessment has been used in the presenting the evidence.

It is suggested that a standard be drawn up to ensure that risk assessment methods that comply with it provide a reasonable degree of accuracy and reduce the opportunities to distort the findings that are produced. Such a standard may have to be incorporated in a more general document such as ISO 9001 Quality Assurance.

The lack of a specific standard that addresses the risks presented by consumer products along the lines of EN 1050 which deals with risk assessment applied to machines for use in the workplace means that standards will continue to be produced that either ignore certain hazards or which do not deal with them adequately.

A recommendation of this study is that such a standard be produced along the lines of EN 1050 in order that hazards will be addressed and the risks examined in every case.

7.6 Consumer Product Risk Assessment (CoPRA).

CoPRA was developed during the course of the research to provide an alternative to the New Zealand Nomograph, which for whatever reason did not appear to be in use to any noticeable extent. CoPRA is intended to give officers a quick and reliable means of assessing the risks of products they have to deal with so that they can prioritise their product safety work more easily and not miss the most serious cases where immediate steps must be taken to eliminate the hazard or at least minimise the risk.

The assessment is in two stages, assessing the risk level and deciding on the appropriate action to take based on that assessment.

Firstly the officer needs to have a full description of the product and decide how it will be used taking into account foreseeable misuse particularly where children and the infirm are involved.

Next the officer should list all the hazards the product has using a checklist to ensure none is missed (Appendix 8).

All those likely to be affected by the product should be identified particularly children but also neighbours and passers-by.

The seriousness of the harm that could be caused, from a bruise to a life threatening condition, is then estimated and given a score, based on the table and further medical guidance provided (AIS), between 1 and 5.

The likelihood of that hazard being realised is then estimated, between improbable and inevitable, and given a score from 1 to 5.

The two estimates are then multiplied to give a risk level from 1 to 25 (trivial to intolerable).

The risk level will determine the action needed to deal with the hazard, from no action to immediate steps to eliminate the hazard or reduce the risk to a minimum. A worked example is provided in Appendix 15.

7.7 Chapter Conclusions

Most of the cases cited as examples had resulted in convictions. This demonstrated that the companies concerned, many of them substantial manufacturers and suppliers of household branded products, did not employ adequate controls within their organisations to avoid committing the offences with which they were charged. This was the judgement of the courts after listening to the arguments put forward by lawyers representing both sides.

Many of the 272 cases with which I was involved started with a complaint to a TSO from a member of the public, sometimes following an injury. Only a relatively small number of prosecutions resulted from pro-active test purchasing made by the officers themselves. These data support the conclusion that the service is primarily reactive in nature.

The current research, which looked at enforcement practices in six major cities, supports the findings of the Audit Commission (1990) report on trading standards showing that there was considerable variation in the level of enforcement of product safety legislation throughout the country.

It is necessary to develop a risk assessment approach that is acceptable to all parties. Such a process would probably result in fewer cases being brought before the courts and speeding up the corrective measures needed to make products safer.

The purpose of presenting these three in some detail and the other risk assessment methods in summary in the literature review and in Chapter 6 Data is to demonstrate the route I had followed to produce an appropriate and usable method for officers who enforce the product safety law. The Consumer Product Risk Assessment (CoPRA) method is outlined in Chapter 8 with the other results of my research and presented in Appendix 14 with a worked example in Appendix 15.

The results of this study indicate that risk assessment, although developed primarily to promote safety in the workplace could be usefully employed in a much wider context. A similar conclusion was reached by van Aken (1997) although the suggestion here is that the process could be applied even more widely than perhaps van Aken envisaged.

Three main areas have been identified in which risk assessment could be more widely used:

Risk Assessment - Wider Use
by manufacturers
in standards
by surveillance bodies

Table 77: Risk Assessment - Wider Use

Although no specific research has yet been carried out on several of the issues raised by this study there is an indication from my investigations that it may be possible for manufacturers and in particular product designers, to eliminate some or all of the faults identified in those products that have been the subject of official action or product recall by applying an objective assessment of the risks presented to users by those products during their development. This would obviate subsequent much more expensive corrective action noted by Farnworth (1989) and reduce the risk of legal action, both civil and criminal, brought against the company. A "*suitable and sufficient*" risk assessment could be carried out by manufacturers of consumer products and this information should be made available for inspection by the enforcement authorities it is suggested.

Although standards are supposed to take risk assessment into account at the drafting stage, there are many examples of where this has not happened and where it has been claimed to be used it has failed to be applied fully.

Official surveillance is carried out by trading standards officers in Great Britain and the study indicates that although some use of the technique has been evident over recent years, they could use a risk assessment approach even more effectively to prioritise their work. The limited extent to which the process is currently being applied was found to be piecemeal and in some cases errors have occurred where insufficient information has been available to obtain an accurate estimation of the risks encountered. Such errors may underestimate important safety issues supporting a low level reaction thus putting the public at greater risk than necessary.

It has to be recognised that the data presented here cannot be held to be representative of all products on the British market over the period under review but they could be said to represent a significant proportion of the total that have caused serious concern as to their safety. The products referred to in the study are those that have been identified through complaints made to Trading Standards Departments and those that have featured in product recalls instigated by manufacturers and suppliers.

The data are also limited in that not all 35,000 estimated official complaints could be taken into account. These are dealt with mainly by the Trading Standards Departments working within the local authority structure that was reorganised during the period under review, and which now number 205 units. Reference has been made in the study to the Office of Fair Trading data that consists almost entirely of information on products from the TSDs but the detail is limited to identifying the type of complaints concerning health and safety. There is no other detail available on which to base any conclusions regarding the seriousness of the complaint or how it was handled.

What may be termed "*technical breaches of standards*", such as the print size on labels being smaller than that specified are less important than those requirements that relate to more serious outcomes of failure such

as a gas fire producing toxic carbon monoxide. It is necessary therefore to quantify the risk in order to judge the appropriate action to take.

A simple breach of a standard should not be considered a breach of the law, which it attempts to interpret, for example. It is necessary therefore to assess the risk presented by such breaches and to deal with them appropriately. This will often mean officers having discussions with the manufacturer, importer or other supplier of the offending product so that the relatively minor infringement can be rectified quickly and with minimum cost.

Stair gates to prevent young children gaining access to stairs however must not have footholds that a child might use to climb and fall. This small but important restriction on the design improves the effectiveness of the gate and reduces the risk of a child falling, in a foreseeable misuse situation.

Electrical insulation presents a particular problem in that the hazard will not manifest itself immediately or possibly ever. The electrical product safety regulations require appliances and equipment not only to be *"safe"* but also to satisfy agreed levels of safety, which implies compliance with the appropriate standard for that product. It may be difficult to persuade a court, if it is necessary to take the matter that far because the manufacturer refuses to comply, that the product presents an unacceptably high risk to the user.

Most equipment is required to have double insulation or a means by which the current can pass directly to earth via a conductor in the event of failure. The fact that the insulation is marginally less thick than recommended by the standard would breach the standard and regulations but may not convince the court that it is sufficiently serious to convict. The prescriptive approach therefore has the advantage in specifying precisely what is required of products and may therefore be preferable to a risk based approach in such cases.

The traditional reactive approach to product safety is of limited use because it focuses on action taken after the event rather than the prevention of accidents. A pro-active, risk based approach is therefore preferred based on risk assessment providing a preventive basis to tackling product hazards.

The faults in products reported above can often be traced back to failing to identifying the hazards in those products at the design stage and to quantify the risks presented. The use of a checklist similar to that provided in EN 1050 (see Schedule 8) but developed specifically for consumer products would it is felt have prevented many of the deficiencies that resulted in complaints, prosecutions and recalls.

All the cases referred to in this study have presented hazards listed in EN 1050. This demonstrates that the law and/or the standards used by the manufacturers and indeed their own in-house quality controls have not dealt with the hazards correctly or indeed often ignored them.

Using such a comprehensive guide as that provided by EN 1050 should greatly reduce the chance of hazards not being addressed. The problem that remains is to assess the risks presented by those hazards and that is where CoPRA (see 7.6) may be able to help.

It could be claimed that the present failure level of consumer products to function safely may be acceptable to society as there appears to be only a modest effort to deal with the problem of complaints, product related accidents and recalls as illustrated in Chapter 3. However, where such examples of failure exist as those provided in this study which clearly show errors in design and manufacture that should have been addressed by manufacturers, the law, standards and enforcement agencies there is justification in calling for a greater effort in dealing with this issue. Applying risk assessment more widely to the problem would go some way towards achieving a significant improvement it is suggested.

Chapter 8: Results and Discussion

8 RESULTS AND DISCUSSION

8.1 Introduction

In this chapter I discuss the results of the telephone questionnaire that produced 1,589 responses from enforcement officers in 62 local authorities (see Appendix 13) and the Consumer Product Risk Assessment (CoPRA) method that I have developed to assist TSOs, manufacturers and those who write standards.

The information provided by the questionnaire provides an insight into the activities of the authorities charged with the duty of enforcing the law on product safety and in particular the experiences and attitudes of some of their officers. The primary purpose was to examine to what extent a risk assessment approach had been used in the enforcement process by officers undertaking investigations. This was intended to include its use when the cases were presented for consideration by the courts.

Whilst dealing with individual queries, questions were put to the enquirers using the questionnaire reproduced in Appendix 11. All enquirers were TSOs, Assistant TSOs or other Enforcement Officers working with local authority trading standards services. Time constraints meant that not all questions could be asked on each occasion and this is reflected in the response rates recorded. Occasionally a respondent who was particularly interested in product safety work was willing to provide answers to all the questions and make further useful comments that were also recorded.

The responses were considered to provide an insight into how the product safety law is enforced in Great Britain and what concerns were uppermost in the minds of officers "*in the field*". Northern Ireland has its own legislative procedures and administrative structure to enforce similar product safety legislation and for this reason has been excluded from this study.

The officers who were questioned were not asked for their position in the departmental structure and were not necessarily at the management level that determined policy and strategy. However, their responses were still considered valid because any significant policy on the enforcement of product safety law would have been explained to those who had to carry it out.

8.2 Results

The use of a more objective approach to law enforcement such as risk assessment did not play a significant role in TSOs product safety work and when asked what means were used to prioritise their work and determine what action was appropriate, probably the most convincing answer was that officers used their "*gut instinct*" about a case. Such responses were not as casual or offhand as might first appear but were often based on considerable knowledge and experience acquired over many years working in law enforcement.

The result of the questionnaire showed that there was no systematic method of prioritising product safety investigation work. Indeed, many of the officers said they could just as easily have been looking into offences concerning counterfeit goods such as CDs, video games and clothing or car servicing. Even where safety was claimed by particular authorities to have the highest priority the subject did not necessarily appear to be accorded the appropriate degree of attention.

Several respondents commented on the pressures on officers to cover a wide range of duties (see Appendix 6) and to meet performance targets that weren't necessarily sympathetic to dealing promptly with product safety matters. Selection therefore seemed to be based on a cab ranking or even "*muddling through under pressure*" approach rather than on an objective assessment of priorities.

Very few officers knew of colleagues whose activities were exclusively in the field of product safety, everyone had to be multi-functional usually

with a wide range of duties including the management of staff. Although more than 150 respondents were aware of risk assessment, fewer than 2% had used any means of formally assessing risks presented by products when prioritising their work themselves.

Funding for the purposes of purchasing and testing products was very limited but most officers said their departments had a small budget for this purpose. The cost of testing and the quality of reports provided by test houses and the time taken to produce those reports was criticised by many participants. Some surveillance work was carried out jointly with adjacent authorities often on a regional basis but the justification for such exercises wasn't clear, indeed it was suggested that testing was more often random than objectively based, providing another area for risk assessment.

8.3 Quantifying the Problem

The second part of the study involves an assessment of the number and types of consumer products that were the subject of complaints and official or voluntary action because they were considered to be unsafe. The detailed information and examples are recorded in Chapter 6 Data and analysed in Chapter 7.

Consumer products used for the purpose of this study are obtained from four principal sources as listed in Table 78 below.

Accident data	Home Accident Surveillance System (HASS)
Complaints	Office of Fair Trading (OFT)
Prosecutions	Trading Standards Departments (TSDs)
Recalls	Royal Society for the Prevention of Accidents (RoSPA)

Table 78: Information Sources

Examples were selected from the data producing a wide variety of product failures to demonstrate how manufacturers might have applied a risk assessment approach at the design stage in order to eliminate hazards.

Suitable examples were taken from the several hundred cases on file in order to apply the assessment techniques more directly. Although in many instances there were insufficient data to be absolutely sure that a particular case could and should have benefited, it is reasonable to conclude that adopting such an approach would have made a real difference. If the techniques were to be more widely applied it could lead to a significant reduction in product-related accidents and complaints, relieving the authorities of the need to investigate many of the cases and reducing the risk of legal action against manufacturers and suppliers.

8.3.1 Accident Data

There are considerable limitations on how the details from the official HASS accident database operated by the DTI can be used to investigate unsafe products. The following information is recorded in the DTI (1998b) Consumers Safety Accident Surveillance Report by the 18 participating A&E hospitals out of 300 such hospitals in the UK:

HASS Data
Details of the person who had the accident, demographic information - age, gender, etc.
Details of the accident – date, time, location, etc.
The circumstances surrounding the accident – including activity at the time, etc.
The injury or injuries caused by the accident.
The involvement of products/articles in the accident.

Table 79: HASS Data

Normally no causal relationship could be firmly established between the product and the accident that it is associated with. The manner in which the product was being used and whether there was a design or manufacturing defect in the product at the time that led to the accident is not provided by the data. Also, publication of these data is up to two years after the occurrence of the accidents that are being reported on. Neither the brand nor source of the product is given nor is there sufficient information to identify the particular product involved. There are

indications as to how the accident might have occurred in the brief notes that accompany the data but these are limited to what the participant can recall at the time of the interview. The University of Nottingham is now examining the causal relationship between products and accidents but early indications from contact with the researchers, Norris (2000) are that such information is not widely available.

The main contribution made by HASS is therefore an indication of those that are at particular risk of having accidents in the home, the elderly and children, the location of the accident in the home, such as the living room and kitchen, the type of activity and product being used at the time and the number of accidents resulting in injuries serious enough to warrant medical treatment.

Because of these limitations, the data have not been widely used in this study other than to recognise that accidents in the home, that are said to involve products, result in 2.8 million seeking medical treatment in the UK each year and represent a major drain on National Health Service resources. It is estimated that product-related accidents may account for half a million people being injured each year and requiring medical treatment. This puts the cost at £25,000 million annually according to TRL (1996).

8.3.2 Complaints

Members of the public complain to their local authorities' Trading Standards Services who deal with the problems raised by the 850,000 complaints each year locally and forward the data to the OFT who publish them in their quarterly journal Fair Trading. It is from these data that I have estimated the number of products that have been the subject of complaints about their safety at a minimum of 30,000 see Figure 11.

8.3.3 Prosecutions

Details of prosecutions are given in Chapter 3 Managing Product Safety. Those cases with which I had a personal involvement having provided an expert witness statement for use in court are listed in Appendix 5. It is

from these data that I selected 23 cases for closer scrutiny for the purposes of this research (see table Table 59).

8.3.4 Recalls

Product recalls are listed in Appendix 10 covering the period 1997 to 2000. I have maintained a database for RoSPA for over ten years and the products listed have provided a useful source for identifying hazards that have resulted in action being taken by the manufacturers and suppliers to reduce the risk to their customers.

8.4 Risk Assessment

There are several risk assessment techniques, which can be employed in each case when dealing with the safety of a consumer product, but they are all to a greater or lesser extent subjective and imprecise. People are influenced by conditions of familiarity, ownership, immediacy and scale therefore great care has been taken to ensure that the assessments carried out are as scientifically rigorous and as objective as possible. The techniques adopted, must also be appropriate and proportionate to the risks involved.

The recall notices listed in Appendix 10 were examined to establish whether there was sufficient detail to carry out a basic assessment of the risk the products presented to the public. Carrying out a risk assessment on products in the database, although after the event, was thought might help identify measures manufacturers could have taken before the problems had been discovered so as to comply more effectively with the law, to maintain customer confidence and reduce unnecessary costs. However, risk assessment is not a mandatory requirement for manufacturers or distributors of consumer products.

I concluded that insufficient information was available to carry out a reasonably accurate risk assessment of the products listed although the faults that occasioned the recall could in most cases have been identified at an earlier stage, particularly at the design stage and when the product

prototypes were tested. The use of a risk assessment approach at this early stage would it is felt have obviated most of the problems identified.

8.4.1 Guidance on Risk Assessment

Even if a thorough risk assessment such as a Failure Modes and Effects Analysis cannot be accepted as a method to be adopted in every case by manufacturers of consumer products, a simpler and cheaper approach that might be more acceptable is suggested by this study (see 9.3.10 and Appendix 10), with a set of questions the designers should have to answer before the product is marketed.

As an aid to assessing the safety of consumer products, the following list of questions, based on HSE (1994) "*Five Steps to Risk Assessment*" was developed:

[illegible]
What is the hazard?
Who is exposed to it?
How, when, where does this occur?
How can harm and failure happen?
What factors make this more or less likely?
What would be the nature and extent of the harm if they did occur?
How likely is it that harm will occur?
What is the risk level (trivial, low, medium, high, very high)?

Table 80: Risk Assessment
Based on HSE (1994) Five Steps to Risk Assessment

Some additional guidance would be needed to ensure the questions are correctly answered including the appropriate action to be taken. Further work is needed in this area. Its application to small manufacturing businesses is considered particularly important in view of the severe competition in certain areas such as small domestic electrical appliances. Addressing the hazards at an early stage will reduce the risk of legal action later that could cripple the company's finances.

European standard EN 1050 "*Safety of machinery – Principles for risk assessment*" provides guidance for use when assessing the safety of machinery and because it was mandated by the EC it is officially recognised as supporting EU Directives. In the absence of a similar document the approach followed by this standard could be used it is suggested to assess the risks presented by consumer products. The stages listed in EN 1050 have been modified and presented as the risk assessment stages to be followed in Table 81 below.

Risk Assessment Stages
Define the system activity;
Identify the hazards involved in all the tasks involving the product, including foreseeable conditions of use and in appropriate cases, misuse;
Analyse the consequences of risk;
Estimate or measure the risk levels involved;
Evaluate this level to determine the tolerability of risk

Table 81: Risk Assessment Stages

8.4.1.1 Risk Factors

There are many factors affecting risk assessment and some are fundamental to the process and must always be taken into account. A major problem is estimating how important a particular factor is in the assessment and due account must be paid to the subjective nature inherent in any estimation.

Risk Factors
Maximum potential injury;
Probability of hazard occurrence;
Availability;
Hazard avoidance;
User;
Feasibility and Cost/benefit.

Table 82: Risk Factors
Source: Based on Hooker (1995)

The main factors that need to be considered when conducting a risk assessment are shown in Table 82 above. It is based on Hooker (1995) and referred to in Chapter 4 but has been extended to include the other two important risk factors presented by a suspect product i.e. the user, who could have special needs and the feasibility, particularly the cost of reducing the risk.

Hazard avoidance would include those factors such as speed of hazard occurrence and the opportunity to take avoiding action. Those whose reactions are slower, e.g. the elderly, or who have little experience of using products, such as children, are particularly at risk and special account must be taken of these factors. Consideration must also be given to the speed and ease of dealing with the hazard. Availability includes the frequency with which a product is being used and the number of units involved, the electric plug is a good example of frequent usage but its ubiquity tends to undermine the care that is needed to ensure that it is operating safely, an example of familiarity breeding contempt.

A procedure for priority setting based on risk assessment was developed in New Zealand and presented by Hooker (1985) (see Figure 9) and was being considered for use throughout Europe. However, inaccurate results may be caused by the many subjective judgements that have to be made. This has been partly addressed using a modified version of the Abbreviated Injury Scale and by providing guidance to officers in how to select the appropriate intermediate levels for the risk factors.

The Abbreviated Injury Scale (AIS) is a numerical estimation of the level of injury likely to be sustained and the severity categories have been used in the Nomograph to identify the extent of the injuries sustained by the suspect product. AIS was developed by the Association of the Advancement of Automotive Medicine as a classification system for assessing impact injury severity. It does not however compare well with

the International Classification of Diseases in Severe Trauma Patients according to Noriaki (2000).

AIS score	Injury
1	Minor
2	Moderate
3	Serious
4	Severe
5	Critical
6	Unsurvivable

Table 83: Abbreviated Injury Scales
Source: Based on Association of the Advancement of Automotive Medicine

8.4.1.2 Frequency of Use

Some attempt has been made to link the number of product-related accidents to the usage of those products in the home by Hayward (1996) which provides at least a start in the direction of carrying out a risk assessment on consumer products, an approach which is supported by Venema (1998).

It is necessary to take into account the uncertainties inherent in the process including risk perception. It is considered that a tolerable risk is one that we are prepared to live with having recognised the benefits and been assured this is the best that can be provided in terms of safety at this time.

Information received about risks is often distorted. A manufacturers' trade association would not want its members' products seen in an unfavourable light for example and might support the least safety conscious producers' goods despite valid criticism of them. On the other hand, a safety campaigner might pursue a case for making products safer without taking into account the cost implications.

Where possible, product users should be consulted during the assessment process in the same way that workers are under workplace safety legislation, as required by the Safety Representatives and Safety Committees Regulations (SI 1977 No 500). Such involvement should limit bias and promote wider acceptance.

A Qualified Assessment starting with Compliance Assessment considers regulations, Directives, standards, codes of practice and guidance documents to produce a checklist relevant to the product in question e.g. electrical equipment, gas appliances, toys and for products not specifically covered, the General Product Safety Regulations 1994 and official guidance DTI (1995).

8.4.2 Extent of Problem

There is an unknown number of unsafe products on the market but the risk to the public needs to be quantified if official action is to be justified. Home Accident Surveillance System (HASS) accident data, though an important source of information, can be misleading. Relatively few accidents are caused directly by unsafe toys for example and tripping over them when left lying around is probably the more likely cause. This does not justify any relaxation in the controls but rather means that the law, backed up by the EN 71 standard, has been effective in preventing injuries caused by sharp points and edges and choking on small parts.

A survey carried out by the Suffolk Trading Standards Department found around 10% of the imported products they checked were unsafe according to Baker (2000). Similar checks were carried out by TSOs at Southampton Docks where up to 25% of the samples examined failed the safety provisions as reported in the European Commission funded journal Product Safety News edited by Jenkins (1995c). Further work is to be carried out into the methods used by enforcement authorities.

Surveillance work should be statistically based and coordinated nationally, for example through regions or via the Local Authorities Coordinating

Body on Food and Trading Standards (LACOTS), now the Local Authorities Coordinating Office on Regulatory Services (LACORS). Independent Quality Assurance Schemes such as that provided by the British Electrotechnical Approvals Board (BEAB) mark and the British Standards Institution's Kitemark can also play an important part in monitoring consumer products for safety.

8.5 Chapter Conclusions

The results of the questionnaire demonstrate that enforcement officers do not normally as a matter of routine carry out any form of risk assessment on the products that they have to investigate. A "gut feeling based on experience" often appears to the order of the day. An objective method of assessing product risks would, it is considered, greatly assist the authorities in selecting the most important cases to pursue straight away.

The product failures examined in this study, and the companies involved in their manufacturer and distribution, many of whom were prosecuted, also demonstrate that the current use of any method to assess the risks presented by their products is failing to ensure consistent compliance with the law.

One of the companies cited in this study is Philips, a large prestigious manufacturers of consumer appliances and one of the leaders in its field in the world and although the cases quoted cannot be held to be representative of their output, they do demonstrate that even the most reputable companies and their products require continuous independent scrutiny.

Large companies and the trade associations they finance exert a powerful influence on how standards are written and therefore the level of safety that is eventually provided to the consumer. Several instances of failings in standards have been referred to in this study that have continued for some considerable time exposing consumers to avoidable hazards.

The law increasingly depends on standards to provide the detailed requirements products must achieve thus giving them quasi-legal status, which will be extended with the introduction of the revised GPSD. However, improved safety such as lower surface temperatures on appliances, for example, may well have been delayed where it was felt that changes to accommodate such improvements could be too costly for particular manufacturers whose representatives largely determine the content of the European and International standards.

After studying cases that I have been involved with over the past twenty-five years there are some conclusions I have reached that could be useful in developing better approaches to the design and manufacture of consumer products in order to reduce the likelihood of product related accidents. One such improvement would be the application of a risk assessment approach at the design stage of consumer products.

There is need for a standard similar in approach to EN 1050 for consumer products in order that risk assessment may be considered when developing standards for those products. It provides a basis for the Consumer Product Risk Assessment approach (see Appendix 14) that has been developed primarily for use by enforcement officers but may well be adapted to assist manufacturers and those who draft standards.

It is difficult to quantify the extent to which badly designed and otherwise unsafe consumer products contribute towards the 2.8 million home accidents each year HASS (2000) however the examples presented in this study show a clear causal connection can be made in many cases.

Reputable companies, who have followed recognised methods to achieve compliance with the law, including compliance with standards, have still marketed many unsafe products. This shows there are deficiencies in those procedures and requirements. It is suggested and supported by evidence in this study that failure to identify the hazards and to assess the risks properly may be a root cause of the product safety problem.

Chapter 9: Conclusions and Recommendations

9 CONCLUSIONS AND RECOMMENDATIONS

The main conclusion from this research, as evidenced by the results of the questionnaire (see 6.3.4), is that most TSOs and other enforcement officers, charged with the duty of ensuring compliance with product safety legislation, do not use risk assessment techniques to prioritise their work or to present their cases in court. This is despite several attempts by myself and others to encourage the wider use of more objective methods.

9.1 Managing Product Safety

The key issue revealed by the research is the need for better management of product safety, from manufacture to disposal. This is particularly important for official surveillance where local authorities, have a statutory duty to enforce product safety law, to function more effectively and more uniformly across the country. The study has attempted to identify where trading standards services which enforce the CPA, may be able to deal with unsafe products in a more effective way. This includes helping officers assess the risks presented by suspect products more objectively in order to prioritise them for the most appropriate action.

The HSWA and CPA address the safety of products differently but the wider use of risk assessment in controlling the safety of machinery used at work could be adopted for consumer products where the risks to the users are just as serious. The wider use of EN 1050 is essential to this process. The personal views of enforcement officer carrying out their duties provide a useful insight into the difficulties they experience in practice, and these need to be examined closely, and dealt with appropriately.

The main purpose of the CPA is to specify requirements for consumer products with regard to safety and to enable duly authorised officers acting for local authorities to prosecute those who supply products that fail the safety provisions. It also introduces the product liability provisions implementing the Product Liability Directive [85/374/EEC].

Under the criminal provisions two matters have to be proved beyond reasonable doubt, firstly that the product in question failed to meet the safety provision and secondly that the person charged supplied it or placed it on the market. This often long and complex process takes considerable time during which similar suspect products will still be on the market and in use. A case may fail even though the product is known and accepted to be unsafe because the defendant may convince the court that he has taken all reasonable steps to avoid committing the offence, such as submitting samples for independent testing. This negates the primary objective of the CPA to reduce the risk presented to the public of unsafe consumer products and a more effective procedure based on risk assessment needs to be considered.

There is an urgent need therefore for the two parts of the process to be dealt with separately. It is necessary for the authorities to decide quickly whether a particular product is unsafe and assess the risk and to take appropriate steps to reduce that risk to the public. The company responsible for marketing the product may then be dealt with in due course and convicted by the court if the evidence supports the charges.

9.1.1 Pro-active Approach

Adopting a more objective pro-active approach by the product safety law enforcement authorities to ensure that an acceptable level of safety is achieved should encourage producers to do likewise and thereby reduce their exposure to the risk of prosecution and civil claims for damages. Consumers and society generally would benefit from such an approach by having to suffer fewer product related injuries and costly NHS treatment. If properly exercised and recorded by manufacturers, a risk assessment approach would provide evidence in support of having exercised a degree of care and support a defence of having taken all necessary steps and all reasonable precautions to prevent the commission of the offence of placing an unsafe product on the market.

The minimum level of safety that must be achieved by manufacturers and suppliers for their products is the level prescribed by law, in the case of consumer products, the CPA, as interpreted by the appropriate standards. The present control system has been found to be mainly reactive in that product failures are dealt with after consumers have complained that faults in the product have affected its safe operation or injuries and property damage have resulted from its use. Greater emphasis should be applied at the design stage, particularly taking into account foreseeable conditions of use and to some extent acceptable levels of misuse, to ensure that products are safe.

9.1.2 Product Design

Greater attention needs to be paid during the designing process if the number of product-related injuries, as indicated by the large number of complaints, product recalls and litigation referred to in this study, is to be reduced. Such an approach has been advocated by Jenkins (1988a) for many years. Risk assessment, similar to that adopted for machinery used at work, could enable manufacturers to better anticipate problems their products might cause and to deal with them before injury and financial loss occur. The results of this study have shown that when failures have been identified, as illustrated in the case of recalls and prosecutions, the deficiencies in design can be demonstrated. This should assist designers in their initial approaches to developing consumer products in a more formal structured risk assessment way.

9.1.3 Safety and the Law

The law should encourage improvements in safety and not be seen as a threat. This is supported by Brack (1999) who said business people should not be intimidated by these legal phenomena but take a pro-active stand of challenge and strive for product design improvement. For the past ten years however a policy of de-regulation euphemistically entitled "*better regulation*" has been applied by government following industry complaints about too much state interference and red tape as reported by the Cabinet Office (1995).

The principles underpinning the activities of the Better Regulation Task Force set out in 1997 are -

Better Regulations Principles
Proportionality,
Accountability,
Consistency,
Transparency and
Targeting.

Table 84: Better Regulation Principles
Source: Cabinet Office (1995)

More effective enforcement of product safety laws based on risk assessment would benefit bone fide manufacturers and traders as well as consumers and penalise those who compromise safety putting the public at risk. It would also complement the Better Regulation approach. Enforcing product safety law must be transparent and supported by statistical methods supporting a risk assessment approach to ensure the level of risk presented by products is reflected in the official attention paid to them, for example by the determining the number of samples taken for official analysis and subsequent action. The research has demonstrated in Chapter 3 that there are many problems enforcing the law on product safety and that product related accidents continue to occur frequently in addition to the many safety complaints and product recalls.

9.1.4 Risk Assessment and the Law

Although consumer product safety legislation does not require a risk assessment to be carried out on products before they are marketed, it is difficult to see how "*safe*" and "*safe product*" can be interpreted, or indeed a due diligence defence established, without applying such a test. Reducing the risk to a minimum implies that an assessment of the risks must be carried out in the first place. Achieving only minimal risks compatible with the product's use, which the law requires, further emphasises the need for a proper risk assessment to be carried out for all products.

The subject of risk appears in most European Directives forming the basis of product safety legislation and consumers are required to be provided with information about product risks by manufacturers to enable them to make their own decisions whether to use their products or not.

9.1.5 Safety Standards

Brack (1999) acknowledged, "*The real safety level of product groups is determined in the normalisation process, not any more in legislation*". As is to be expected, industry has the expertise, commercial interest and ability to dictate what the standards will contain by dominating the standards-making process. Levels of safety were traditionally determined by safety regulations specifying precise requirements. These regulations were made and subject to amendment and annulment by Parliament. Safety levels that consumer products have to satisfy now are largely determined by what the industry wants. It is imperative therefore that a proper risk assessment be undertaken in every case particularly when drafting harmonized standards.

It is unlikely and undesirable that the use of voluntary standards as a means of interpreting legal requirements will be changed. Subject to some modifications in the way the process is managed to ensure a fairer balance in the representation of product users and the adoption of risk assessment, they still provide the detailed guidance necessary to assist manufacturers in their attempt to produce reasonably safe products.

Variations on the Risk Calculator, referred to in Chapter 4 Risk Assessment (see Figure 8) have recently been produced by others, one example of which was submitted to Dr Raafat at Aston University in 1999 by a trade association. The proposal was to use the risk assessment method to defend members against prosecution charges for marketing unsafe products and in civil product liability cases to challenge a claim that a person had been injured by one of their products.

Dr Raafat and I felt there were serious limitations as to the accuracy of some of the assessments made using the proposed methods and that their efforts would be better directed at removing hazards and controlling risks at the design stage rather than attempting to justify a fault after a problem had arisen. Such methods may only serve to counter and confuse official attempts to quantify the risks such as that advanced by Hooker, referred to above in Figure 9: Risk Assessment Nomograph.

There is a danger of untested methods being used to assess risks presented by products simply to justify the marketing of those products that do not meet the specific requirements of voluntary standards. The risk calculator and other accepted methods should be seen as a proactive aid to prioritise action and reducing risks presented by products rather than as justification for marketing unsafe products or those that fail to satisfy the agreed performance levels demanded by law and set out in standards.

9.2 Using Risk Assessment

The use of risk assessment in many areas that affect the safety of consumer products has been considered in this study. Although the law aided by standards helps to determine what is acceptably safe, it is still not sufficiently precise and risk assessment is needed to assist in this.

9.2.1 Product Safety Design

The safety of a consumer product has to be addressed at the earliest stage of its development and this is inextricably bound up with its design and performance. It can be concluded from this limited study and overview that the product safety system needs to be better managed so that an integrated approach, including risk assessment, can be used to assist the design, distribution, use and eventual disposal of safer consumer products. This risk assessment approach could be based on EN 1050 and EN 292-1 and in line with the BS 8800 guide to occupational health and safety management systems and EN 7000 for environmental management systems.

9.2.2 Wider Use of Risk Assessment

The law has developed from a prescriptive to the more participative involvement by manufacturers in deciding how best to achieve their mandatory safety obligations. The way forward is to ensure the safety of consumer products through the wider use of risk assessment in standards writing in order to achieve the essential safety requirements prescribed under the European Directives as enacted in domestic British legislation.

The adoption of a risk assessment approach to the investigation of unsafe products that are available on the market would, it is considered, greatly assist enforcement officers in prioritising their work. This approach has enjoyed some considerable success in New Zealand according to Hooker (1995) where it was introduced over ten years ago. However it is essential that enforcement officers receive public complaints relating to unsafe products straight away so that the cases may be investigated without delay and appropriate action taken to deal with those dangerous products that present a serious and immediate risk to the public.

Writing in the trading standards officers' journal I have emphasised the importance of applying the techniques provided by formal risk assessment stating "*A fundamental pre-requisite for improving product safety is the development and adoption of a more robust and cohesive approach to risk assessment across the whole field of product safety regulation, standard setting, risk management and enforcement.*" Jenkins (2000)

No discernible take-up of the risk assessment approach to enforcement of the product safety laws has been discovered by this study despite the enthusiasm expressed when the technique was first considered at the European Product Safety Conference in Stockholm in 1995 at which Hooker (1995) and I presented papers. Since that time efforts have been made by me to encourage the use of risk assessment by enforcement officers through discussions, training sessions and articles but this research demonstrates that these efforts have had little or no effect.

It is encouraging to note that design and technology now features in the schools curriculum but the results obtained so far from ten presentations examined show little regard has been paid during training for the basic requirements of products, according to Kirk & Ridgeway (1970), to provide useful benefits and to be "*safe, efficient, reliable and durable*".

The application of the risk assessment approach to all aspects of the product safety system is illustrated in Figure 2 (see also 4.5).

9.3 Recommendations

9.3.1 Risk Assessment

A proposal to apply hazard analysis and risk assessment to consumer products has been made by van Aken (1997). This study supports that proposal and provides many practical examples where it could have been applied to good effect.

The study has shown that the formal and traditional procedures that are followed with regard to both criminal and civil law make it difficult to deal with unsafe consumer products quickly and effectively. The procedures often involve delay and confusion thereby increasing the risk to the public. An objective risk assessment carried out immediately after reliable information has been received by those who enforce the law, would establish the level of risk the public is exposed to and indicate what kind of response is required to deal with it.

A formal recognition of risk assessment would provide the necessary objective approach to decision making and enforcing the law on product safety and help reduce present differences of opinion between those who are required to observe the law and those who have a duty to put it into practice. The introduction of risk assessment would assist the modernisation of trading standards process and put product safety back at the top of the agenda.

9.3.2 Information

There are many examples of unsafe consumer products on the market as evidenced by the number of recalls, prosecutions and complaints identified by this study. The data however are difficult to obtain in order to quantify the problems precisely and to apply measures of effectiveness to any attempt to improve the current situation. Modern technology should be employed to improve data collection and dissemination and information should be made readily available to the public, preferably by electronic means. This would enhance public confidence in what the government is trying to achieve and enable people to make their own assessment of the risks involved in using a particular suspect product.

9.3.3 Product Safety Law

Legislation does not always operate to promote the safety of products because statutory rules and procedures must be followed to ensure equity. Also, the safety of the product is not always the primary concern as the many examples in this study demonstrate. One might expect that the main objective would be to establish whether a particular product was safe as determined by the law. But it is rather what offence was committed, if any, and who was guilty of that offence.

Clearly there is a need to have an objective assessment of the safety of a particular suspect product and to deal with it in an appropriate manner in order that the public is not put at risk. This is where risk assessment could be used to great advantage placing the emphasis on reducing the risk to a level that is what HSE (1992) describes as "*as low as reasonably practicable*" (ALARP) as quickly as possible and leaving the investigators to bring those who supplied the products before the courts in due course.

9.3.4 Risk Assessment and Enforcement Practice

An enforcement authority may issue a Suspension Notice under Section 14 of the Act when it has reasonable grounds for suspecting that a product has failed a safety provision. This is a temporary measure that can apply for a period of up to six months.

There are compensation provisions where there has been no contravention of the safety provision and the defendant has not brought the action upon himself because of any neglect or default on his part. Neglect or default may for example be a failure to produce evidence that safety checks have been carried out on the products under investigation. Both conditions have to be met if a claim for compensation is to succeed. Despite this, the fear of compensation has probably undermined the effectiveness of such Notices. Case law suggests that the level of suspicion that leads an officer to take formal action may not be such that it could be used in evidence but it has to be real and must be reasonable.

Officers must be aware of the considerable cost their employing authorities may be called upon to bear if a defendant company can show that his products satisfied the safety requirements. Where both parties had acted reasonably it is the local authority that would be liable to pay compensation but it was hoped that "*this would not constrain officers who are exercising highly important powers of suspending the supply of potentially dangerous goods*" [House of Lords Official Report, Vol.485, cols 920-921]. The minister rejected any amendment to the compensation provision stating that he considered "*the circumstances in which compensation would be paid are relatively narrow*" [House of Commons, Official Report, Vol.116, col.347].

The officer's suspicions may be raised where there is no documentary evidence that a product has been tested before it is placed on the market for example or where he has good information that an injury has been caused by a fault in a similar product. The quick response to unsafe products envisaged by the promoters of the Suspension Notice procedure seems to have been frustrated. However, it has been suggested that Suspension Notices should be used more widely and that the courts will invariably have to support the officers who issue them. An objective assessment of the risk involved would greatly assist in supporting the appropriate action taken in such cases.

It is recommended that where such products are under suspicion that the officer involved obtains an independent expert view that includes a risk assessment along the lines suggested in this study. Speed is of the essence in such matters and where the officer has reliable information to hand he is justified in suspending the further supply of the suspect products pending a more detailed examination. His authority will not then be liable to pay compensation to the defendant company.

The operation of the important Suspension Notice procedure therefore needs to be placed on a more sound objective basis and consideration given to the application of risk assessment based on an independent expert view in order to ensure fair and speedy action.

9.3.5 Consumer Product Safety

The consumer product safety system itself needs to be better managed including manufacture and official surveillance. Greater attention needs to be paid at the design stage to ensure that products are legally "*safe*" and companies should integrate product safety within their total management system including their occupational and environmental safety obligations.

A level of sufficiency to satisfy product safety law should follow the Environmental legislation term "*best practical means*" which itself mirrors what the Health and Safety law determines to be "*reasonably practicable*". The primary objective for designers however must be to eliminate the hazards that are identified and to reduce the risks to a level that is as low as reasonably practicable (ALARP). This should build on what has already been achieved in the work and environmental fields.

9.3.6 Consumer and Workplace Products

The design, manufacture and control of consumer products should be brought more into line with that of machinery for use at work where the application of a risk assessment approach has proved beneficial for employers, manufacturers and users.

Workplace and environmental controls contain a firm basis for managing risk, assessment, training, management and information exchange that are relevant to all areas. The BS 8800 (1996) Guide to occupational health and safety management systems and EN 7000 Guides to managing design covering innovation, products, service, construction and obsolescence support this approach.

The standards EN 1050 and BS 292-1 provide a good basis for the risk assessment approach. This could be extended further to cover the safety of consumer products thus integrating all the relevant issues, the safety of workers as well as product users and environmental obligations within the management function.

Consumer products should be required to satisfy three conditions, they must be "*safe*" as defined, be made in accordance with good engineering practice regarding safety and they must satisfy specified safety objectives determined by assessing the risks they present to users and third parties.

9.3.7 Risk Assessment and Standards

Standards should be developed using a risk assessment approach and the failures identified in this study in which electrical equipment standards have failed to address the non-electrical hazards adequately should be investigated. The traditional and apparent anomalous separation between the standards bodies CENELEC and CEN should be investigated and a unified European standards body considered.

9.3.8 Risk Assessment and Due Diligence

A rigorous risk assessment should be carried out prior to marketing new products in order to satisfy the due diligence requirement and this should be formally adopted in guidance for manufacturers so that it is an accepted part of a company's operational procedures. Such an approach would constitute an important element of a statutory defence under Section 39 of the Consumer Protection Act 1987 against criminal charges.

The assessments carried out should form an essential part of the technical file maintained for each product and be updated as required by changes in technology, standards and the law. Technical files should be made available for inspection by authorised persons such as TSOs.

9.3.9 Market Surveillance

More effective pro-active market surveillance needs to be employed by enforcement authorities and product liability claims following injuries caused by defects in products need to be better supported.

The public should have improved access to their trading standards officers in order to report dangerous products. The service should be able to provide them with basic civil advice on how best to proceed if they appear to have a valid claim. This will enable enforcement officers to have useful information on unsafe products so that they may investigate speedily.

Manufacturers are more likely to make sure their products are safe if they see others penalised for putting dangerous products on the market. All local enforcement authorities should adopt a surveillance scheme within their administrative areas based on quality assurance techniques ISO 9001 Quality Management Systems as advocated in an earlier report by Jenkins (1982) and assess the risks consumers are exposed to in order to prioritise their work. Official sampling should be based on BS 6001.

With limited resources available to both manufacturers and the enforcement authorities, difficult choices have to be made and priorities set. Risk assessment should be more widely used to assist in this process and ensure that the products will be as safe to use as is reasonably practicable.

9.3.10 Consumer Product Risk Assessment (CoPRA)

A suggested approach of applying risk assessment to consumer products for manufacturers, enforcement officers and those who draft standards is introduced in 7.6. It is recommended that this be adopted after the further research that will be necessary. Failure to adopt a risk assessment approach by TSOs, as indicated in their responses to the questionnaire, suggests that the available methods may not be as popular or usable as it was previously thought. Hence the need for CoPRA.

CoPRA (Appendix 14) was developed to speed up and simplify the process making it more easily used by busy officers who have to cover a vast range of consumer product and services problems. CoPRA has also been developed as a guide for manufacturers and for those who write standards. A worked example is provided in Appendix 15.

9.4 Further Research

9.4.1 Designing Safe Products

The results of this study indicate that further work is needed to quantify the extent of accidents caused by inadequacies in product design. The term "*design*" should be taken to have the widest meaning covering all aspects of a product that affect its safe use, including the manner in which and purposes for which the product has been marketed, its get-up or presentation, any warnings and instructions for use provided with it and perhaps most importantly, what might reasonably be expected to be done with it i.e. its use under foreseeable conditions.

Courses that prepare designers for their employment in product manufacturing need to be further examined with regard to their safe product design content. The survey published by the DTI (1989) stated, "*Professional and other supporting organisations seemed to have little to offer on the day to day practicalities of designing safer products.*" I have been unable to find any evidence of co-ordinated action having been taken to address this major shortcoming.

9.4.2 Safety Research

Much useful research has been funded and published by the DTI (see Appendix 1) but its overall quality and impact varies considerably. The degree to which the findings have subsequently influenced product design, manufacturing, good practice, standards writing and enforcement work should be monitored for their effect.

Other than the use and indeed misuse of accident data provided by HASS, I saw little evidence of the research findings being used in practice, even in the several technical committees drafting new standards that were monitored or when amending current specifications for consumer products. Examples of the misuse of accident data include quoting the sample data taken from the eighteen hospitals to represent the total number of accidents involving a particular product, whereas the national estimate is higher by a factor of around twenty. Also references made to injuries such as burns and those involving the eyes which are mostly dealt with by specialist centres of which there are none in the participating accident and emergency hospitals participating in HASS. Shortcomings in the available accident data were highlighted by Wilson (1979) and have still not been addressed. Limitations in the details available in HASS were also noted by Hayward (1988).

The greater detail available in the USA's National Electronic Injury Surveillance System (NEISS) system provides a more useful and quicker way to identify non-complying and dangerous products that have caused injuries and deaths. Even this state of the art accident surveillance system is in need of improvement according to Quinlan *et.al.* (1999).

Further work is needed on how best to collect and disseminate accident information more effectively in the UK and elsewhere in the European Economic Area. Such information is essential if risk assessment is to be carried out by manufacturers, distributors and the authorities and also applied by consumers themselves.

9.4.3 Safety Standards

Standards make an important contribution to product safety but many fail to apply a risk assessment approach, contrary to the rules laid down. The extent and consequences of this failure need to be quantified and many of the standards re-written so as to meet the primary objective of being able to interpret the European Directives' Essential Safety Requirements effectively. EN 1050 should be adopted or adapted for use with consumer product standards.

9.4.4 Law Enforcement

Further research is needed into the application of a risk assessment approach in the area of product safety law enforcement. There is little evidence of the technique being applied in practice at present, as evidenced by the results of the questionnaire (see 6.3.4). This will have meant that investigations are being conducted into products that are less dangerous than others that have not been followed up, for reasons other than public safety.

Research is needed into the protracted procedures necessary to fulfil the legal requirements that often militate against dealing with unsafe products effectively. A proper application of risk assessment to a suspect product should be used to determine appropriate and immediate action whilst allowing formal prosecution or action for civil damages, as considered necessary, to proceed in tandem.

The Consumer Product Safety Risk Assessment (CoPRA) process (see Appendix 14) needs to be evaluated as an aid to TSOs both for the purpose of prioritising their work on product safety and also how the presentation of risk assessment can best be made to the public, media, manufacturers, authorities and the courts by this method.

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APPENDICES

Appendix 1: DTI Research Reports

Title	Scope	Ref:
Accidents, Research on the pattern and trends in home.	Overview of the current incidents of home accidents, both fatal and non-fatal to identify the areas with greatest potential for taking action to reduce home accidents	99/858
Adultdata. The handbook of measurements and capabilities of the older adult: data for design safety	Anthropometric and strength data on older people aged 60 and over	00/500
Adultdata: the handbook of adult anthropometric and strength measurements. Data for design safety.	The ADULTDATA handbook is a collection of data on adult anthropometric (body size) measurements and strength capabilities.	98/736
Aerosols, accidents caused by ignition of aerosols.	Study of accidents caused by aerosol fires throughout the European Union.	97/884
Aids and equipment for elderly people.	An ergonomic investigation of the design, safety and performance of equipment designed to assist elderly people in their activities of daily living.	92/X33
Anthropometric strength data for design safety - phase 1	Contains anthropometric data on people. Intended for designers of consumer products Intended to fill in gaps in the existing data which is contained in the publications, Childata [URN 95/681], Adultdata [URN 98/736] and Older Adultdata [URN 00/500]	00/1070
Barbecue, An investigation into barbecue accidents.	Research into the number and nature of barbecue accidents and also into the development of carbon monoxide warnings.	01/722
Batteries.	Study of accidents recorded by the Home Accident Surveillance System (HASS) involving batteries and battery powered products.	88/X2
Bleach products, Home accidents from household bleach	Report presenting data on research on composition of household bleach products, prompted by a German proposal to amend Directive 76/769/EEC	96/844
Bottles, hazards from carbonated drinks bottles	Report into accidents caused by bottle tops on carbonated drinks bottles	97/635
Bottles.	Analysis of bottle accidents using HASS data 1987	89/X9
Burns and scalds accidents in the home.	Research study to provide a clear understanding of the main causes of accidents leading to burns and scalds, highlighting the target groups at risk.	98/757
Camping equipment accidents.	An assessment of all accidents involving camping equipment which appear in Home Accident Surveillance Systems (HASS) and Leisure Accident Surveillance Systems (LASS) statistics.	97/546
Candles, The safety and use of tealights and candles	An investigation into the reasons for the increasing number of accidents resulting from the use of candles and tealights.	00/1106
Carbon monoxide deaths from poisoning by non-gas fuelled domestic heating appliances in rented accommodation.	Research to determine number of deaths annually from 1987 to 1996 from CO poisoning, identify the circumstances surrounding each case, assess trends, and present findings concisely.	98/508
Carbon monoxide poisoning and faulty heating systems Consumer knowledge of MORI SOCIAL RESEARCH	Examining the extent of knowledge about the hazards of carbon monoxide from faulty heating systems and what, if any, precautions are taken to reduce the risks.	99/953

Carbon monoxide poisoning by domestic heating appliances: data and analysis	Report from project to collect and analyse data on fatal and non-fatal poisonings from carbon monoxide generated by domestic heating appliances	95/930
Carbon monoxide poisonings A study of the occurrence from domestic heating appliances in the European Community.	Study commissioned by DTI to provide a clear understanding of the frequency and nature of carbon monoxide poisoning accidents caused by domestic fuel burning appliances throughout the European Union	95/929
Childata	Anthropometric data on children	95/681
Child restraints for nursery goods. Backpacks: summary report.	Second stage report of study of child restraints for nursery goods and restraints for backpacks.	94/722
Child safety equipment for use in the home.	Study of the effectiveness of child safety equipment for use within the home.	90/X10
Child usage of gas and electrical consumer products.	Research project to provide evidence of the extent to which certain gas and electrical appliances play a part in young children's lives and the extent to which such appliances are used by young children unsupervised.	94/723
Children under 5 playing with cigarette lighters and matches, European research.	Summary of European research into accidents caused by children under 5 playing with cigarette lighters and matches:	97/640
Choking hazards for children in the European Community.	Study involving collation of data on the incidence of fatal and non-fatal accidents of children under 10 years in the EC, with comparison between countries and assessment of size and nature of the 'foreign body' involved in relation to the age of the child or the size of the airways.	96/912
Choking risks to children under four from toys and other objects.	Findings of an analysis of choking accidents among children based on 1,289 non-fatal cases between 1987 and 1996, and 182 fatalities between 1986 and 1995.	99/708
Christmas decorations, trees and lights.	An analysis of home and leisure accidents.	90/X5
Cigarette lighters and matches, The hazards caused by children under five playing with in the UK	Summarises the available evidence on the nature of the hazard posed by children playing with cigarette lighters and matches in the UK, in terms of the number of fires, deaths and injuries caused by children of different ages.	96/952
Clothing flammability accidents study.	Research with a detailed assessment of the scale and nature of accidents caused by clothing flammability, with accurate estimates of how they vary by age.	94/549A
Cosmetic and other skin-contact products, N-Nitrosamines.	Results of a survey of cosmetic products, insect repellents, and washing-up liquids for N-Nitrosamines, carried out between 1994 and 1997. Includes methodology, conclusions and recommendations	98/625
CRCs and tamper evident devices on packaging, technological review.	Examines the use and development of Child Resistant Closures (CRCs) public expectation and scope of legal requirements in child safety regs for medicines and hazardous chemicals (BS EN 28317 and CHIP2 1994).	99/656
Designing safety into products: making ergonomics evaluation a part of the design process.	Handbook aimed at the design community to try to influence decision-making on products at the earliest possible stage.	97/Z22

Design Product design trends	To see if consumer safety has been compromised by changes in design or use of new materials. A detailed assessment made of a small number of products, and views of professional designers and design bodies sought on the issue of health and safety training for designers	89/X1
Dishwasher fires: European study.	Study to provide a clear understanding of the frequency and nature of incidents caused by fires in dishwashers in the European Union.	95/965
Dishwashers, Fires in: summary and recommendations.	Technical report on assessment of fires in dishwashers with summary and recommendations. Assess data and trends.	95/807 95/808
DIY and tool safety, Consumer knowledge of.	MORI social research study to examine the extent of knowledge about the risks in carrying out DIY activities.	99/965
DIY Hiring	A study into the hiring of DIY power and other tools	87/X3
DIY, Investigation into domestic use and accidents with mobile towers	The findings of a study to assess domestic use and accidents with mobile access towers.	97/750
Domestic knives.	Analysis of a sub-set of the Home and Leisure Accident Surveillance System (HASS) for 1991.	93/X84
Elderly: accidents to the elderly.	Study of a sub-set of the Home Accident Surveillance Systems (HASS) data for 1983.	86/X2
Electric blanket fires and related injuries.	Study to determine why accidents caused by electric blankets are occurring, identify the precise nature of the problem, and consider how the incidence of such accidents can be reduced.	99/1061
Electric current accidents.	Analysis of sub-set of the Home Accident Surveillance System (HASS) data for 1980-1987.	90/X8
Electrical fuse links, risk assessment of BS 1362 fuse links under short circuit conditions	Assessment of the safety risk to UK consumers of 13 fuse-links, which bear the letters PMS and the British Standard Institution's (BSI) Kitemark, made in China	98/752
Face paints, Report on the safety of.	Results of a survey of face paints available on the UK market and an assessment of their safety	97/547
Firework injuries: 1995 to 1999.	Information about numbers and types of injuries caused by fireworks during the Bonfire Night 'firework season' 12 October to 8 November inclusive.	96/776 97/606 98/164 99/210
Fireworks (Safety) Regulations 1997: summary of responses to consultation.	Survey of responses on proposal to introduce, by way of regulations, a number of measures relating to fireworks.	99/670
Fireworks, Children and fireworks research: results summary.	Survey of the views and attitudes towards fireworks and firework publicity of 501 young people.	90/X3
Fitness equipment, An ergonomic evaluation of the design, safety, performance of selected items.	Report on fitness equipment for the home.	91/X17
Five gallon buckets, Fatal drowning accidents.	Report into the dangers to children of drowning in five gallon buckets.	96/915
Flame retardants in consumer products, Risks and benefits in the use of	The role of flame retardants to improve fire safety of consumer products and help reduce fires is recognised, however some countries in Europe have expressed concerns about their use. This report was	98/1026

	commissioned by the DTI to inform debate on the relevant risks and benefits of flame retardant use in consumer products.	
Fluorescent lightsticks.	Investigation of fluorescent lightsticks currently available on the UK market to identify and determine the dangers presented by chemicals in these products.	99/1100
Fuel-Using Ride-on Vehicles FURV's	An ergonomic investigation of Fuel-Using Ride-on Vehicles (FURV's) for use by children aged between 3-7 years.	90/X12
Furniture and furnishings (fire) (safety) regulations 1988, Effectiveness of	A study of the current and future effectiveness of the current fire regulations as regards furniture and furnishings, in the light of recent developments in the furnishings textiles field.	00/783
Glass in domestic furniture Safety requirements for summary/ recommendations	Summarises results and recommendations of research by the National Engineering Laboratory into glass used in domestic furniture comparing BS with proposed EN	96/940
Glass in furniture	Analysis of nature and extent of accidents involving glass in household furniture	87/X2
Glass, Domestic accidents involving.	Study to identify specific hazards associated with accidents involving glass used as packaging for consumer goods.	97/955
Grinders	Investigation of accidents involving grinders using HASS 1986 data	86/X4
Hair straightener alkalinity, Measurement of.	A range of hair straighteners (also known as hair relaxers) were analysed for alkalinity both by potentiometric titrimetry and by pH measurements.	95/801
Hedge trimmers.	Electric hedge trimmer accident investigation	85/X1
Instructions for consumer products, writing safety instructions	The outcome of research to compile a good practice guide to help manufacturers and retailers present safety information in a consumer friendly way.	98/768
Kitchen equipment	Analysis of accident data - selected kitchen equipment	86/X3
Ladder safety devices, Assessment of	Study to provide information on the types of leaning ladder safety devices available to consumers, and to explore the advantages and disadvantages associated with their use.	99/707
Ladders (domestic), research programme into the need for dynamic testing of: report	Phase 1 report on study investigating use, performance and testing of domestic ladders	97/641
Leisure accidents to the under fives	Report with statistics and analysis concerning leisure accidents to children under five years of age in the UK	90/X4
Life, optimisation of consumer safety	Study investigating valuation of human life in the context of standards for consumers safety	98/1028
Liquified petroleum gas	Accidents in the home involving LPG	87/X1
Match containers, safety of	Gives the latest position on the safety aspects of containers for matches. Focuses on child resistant (CR) match containers and warning labels	00/892
Medicines	Study of relationship between medication and accident	93/X81
Mental disability and consumer safety	A review of consumer safety and mental disability related to ordinary household products and architectural features	93/X79

Night lights and ceramic burners, Fires associated with.	Study to investigate reasons why night light and tea light candles used in ceramic burners caused potentially serious fires by flaring/bursting into flame.	96/1121
Nursery equipment: accident data from European Community countries	Study to clarify current position concerning safety of nursery goods in Europe, assessment of the accident pattern and establishment of factual information to assist those concerned with safety standards.	90/X7
Package opening, Assessment of broad age-related issues for.	Studies the range of problems related to the ageing process as a whole, including the need for some products to balance child-resistance against openability for older persons.	99/621
Package size, Assessment of problems related to.	Relates the opening capabilities of different user groups to various pack opening requirements, in order to identify current or potential industry guidelines on openability. The most common causes of problems related to package size are also identified alongside some potential solutions.	99/620
Packaging accidents: domestic accidents involving packaging video	VHS video tape aimed at business on the basic findings of DTI research into package opening accidents	99/917
Packaging opening tools, use and misuse	Examines the use and misuse of tools and devices for opening packaging, reviews available accident data, identifies what kinds of tools for opening packaging are available, and draws upon panel assessments to determine consumer attitudes.	99/619
Packaging, development of further warning symbols for.	Investigates the potential to develop warning symbols to help deter children from ingesting harmful products, primarily by encouraging adults to keep the products out of the reach of children. Examination of European CHIP2 legislation recommends the review and wider advertising of current CHIP symbols.	99/655
Packaging, Domestic accidents involving plastic packaging.	Study to identify specific hazards associated with accidents involving plastics used as packaging for consumer goods.	97/954
Packaging, Domestic accidents involving.	Study of accidents caused by non-medicine packaging.	97/952
Packaging, Domestic accidents related to: volume I.	Study to identify the products and types of packaging which cause the highest proportion of accidents. Volume I contains a discussion of the analysis, interviews with victims and experts in the food industry, and incorporates conclusions.	97/956
Packaging, Domestic accidents related to: volume II. Analysis and tabulation of data.	Study to identify the products and types of packaging which cause the highest proportion of accidents. Volume II contains analysis and tabulation of data.	97/957
Packaging, Examination of ways to reduce injury from glass packaging.	Examines the technologies that exist to reduce the effects of glass packaging shattering, with any product integrity and cost implications.	99/641
Packaging, How to improve safe disposal instructions.	Focus on the 39% of all packaging related-accidents that occur in the after-use stage, featuring the two main types: glass bottles and food cans. Various technical solutions examined, including use of effective opening tools, additional pack instructions	99/622

Packaging, Improvements in the design of metal containers for easier opening and less hazardous disposal including alternatives to trapezoid corned beef tins.	Describes the evolution of metal cans since their initial introduction, examining the potential for technical adaptions, such as a change to plastic cans, to improve safety within the constraints of industry cost and environmental concerns.	99/640
Personal factors in domestic accidents	Prevention of accidents through product and environmental design.	80/X1
Physical disability and consumer safety	A review of consumer safety and physical disability related to ordinary household products and architectural features. Report focuses on safety concerns of people with physical disabilities as a distinct group.	91/X13
Pictograms, The role of in the conveying of consumer safety information	Summarises the results of a study funded by DTI to assess the role of pictograms in the conveying of consumer safety information.	97/751
PPE, Design and provision.	An ergonomic study into the design, provision and use of Personal Protective Equipment for recreational and DIY activities.	89/X5
Professional products on the consumer market, The migration of	Study to investigate the extent to which products designed for professional use move across into the domestic market and in doing so, expose the untrained user to risk of injury	99/727
PU foam crumb, Assessment according to SI 1324.	Summarises a programme of risk to examine the viability of meeting the prescribed test for certain ignition resistance standards by the Furniture and Furnishings (Fire) (Safety) Regulations 1988 for crumb foam.	97/746
Pushchairs: child restraints for nursery goods	Examines a method of testing the effectiveness of integral harnesses	95/966
Recall, Product recall research	A study examining the number and quality of recalls of consumer products DTI has policy responsibility for. Overview of current voluntary recall system	99/1255
Residual current devices: added value for home safety	Report assessing the impact of home safety in the UK that would result from a more widespread use of RCDs	97/744
Second-hand goods Summary of research: market survey.	Project to look into the safety of selected second-hand goods, covering both their intrinsic safety and the behaviour and expectations of those who buy them.	95/967
Skateboards	Analysis of home accidents involving skateboards	92/X34
Soothers, safety research into the size and shape of soothers	Research to determine the potential hazards associated with soothers used by toddlers and babies	98/876
Stepladders, Assessment of the safety of.	Project defining and classifying the stepladder market, identifying current and typical use, establishing current rates and types of injuries associated with stepladders, and identifying possible routes to improvements in stepladder safety.	96/913
Strangulations, trappings & suffocations, Fatal.	Study of fatal accidental strangulations, trappings & suffocations to children 0-9 years of age: 1982-1992. Sequel to the report covering the period 1968-1980.	96/1107
Sunbeds.	Analysis of accidents involving sunlamps and sunbeds	88/X1

Tins, Domestic accidents involving.	Study to identify specific hazards associated with accidents involving tins used as packaging for consumer goods.	97/953
Toy bicycle braking requirements and braking system performance of bicycles covered by the Toys (Safety) Regulations 1989	Report on the braking performance of bicycles covered by the Toys (Safety) Regulations 1989 following representations made to the Consumer Safety Unit that the requirements in the relevant harmonized European standards were inappropriate.	90/X9 90/X16
Toy Playground equipment for the home	Analysis of accidents involving playground equipment for the home	88/X3
Toy Video games and epilepsy: final report /interim findings and summary	National survey of photosensitivity and seizures induced by electronic screen games (video, console and computer games).	94/724 94/X40 93/X83
Toys, Hair on toys	Study to assess consumers' perceptions of suitability of toys with different types of fur or hair for children of different age groups, particularly those aged 5 or under.	93/X85
Toys, Noise from toys and its effect on hearing.	Study to provide and collate up-to-date information, to allow noise limits for toys to be set on a firm scientific basis so as to protect hearing without being unnecessarily restrictive	97/944
Toys, Phthalates in toys and childcare articles: summary of responses to public consultation	Summary of responses to consultation on EC proposal for a Council Directive on the use of phthalates in toys and childcare articles.	00/1040
Trichloroethane (TCE) 1,1,1- Investigations into alternatives to.	For the degreasing of samples prior to testing under the Pencils and Graphic Instruments (Safety) Regulations and EN71:part 3	95/798 96/512
TV fires (Europe)	Gives an assessment of the cause, nature and frequency of fires in television sets both in the UK and throughout Europe	96/761
Unrecalled products: a paper on the estimated safety risks	An analysis of unrecalled, but potentially dangerous products for which DTI has responsibility (all consumer products excluding food, pharmaceutical products and motor vehicles).	00/806
Upholstered furniture fires: European study	Study to provide a clear understanding of the frequency and nature of fatal accidents caused by furniture fires in the European Union.	93/X80
Volatile substance abuse	Assessing the size and nature of the volatile substance abuse problem and the role which labelling has in reducing it	96/911 97/885

Appendix 2: Safety Regulations

Product Regulated	Regulation*
Aerosol dispensers	SI 1977 No.1140
Asbestos products	SI 1985 No.2042
Bunk beds	SI 1987 No.1337
Ceramic ware	SI 1988 No.1647
Chemical (hazard information)	SI 1994 No.3247
Children's clothing (hood cords)	SI 1976 No.2
Child-resistant packaging	SI 1986 No.758
Cigarette lighter refills	SI 1999 No.1844
Construction products	SI 1991 No.1620
Cooking utensils	SI 1972 No.1957
Cosmetic products	SI 1984 No.1260
Dangerous substances and preparations	SI 1994 No.2844
Electrical appliances	SI 1969 No.310
Electromagnetic compatibility (EMC)	SI 1992 No.2372
Fireguards	SI 1991 No.2693
Fireworks	SI 1997 No.2294
Food imitations	SI 1989 No.1291
Furniture and furnishings (flammability)	SI 1988 No.1324
Gas appliances	SI 1995 No.1629
Gas catalytic heaters	SI 1984 No.1802
Gas cookers	SI 1989 No.149

General product safety	SI 1994 No.2328
Imitation dummies	SI 1993 No.2923
Lifts	SI 1997 No.831
Machinery	SI 1992 No.3073
Materials and articles in contact with food	SI 1987 No.1523
Medical devices	SI 2000 No.1315
Nightwear (flammability)	SI 1985 No.2043
Oil heaters	SI 1977 No.167
Packaging	SI 1998 No.1165
Pedal bicycles	SI 1984 No.145
Pencils and graphic instruments	SI 1998 No.2406
Personal protective equipment	SI 1992 No.3139
Plastic materials in contact with food	SI 1998 No.1376
Plugs and sockets	SI 1994 No.1768
Pressure equipment	SI 1999 No.2001
Simple pressure vessels	SI 1991 No.2749
Tobacco products (labelling)	SI 1991 No.1530
Tobacco for oral use	SI 1992 No.3134
Toys	SI 1995 No.204
Wheeled child conveyances	SI 1997 No.2866

* as amended

Appendix 3: European Directives

73/23/EEC	Low-voltage equipment
85/374/EEC	Product Liability
87/404/EEC	Simple pressure vessels
88/378/EEC	Toy safety
89/106/EEC	Construction products
89/336/EEC	Electromagnetic compatibility
89/392/EEC	Machinery
89/686/EEC	Personal protective equipment
90/384/EEC	Non-automatic weighing instruments
90/385/EEC	Active implantable medical devices
90/396/EEC	Gas burning appliances
91/263/EEC	Telecommunications Terminal Equipment
92/42/EEC	Hot Water Boilers
93/15/EEC	Explosives for civil use
93/42/EEC	Medical Devices
93/68/EEC	Amending Directive[3]
94/9/EEC	Equipment and systems for use in potentially explosive atmospheres
94/25/EEC	Recreational craft
95/16/EEC	Lifts (elevators)
96/48/EEC	Interoperability of the trans-European high speed rail system
96/57/EEC	Energy efficiency requirements for household electric refrigerators and freezers
97/23/EEC	Pressure equipment

[3] 93/68/EEC Rules for the Affixing and Use of the CE Conformity Marking

Appendix 4: Standards

A. Household electrical

BS EN 60335-1	Specification for safety of household and similar electrical appliances - part 1: general requirements
BS EN 60335-2-17	Safety of household and similar electrical appliances - particular requirements for blankets, pads and similar flexible heating appliances
BS EN 60335-2-98	Safety of household and similar electrical appliances - part 2: particular requirements - section 2.98 humidifiers
BS EN 60335-2-2	Safety of household and similar electrical appliances - part 2-2: particular requirements for vacuum cleaners and water suction cleaning appliances
BS EN 60335-2-3	Specification for safety of household and similar electrical appliances - part 2-3: particular requirements for electric irons
BS EN 60335-2-4	Specification for safety of household and similar electrical appliances - particular requirements - spin extractors
BS EN 60335-2-5	Specification for safety of household and similar electrical appliances - part 2: particular requirements - section 2.5: dishwashers
BS EN 60335-2-6	Safety of household and similar electrical appliances - particular requirements - cooking ranges, cooking tables, ovens and similar appliances for household use
BS EN 60335-2-7	Safety of household and similar electrical appliances - part 2-7: particular requirements for washing machines
BS EN 60335-2-8	Specification for safety of household and similar appliances - particular requirements - shavers, hair clippers and similar appliances
BS EN 60335-2-9	Safety of household and similar electrical appliances - part 2-9: particular requirements for grills, toasters and similar portable cooking appliances
BS EN 60335-2-10	Safety of household and similar electrical appliances - particular requirements - floor treatment machines and wet scrubbing machines
BS EN 60335-2-11	Safety of household and similar electrical appliances - part 2-11: particular requirements for tumble dryers
BS EN 60335-2-12	Safety of household and similar electrical appliances - particular requirements for warming plates and similar appliances
BS EN 60335-2-13	Safety of household and similar electrical appliances - particular requirements for deep fat fryers, frying pans and similar appliances
BS EN 60335-2-14	Safety of household and similar electrical appliances - part 2-14: particular requirements for kitchen machines
BS EN 60335-2-15	Safety of household and similar electrical appliances - part 2-15: particular requirements for appliances for heating liquids
BS EN 60335-2-16	Safety of household and similar electrical appliances - particular requirements - food waste disposers
BS EN 60335-2-17	Safety of household and similar electrical appliances - particular requirements for blankets, pads and similar flexible heating appliances
BS EN 60335-2-21	Safety of household and similar electrical appliances - particular requirements for storage water heaters
BS EN 60335-2-23	Specification for safety of household and similar electrical appliances - particular requirements for appliances for skin or hair care
BS EN 60335-2-24	Specification for safety of household and similar electrical appliances - particular requirements for appliances for skin or hair care
BS EN 60335-2-26	Specification for safety of household and similar electrical appliances - particular requirements - particular requirements for clocks
BS EN 60335-2-27	Safety of household and similar electrical appliances - particular requirements - skin exposure to ultraviolet and infrared radiation
BS EN 60335-2-28	Specification for safety of household and similar electrical appliances - particular requirements - particular requirements for sewing machines
BS EN 60335-2-29	Safety of household and similar electrical appliances - particular requirements - battery chargers

BS EN 60335-2-30	Safety of household and similar electrical appliances - part 2-30: particular requirements for room heaters
BS EN 60335-2-31	Safety of household and similar electrical appliances - part 2: particular requirements - section 2.31: range hoods
BS EN 60335-2-33	Safety of household and similar electrical appliances - particular requirements for coffee mills and coffee grinders
BS EN 60335-2-34	Safety of household and similar electrical appliances: part 2-34: particular requirements for motor-compressors
BS EN 60335-2-40	Safety of household and similar electrical appliances - part 2.40: particular requirements for electrical heat pumps, air-conditioners and dehumidifiers
BS EN 60335-2-41	Specification for safety of household and similar electrical appliances - particular requirements - pumps for liquids having a temperature not exceeding 35 deg C
BS EN 60335-2-43	Safety of household and similar electrical appliances - particular requirements - clothes dryers and towel rails
BS EN 60335-2-44	Safety of household and similar electrical appliances - particular requirements for ironers
BS EN 60335-2-45	Specification for safety of household and similar electrical appliances - particular requirements - portable heating tools and similar appliances
BS EN 60335-2-51	Safety of household and similar electrical appliances - particular requirements - stationary circulation pumps for heating and service water installations
BS EN 60335-2-52	Specification for safety of household and similar electrical appliances - particular requirements for oral hygiene appliances
BS EN 60335-2-53	Safety of household and similar electrical appliances - sauna heating appliances
BS EN 60335-2-54	Safety of household and similar electrical appliances - particular requirements - surface-cleaning appliances employing liquids
BS EN 60335-2-55	Specification for safety of household and similar electrical appliances - particular requirements - electrical appliances for use with aquariums and garden ponds
BS EN 60335-2-56	Safety of household and similar electrical appliances - particular requirements for projectors and similar appliances
BS EN 60335-2-57	Safety of household and similar electrical appliances - particular requirements for ice-cream appliances incorporated motor-compressors
BS EN 60335-2-59	Safety of household and similar electrical appliances - particular requirements - insect killers
BS EN 60335-2-60	Safety of household and similar electrical appliances - particular requirements - whirlpool baths
BS EN 60335-2-61	Specification for safety of household and similar electrical appliances - particular requirements - thermal storage room heaters
BS EN 60335-2-65	Specification for safety of household and similar electrical appliances - particular requirements air-cleaning appliances
BS EN 60335-2-66	Specification for safety of household and similar electrical appliances - particular requirements - water-bed heaters
BS EN 60335-2-73	Particular requirements- fixed immersion heaters
BS EN 60335-2-74	Specification for safety of household and similar electrical appliances - particular requirements - portable immersion heaters
BS EN 60335-2-76	Safety of household and similar electrical appliances - part 2-76 - particular requirements for electric fence energizers
BS EN 60335-2-77	Safety of household and similar electrical appliances - part 2-77: particular requirements for pedestrian controlled mains-operated lawnmowers
BS EN 60335-2-78	Safety of household and similar electrical appliances - particular requirements - outdoor barbecues
BS EN 60335-2-80	Safety of household and similar electrical appliances - fans

BS EN 60335-2-81	Safety of household and similar electrical appliances - particular requirements - foot warmers and heating mats
BS EN 60335-2-82	Safety of household and similar electrical appliances - part 2-82: particular requirements for service machines and amusement machines
BS EN 60335-2-84	Safety of household and similar electrical appliances - particular requirements for toilets
BS EN 60335-2-85	Safety of household and similar electrical appliances - particular requirements for fabric steamers
BS EN 60335-2-88	Safety of household and similar electrical appliances - particular requirements - humidifiers intended for use with heating, ventilation, or air-conditioning systems
BS EN 60335-2-97	Safety of household and similar electrical appliances - part 2-97: particular requirements for drives for rolling shutters, awnings, blinds and similar equipment
BS EN 60335-2-98	Safety of household and similar electrical appliances - part 2: particular requirements - section 2.98 humidifiers
BS EN 60335 Pt2-25	Safety of household and similar electrical appliances - part 2-25: particular requirements for microwave ovens
BS EN 60335 Pt2-32	Safety of household and similar electrical appliances - particular requirements for massage appliances
BS EN 60335 Pt2-35	Safety of household and similar electrical appliances - particular requirements for instantaneous water heaters

B. Children's products

BS EN 862	Packaging - child-resistant packaging - requirements and testing procedures for non-re-closable packages for non-pharmaceutical products
BS EN 1130-1	Furniture - cribs and cradles for domestic use - safety requirements
BS EN 1130-2	Furniture - cribs and cradles for domestic use - test methods
BS EN 1272	Child care articles - table mounted chairs - safety requirements and test methods
BS EN 1273	Child care articles - baby walking frames - safety requirements and test methods
BS EN 1466	Child care articles - carry cots and stands - safety requirements and test methods
BS EN 1930	Child care articles - safety barriers - safety requirements and test methods
BS EN 12221-1	Changing units for domestic use - part 1 - safety requirements
BS EN 12221-2	Changing units for domestic use - part 2 - test methods
BS EN 12227-1	Playpens for domestic use - part 1 - safety requirements
BS EN 12227-2	Playpens for domestic use - part 2 - test methods
BS EN 12586	Child care articles - soother holder - safety requirements and test methods
BS EN 12868	Child use and care articles - methods for determining the release of n-nitrosamines and n-nitrosatable substances from elastomer or rubber teats and soothers
BS EN 28317	Child resistant packaging - requirements and testing procedure for re-closable packages
BS EN 71-1	Safety of toys - part 1: mechanical and physical properties
BS EN 71-2	Safety of toys - flammability
BS EN 71-3	Safety of toys - specification for migration of certain elements
BS EN 71-4	Safety of toys - experimental sets for chemistry and related activities
BS EN 71-5	Safety of toys - chemical toys (sets) other than experimental sets
BS EN 71-6	Safety of toys - graphical symbols for age warning labelling
EN 716	Furniture, children's cots and folding cots for domestic use - 2 parts, safety requirements and test methods
EN 1178	Furniture, children's high chairs for domestic use, safety requirements and test methods
EN 12790	Baby carriers, wheeled child conveyances, reclined cradles

EN 50088	Electric toys
EN 28317	Child-resistant packaging recloseable
EN 862	Child-resistant packaging non-recloseable
EN 12868	Child use and care articles, rubber teats or soothers, release of nitrosamines
EN 747	Furniture, bunk beds, two parts safety requirements and test methods

C. Other

BS 8800	Guide to occupational health and safety management systems
BS 7000-1	Design management systems - part 1: guide to managing innovation
BS 7000-2	Design management systems - guide to managing design of manufactured products
ISO 9000	Quality management systems fundamentals and vocabulary
ISO 9001	Quality management systems - requirements
BS 6001-0	Sampling procedures for inspection by attributes - introduction to the BS 6001 attribute sampling system
BS 6001-1	Sampling procedures for inspection by attributes - part 1 - sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
BS 6001-2	Sampling procedures for inspection by attributes - specification for sampling plans indexed by limiting quality (LQ) for isolated lot inspection
BS 6001-3	Sampling procedures for inspection by attributes - specification for skip-lot procedures
EN 131	Ladders, two parts, terms, types, sizes and requirements testing marking
EN ISO 9994	Lighters, safety specification
EN 1021	Furniture, ignitability cigarette and match tests - 2 parts
EN 597	Furniture, ignitability, mattresses and bed bases - 2 parts, cigarette and match tests
EN 54-2	Smoke alarms
EN 563	Safety of machinery, temperatures of touchable surfaces
EN 778	Domestic gas fired convection heaters without fan
EN 1319	Domestic gas fired convection heaters with fan assisted burners
EN 30	Domestic cooking appliances, safety general
EN ISO 11683	Packaging, tactile danger warnings
EN 272	Packaging, tactile danger warnings
EN 1129	Furniture, foldaway beds - 2 parts, safety requirements and test methods

D. Guides

ISO/IEC Guide 51:1999	Safety aspects, guidelines for their inclusion in standards (adopted as CEN/CENELEC Memorandum No.9).
ISO/IEC Guide 50:1987	Child safety and standards, general guidelines – being revised (as at 20th July 2003).
CEN report CR 13387	Child use and care articles, general and common safety guidelines.
ISO/IEC Guide 37	Instructions for products of consumer interest.
CEN/BTWG/117 N11	Draft for comment child safety, guidelines for its inclusion in standards 2001.

Appendix 5: Expert Witness Statements

Date	Authority	Product	Company	Hazard/Fault	Notes
10.92	Barking & Dagenham	Plug-in air fresheners	Glade	Poisoning	Contents accessible to children
07.93	Barking & Dagenham	Hobby kits	W H Smiths and Acorn	Sharp points	3 days - Swindon Crown Court
03.96	Bedford CC	Windows	Aspen Windows Ltd	Cuts	Not safety glass
08.93	Birmingham City	Toy Swing Boat	T P Activity Toys Ltd	Impact injury	Child broke leg passed EN 71
04.97	Birmingham City	Glazing	No name	Cuts	Not safety glass
00.99	Birmingham City	Anglepoise lamp	HHS Trading	Electrical/ burns	No formal action noted
08.95	Birmingham City	Paint scraper	Unbranded	Complainant injured	Sharp edges <0.5mm
12.97	Birmingham City	Candles	8 – Various coloured	Fire	Erratic burning
08.94	Birmingham City	Scented candles in glass	Bursters - Various	Sharp edges/ burns	Containers broke
05.93	Birmingham City	Fireguard, safety gates	Wirax etc	Burns	Nursery products survey
01.93	Birmingham City	Electric knife	Moulinex	Cuts	Switch fault in on position
08.92	Birmingham City	Playpen	Mamas & Papas	Choking	Foam padding
09.92	Birmingham City	Fire blanket	WH Smith & BRK	Fire	Failed performance BS
12.91	Birmingham City	Fire blanket	B&Q – Allied	Fire	Failed BS – prosecuted
08.92	Birmingham City	Skateboards	Blue Wheels	Impact injury	Failed BS 5175
11.95	Birmingham City	Hood cords	Unbranded	Strangulation	Children's duffle coats
11.95	Birmingham City	Cord accessory	Unbranded	Strangulation	Child's swimming costume
04.97	Brent & Harrow	Pressure cookers	Butterfly Elite	Explosion	relief valve faulty
12.93	Bromley	Oil lamp, decorative	Clearcraft	Fire	No flame regulator or guard
04.98	Bury	Christmas pen holder	Poundstretcher	Choking	Not a toy – GPSR
05.98	Caerphilly	Baby walkers	Baby Club & Beepop	Fall	Prosecution GPSR
08.95	Cambridge	Kettle	Le Creuset	Scalding, burns	No maximum marked
01.97	Cheshire	Kettle	Alvers	Scalding, burns	No max mark, Lid security
09.95	Cleveland	Safety film for glass	Kiddiproof	Cuts	Prosecution failed
11.93	Cleveland	Coffee jug	Solac	Scalding	Complainant injured
11.95	Coventry	Baby walker	Ninna Nanna	Pinching, entrapment	Lacks rigidity
06.92	Coventry	Toy egg	Tombola	Choking	Contained whistle
10.92	Coventry	Step stool	Abru	Falls	Failed BS 7377

02.91	Coventry	Baby rattles	Unbranded	Choking	Small parts
02.91	Coventry	Baby rattles	Youpy	Choking	Small parts
02.91	Coventry	Novelty eggs	WH Cornelius	Choking	Small sharp metal parts
08.90	Coventry	Halloween masks	Macsel Greetings	Flammability	GPS
12.93	Coventry	Jogging top	Big barbarians	Strangulation	Hood cord
04.93	Coventry	Moses basket stand	Unbranded	Fall	Stability
03.98	Coventry	Claw hammers	Premier Beaumont	Impact	Hardness failed BS 876
03.96	Coventry	Lighters	Mitake	Fire, explosion	Failed BS 6908
08.96	Coventry	Safety gates	Hago Kiddiproof	Pinching entrapment	Finger trap, impact failure
12.96	Coventry	Claw hammers	Premier Beaumont	Impact	Failed BS 876 hardness
08.99	Coventry	Pin hammers	Unbranded	Impact	Failed BS 876
02.97	Croydon	Wooden clown puppet	Henbrandt Ltd	Cuts	Removable sharp nails
12.96	Croydon	2 piece outfit	Baby baby	Choking	Removable press studs
02.00	Derbyshire	Double glazed porch	Replacement glazing	Cuts	4mm annealed glass used
11.98	Derbyshire	Double glazed window	Replacement glazing	Cuts	Prosecution - 4mm glass
10.97	Derbyshire	Double glazed window	Replacement glazing	Cuts	4mm annealed glass used
12.96	Derbyshire	Double glazed window	Replacement glazing	Cuts	4mm annealed glass used
10.96	Derbyshire	Double glazed window	Replacement glazing	Cuts	4mm annealed glass used
02.96	Derbyshire	Double glazed window	Replacement glazing	Cuts	4mm annealed glass used
04.93	Dorset	Sheepdog soft toy	Tebro	Choking	Loose hair
08.94	Dorset	Stainless steel kettle	Unbranded	Scalding	Erratic flow of water from spout
09.98	Edinburgh	Toys	Lone star	Burns	Flammability of wig
05.96	Falkirk	Sunbed support stand	Unbranded	Impact	Spring loaded – injury
08.92	Gloucester	Cooker hood	Magnet	Electrocution/burns	Prosecution succeeded
11.99	Gloucester	Folding mattress	Lidl	Burns/fire	Prosecution succeeded
06.91	Greenwich	Swinging cribs	Chaucer/Serenade	Entrapment	Suspension appeal
01.92	Greenwich	Wave machine	The Wave	Electrocution	Basic insulation, live parts
01.92	Greenwich	Infinity mirror	Unbranded	Electrocution	Basic insulation, live parts
07.95	Gwynedd	Electric jug kettle	Hinari	Scalding	Prosecution
12.97	Hackney	Refillable lighters	Mitake	Burns/fire/explosion	Flame height, gas leaks
03.93	Hampshire	Window lock	Hago	Fall	Faulty fitting instructions

02.99	Herefordshire	Torch – rechargeable	Ever Ready	Electrocution	Adapter faulty, not marked
09.99	Herefordshire	Electric oven	Indesit	Burns	Surface temperatures
08.96	Herefordshire	Novelty pencil boxes	Clown	Choking/cuts	Small parts, sharp points
03.93	Hereford & Worcester	Kettle	Fissler UK Ltd	Scalding	No max marking
04.93	Hereford & Worcester	Crayons	Happy Egg	Toxic/choking	Food imitations
04.93	Hereford & Worcester	Sundial	Unbranded	Cuts	Sharp protrusions
09.93	Hereford & Worcester	Bath mats	Ross	Fall	No further action
11.90	Hereford & Worcester	Toy crystal set	Peter Pan Playthings	Toxic	prosecution £2000 fatality
08.93	Hereford & Worcester	Tyre pressure gauges	Impax	Motor accident	Incorrect readings
09.89	Hereford & Worcester	Christmas decoration	Frosted Candy Garland	Choking	Food imitations
01.96	Hereford & Worcester	Trampoline	Grattan – Sanyes	Toxic	White asbestos found in pads
09.96	Hereford & Worcester	Electric toaster	Salton	Burns	Prosecution - Surface temp.
07.98	Kensington & Chelsea	Cigarette lighters	Nibo Ltd	Fire explosion burns	Child appealing Suspension
01.98	Kingston upon Hull	Bostic glitter glue pens	RMS International	Toxic	Prosecution
02.90	Kingston upon Thames	Cots	Cossatto	Entrapment	Prosecution
09.93	Knowsley	Toys (3) – pull along	Test purchases	Choking	Detachable small parts
05.98	Knowsley	Child's set with purse	Ninalise	Strangulation	BS 7907 – clothing cord
04.92	Knowsley	Kettles plastic handle	Cagan Hollowware Ltd	Burns	BS 6743 6557
11.93	Knowsley	Pressure gauge	Grafter	Tyre pressure	Lack of accuracy
06.93	Knowsley	Child's anorak	Priya Imports Ltd	Strangulation	Hood cord £900
06.93	Knowsley	Infants' novelty slippers	British Bata Ltd	Choking	Eyes detach
11.93	Knowsley	Toys – various	Test purchases	Toxic	Lead in paint £3k fine
02.93	Knowsley	Toy paint set	Stone Galleon	Toxic	Paint £750 fine
02.94	Knowsley	Tyre pressure foot pump	Kinzo Ltd	Tyre pressure and TDA	£1k fine
11.98	Knowsley	Children's coat	Unbranded	Entrapment	BS 7907 – clothing cords
05.95	Lancashire	Gas fire	Robinson Willey	CO poisoning	Prosecution – fatality
02.95	Lancashire	Electric plug	Salton	Electrocution	European 2-pin
01.95	Lancashire	Electric insect killer	Questword Ltd	Electrocution	Prosecution £1k fine
12.99	Leicester	Electric toaster	Hinari	Burns	Judicial review
01.93	Leicester	Microwave detector	Detecto	Inaccurate	No formal action
06.94	Lincolnshire	Vacuum flasks	Aladdin	Scalding	Prosecuted £3k fines

08.99	Lincolnshire	Microwave/grill combi	Unknown	Burns	Surface temperatures
02.98	Lincolnshire	Bombag novelty	Lone Star Toys Ltd	Distraction – noise	Crown Court - suspension
07.95	Lincolnshire	Pump action jugs	Woolworths	Scalding	£4.5k fines
12.92	Lincolnshire	Diving watch	H Samuel - Apollo	Inaccurate readings	No formal action
11.93	Lincolnshire	Work stations (2)	Blitz	Toxic	Lead
04.94	Lincolnshire	Tiger tail balloons	David Halsall Toys	Eye injury	Prosecution
04.99	Liverpool	Baby walker	Trend Europa Brevi	Fails BS GPSR	Prosecution
07.99	Liverpool	Baby walker	Chico UK Ltd	Fails BS GPSR	Prosecution
07.99	Liverpool	Baby walker	Petite Star Products	Fails BS GPSR	Prosecution
09.92	Liverpool	Jelly-like toys	Badgeneal Ltd	Choking hazard	3 x prosecutions
09.92	Liverpool	Toys – various	Test purchases	Choking hazard	Detachable small parts
11.91	Manchester	Nursery furniture	Pony Ltd	Entrapment	Prosecution
08.93	Manchester	Smoker's lighter	Unbranded	Fire/explosion	Fails BS and GPSR
09.98	Merthyr Tydfil	Swinging Crib	Angels 2000	Finger traps/ lock failed	Fails BS and GPSR
04.93	Mid-Glamorgan	Glazing	Replacement glazing	Cuts	Not safety glass
07.96	Newcastle	Garden slide	ELC	Entrapment hazard	Prosecution – fatal accident
07.99	Newcastle	Inflatable toys	Aquatic Products	Entrapment, drowning	No formal action
07.97	Newcastle	Toy art set	Poundstretcher	Choking	4 authorities prosecution
07.97	Newry & Mourne	Bath mat	Neptune	Fall	Prosecution failed
01.93	North Yorkshire	Hammers - various	Test purchases	Impact injuries	Fails BS not hardened
03.92	North Yorkshire	Child's shell suit	Unbranded	Strangulation	Hood cord
03.99	Northampton	Glass top coffee table	Unbranded	Cuts	Fails BS and GPSR
06.93	Northampton	Children's t-shirt hoods	Test purchases	Strangulation	Prosecution
05.99	Northampton	Flasks – pump action	Li-lo Leisure Products	Scalding	Prosecution £3k fine – injury
02.93	Oxford	Folding stools	MFI	Impact	Failed BS Prosecution – injury
03.95	Oxford	Fireworks	Danmade Ltd	Burns	Failed BS Prosecution
09.98	Sandwell	Glass shelf	Homebase	Cuts	Prosecution – injury
05.00	Sandwell	Upholstered furniture	Complaint	Cuts	Poor workmanship
07.98	Sandwell	Flotation toy	Intex	Drowning	No formal action
02.96	Sandwell	Electric fan	Orient Star	Electrocution/ fire	Prosecution £1k fine + £2.5k
09.95	Sandwell	Garden fork	Green Lawn	Impact	Failed BS Hardness

02.96	Sandwell	Toy Santa hat and beard	Poundland	Flammability	Prosecution £1.2 + £0.5k
11.94	Sandwell	Toy racing car	BJ Toys	Choking	Detachable small parts
04.93	Sandwell	Glass top coffee table	Unbranded	Cuts	Failed BS and GPSR
07.93	Sandwell	Vegetable slicer	Borner	Cuts	No formal action
06.93	Sandwell	Handy fan	Unbranded	Cuts	No formal action
03.94	Sandwell	Thermometer in dummy	Hayger babytemp	Choking	Failed BS
01.93	Sandwell	Toilet trainer seat	Tommee Tippee	Cuts	sharp edges
06.92	Sandwell	Tubular metal chair	Complaint	Cuts, entrapment	Injuries spring loaded
08.92	Sandwell	Vacuum flask	Complaint	Scald	Prosecution - Failed BS
11.91	Sandwell	Toy	Complaint	Flammability	Failed BS
07.91	Sandwell	Baby keep warm dish	Benjyware	Scalding	Injury
02.92	Sandwell	Table-mounted chair	Test purchase	Fall	No formal action noted
08.90	Sandwell	Foam filled toys (18)	Test purchases	Flammability	Prosecution failed
11.88	Sandwell	Kettle	Complaint	Burn scald	Failed BS 6557
06.00	Sandwell	Plastic drink bottles	Local importer	Choking	Statement - recall
09.96	Sefton	Electric jug kettle	Hinari	Burn, scald	Prosecution
04.92	Shropshire	Kettles	Seagull	Burn scald	Failed BS 6557
03.94	Shropshire	Hurrican oil lamps	Swallow	Fire	Failed BS 6557
02.96	Solihull	Luggage strap – elastic	Polco and Belcar	Impact	Injuries
08.93	Solihull	Toy sticky catcher	Coconuts Ltd	Choking Food imitations	Prosecution £750
08.93	Solihull	Toy animal ooze	Coconuts Ltd	Choking	Food imitation Prosecution
05.93	Solihull	Toy spider webs	Test purchase	Choking	Small parts
05.93	Solihull	Cool touch cooker	New World	Burns	Prosecution TDA surface temp
05.92	Solihull	Vacuum flasks	Aladdin	Scalding	Failed BS
05.92	Solihull	Step ladders	Unbranded	Fall	Failed BS
07.91	Solihull	Baby walker	Brevi	Shearing etc Failed BS	Prosecution £2.5k
08.91	Solihull	Garden chair	Complaint	Fall	Failed BS impact etc test
12.93	Solihull	Food blender	Philips	Cuts	Injury
10.92	Solihull	Baby walker	Ninni Nana Unistar	Pinching, entrapment	Failed BS Prosecution £2.2k
10.92	Solihull	Carpet cleaner	Rug Doctor	Electrocution	Not splash proof
08.99	Southampton	Toy cape	Rubies Masquarade	Strangulation - cord	Prosecution failed

05.98	Southwark	Toaster	Goldmark Grattan	Burns	Surface temp
08.95	South Glamorgan	Barbecue grill	Products Plus London	Cuts	Sharp edges
08.99	Stafford	Luggage straps	Astro	Impact	Prosecution - eye injury
08.99	Stafford	Glass shelves	Do It All	Cuts	Prosecution
12.98	Stafford	Candles	Test purchase	Burns and fire	No formal action noted
12.94	Stafford	Gas lighters	Japan	Burns and fire	No formal action noted
01.97	Stockton on Tees	Drill stand	Wolfcraft	Impact	Collapsed Injury - prosecution
06.96	Stockton on Tees	Safety film for glass	Bonwyke Ltd	Cuts	Prosecution failed
02.97	Stockton on Tees	Glazing – annealed	Complaint	Cuts	Sub standard – prosecution
06.00	Stockton on Tees	Plastic bags for toys	Test purchase	Suffocation	No formal action noted
12.95	Suffolk	Dessert sparkler	Danmade Ltd	Fire and burns	Suspension Notice appeal
03.92	Suffolk	High chair	Sobrinca	Fire and fall – failed BS	Prosecution
09.91	Suffolk	Cot	Serenade Bamby	Entrapment	Failed BS
05.91	Suffolk	High chair	Bebe confort	Pinching	Failed BS
05.91	Suffolk	Playpen	Comfifolder	Entrapment	Failed BS
06.91	Suffolk	Cot	Pony	Entrapment	Failed BS
09.91	Suffolk	Toy rabbit	Seized	Choking	Loose hair
12.91	Suffolk	Toy bear	Seized	Choking	Loose hair
08.91	Suffolk	Toys hairy – various	Seized	Choking	Loose hair
08.91	Suffolk	Toys hairy – various	Seized	Choking	Loose hair
09.92	Suffolk	Toy husky dogs	Top Toys Ltd	Choking	Loose hair Prosecuted forfeited
12.92	Surrey	Oil lamps	Unbranded	Fire and explosion	Failed BS 2049 and regs.
07.92	Surrey	Toy furry dog	Lovable Li-lo	Choking	Loose fibres
07.96	Surrey	Pushchair	Bebe confort	Fall – collapsed in use	Prosecution
01.93	Sutton LB	Toy aerosol gun	Bristol Novelty Ltd	Fire and explosion	Use with aerosol can
07.92	Sutton LB	Cot	Norma	Entrapment	Prosecution Appeal case
05.98	Tower Hamlets LB	Novel cigarette lighters	Test purchases	Fire, burns	Prosecution
06.99	Tower Hamlets LB	Night lights and socket	Academy	Electrocution	No formal action noted
07.96	Trafford	Novelty bomb bags	Lone Star	Noise – distraction	Prosecution
02.92	Trafford	Floral candle decoration	Colony candle rings	Flammability	No formal action noted
11.91	Trafford	Toy play clay	Test purchase	Choking	Food imitation Prosecution

09.92	Trafford	Electronic magic mirror	Seized	Cuts	Suspended
09.92	Trafford	Toy Piano	Seized	Choking	Detachable small parts
01.00	Walsall	Elec. Garden shredder	Husqvarna	Cuts	No formal action noted
04.99	Walsall	Electric toaster	Wahl	Burns	Pending
04.99	Walsall	Electric toaster	Lloytron	Burns	No formal action noted
04.99	Walsall	Electric toaster	Sunbeam	Burns	No formal action noted
04.99	Walsall	Electric toaster	Heda	Burns	No formal action noted
03.96	Walsall	Electric plug and cable	Aashima UK Ltd	Electrocution	Prosecution failed
09.98	Walsall	Toy bike/scooter	Bluebird	Impact	Poor instructions and unstable
10.98	Walsall	Panic bolt	Yale	Burn, toxic, fire	Failed 22N - Modified
06.98	Walsall	Ironing board	P N Importers	Impact	Injury Prosecution £2k
06.98	Walsall	Carpet gripper rods	Complaint	Cuts	No formal action noted
11.94	Walsall	Glazing	Complaint	Cuts	Not safety glass Prosecution
11.97	Walsall	Glazing	Complaint	Cuts	Not safety glass Prosecution
06.96	Walsall	Loft ladder	Complaint	Collapsed	No formal action noted
08.93	Walsall	Digital multimeter	Micromta Tandy	Electrocution	Prosecution
05.90	Walsall	Vacuum flasks	Eros	Scalding	Prosecutions successful (15)
05.90	Walsall	Vacuum flasks	Daniel	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	Sallheimer	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	Ison Brothers	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	Thermos	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	IKEA	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	Trade Mgnt Services	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	Churchill	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	KB	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	Eldiro Shlutz	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	Curver Con Prods ltd	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	Gio-style UK ltd	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	Alladin Industries Ltd	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	Other brand	Scalding	Prosecution
05.90	Walsall	Vacuum flasks	Other brand	Scalding	Prosecution

06.91	Walsall	Toy scatterpillar	Bluebird Toys	Impact	Cuts bruises Injury EN 71
06.00	Walsall	Stepladders	Premier	Falls	Complaint
04.92	Walsall	Stairgate	Guinness Bros	Fall	Complaint – not prosecuted
10.91	Walsall	Toy gorilla	Tebro	Choking	Loose hair - Prosecution failed
01.90	Walsall	Rubber hot water bottle	Yung	Scalding	Failed BS – prosecution
01.90	Walsall	Hot water bottle bag	Complaint	Suffocation	No formal action noted
09.88	Walsall	Toy shaggy dog	P&M Supplies Ltd	Choking	Prosecution failed on appeal
07.88	Walsall	Novelty pencils	RMS International Ltd	Cuts	Sharp point injury Prosecution
07.88	Walsall	Toy savings bank	Test purchase	Choking	Small parts - Prosecution
12.88	Walsall	Electric jug kettle	Swan	Electrocution	Water access Complaint
01.88	Walsall	Novelty clip-on badges	Test purchase	Choking	Small parts Prosecution £1k
02.88	Walsall	Toy horses	Test purchase	Cuts and choking	Prosecution
05.88	Walsall	Novelty clip-on toys	Test purchase	Choking small parts	Prosecution failed on appeal
04.92	Walsall	Play shoes	Test purchase	Impact	No formal action noted
09.92	Walsall	Saucepans	Test purchases	Scalding	Handles failed Prosecutions
10.90	Walsall	Toy dog	Huggies	Choking	Loose hair
08.93	Walsall	Stair carpet	Complaint	Cuts	Sharp points
04.93	Walsall	Baby's nappy	Cosifit	Cuts	wire protruding - injury
07.94	Walsall	Hooded shirt cords	Baby Gap	Strangulation	No prosecution
06.93	Walsall	Skateboards	Power	Impact	Failed BS 5715
10.92	Walsall	Skateboards	KB	Impact	Prosecution – fined £4.7k
04.93	Walsall	Toy fashion shoes	Dazzlers	Impact	Lacked stability
03.93	Walsall	Oven cleaner	Jeyes Kleenoff	Toxic	Prosecution TDA –"*no fumes*"
03.94	Walsall	Child seat	Hasbro Step-N-Boost	Impact	No harness – modified
10.94	Walsall	Loft ladder	Complaint	Impact	Complaint - injuries
12.94	Warwickshire	Toy rocking santa	Test purchase	Entrapment choking cuts	Failed EN 71
12.94	Warwickshire	Toy musical santa	Test purchase	Suffocation on bag	Failed EN 71
08.92	Warwickshire	Novelty Icky Poo	Test purchase	Choking	Food imitation Prosecution
08.92	Warwickshire	Novelty Spiky Balls	Test purchase	Choking	Food imitation Prosecution
08.96	Warwickshire	Novelty fashion rings	Toyvend	Cuts	Prosecution Appeal - £16k
02.93	Warwickshire	Kitchen grater	GSD Universal	Cuts	sharp edges

04.93	Warwickshire	Twin-edged knife	Complaint	Cuts	sharp edges
12.94	Warwickshire	Toy fashion rings	Toyvend	Cuts	Prosecution
02.96	Warwickshire	Exercise skier	Alpine X country	Toxic	Asbestos in brake pads
04.89	Warwickshire	Multi-purpose chair	Brevi Pony Ltd	Impact	Harness points/ unstable
04.96	Warwickshire	Chinese crackers	Bright Star	Burns	HSE tested Suspension Notice
04.00	West Sussex	High chair	Country style	Impact	Sudden collapse
01.00	West Sussex	Ascot cot	Mothercare	Strangulation trapping	Chrome plating flaking etc.
07.99	West Sussex	Diving sticks – various	Test purchases	Impact	No formal action noted
06.97	West Sussex	Furniture – settee	Test purchase	Flammability	No formal action noted
06.97	West Sussex	Furniture – sofa/bed	Test purchase	Flammability	No formal action noted
06.97	West Sussex	Furniture – armchair	Test purchase	Flammability	No formal action noted
06.95	West Sussex	Electric can opener plug	Moulinex (2nd hand)	Electrocution	No formal action noted
06.97	West Sussex	Fuel effect heater	Belling (2nd hand)	Electrocution, burns	No formal action noted
08.93	West Sussex	Swim aid toy ring	Unbranded	Drowning	No formal action noted
01.94	West Sussex	Aquatic toy – valve fail	Unbranded	Drowning	No formal action noted
09.98	Windsor&Maidenhead	Table mounted chair	Complaint	Impact	No formal action noted
11.93	Wirral	Sweat shirt hood cord	What Everyone Wants	Strangulation	Seized
05.93	Wirral	Father Christmas toy	Primark	Choking	Small parts
03.99	Wirral	Bunk beds	Montreal	Impact	Collapsed. Prosecution - £2.5k
02.95	Wirral	Child's hood top cords	Gap	Strangulation	No formal action noted
06.99	Wokingham DC	Sliding patio door bolts	Complaint	Cuts	Protrusion injuries
11.99	York	Gas cooker	Beko	Burns	High surface temp
04.97	York	Hammers (4)	Test purchases	Impact	Eye injuries
04.97	York	Hammer	Test purchases	Impact	Eye injuries

Appendix 6: Legislation Enforced by Trading Standards[4]

A. Principal Legislation

Legislation	Scope
Agriculture Act 1970	Fertilisers and animal feeding stuffs – Labelling and limiting deleterious materials
Agricultural Produce (Grading And Marking) Acts 1928 And 1931	Grading and marking of agricultural produce
Animal Health Act 1981	Control of animal diseases and welfare of animals on the farm, in transit and at market
Protection Of Children (Tobacco) Act 1986 Children And Young Persons (Protection From Tobacco) Act 1991	Prohibits the sale of tobacco to children. Controls where cigarette vending machines can be sited
Clean Air Act 1993	Controls the lead content of petrol and the sulphur content of diesel fuel
Consumer Credit Act 1974	Control of consumer credit and hire and advertising, licensing of credit and hire traders debt-collecting and credit reference agencies
Consumer Protection Act 1987	Prohibits supply of goods failing the GSR[5]. Prohibits the supply of unsafe goods. Enforces Regulations on consumer goods. Provides for approved safety standards to enable compliance with the GSR. Power to seize and forfeit unsafe goods. Suspend sales of unsafe goods. Require notices warning consumers of unsafe goods to be published. Prohibits misleading price indications
Control Of Pollution Act 1974	Sale of anti-fouling paints and treatments
Development Of Tourism Act 1969	Price of accommodation to be displayed
Education Reform Act 1988	Restricts awarding of degrees to bodies authorised by Royal Charter, Act of Parliament, or designated by the Secretary of State. Restricts use 'Bachelor', 'Master' or 'Doctor'
Energy Act 1976	Publish data on passenger car fuel consumption
Energy Conservation Act 1981	Labelling of appliances on fuel consumption

[4] Responsibilities vary, e.g. County Councils usually have a wider remit than Metropolitan Borough Councils

[5] General Safety Requirement predated the General Product Safety Regulations 1994

Estate Agents Act 1979	Clients' money, disposal and acquisition of land by Estate Agents, banning 'unfit' persons
European Communities Act 1972	Implements community obligations
Explosives Acts 1875 And 1923 Explosives (Age Of Purchase) Act 1976	Registration of explosives stores and sellers. Prevent sales of fireworks to under-age children.
Fair Trading Act 1973	Promotes fair trading. Provides controls on persistent offenders who contravene trade laws.
Food Safety Act 1990	Prohibits sale of unfit food. Controls the quality and standards of food. Controls description, advertising, and labelling of food and claims made. Prohibits adulteration of food.
Food And Environment Protection Act 1985	Protects the public from food rendered unsafe as a result of the escape of harmful substances such as radioactive fall-out. Protects the public from the misuse of pesticides.
Hallmarking Act 1973	Protection for purchasers of precious metals in relation to composition, assaying, marking and description. Recognition of international markings on gold, silver and platinum.
Health And Safety At Work Etc Act 1974	Controls the classification, packaging, labelling, carriage, and storage of dangerous substances.
Medicines Act 1968	Controls medicinal products - production, composition, labelling, and advertising. Controls the incorporation of medicinal products in animal feeding stuffs.
Merchant Shipping Act 1979	Responsibilities regarding weighbridges (including attendants) used to check loads (i.e. the weight of heavy goods vehicles).
Motor Cycle Noise Act 1987	Regulates sale of motorcycles exhaust systems.
Nurses Agencies Act 1957	Licensing agencies providing nurses in homes.
Olympic Symbol Etc (Protection) Act 1995	Prevents unauthorised use of the Olympic games' symbols and similar labels.
Petroleum (Consolidation) Act 1928 And Petroleum (Transfer Off Licences) Act 1936	Require businesses storing petroleum spirit to hold a licence and to comply with stringent safety rules.
Poisons Act 1972	Controls the sale of poisons. Provides for registration of sellers of poisons.
Prices Acts 1974 And 1975	Price display of certain goods. Provides protection and price information

	for consumers. Controls the manner in which prices and sale prices of goods may be indicated.
Property Misdescriptions Act 1991	Prescribes various illegal practices associated with buying and selling of property.
Timeshare Act 1992	Regulates sale of timeshare properties.
Trade Descriptions Act 1968	Prohibits misdescription of goods. Prohibits false claims for services, accommodation and facilities.
Trade Marks Act 1994	Fraudulent application or use of a trademark.
Trading Representations (Disabled Persons) Acts 1958 And 1972	Controls traders' representations re. employment or assistance of blind or disabled persons in the production, packing, or sale of goods.
Video Recordings Acts 1984 And 1993	Requires classification and labelling of videos.
Weights And Measures Act 1985	Controls trade weighing and measuring equipment. Protects against deficient quantity. Providing metrological service to trade/industry. Guidance and control on packers' QC systems. Promotes free flow of goods within EEC.

B. Other Legislation Enforced by the Trading Standards Service.[6]

Legislation	Scope
Accommodation Agencies Act 1963	Controls taking of money for providing services in connection with the letting of property.
Administration Of Justice Act 1970	Offence to harass debtors or alleged debtors.
Business Names Act 1986	Business carried on under a name other than that of its owner to display particulars of ownership on premises and stationery.
Cancer Act 1939	Prohibits claims that there is a cure for cancer.
Companies Act 1985	Requires limited companies to state their trading details on business premises and in documents.
Copyright, Designs And Patents Act 1988 As Amended By The Broadcasting Act 1990	Protection for designs. Counterfeit offence. Controls making, importing, or distributing infringing copies of copyright material.
Dogs Act 1906 As Amended By The Dogs (Amendment) Act 1928	Deals with unburied animal carcasses.
Farm And Garden Chemicals Act 1967	Controls labelling and marking of products. Prohibits transactions in unlabelled products.
Forgery And Counterfeiting Act 1981	Prohibits forgery and counterfeiting of documents.
Insurance Brokers (Registration) Act 1977	Requires brokers to be registered.
Intoxicating Substances (Supply) Act 1985	Prevents sale of intoxicating substances, and equipment to aid its misuse, to children.
Knives Act 1997	Prevents the marketing of dangerous knives, and prohibits their sale to minors.
Malicious Communications Act 1988	Punishment of persons who send or deliver letters or other articles with the purpose of causing distress or anxiety.
Mock Auctions Act 1961	Prohibits certain practices in relation to sales purporting to be sales by auction.
Motor Vehicles (Safety Equipment For Children) Act 1991	Amends the Road Traffic Act 1988 to provide regulation making powers for the shape, construction, or other quality of restraining devices used for children.
Protection Against Cruel Tethering Act 1988	Prohibits animals from being tethered in certain circumstances.
Protection Of Animals Act 1911 Amended By The Protection Of Animals (Amendment) Act 1954 And Agriculture (Miscellaneous Provisions) Act 1968	Gives courts powers to ban persons from keeping animals. Deals with the cruelty aspect of animal welfare.

[6] Local authorities may authorise their Trading Standards Services to enforce this other legislation

Road Traffic Acts 1988 And 1991 Road Traffic Act (Consequential Provisions) Act 1988 Road Traffic Offenders Act 1988 Road Traffic (Foreign Vehicles) Act 1972	Prohibits the overloading of goods vehicles. Prohibits sale of unroadworthy vehicles. Imposes minimum safety requirements of certain vehicles.
Solicitors Act 1974	Controls unlicensed conveyancing.
Telecommunications Act 1984	Controls advertising, marketing and labelling of telephones and equipment.
Theft Acts 1968 And 1978	Prohibits obtaining property or obtaining a pecuniary advantage by deception or false accounting.
Trading Stamps Act 1964	Regulates the issue, use, and redemption of trading stamps.
Unsolicited Goods And Services Acts 1971 and 1975	Controls the supply of unsolicited goods. Provides penalties for demanding payment for unsolicited goods. Controls trade directory entries.

C. Civil Law Relating to Fair Trading

Local authorities have no direct responsibility for the following Acts that provide the basis for contract law applicable to consumers and businesses alike, and therefore relevant to the conduct of fair trading.

Legislation	**Scope**
Consumer Arbitration Agreements Act 1988	Prevents compulsory arbitration clauses in consumer contracts.
Misrepresentation Act 1967	Redress for misrepresentations of goods
Unfair Contracts Terms Act 1977	Makes void unfair contract terms.
Torts (Interference With Goods) Act 1977	Allows holders of other people's goods to sell them if certain conditions are complied with.
Sale Of Goods Act 1979 as amended by Sale Of Goods (Amendment) Act 1994, Sale And Supply Of Goods Act 1994 and Sale Of Goods Act 1995	Details the rights of purchasers and the duties of sellers in the sale of goods.
Limitation Act 1980	Prevents action being taken by parties to a contract after six years.
Supply Of Goods And Services Act 1982	For contracts other than for the sale of goods, details the rights of purchasers and the duties of sellers.
Cheques Act 1992	Enables consumers to protect payment by cheque.

Appendix 7: Prosecutions

Officer portfolio 01.01.91 to 31.12.00[7]

Date	Product	Fault	Hazard
23.01.91	Toy teddy bear	Small parts	Choking
13.03.91	Rubber grip camping axe	Loose head	Impact
10.04.91	Vacuum flask	Failed impact test	Foreign body
01.05.91	Vacuum flask	Failed impact test	Foreign body
15.05.91	Vacuum flask	Failed impact test	Foreign body
26.06.91	Hot & cold insulated flask	Failed impact test	Foreign body
11.09.91	Rubber grip claw hammer	Loose head	Impact
16.09.91	Giant vacuum flask	Failed impact test	Foreign body
20.11.91	Vacuum flask	Failed impact test	Foreign body
27.11.91	Vacuum flask	Failed impact test	Foreign body
19.02.92	Vacuum flask	Failed impact test	Foreign body
09.03.92	Toy shaggy dog	Loose hair	Choking
18.03.92	Toy ukulele	Cadmium and lead	Poisoning
05.05.92	Toy clown and duck	Lead and chromium	Poisoning
06.05.92	Vacuum flask	Failed impact test	Foreign body
16.09.92	Electric iron – Dateline	Faulty cable	Fire
05.10.92	Toy skateboard	Failed BS speed & clearance tests	Impact
02.12.92	Tyre pressure gauge	Incorrect readings – TDA	Impact
10.02.93	Stationery desk sets	Lead	Poisoning
24.03.93	Toy gorilla	Loose hair	Choking
24.03.93	Child's football hat	Loose hair	Choking
18.08.93	Electric wallpaper stripper	Faulty insulation	Electrocution
15.09.93	Electric disc grinder	Faulty power cord and markings	Electrocution
15.09.93	Electric arc welder	Faulty power cord and markings	Electrocution
15.09.93	Electric isolating transformer	Faulty power cord and markings	Electrocution
02.03.94	Toy postman and snowman	Stuffing easily removed	Choking
02.03.94	Toy elephant	Cadmium	Poisoning
20.07.94	Electrical mains tester	Faulty insulation	Electrocution
01.08.94	Elastic luggage straps	Hook failed sudden energy release	Impact
07.09.94	Electrical mains tester light	Faulty insulation	Electrocution
05.10.94	Electrical mains tester light	Faulty insulation	Electrocution
06.12.94	Upholstered furniture	Failed flammability tests	Fire
24.01.95	Elastic luggage straps	Hook failed sudden energy release	Impact
21.02.95	Elastic luggage straps	Hook failed sudden energy release	Impact
16.05.95	Crayons	Lead	Poisoning
19.09.95	Elastic luggage straps	Hook failed sudden energy release	Impact
24.04.96	Electric voltage tester	Live parts	Electrocution
05.06.96	Gas cooker – second hand	Excessive surface temperatures	Burns
05.06.96	Gas cooker – second hand	Gas leaks	Explosion
26.06.96	Stationery sets	Failed standard no airway in cap	Choking
17.07.96	Chalkboard and chalks	Lead and chromium	Poisoning
07.10.96	Electric immersion heater	Electric shock	Electrocution
12.02.97	Elastic luggage straps	Hook failed sudden energy release	Impact
21.05.97	Bed/settee	Failed flammability tests	Fire
05.06.97	Bingo pens	Failed standard no airway in cap	Choking
21.07.97	Elastic luggage straps	Hook failed sudden energy release	Impact

[7] Source: Investigating officer: R W Deakin, Walsall Council, Trading Standards Service (64 cases in 10 years 6.4 cases p.a.)

08.09.97	Upholstered furniture	Failed flammability tests	Fire
10.11.97	Upholstered furniture	Failed flammability tests	Fire
08.12.97	Elastic luggage straps	Hook failed sudden energy release	Impact
08.12.97	Claw hammer	Loose head	Impact
12.01.98	Elastic luggage straps	Hook failed sudden energy release	Impact
14.09.98	Electric night light	Access to live parts	Electrocution
12.04.99	Elastic luggage straps	Hook failed sudden energy release	Impact
12.04.99	Elastic luggage straps	Hook failed sudden energy release	Impact
26.04.99	Ironing boards	Collapsed under load	Impact
25.10.99	Elastic luggage straps	Hook failed sudden energy release	Impact
31.01.00	Elastic luggage straps	Hook failed sudden energy release	Impact
06.03.00	Electric home dico lights	Control box overheated	Fire
20.06.00	Elastic luggage straps	Hook failed sudden energy release	Impact
24.07.00	Elastic luggage straps	Hook failed sudden energy release	Impact
18.09.00	Sofa bed	Not match resistant	Fire
02.10.00	Elastic luggage straps	Hook failed sudden energy release	Impact
13.10.00	Elastic luggage straps	Hook failed sudden energy release	Impact
16.10.00	Sofa bed	Not match resistant	Fire

Appendix 8: Hazards, Situations and Events[8]

No.	Hazards
1	Mechanical hazards due to - • Shape • Relative location • Mass and stability – potential energy • Mass and velocity – kinetic energy • Inadequate strength • Elastic elements • Liquids, gases under pressure • Vacuum effect
1.1	Crushing
1.2	Shearing
1.3	Cutting
1.4	Entanglement
1.5	Drawing-in, trapping
1.6	Impact
1.7	Stabbing, puncture
1.8	Friction, abrasion
1.9	High pressure fluid injection, ejection
2	Electrical hazards due to -
2.1	Contact with live parts (direct)
2.2	Contact with live parts under fault conditions (indirect)
2.3	Approach to live parts under high voltage
2.4	Electrostatic phenomena
2.5	Thermal radiation
3	Thermal hazards resulting in
3.1	Burns, scalds following contact with high or low temperatures
3.2	Hot or cold working environment
4	Hazards caused by noise resulting in
4.1	Deafness, other physiological disorders, e.g. loss of balance
4.2	Interference with speech communication
5	Hazards caused by vibration
5.1	Use of hand-held machines
5.2	Whole body vibration
6	Hazards generated by radiation
6.1	Low frequency, radio frequency radiation, microwaves
6.2	Infrared, visible and ultraviolet light
6.3	X and gamma rays
6.4	Alpha, beta rays, electron or ion beams, neutrons
6.5	Lasers
7	Hazards generated by materials and substances
7.1	Contact or inhalation harmful fluids, gases, mists, fumes dusts
7.2	Fire or explosion
7.3	Biological or microbiological
8	Ergonomic principles neglected in design, hazards from -
8.1	Unhealthy postures, excessive effort

[8] Developed from EN 1050

8.2	Hand-arm, foot-leg anatomy considerations
8.3	Personal Protective Equipment not used
8.4	Local lighting inadequate
8.5	Mental overload, underload, stress
8.6	Human error, behaviour
8.7	Manual controls – inadequate design, location, identification
8.8	Visual display – inadequate design, location of VDUs
9	Combination of hazards
10	Unexpected start-up, overrun/overspeed from -
10.1	Failure/disorder of control system
10.2	Restoration of energy supply
10.3	External influences on electrical equipment
10.4	Other external influences (gravity, wind, etc.)
10.5	Software errors
10.6	Operator errors due to mismatch characteristics, abilities (8.6)
11	Impossibility of stopping machine in best possible conditions
12	Variations in rotation speed of tools
13	Failure of power supply
14	Failure of control circuit
15	Errors of fitting
16	Break-up during operation
17	Falling or ejected objects or fluids
18	Loss of stability/overturning of machinery
19	Slip, trip, fall
	Additional hazards due to mobility
20	Travelling function
20.1	Movement when starting engine
20.2	Movement without driver
20.3	Movement without all parts safe
20.4	Excessive speed of pedestrian controlled machinery
20.5	Excessive oscillations when moving
20.6	Insufficient ability of machinery to be slowed down, stopped
21	Linked to the work position, including driving station
21.1	Fall of persons during access to or at/from work station
21.2	Exhaust gases/lack of oxygen at work position
21.3	Fire, flammability of cab, lack of extinguishing means
21.4	Mechanical hazards at work position • Contact with wheels • Rollover • Fall of objects, penetration by objects • Break-up of parts rotating at high speed • Contact with machine parts/tools (pedestrian controlled)
21.5	Insufficient visibility from work positions
21.6	Inadequate lighting
21.7	Inadequate seating
21.8	Noise at work position
21.9	Vibration at work position
21.10	Insufficient means for evacuation/exit
22	Due to control system
22.1	Inadequate location of manual controls

22.2	Inadequate design of manual controls and mode of operation
23	From handling the machine (lack of stability)
24	Due to power source and transmission of power
24.1	Hazards from engine and batteries
24.2	Hazards from transmission of power between machines
24.3	Hazards from coupling and towing
25	From/to third persons
25.1	Unauthorised start-up/use
25.2	Drift of a part away from stopping position
25.3	Lack or inadequacy of visual or acoustic warnings
26	Insufficient instructions for driver/operator
	Additional hazards due to lifting
27	Mechanical hazards and events
27.1	From load falls, collisions, machine tipping, caused by -
27.1.1	Lack of stability
27.1.2	Uncontrolled loading, overload, overturn moments exceeded
27.1.3	Uncontrolled amplitude of movements
27.1.4	Unexpected/unintended movement of loads
27.1.5	Inadequate holding devices, accessories
27.1.6	Collision of more than one machine
27.2	From access of persons to load support
27.3	From derailment
27.4	From insufficient mechanical strength of parts
27.5	From inadequate design of pulleys, drums
27.6	Inadequate chains, ropes, accessories and integration
27.7	Lowering of load under control of friction brake
27.8	Abnormal conditions of assembly/testing/use/maintenance
27.9	Effect offload on persons (impact by load or counterweight)
28	Electrical hazards
28.1	Lighting
29	Ergonomic principles neglected
29.1	Insufficient visibility from driving position
	Additional hazards due to underground work
30	Mechanical hazards due to -
30.1	Lack of stability of powered roof supports
30.2	Failing accelerator or brake control of machinery on rails
30.3	Failing or lack of deadman's control of machinery on rails
31	Restricted movement of persons
32	Fire and explosion
33	Emission of dust, gases etc.
	Additional hazards due to lifting or moving of persons
34	Mechanical hazards and events due to -
34.1	Inadequate mechanical strength
34.2	Failing of loading control
34.3	Failing of controls in person carrier (function, priority)
34.4	Overspeed of person carrier
35	Falling of person from carrier
36	Falling or overturning of carrier
37	Human error, behaviour

Appendix 9: Articles on Product Safety [Jenkins]

01.07.90	Six months is not a safe time limit	TSR Vol.98 Issue 7 pp.14-15
Sum.'90	The pain of glass	Care in the home, RoSPA, p.6
Sum.'90	Is the law working?	Care in the home, RoSPA, p.19
Win.'90	The missing link – pre-fitted plugs	Care in the home, RoSPA, pp.14-15
Win.'90	Standard beats glass table peril	Care in the home, RoSPA p.16
Win.'90	Electrical safety in the bathroom	Care in the home, RoSPA, pp.18-19
01.08.91	How safe must a consumer be?	TSR Vol.99 Issue 8 pp.14-15
Sum.'91	How safe should a consumer product be?	Care in the home, RoSPA, pp.12-14
Sum.'91	Not so harmonious for fire safety	Care in the home, RoSPA, pp.22-23
Aut.'91	Bearing gifts from afar, how safe are imported goods?	Care in the home, RoSPA, pp.5-7
Aut.'91	Making that dream home safe	Care in the home, RoSPA pp.8-9
Sum.'92	Safer glazing	Care in the home, RoSPA p.18
Aut.'92	Plugging away pays off	Care in the home, RoSPA, pp.16-17
01.09.92	Plugging away pays off	TSR Vol.100 Issue 9 pp.8-9
Aut.'92	Another victim – CO poisoning	Care in the home, RoSPA, p.9
Win.'92	Design – the key to ending hazards	Care in the home RoSPA , pp.14-15
Win.'92	Don't toy with your child's safety	Care in the home, RoSPA, pp.16-17
Spr.'93	Scaling the heights	Care in the home, RoSPA p.7
Spr.'93	A new look at plugs	Care in the home, RoSPA p.11
Spr.'93	Risk! Are we overexposed?	Care in the home, RoSPA, pp.12-14
01.05.93	No hiding place for unsafe products	TSR Vol.101 Issue 5 pp.16-21
Sum.'93	EC Safety roundup	Care in the home, RoSPA, p.15
Aut.'93	Towards a Euro plug	Care in the home, RoSPA, p.15
Aut.'93	Reflecting on glass	Care in the home, RoSPA, p.21
Spr.'94	Many a slip	Staying Alive, RoSPA, p.11
Sum.'94	Smoke alarms	Staying Alive, RoSPA, p.16
Sum.'94	Latest rules on product safety	Staying Alive, RoSPA, p.23
01.10.94	RoSPA tests confirm tamper-proof plugs are safer	TSR Vol.102 Issue 10 p.10
Aut.'94	Glass to cut injury toll	Staying Alive, RoSPA, p.19
Win.'94	Are we unfair to traders?	Staying Alive, RoSPA, p.15
Aut.'95	Dishwasher dangers	Staying Alive, RoSPA, p.5
Win.'95	No battery – seven die	Staying Alive, RoSPA, p.19
01.04.96	Bargain lighters can kill	TSR Vol.104 Issue 4 pp.14-15
01.10.96	Firework controls	TSR Vol.104 Issue 10 pp.18-19
Aut.'96	New Euro rules urged	Staying Alive, RoSPA, p.7
Aut.'96	Toys without tears	Staying Alive, RoSPA, pp.8-10
Aut.'96	When safe becomes unsafe	Staying Alive, RoSPA, p.22
Win.'96	Focus on home safety	Staying Alive, RoSPA, p.24
Win.'96	Designing safety	Staying Alive, RoSPA, p.26
01.02.97	Product safety and the OJ case	TSR Vol.105 Issue 2 pp.14-15
Spr.'97	Safer design	Staying Alive, RoSPA, p.17
Sum.'97	Welcome for research on product recalls	Staying Alive, RoSPA, p.18
01.10.97	Fireworks and children	TSR Vol.105 Issue 10 pp.F.10-11
01.07.98	RoSPA calls for review of product safety	TSR Vol.106 Issue 7 pp.F.6-7
Win.'98	Drawstring dangers	Staying Alive, RoSPA, p.6
01.02.99	Candle safety	TSR Vol.107 Issue 2 pp.14-15
Spr.'99	£5,000 fine for shelf	Staying Alive, RoSPA, p.4
01.04.99	Temperatures of touchable surfaces, a burn hazard	TSR Vol.107 Issue 4 pp.14-17
Sum.'99	Not child proof	Staying Alive, RoSPA, p.24
01.10.99	£750m product liability award!	TSR Vol.107 Issue 10 pp.F.14-15
Aut.'99	Bath seats and the danger of children drowning	Staying Alive, RoSPA, p.23
01.07.00	Managing product safety	TSR Vol.108 Issue 7 pp.18-19

Appendix 10: Product Recalls 1997 to 2000

Product	Hazard	Action	Source	Date
Electric lamps from Jerry's Home Store models 4400051-55	Risk of electrocution	Do not use tel: 0171-225 2246/ 0410 042911	Times	01-02-97
Argos Bed Guards	Risk of entrapment	Do not use. Return to store for refund	Times	01-02-97
Early Learning Centre Climbing frame ref: 1905 before Jan 1995	Risk of entrapment	Remove three rungs less than 14cm below platform tel: 0990 352352	Times	01-02-97
IKEA Kettle - Avers	Risk of scalding from spout	Return to store for a refund	Times	01-02-97
Bathroom cabinets with electrical outlets	Risk of electrocution	Do not use. Tel: 01905 795796 Return to store for refund.	Times	01-02-97
Candle bridge Christmas decoration "*Classic Christmas*"	Electrical safety hazard	Do not use. Return to store for refund	Times	01-02-97
Wooden Tilter Chairs Staples July-Oct1996	Could break in use	Do not use	Times	01-02-97
Early Learning Centre Super Slide Sold before Oct 1996	Stability – may collapse	Check for distortion. Return for refund tel: 0990 352352	Times	01-02-97
Gym-activity play frame K for Kids Play	Choking hazard - small parts in plastic ball	Do not use. Return to Tesco for a refund. tel: 0800 505555	Times	01-02-97
"*Paws for Thought*" stamper pen Britannia Gift Co Ref: 262L2240 Woolworths sold Feb.'95 to Sept.'96	Cap presents risk of suffocation	Do not use. Return to Woolworths for a refund	Times	01-02-97
Remington Professional 1600 hairdryer Model D2120	Switch may be unsafe	Do not use. Return to: Remington, tel: 0800 163193	Times	01-02-97
Playskool soft walking wheels (bus, truck, train, fire engine and airplane)	Small wheel hubs can detach present a choking hazard	Do not use. tel: 0800 281033	Times	01-02-97
AC Adaptors Supplied with Compaq Armada 4100 Computers Part nos. 217984-001 and 217931-002	Risk of electric shock	Do not use. Disconnect from mains. Contact Compaq tel: 0800 894 376 for replacement	Times	01-02-97
Cabbage Patch Snack Time Kid	Child's hair can get caught in dolls teeth entrapment hazard	Do not use.	Times	01-02-97
Child's bedside light - animal shaped	Poor wiring can cause overheating	Do not use.	Times	01-02-97
K for Kids play Gym-Activity play frame Sold by Tesco since June 1996	Plastic ball could break releasing a bell which is a choking hazard	Do not use. Return to Tesco store. tel: 0800 505555	Times	01-02-97

M.Y. Ballhouse and balls Bestoy - Far East	Sharp metal objects found in bag	check before children play with toy	Times	01-02-97
GoldStar Upright Freezer GF 161SSF	Risk of electric shock	Do not use fast freeze switch and area not to be exposed to moisture. tel: 0990 73 2255 now!	Times	01-02-97
Matsui 1424 14" tv Sold by Curry & Dixon since January 1993	Risk of fire.	Unplug from mains. Do not use. tel: 0541 541541	Times	01-02-97
Baby suits sold in Mackays	Child may choke on acrylic fur hood lining	Do not use. Return to store.	Times	01-02-97
Frogs & Friends sponge & paint set	Paint may produce allergic reaction	Return to Asda for refund	Times	01-02-97
Safeway Kidsown Chunky plane toy	Minor fault found	Return to store for refund.	Times	01-02-97
Secto flea spray Batch codes 6D to 6J incl	Incorrect discharge possible	Do not use. tel: 0500 750 850	Times	01-02-97
Disney store nightdress White Esmeralda and dark blue Dalmatian	Flammability hazard	Do not use. Return to store. tel: 01923 202635	Times	01-03-97
Principles navy and white stripe velour sleepsuit red tartan teddy design on front	Loose poppers present a choking hazard	Return to store for refund	Times	01-03-97
Principles babies red microfibre padded jacket navy fleece liner	Loose poppers could pose choking hazard	Return jacket to store for a refund	Times	01-03-97
Sainsbury's Economy Cornflakes	May contain nuts - allergic reaction	tel: 0500 622211	Times	01-03-97
Christmas Herb Oil Tesco 19" pyramid shaped glass bottle Dartington Foods	Glass bottle may shatter	Wrap thick cloth around bottle before moving & place in plastic bag. Keep cool Return to store. tel: 0800 505555	Times	01-03-97
Onken Frufoo fromage frais and Choko-UFO	Paracetamol tablets found in toy capsule	Return to store for refund	CSB July 1997	01-07-97
Freeze Pops - Power Rangers, Looney Tunes etc	Fermentation has resulted in alcohol being produced	Return to store for refund	CSB July 1997	01-07-97
Life jacket bobbins marked "*1996*"	Inflation malfunction possible	Remove bobbin and return to ASPLI Safety Ltd Leeds tel 0113-246 1550/1463	ASPLI Ltd	01-07-97
Candles 45 x 62 mm yellow/orange in red plastic holders base marked "*Porto*"	Base continues to burn when candle is extinguished	Portuguese authorities reported recall	CSB July 1997	01-07-97
Next Nubuck children's sandals	Small parts (flowers) could choke	tel: 0116 284 9424	CSB Sept 1997	01-09-97
Superdrug cotton buds	Discoloured by contamination	Return to store for refund	CSB Sept 1997	01-09-97
Bean bags and bean chairs	Safety fault	Return to store for refund	CSB Sept 1997	01-09-97

Next Nubuck children's sandals	Small parts (flowers) choking hazard	tel: 0116 284 9424	CSB Sept 1997	01-09-97
Superdrug cotton buds	Discoloured by contamination	Return to store for refund	CSB Sept 1997	01-09-97
Bean bags and bean chairs	Safety fault	Return to store for refund	CSB Sept 1997	01-09-97
Tomy UK Ltd Fold n play cradle seat ref: 1974	Fails Fire Safety Regs	Do not use. Return to store for replacement cover	Ind	10-09-97
Psion mains adaptor	Pins could break	Do not use. 'phone 0800 018 6637	Times	12-09-97
Bosch Siemens Neff Cooker hoods	Front flap may fall down	tel: 0800 316 1010	S Times	14-09-97
Next children's mock crocodile bar shoes	Soles detach	tel: 0116 284 9424	D Mail	29-09-97
Hitachi HE-25 Plugs on some SNES and N64 video games	Cover may detach - risk of electrocution	Turn off mains, remove plug, check for HE-25 mark tel: 0500 030 030	Times	01-10-97
Teletubbies Home Hill Bubble Bath	Not safe for children under 3 - small parts	tel: 01865 390078	CSB Nov 1997	01.10.97
M&S back and neck heating pillows	Overheated causing burns	Do not use. Return to store for a refund	Ind	04-10-97
Pencils with erasers - Tesco School Shop (10 pack) red only	Metal casing may detach	Do not use, return to store for refund - tel: 0800 505555	Times	08-10-97
Reuters 4-way multiple sockets "*Selmar*"	Incorrect flex fitted which could overheat	tel: 0800 731 2006 for replacement	D Mail	15-10-97
Cosatto "*Go Safe Pilot*" car seats bought in 1997	Shoulder harness strap may split	tel: 0800 0261 122 with Approval no. 03442xxx	D Tel	23-10-97
Medihaler-EPI 400 dose inhaler	Being discontinued for safety reasons	Seek medical help and return to store	D Tel	23-10-97
Bosch MT65 workbench	Safety problem	Stop using tel: 0500 268 241	Guardian	28-10-97
Principles children's jackets	Loose toggles - small parts choking hazard	Return to store for refund	D Tel	30-10-97
Bhs Witch's cap for kids Lot no.8082	Fails flammability requirements	Stop using and return to store for refund	CSB Dec 1997	01.11.97
Bio Moss Killer (concentrate) and Vitax Green-up Lawn Feed'N Weed plus Mosskiller	Eye irritation caused Approval for sale withdrawn	tel 0800 110 010 or 0800 731 4497 for advice on safe disposal	D Tel	01-11-97
Bhs Load the donkey toy Lot no.8052	May contain harmful material	Stop using and return to store for refund	Times	12-11-97
Amstell beer 330ml	Glass found in bottles	Do not drink. Stocks will be replaced tel: 0845 600 0500	Times	14-11-97
Tesco K for Kids Stretch across bears	Seam may split, stuffing may choke	Return for refund tel 0800 505555	Times	15-11-97
Littlewoods Snow globe Christmas novelties	Fault found Choking hazard	Return to store tel: 0151 242 6140	D Mail	21-11-97

Zanussi & Electrolux fridge/freezers	Door hinge may fail causing instability	Check serial nos. tel 08800 33 43 53	Times	21-11-97
Hoover tumble dryers Models: D6986 D6988	Fire risk from lint accumulation	tel: 0800 212 335 for free modification	D Tel	22-11-97
Zanussi and Electrolux freezers	Weakness found in top hinge on upper door	tel: 0800 33 43 53	S Tel	23-11-97
Homeguard Dawn to dusk lamp model L404 Index catalogue	Possible access to live parts – electrocution hazard	Do not use. Switch off at mains and remove from socket	D Tel	28-11-97
Adult Meltus Expectorant with decongestant Code 1197P187	Incorrect grade of alcohol used	Consult doctor if you feel unwell. Return to pharmacist. 'phone 0161-652 2222	Times	15-12-97
Adult Meltus Expectorant with decongestant Code 1197P187	Incorrect grade of alcohol used	Consult doctor if you feel unwell. Return to pharmacist. 'phone 0161-652 2222	Times	15-12-97
Spear & Jackson 250mm Sure-grip slip joint waterpump pliers Code: 60-720R	Defect found	Do not use. Return to shop	Times	18-12-97
Spear & Jackson 250mm Sure-grip slip joint waterpump pliers Code: 60-720R	Defect found	Do not use. Return to shop	Times	18-12-97
Calor Gas Butane regulator SRG 541.101 Dated 09.96 to 11.97	Gas leaks found – fire and explosion hazard	Check date if between 09.96 and 11.97 do not use tel: 0800 731 3826	Times	19-12-97
Argos box of 12 foil Christmas crackers	Risk of choking on small parts of toy camera	Return unopened boxes for refund or if opened - dispose of camera	D Mail	19-12-97
Calor Gas Butane regulator SRG 541.101 Dated 09-96 to 11-97	Gas leaks found	Check date if between 09-96 and 11-97 do not use tel: 0800 731 3826	Times	19-12-97
B&Q Nite Lite Snowmen - bought since 23-09-97	Potential safety problem – electrocution hazard	Stop using immediately tel: 0121 778 1471	D. Mail	23-12-97
Caradon security Superswitch with blue light level control only	Faulty light level control	Return for refund tel: 0161 432 0494	D Mail	29-12-97
Woolworths Hand blown wine glasses - bought since Nov 1997	Potential weakness	Do not use. Return to store for refund	Times	02-01-98
Wickes fan and static oven - door inner glass Nos. 9727 to 9733	Glass may break in use	tel: 0800 783 6908 to arrange replacement	D Mail	08-01-98
Typhoo Winter animals promotion- seal, whale, penquin, polar bear.	Safety problem	Return to Typhoo Winter animals promo. Freepost Blackburn X Lancs BB0 1GR	Times	10-01-98
PMS fuses in Swan toasters and sandwich makers Nos. W92, W93, T90 and BK1	Fault found in some fuses	Replace with 13A fuse approved to BS 1362 tel: 0121 380 0600/1	D Express	12-01-98

Flash trigger sprays - bottles no. 437 and 447	Some problems with mechanism	tel: 0800 591 595	Times	17-01-98
Whisky tumblers gift pack with Bunnahabhain Malt	Weakness in glass	Do not use tumblers tel: 0800 783 2734	D Mail	21-01-98
Tefal Country Lane Deep Fryer from Woolworths Code No. 611283	Safety fault	Return to store for refund	Guardian	04-02-98
Tesco novelty hot water bottles purchased since September 1997	May leak	Do not use, return to store for refund tel: 0800 505555	D Mail	09-02-98
NEC G9, G9D+ mobile phone rapid chargers	Could overheat	Stop using tel: 0500 194 500	Times	17-02-98
Cannon Coalridge balanced flue gas fires	Safety upgrade needed	tel: 0800 838 220	D. Mail	19-02-98
C&A Child's novelty hot water bottle	May leak	Return to store for refund	D. Mail	20-02-98
Potterton Kingfisher gas boiler flr-stndng	Electronic fault causing possible gas leak	Turn off - tel: 0800 783 2937	D Tel	28-02-98
Tag-a-long childs cycle trailer Curatti Sport Ltd	Could fail and separate	Stop using and get dealer to repair tel: 0145 4201 700	ITSA CSB March 1988	01-03-98
Premier Ultra bright Musical Multi-action Christmas lights LS-R4	Access to live parts via control box	Do not use Return to store for refund	Which? March 1998	01-03-98
Tag-a-long childs cycle trailer Curatti Sport Ltd	Could fail and separate	Stop using and get dealer to repair tel: 0145 4201 700	ITSA CSB March 1988	01-03-98
Ariston and Indesit washing machines and washer dryers	White door lock may be faulty. Door may open in use	tel: 0800 9807 160	Times	03-03-98
Tesco paracetamol capsules 24 pack, 500mgs	Poor print quality may cause incorrect dosage for children	Return to store for refund tel: 0800 505555	Times	21-03-98
Harvest mains plug	Wiring fault found	If not used or not working properly tel 0800 496 4019	S Times	22-03-98
Mothercare feeding bottles - curved shape	Incorrect markings on 250ml bottles	Return to store tel: 01923 206 495	D Mail	23-03-98
Mandanol tablets 500mg 25 pack size	May be contaminated with aspirin	do not take tel: 01942 816184	Times	26-03-98
Heatrae Sadia Supreme boiling water dispenser Nos. 140 155 & 170	safety modification required on some dispensers – electrocution hazard	Switch off at mains when unattended tel: 0800 783 9673	Times	31-03-98
Sharp 14" portable colour TV purchased Aug 97 to March 98	A faulty component could cause electric shock	Disconnect and do not use until checked tel: 0800 262 958	Times	07-04-98
Sony KV-28FD1E TV	Mechanical fault	tel: 0870 240 0421 fax: 01635 871127	Times	07-04-98

Terbutaline inhaler 250 microgram. L18	May contain Flixotide instead of Terbutaline	Consult doctor tel: 01302 365 000	Telegraph	07-04-98
Tesco fragranced candles - Tranquility and Vitality	May flare up	Return candles to store for refund tel: 0800 505555	Times	10-04-98
Early Learning Centre Cozy Swing Seat with white buckle on strap	May develop fault in use	tel: 0800 967371 - Today's Kids	D Mail	10-04-98
Tomy Ball Party toy	Parts removed from balls - choking hazard	Remove softer balls and dispose of tel: 01703 662 600	Times	14-04-98
Reebok infants (girls) quilted jacket and boys Athletic Department jacket with hood	Zip may break off	Return to store for refund tel: 0800 305 050	Times	16-04-98
Findus Chicken & Bacon Crispy Pancakes 500g "8-pack" from Farmfoods Freezer Centres - £1:79	May contain small glass cubes	Do not eat. Dispose of. tel: 0800 262 491	Times	16-04-98
Glass lampshade and resin candle holder	Safety problem	Do not use. Return to local H Samuel store	D Mail	16-04-98
Wilkinson gourmet sets	fuel leak - fire risk	do not use return to store tel: 0800 783270	D Mail	10-05-98
Kappa - Dawson rainjacket	hood cords - strangulation hazard	return for modification tel: 01250 874567	D Mail	15-05-98
Lego Primo Ladybird rattle (art no 2093)	Choking hazard - small parts	Do not use	PR Co.	22-05-98
Epipen/Epipen Junior Auto-injector	Under dosing risk	Carry second injector tel: 01189 313200	Times	27-05-98
Ellesse children's rucksack jacket	manufacturing fault	Return to Ellesse tel: 0800 328 1973	Mail	08-06-98
Playskool 12" BJ plush doll - Barney range	eyes detach - choking hazard	stop using tel: 0800 328 7007	S Tel	21-06-98
Galt pull-along snail	antennae may detach - choking hazard	return to shop tel: 0161 428 9111	Times	26-06-98
Wickes extension ladders by Youngman Jan - June 1998	rungs may be loose	check rungs tel: 0500 300 328 tel: 0800 414 333	Which? Aug 1998	01-08-98
Boots car bottle and babyfood warmer	could overheat - risk of fire	return to store for refund or replacement tel: 08450 70 80 90	ITSA Bulletin Aug 98	01-08-98
Paracetamol caplets 500mg (16&32 packs)	Incorrect dossage - not for children under 6 yrs	Return product to retailer for refund	Times	07-08-98
Xpelair Premier fans	overheating - risk of fire	switch off do not use tel: 0800 328 7097	Times	10-08-98
M&S fabric slings for deck chairs and directors` chairs	fabric may tear resulting in sudden collapse	do not use tel: 0345 624 624	Times	15-08-98
Partner petrol lawn mower - bought 1998 certain model nos. only	blade adaptor can come loose causing injury	do not use tel: 01325 300303 for a safety check	Which? Sept 1998	01-09-98

Ariston and Indesit Wash m/c and dryers	door may be opened when m/c is in use – access to children	tel 0990 199593	Mail on Sunday	11-10-98
Asda Fresh Mini Burgers in Buns - 416g	may contain piece of plastic	return to store	Times	16-10-98
Tesco Happy Elephant Soft Activity Toy	white popper loose - choking hazard	return to store tel 0800 505555	Guardian	16-10-98
IKEA toothbrush mug and soap dish	knobs detachable small parts choking hazard	return to store	D Mail	26-10-98
Halloween Masks - scary & hairy monster	fire risk	return to store tel 0800 320 596	Ind	30-10-98
Barnardo's stained glass church	electrical fault	return to shop tel 0890 6039079	Times	31-10-98
Asda Happy Harry Tombstone Masks	fire risk	return to store	D Tel	31-10-98
Boots cordless stainless steel electric kettle	Risk of scalding	Return to store tel: 08450 708090	Times	01-11-98
House of Fraser Morocco dining chair	safety fault	do not use tel 0171 963 2099	D Mail	04-11-98
Barbie felt tip pens - Mattel	tops and end caps present choking hazard	tel 01628 500303	D Mail	11-11-98
Tesco whole black pepper 55g jar	contamination	return to store tel 0800 917 8390	Guardian	11-11-98
Wells soft drinks	screw cap problem		Express	13-11-98
Princes chopped tomatoes in tomato juice (227g)	excessive levels of tin	return to store tel 0151 242 5776	D Tel	21-11-98
Safeway and Tesco Canned tomatoes	excessive levels of tin	return to store	D Tel	21-11-98
Nike tracksuits - boys Montreal and Wave Warm-up	faulty hood cords	return to store for refund tel 0800 068 6453	D Mail	03-12-98
Reindeer & Christmas stockings – OPM	serious health risk	return to store - refund tel 0117 963 9955	D Mail	03-12-98
Napolina Canned tomatoes (400g)	excessive levels of tin	return to store tel 0800 272 583	D Tel	09-12-98
Redring Zeta electric shower units	safety problem	do not use return for replacement	ITSA 170	10-12-98
Novelty candles - Great Mills - made in China	coating may ignite	do not light tel 01761 416034	D Express	11-12-98
Dequadin lozenges 20 batch 7S Expiry March 2001	pieces of metal found in lozenges	do not use return to pharmacy tel 0800 9171280	Times	14-12-98
WH Smith pocket Kama Sutra & sensual massage oil gift pack	may cause irritation	do not use return to store tel 01793 695195	Guardian	15-12-98
McVitie's all butter shortbread 200g "best before 19 Jun 99 TB"	technical problem	tel 0800 14 12 14	D Express	17-12-98
Waitrose brazil & pistachio nuts	quality problem	return to store tel 0800 188884	D Tel	22-12-98
Index folding highchair	tray clips removed sudden collapse	stop using contact store tel 0800 557700	D Mail	22-12-98

Dream Cuisine and Premier Kettles	handle could overheat	return to store tel 0181-787 3111	Times	22-12-98
WH Smith Mousehunt mug free with video	glazing problem -toxic hazard	do not use return to store	Guardian	28-12-98
Pacific Scientific treadmill motors various models	electrical fault risk of electrocution	do not use. tel: Hugh Gordon 01332 381 853 0800 917 1708	D Tel	26-01-99
Teletubbies Soft Torch Woolworths TT502	choking hazard	return to store for refund	Times	26-01-99
H&M nightdress	flammability hazard	do not wear return to store tel: 0171 323 2211	D Mail	05-02-99
Vidal Sassoon Steam and Style	faults found	return for checking tel: 0114 242 0405	Guardian	12-02-99
Tesco Australian sparkling wine brut 75cl bottles	particles of glass	return to store tel: 0800 50 55 55	Times	17-02-99
Jug kettles and kettles with filters made in 1992 & 1993	safety fault found electrocution and scalding hazards	tel: 0500 405 406	Times	25-02-99
Philips jug kettles HD 4388; HD 4389; HD 4390; HD 4391	safety fault found electrocution and scalding hazards	tel: 0800 917 1061	Times	25-02-99
M&S Jug kettles and kettles with filters made in 1992 & 1993	safety fault found electrocution and scalding hazards	tel: 0500 405 406	Times	25-02-99
Cuddlies' soft toy Tiger Toss from House of Fraser	Unsafe Choking hazard	return to store	D Mail	01-03-99
Boots Microwarmer	unsafe if overheated	do not use tel 08450 70 80 90	Boots & Times	01-03-99 18-11-99
Philips PC PCA120SA & PCA300SA loudspeakers	electrically unsafe	stop using tel: 0800 896 324	Times	11-03-99
Brother sewing machines	electrical hazard	stop using disconnect from mains tel 0800 731 3553	Ind	24-03-99
Ladybird boys/girls dressing gown	fails standard	return to Woolworths for refund	Times	26-03-99
Kidde Safety Lifesaver 9CO-1 CO detector	contaminated and may not work	tel 0800 917 0722	D Mail	26-03-99
Asda Polony sausage	piece of metal found	return to store	Times	16-04-99
Small talk electric toothbrush	small part choking hazard	return brush head tel 0800 975 4588	Times	17-04-99
Kiddi Proof gates Argos	baby trapped head	withdrawn from sale	Mail	23-04-99
HI-5 front forks	fractures reported	tel 01252 310 291	M Biking	01-05-99
Ariston/Indesit dryers & washing machines	door can open in use	tel 0870 240 2780	Ind	07-05-99
IKEA Mula stacking ring toy	fatal choking	return ball to store	IKEA	11-05-99
Oasis lipstick lighter	safety problem	return to store	Mail	17-05-99
Miller genuine draft bottles with twist-caps	chips of glass can break off when opening	return to store tel 0800 028 2107	Guardian	12-06-99

Hydrogen peroxide solution	glass fragments found	return to supplier tel 01484 842217	Times	12-06-99
Ladybird Barbie sandal	failed safety tests	return to Woolworths	Ind	14-06-99
Hasbro Star Wars Qui-Gon Jinn Lightsabers	batteries might overheat or rupture	do not use tel 0800 22 42 72 76	Times	25-06-99
Bacardi promo pack	glass fragments found	return to retailer tel 0800 252038	Times	26-06-99
Sharwood's Hoi-sin & Plum stir-fry sauce ref: BBE OCT00 HSS 9050	may contain pieces of glass	return jar to store tel 0800 181 565	Times	30-06-99
B&Q folding charcoal barbecue	leg may collapse	do not use, return to store tel 01703 257323	Times	10-07-99
Energizer rechargeable DoubleDuty Premium, Pocket and Lantern Torches	may overheat	do not use tel 0800 028 5694	Times	24-07-99
Nike Sport Waterbottle	drinking valve may detach -choking hazard	stop using tel 0800 056 1640	Times	24-07-99
Hasbro Toy Action Man Bungee Jump Extreme Harness	grappling hook can dislodge and strike user	stop using return hook to Hasbro tel 0800 22 42 72 76	Times	31-07-99
Bhs girl's turquoise t-shirt & short set	contents of decorative badge flammable etc	stop wearing, return to store. tel 0800 181 107	Times	13-08-99
Tomy Multi-activity table	small parts in rattle - choking hazard	do not use tel 0808 100 2690 for replacement	Times	18-08-99
B&Q 2x500 Watt Halogen light bulbs bought since 12-07-99	if marked 120V will shatter	do not fit tel: 0845 601 0837	Times	25-08-99
Budweiser - bottles	glass fragments found		FT	03-09-99
Philips "Fluency" Cordless telephone Models TD9206&9606	weakness in power unit casing	switch off, unplug tel 0800 783 6201	Times	08-09-99
Playmobil torch with toy rescue boat 3063	batteries may overheat	tel 01268 490184 return for £2:50 refund	Times	18-09-99
Asda Volcano Lamp	glass weak may break	return to store	D Mail	28-09-99
Daewoo tv GB20T8ST	fire hazard	tel 0800 731 9593	D Tel	29-09-99
Boots dungaree set	choking hazard	tel 08450 708090	ITSA	01-10-99
Powermax 135 HTS boiler unit	potential danger	tel 0800 0680041	ITSA	01-10-99
Crewsaver Lifejacket auto firing capsule	some jackets may not inflate	tel 0800 398 0398	D Tel	09-10-99
Asda cod fillet fish cakes, frozen, 2 pack 240g use by August 00	Pieces of metal found	return pack to store for refund	Times	19-10-99
Stihl trimmers and auger No. 41 585 423 to 42 423 154	fuel tank defective	stop using, return to dealer tel: 01276 417640	D Mail	08-11-99
Hotpoint Iced Diamond Freezers Aug 98-99	fire risk if liquid spilled on control panel	tel 0800 092 8100	Mail	11-11-99
Boots Microwarmer	dangerous overheating	tel: 08450 70 80 90	Times	18-11-99
Trebor Bassett Refresher lollies bb 18/11/2000	sticks can break	return to store for refund	Times	23-11-99

Principles toilet products - various	containers may break	do not use, return to store for refund tel: 0800 731 8280	Times	26-11-99
Miele vented tumble dryers Models T490 T640 T689	fire hazard when safety thermostat delayed	do not use til modified tel: 0500 115 225	Times	01-12-99
Royce Union FS 1000 bike 26" wheel mens Y frame full suspension	fault with Ballistic 600XL shock forks	do not ride tel: 0800 731 7314	D Mail	01-12-99
Next gold star candle	burns dangerously	do not use tel 08702 435435	D Mail	08-12-99
Hinari Lifestyle slow cooker Model SC350/ SS Chrome	electrocution hazard	return to Tesco tel: 0181-787 3111	Times	11-12-99
GapKids/babyGap Pyjama set	flammability hazard	stop wearing tel: 0171-518 6382	Times	11-12-99
Wickes skylight window 200-116	opening section could detach	open within limits tel 0800 849 2060	D Mail	18-12-99
Morrisons Meat Lasagne 300g	small pieces of metal	do not eat product return to store - refund	D Tel	13-01-00
Tesco Lasagne various	small pieces of metal	do not eat product return to store - refund	D Tel	13-01-00
Ebac Electronic dehumidifiers	safety problem	do not use, unplug tel 0800 591 991	Times	15-01-00
WHSmith Relaxation gift pack £15	oil burner unsafe	do not use burner return to store tel. 01793 695 195	Times	18-01-00
Laura Ashley child's fleece top	hood cord presents choking hazard	return to store tel. 0800 868100	D Tel	02-02-00
Index soldering kit Number 350-316	electrocution hazard – casing/wiring of plug	stop using immediately return to store	D Mail	02-02-00
Toys R Us Playbead or St Malo cot	loose side slats	return to store tel. 0800 731 7314	Express	08-02-00
Goodmans TV Model 206NS	Safety fault	switch off if unattended tel. 0845 609 6099	Times	12-02-00
BBC Live & Kicking magazine key ring fob	kerosene and diesel oil found	throw away	D Tel	12-02-00
Matsui 1455 14" colour TVs	overheating fire hazard	tel Currys Superstore tel. 0870 1541541	Times	16-02-00
Great Mills Sanky desk lamp	safety problem	unplug do not use tel 01761 416034	Express	18-02-00
Insync 203/201 bicycle forks Spinner Industries Taiwan	possible safety fault	check sticker on fork if INSYNC or SYNC return to dealer	D Mail	19-02-00
Malt House Vintners Cotes du Rhone wine	glass fragments found in bottle	tel. 0990 44 30 40	D Tel	19-02-00
Sony InfoLithium battery packs NP-F750 NP-F550	overheating fire hazard	tel. 0800 169 5263	Times	09-03-00
Ebac 880e Electronic humidifier	overheating problem	do not use, unplug tel. 0800 591 991	Times	24-03-00
Batchelors SlimaSoups	metal fragments	tel.0500 848 586	D Tel	27-03-00
One Touch Blood Glucose monitoring strips Waymade Health	mislabelled as Whole Blood Calibration	return to pharmacist tel. 01268 535 200	Times	06-04-00

Rexel personal shredders 40,90,95,100&105 with MS plugs 323N	electrocution - plug top may separate	switch off, isolate at box, hold base not top when removing plug tel.0800 1692448	D Mail	07-04-00
Classic II Touch Lamps importer: LE Lighting	brass lamp holder - electrical wiring fault	do'nt use, return to shop tel.020 8807 2121	Times	10-04-00
Haze Active air freshener Reckitt & Colman	safety risk if plastic casing damaged	tel. 0800 779085	Times	27-04-00
Bhs Jelly tealight holder	may ignite - fire hazard	stop using and return to store for refund tel. 0800 181 107	Times	28-04-00
Somerfield auto dog lead	stitching may break allowing pet to escape	return to store	D Mail	01.05.00
Laura Ashley child's duvet bedset	buttons on pillowcase detach- choking hazard	Stop using return to store tel.0800 868 100	D Tel	04.05.00
Masterplug Heavy Duty Cable Reel sold 14 Feb to 10 May	stop using immediately electric shock	tel. 0800 781 507	Times	10.05.00
Asda M/wave "Ready in Minutes" snacks - dates up to 25.05	packaging may ignite	do not reheat return to store	D Tel	12.05.00
IBM AC adaptors FRU 12J0539 and 12J0537	may overheat	don't leave plugged in tel.01475 555055	D Tel	19.05.00
Toys R Us Blazer bikes 21 speed front suspn 26" Mens Montilla or 24" Boys Kazatin	front shock forks may be faulty	tel 0800 169 9703 to arrange check	Times	10.06.00
Toy Story figurines offer Nestle Cereals	suction cup acts magnifies sun - fire	dont expose to sunlight tel. 01707 824 355	Express	22.06.00
Hepworth central htng boilers Glo-worm Energysaver Combi 100 and Saunier Duval Ecosy 28E&SB 28E	Overheating can lead to failure	If boiler is 985mm (38.8in) high tel 0800 915 7722	Times	10.07.00
Feber Star 3 Bike Monster bat. charger	Safety fault	If charger orange/grey tel. 0808 100 1372	Times	10.07.00
Remington Aromatherapy Steam Facial Model FS350	droplets can enter mask causing injury	stop using immediately tel.0800 212 438	D Exp	18.07.00
Proline fridge freezer CCB 235 - Comet	fault detected - leak of coolant onto food	tel.0845 609 6099 quoting serial number	Times	19.07.00
Power Devil 1200w Hover Mower Model No. PDG4140	blade holder can break in use	do not use, return to store for refund tel.01761 416 034	D Exp	21.07.00
Wickes Triple Halo spotlight No.700149	instructions may result in unsafe installation electrocution hazard	do not touch fitting tel. 0800 0851 323	D Exp	22.07.00
Fisher Price Hop Skip Jumper - baby bouncer	missing safety strap	tel.01628 500 302	Mail	26.07.00
Fisher Price Big Action Construction - 72028	if crane has 64cm strap (30cm strap OK)	tel.01628 500 302	D Tel	26.07.00

Woolworths/Chad Valley pull along toy caterpillar	small parts present choking hazard	do not use, return to store for refund	Ind	21.08.00
Wickes 7 KW shower Aquatronic 1 (3rd-29th Aug '00) No. 410070	faulty - valve reversed can cause scalding	do not use tel.0800 015 4145	D Exp	24.08.00
Tesco Star SP-120B speakers sold with Medion 650 PIII PC	potential technical problem	stop using, unplug, return to store for refund tel.0800 505555	Ind	24.08.00
Fisher-Price lift and lock swing Models - 2092, 75960, 75970, 75973 and 75980	accident in USA after misuse	tel. 01628 500 302 for free harness	D Tel	25.08.00
OLOP 900 RTT Micro Scooter Woolworths	sharp edge near front wheel	return to store for guard to be fitted	Times	01.09.00
Carlton & Electrolux toasters Currys & Dixons	faulty plugs with loose wires found on some models	do not use, take plug from mains and check tel 0870 550 0049	D Tel	07.09.00
Playskool Klackeroo Clikck Clack Cla a Billes 5454	knobs can detach - choking hazard	stop using tel. 00800 22 42 72 76 for replacement	D Mail	20.09.00
Bass Hooch Lemon & Tropical 330ml bottles	glass fragments found in bottle	tel. 0800 371 166	D Tel	28.09.00
Vaillant gas boilers installed 1991-1996	may become dangerous	tel. 0800 838220	Corgi	01.10.00
First Alert SureGrip Fire Extinguishers FE1A10GUK	cylinder may not discharge	tel. 0800 317 466	Times	03.10.00
Boots Microwarmer	microwave overheating can cause injury	reminder - return to store	Guard	14.10.00
Dell laptop batteries	short circuit fire hazard	do not use contact Dell	D Tel	14.10.00
Fisher Price Sparkling Symphony Gym	ribbons may detach and be ingested	discard ribbons	D Tel	19.10.00
Skoda Fabia Child Seat	failed safety tests	not approved for Fabia but OK in other models	Auto Express	23.10.00
Aldi Original Ortho Relax mattress	fails flammability requirements	return to store	Sun	01.11.00
Selecta Shower frameless rise & fall curved bath screen	bottom hinge pin can fail causing screen to detach from wall	do not use return to Homebase tel. 01706 350 191	Times	04.11.00
Asda Child's hooded orange wool coat with floral motif	quality fault	return to Asda store for refund	Times	09.11.00
Birds Eye potato products - bbd 02 2002 or 03 2002	metal fragments found	dispose of - return best before date panel tel. 0500 434445	Guardian	11.11.00
Birds Eye Potato Waffles, Alphabites & Crispy Potato Fritters	metal fragments found	dispose of contents and send pack to Birds Eye tel 0500 434445	D Mail	13.11.00
CMP 2000 Charger - Mobility, Wheelchairs, Scooters, Leisure	may catch fire - 24v6A	do not use contact supplier tel. 0800 085 876	Ind	13.11.00
Peanut Butters - various	mould	don't consume tel. 0161 226 2251	D Mail	13.11.00

Marks & Spencer Children's throw	choking hazard - loose thread and edging	return to store	Guardian	15.11.00
2000W portable fan heater Model: BH 1600 (HT-1200)	faulty plug and fuse	do not use return to Great Mills tel. 01761 416034	D Mail	16.11.00
Morrisons cream of tomato soup 410g	excess tin levels	do not eat return to store	D Mail	17.11.00
Next Fairy Wand	sharp point	return to store	D Tel	20.11.00
Urban Edge Scooter model 92209742100	sharp edges on folding mechanism	return to JJB Sports store	D Mail	20.11.00
Bottles of gin, rum, vodka, brandy, whisky - various brands	glass particles found	do not consumer tel. 0151-521 5407	D Mail	22.11.00
Agfa CL30-AC ePhoto Adapter	overheating, leakage, possible explosion	don't use adapter with batteries in camera - tel. 01462 680060	Times	22.11.00
Tomato Soup - various brands [HL Foods]	excess levels of tin	do not consume tel. 0800 085 3959	D Tel	28.11.00
new Karvol vaporiser - from May 2000	access to liquid in refill bottle	return to supplier tel. 0800 093 2075	D Tel	01.12.00
Index 3-in-1 high chair after 23.07.00	crotch strap may release from seat base	stop using immediately return to store	D Mail	01.12.00
Tagg healthcare gastro sachets	high levels of copper causing sickness	return to Superdrug tel. 01638 668 966	D Mail	07.12.00
Boots aromatherapy mood candles	fire hazard - wick not centrally located	return to store tel. 0800 316 3164	Ind	30.12.00

1. The above list of recalls covers consumer products excluding medicines, fertilisers, vehicles and food unless the food has been contaminated with for example, glass splinters or metal fragments.
2. Only basic details are provided from the recall notices as published.
3. The original notice and companies named should be referred to for details.
4. CSB = Consumer Safety Bulletin, TSI
5. The Trading Standards Institute now has a recalls database (tel: 01702 552 204) and have published guidance[9] on recall practice as has the DTI[10]
6. The data were made available and included in the DTI recall research report[11]
7. An official database of recall notices was called for[12] by RoSPA in 1988.
8. Further guidance is available for distributors and manufacturers[13]
9. The sources are primarily daily newspapers such as the Times.
10. Occasionally, announcements are made by the company's PR firm.
11. Consumers' Association *"Which?"* Publishes recalls occasionally.

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[9] Product Safety Recalls, Ian Simpson, ITSA, 1998 , ISBN 0 901340 57X
[10] Consumer Product Recall Guide ref.URN 99/1172, dti 1999 (tel: 0207-215 0383)
[11] Product Recall Research, DTI, 1999, ref. URN 99/1255
[12] Planning that recall, David Jenkins, Staying Alive, RoSPA, September, 1988.
[13] Managing Product Recall, Howard Abbott, Pitman, 1991, ISBN 0 273 03449 9

Appendix 11: Questionnaire

A. Product/issue:

1. What product or issue is the subject of your current enquiry?

2. What is the nature of your enquiry?

3. Do you use a formal risk assessment procedure?

B. Procedures:

4. Is there a specialist in product safety in your department?

5. Are there enough resources to carry out safety investigations?

6. What, if any, problems inhibit effective action?

C. Other:

7. Any other comments?

Notes:

Respondents: TSOs and other local authority enforcement officers.
Duration: 01.01.96 to 31.12.00 (5 years).
Method: Telephone calls.
Restrictions: Information given in confidence for research purposes.

Appendix 12: Webpages Relevant to the Study

ANEC – European Consumers in Standardisation	www.anec.org
Association of British Insurers	www.abi.org.uk
Aston University	www.aston.ac.uk
BBC Watchdog – TV consumer programme	www.bbc.co.uk/watchdog
Benchmarking	www.benchmarkindex.com
Better Regulation Task Force	www.brtf.gov.uk
Birmingham City Council	www.birmingham.gov.uk
British Electro-technical Approvals Board	www.beab.co.uk
British Safety Council	www.britishsafetycouncil.org
British Standards Institution	www.bsi-global.com
Cabinet Office	www.cabinet-office.gov.uk
Child Accident Prevention Trust	www.capt.org.uk
Companies House	www.companies-house.gov.uk
Consumer Product Safety Commission, USA	www.cpsc.gov
Consumer Support Networks	www.csnconnect.org.uk
Consumers in Europe Group	www.ceg.co.uk
Consumers' Association Research and Testing	www.carte.com
Department for Education and Skills	www.dfes.gov.uk
Department of Health	www.doh.gov.uk
Department of Trade and Industry	www.dti.gov.uk
Dept. for Transport, Local Gov. and the Regions	www.dtlgr.gov.uk
EnergyWatch	www.energywatch.org.uk
European Commission	www.europa.eu.int
European Consumer Safety Association	www.ecosa.org
European Directives	www.newapproach.org
Gravatom Engineering Systems Limited	www.gravatom.com
Health & Safety Executive	www.hse.gov.uk
Hire Association Europe	www.hae.org.uk
HMSO	www.hmso.gov.uk
Home Office	www.homeoffice.gov.uk
Institute for Scientific Information	www.isinet.com/isi/
International Consumer Organisations	www.vn.org/africa.htm
International Product Safety News	www.safetylink.com
LACORS	http://www.lacots.com/pages/trade/lacors.asp
Local Government Association	www.lga.gov.uk
National Association of Citizens Advice Bureaux	www.nacab.org.uk
National Consumer Council	www.ncc.org.uk
National Consumer Federation	www.ncfg.org.uk
National Safety Council, USA	www.nsc.org
National Statistics	www.statistics.gov.uk
Office of Fair Trading	www.oft.gov.uk
Product recalls	www.recallannouncements.co.uk
Royal Society for the Prevention of Accidents	www.rospa.com
Standards database	www.ili.co.uk
Ergonomics Society	www.ergonomics.org.uk
European Union Online	http://europa.eu.int/index_en.htm
Trading Standards Institute	www.tradingstandards.gov.uk
UK Parliament publications	www.parliament.the-stationery-office.co.uk
Walsall MBC	www.walsall.gov.uk
Which? Online	www.which.net

Appendix 13: Instructing Authorities

Date[14]	Local Authority	Cases
01.90	Walsall	54
08.90	Sandwell	20
08.90	Coventry	14
12.91	Birmingham City	14
07.91	Solihull	12
04.90	Warwickshire	11
05.91	Suffolk	11
01.94	West Sussex	10
09.90	Hereford & Worcester	9
04.92	Knowsley	9
12.92	Lincolnshire	7
02.96	Derbyshire	6
11.91	Trafford	5
09.92	Liverpool	5
05.93	Wirral	4
06.96	Stockton on Tees	4
12.98	Stafford	4
07.92	Surrey	3
08.92	Gloucester	3
06.93	Northampton	3
01.95	Lancashire	3
07.96	Newcastle	3
08.96	Herefordshire	3
06.91	Greenwich	2
11.91	Manchester	2
03.92	North Yorkshire	2
04.92	Shropshire	2
07.92	Sutton LB	2
10.92	Barking & Dagenham	2
01.93	Leicester	2
02.93	Oxford	2
04.93	Dorset	2
07.93	Barking & Dagenham	2
11.93	Cleveland	2
12.96	Croydon	2
04.97	York	2
05.98	Tower Hamlets LB	2
01.00	West Sussex	2
02.90	Kingston upon Thames	1
03.93	Hampshire	1

[14] date of first case statement provided for this local authority

04.93	Mid-Glamorgan	1
12.93	Bromley	1
07.95	Gwynedd	1
08.95	Cambridge	1
08.95	South Glamorgan	1
03.96	Bedford CC	1
05.96	Falkirk	1
09.96	Sefton	1
01.97	Cheshire	1
04.97	Brent & Harrow	1
12.97	Hackney	1
01.98	Kingston upon Hull	1
04.98	Bury	1
05.98	Caerphilly	1
05.98	Southwark	1
07.98	Kensington & Chelsea	1
09.98	Edinburgh	1
09.98	Merthyr Tydfil	1
09.98	Windsor & Maidenhead	1
06.99	Wokingham DC	1
08.99	Southampton	1
06.00	Stockton on Tees	1
Total		**272**

Appendix 14: Consumer Product Risk Assessment (CoPRA)

This process is intended to help enforcement officers [15] address product safety issues using a basic quantitative risk assessment approach
Consumer Product Risk Assessment (CoPRA)
1. Describe the product fully noting its intended use and reasonably foreseeable conditions of use (check packaging, presentation, 'get-up' and display for guidance)
2. List all significant hazards (physical, chemical, biological etc.(see Appendix 8 Checklist) that may give rise to harm and how (e.g. choking on small parts; cutting on sharp edges; poisoning from toxic substances)
3. Identify all those who could be harmed (those normally and inadvertently exposed, particularly children)
4. Assess how serious the harms could be (range of likely harmful consequences, from superficial abrasion to lack of oxygen supply by choking using AIS) – score 1 to 5
5. Estimate how likely such harms could occur (e.g. HASS data, number of units supplied, frequency of use and warnings) – score 1 to 5
6. Combine scores from 4 and 5 to estimate the risk level - 1 to 25

Injury type	Score	Likelihood	Level	Risk
Bruise	1	Improbable	0 – 1	Trivial
Abrasion	2	Remote	>1 <4	Low
Fracture	3	Occasional	4 <9	Moderate
Major	4	Probable	9 <16	High
Life threatening	5	Inevitable	16 - 25	Intolerable

[15] CoPRA is intended to be adapted for use by designers and manufacturers of consumer products and to assist those who write standards.

Action

Depending on the risk level recorded above the following questions must also be addressed to determine what action is appropriate in each case:
What controls currently exist? (legislation, standards and guidance - General Product Safety Regulations 1994 CPA);
Have preferred methods of control been adopted by the company? (based on the hierarchical list - elimination, reduction, isolation, control, adaptation)
• Do these controls reduce risks to a tolerable level?
• Do they achieve effective risk/cost optimisation?
• Are they adapted where necessary to individual needs?
• Do they incorporate sufficient 'defence in depth'?
• Do they address foreseeable misuse conditions adequately?
If not, what more needs to be done? (Is there a gap between existing measures and 'reasonably practicable methods of control'?)
Have additional risk control needs been properly prioritised? (Resources for additional risk control allocated rationally and within proper timescales?)
Will control measures continue to be effective? (e.g. are appropriate people and procedures available to maintain necessary levels of control?)
Are there opportunities for review and improvement? (For example, feeding back lessons from experience, complaints, market information etc.)
Has the company taken all reasonable steps and exercised all due diligence to avoid committing an offence [s.39(1) CPA]

Risk level	Action
Trivial	No action necessary
Low	Reduce risk where possible
Moderate	Reduce risk to ALARP
High	Reduce risk as soon as possible
Intolerable	Immediate steps to reduce risk

Appendix 15: CoPRA – A Worked Example

Consumer Product Risk Assessment (CoPRA)

Estimating the level of risk presented by a consumer product

Client: Trading Standards Officer

Product: Christmas World Table Decoration
Seal No. BO1072

1. Description of product, noting its intended use and reasonably foreseeable conditions of use and possible misuse.

The Christmas World table decoration [identified as Artikel NR 15355 Sample B 01072] illustrated above, is approximately 200mm tall and consists of a wooden arch supported on a wooden base on which sit four small candle holders. A wooden disc supporting several small animal and human figures rotates around a vertical metal rod surmounted by a wooden top piece into which 8 paddle-shaped blades are fitted. The blades are turned through approximately 25 degrees from the horizontal to facilitate rotation in the rising airflow.

Four red candles approximately 55mm tall by 15mm diameter, not provided with the product but supplied by the client were secured firmly in the holders and lit. The maximum flame height was approximately 40mm and the gap between the top of the flame and the wooden blades was approximately 90mm.

As the candles burned the gap between the flame and the underside of the blades increased but the surface of the blades were found to be warm to the touch. One of the figures on the turntable became dislodged and was secured by means of some adhesive material.

During this period of three minutes, the candles were kept lit, contrary to the instructions but considered to be a foreseeable condition of use, and it was noted that two of the blades showed signs of charring before the turntable started to turn again under the influence of the rising warmer air.

Warnings were provided on the packaging and with the product:

a. Every burning candle is a fire and has to be watched.
b. Never put burning candles too close together and never arrange them on top of each other.
c. To avoid drip and smoke, avoid slant and draught in general and cut the wick eventually [sic].
d. Do not damage the burning bowl and keep it always clean.
e. It is important to blaw [sic] out the candles immediately when the pyramid stops turning.
f. Adjust the paddles to an angle of 25 degrees.
g. Never leave a burning candle unattended.

The warnings identify the main hazard, that of uncontrolled burning. Any naked flame has the potential to cause a fire when flammable materials are nearby. Constant supervision would be needed to prevent such an event and enable prompt action to be taken if inadvertent contact is made with the flames.

Foreseeable misuse

Use of candles smaller than required to provide a secure fitting with the result that one or more may be dislodged thus increasing the likelihood of the flame making contact with adjacent flammable materials.
Leaving the decoration unattended during which time ignition of materials could occur.
Access to children who may be attracted by the flames and introduce flammable materials that could ignite.

2. List all significant hazards (physical, chemical, biological etc.) that may give rise to harm and how (e.g. choking on small parts; cutting on sharp edges; poisoning from toxic substances).

Flammability – the potential to cause uncontrolled burning.
Toxic painted surfaces – causing poisoning in children mouthing the figurines.
Small (detachable) parts – resulting in the choking of small children.

3. Identify all those who could be harmed (those normally and inadvertently exposed, particularly children)
Occupants of the property where the product is used including children, visitors and neighbours who could be affected by a fire should ignition occur.
4. Assess how serious the harms could be (range of likely consequences, from superficial abrasion to lack of oxygen supply by choking using AIS) – Score 1 to 5.
Flammability – Life threatening - Score 5 Toxicity - Major - Score 4 Choking – Life threatening - Score 5
5. Estimate how likely such harms could occur (e.g. HASS data, number of units supplied, frequency of use and warnings) – Score 1 to 5
Flammability considerations: Candle fires have increased in recent years (2,269 candles and naked flames 1999)[16] Limited use of product – around the Christmas period only Warnings provided with the product (see 1 above) Likelihood – remote – Score 2
Toxicity considerations: Toxicity of coatings not checked Only small surface area with limited amount of paint Child would have to remove pieces and mouth them Likelihood – improbable – Score 1
Choking considerations: Figurines are not securely fixed to base and could be removed by children The product is attractive to children and small parts present a choking hazard Likelihood – remote – Score 2

[16] Sources of ignition in accidental dwelling fires, Home Office 2000

6. Risk level - Combine scores from 4 and 5 to estimate (1 to 25)

Flammability:
Risk level: 2 x 5 = 10
Risk is classed as high

Toxicity:
Risk level: 1 x 4 = 4
Risk is classed as moderate

Choking:
Risk level: 2 x 5 = 10
Risk is classed as high

7. Action

The flammability and small parts hazards should be reduced as soon as possible.
Discontinue further sales and warn users of the fire hazard and risk of choking.
Supply appropriately sized candles with the product to ensure secure fitting.
Improve warnings, bold precise and compelling using simple words and phrases.
Ensure figurines are securely fixed and coatings are non-toxic.

8. Opinion

The assessed risk is high. Action needs to be taken to reduce it to an acceptable level.

Increasing numbers of fires with candles is noted and particular care must be taken.

Improving the warnings and providing correctly sized candles would in my opinion justify the continued sale of this product.

The product can then be used safely provided care is taken when setting it up and supervising it, ensuring children in particular are not allowed to play with it.

In its present condition I consider the Christmas World Table Decoration is not a safe product and fails the level of safety required under the General Product Safety Regulations 1994.