Chemical Hazards and Poisons Report

From the Chemical Hazards and Poisons Division

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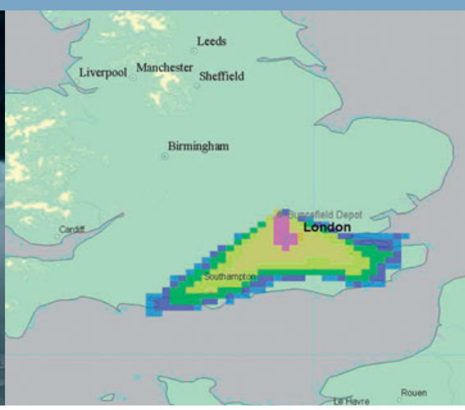

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Editorial

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Editor Chemical Hazards and Poisons Report

This Chemical Hazards and Poisons Report considers four incident response areas:

- The Buncefield explosions and fire that started on 11th December 2005, unsurprisingly from the enormous scale of the event, is of continuing interest and concern. The Buncefield fire summary provides an overview of the event. A second article summarises the work undertaken by the Health Protection Agency in conjunction with the Met Office.

- Industrial fires continue to cause concern. Two relatively small-scale events are reported. One of the areas of unease remains the management of asbestos when environmental contamination may have occurred from such a fire. A review of legislation relating to this occupational and environmental area is included along with a paper addressing environmental exposure to asbestos and the risk of mesothelioma.

- Many lessons have already been identified from the London Bombings of July 7th 2005. Two papers discuss the bombing events: one examines the psychological reactions to these events and the other is concerned with the environmental sampling and analysis on the London Underground. The second paper also points to some of the lessons identified for major incident reponse.

- Emergency Departments are potentially vulnerable to patients presenting directly without warning following exposure to chemical incidents. This study summarises a three month review of chemical incidents identified in a single Emergency Department of a London Teaching Hospital.

Emergency preparedness issues are again identified as important. Articles cover topics including the management and co-ordination of major incidents, the ability of emergency physicians to recognise victims of a bio-chemical attack and the new Government Decontamination Service. A US study on cross-national research on multi-agency co-ordination points to international lessons identified.

Significant developments at the Chemical Hazards and Poisons Division are reported. The Department of Health's Air Pollution and Noise Unit has transferred to the Chemical Hazards and Poisons Division and some of the work recently undertaken by the Committee on the Medical Effects of Air Pollutants (COMEAP) is also reported.

A series of conference reports are included. Of particular note are the reports on the WHO workshop on protecting children from established and uncertain chemical threats: tools and mechanisms for information towards prevention 2005, the Dioxin 2005 report and the Water contamination events: communicating with consumers 2006.

Education and training remains high on our list of priorities. A review of HazMat training for emergency departments is included. A report on the Hanover Command Band exercises is given that summarises how multi-agency learning can be considered in an exercise environment

The next issue of the Chemical Hazards and Poisons Report is planned for September 2006. The deadline for submissions for this issue is August 25th 2006. Please do not hesitate to contact me about any papers you may wish to submit by e-mail on Virginia.Murray@hpa.org.uk or call me on 0207 759 2873.

I am very grateful to Professor Gary Coleman for his support in preparing this issue. I thank Dr James Wilson and Dr Charlotte Aus who are our associate editors to the Chemical Hazards and Poisons Report for all their help in preparing this issue.

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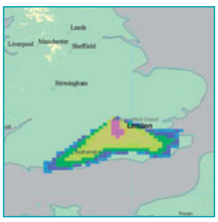

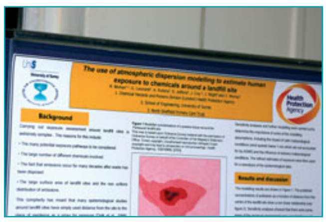

Incident Response: Buncefield Fire

Buncefield Fire Summary

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Abstract

On Sunday, 11th of December at 0600 hours, a series of explosions started the largest fire in Europe for the past five decades. The fire was ongoing for four days, causing a black plume of smoke that covered tens of kilometres and would be seen on satellite images, heading southeast over London and ultimately towards France and Portugal. The fire destroyed the Buncefield oil depot, forced thousands of residents from their homes and shut parts of the M1 motorway for approximately 12 hours. This paper aims to summarise the acute event, the input of CHaPD, London to the management of this event, and ongoing issues.

Background

Buncefield, the fifth largest oil tank farm in the UK, is one of approximately 1,200 Control of Major Accident Hazards (COMAH)[1] sites, that have the potential to cause major accidents because they use, or store, significant quantities of dangerous substances, such as oil products, natural gas, chemicals or explosives[2]. The tank farm provided more than 25 holding tanks for petroleum distillates and related material, such as aviation fuel, for supply to the international airport Heathrow, as well as storing petrol, diesel and kerosene for use in transport, industrial and domestic purposes. Four major pipelines carried fuel into the Buncefield site. In 2002, it was reported that 2.37 million tonnes of fuel passed through the depot. The safety record at Buncefield and the 50 other major oil and fuel storage depots in the UK is good, according to the Health and Safety Executive[3].

Event

On Day 1 (11.12.05) at 0600 hours the first of a series of explosions began, that resulted in a huge fire producing a massive smoke plume that could clearly be seen covering London and the South East of England. The explosions were felt in the local area, causing widespread structural damage to both commercial and residential buildings, and were reported to have been heard as far way as the Netherlands. A major incident was declared at 0608 hours and command and control set up near the site (operational) within minutes, with strategic command in place at the Hertfordshire Police Headquarters by 0900 hours. A decision was made at 0900 hours to evacuate those with damaged homes and workplaces, and to tell everyone under the plume to shelter, 'go in, stay in, tune in'. Strategic command continued until 1830 hours on Day 4 (14.12.05). There was extensive media news coverage locally, nationally and internationally.

The oil tanks were thought to be burning at temperatures exceeding 1,000°C. Expert assessment considered that such a hot fire would cause complete combustion of the hydrocarbon fuel, and that the toxic products within the plume were likely to be limited to black carbon, carbon monoxide and carbon dioxide. However, it was considered important to verify this, as there was some concern regarding protecting public health and risks to occupational exposure and some adverse health effects reported by police at the front line. During the following 48 hours or so further explosions occurred and the fire continued until it was finally under control by the evening of Day 4 (14.12.05). The supply pipelines were all immediately shut down after the initial explosion.

According to the Met Office, the intensity (heat) of the fires on 11 December, combined with very light winds and a high pressure system, caused the plume to "punch a hole" in the inversion layer that carried much of the pollution about 2,750 metres above the ground leading to it covering a wide area that stretched from East Anglia to Salisbury Plain, in Wiltshire.

More than 650 firefighters from 32 brigades were involved in tackling 22 burning tanks of diesel, kerosene and aviation fuel. The last burning fuel tank was finally extinguished on Day 4 following 59 hours of fire fighting. An initial decision at Gold command revolved around whether the fire should be allowed to burn itself out, or firefighting should be used to extinguish the fire, as both decisions had potential adverse environmental and health consequences that needed to be considered. The key concerns were if the fire were allowed to burn what would happen to the plume, and if the fire was extinguished would all the firefighting foam and hydrocarbons from the site remain contained within the site. The decision was made to actively fight the fire. Firefighting involved using foam cannons to spray firefighting foams to smother the flames and to prevent reignition.

The firefighting foams used were both perfluorooctane sulfonate (PFOS)-containing and non-PFOS based fluorosurfactants (based on perfluoroalkylated substance (PFAS)-compounds (telomers) with a shorter chain length for which perfluorooctanoic acid (PFOA) is a common contaminant. PFOS and PFOA are chemicals of concern because of their persistant, bioaccumulative and toxic (PBT) characteristics. They are used in a number of products, because of their special chemical properties e.g. ability to repel both water and oil[4]. There was a recent consultation by Defra concerning restricting the use and supply of PFOS.
http://www.defra.gov.uk/corporate/consult/pfos/

Modelling & monitoring

Details of the plume direction and spread were obtained through visual observations, satellite images from the Met Office, and regular results of various atmospheric dispersion models: CHEMET, NAME (Numerical Atmospheric dispersion Modelling Environment) and ADMS (Atmospheric Dispersion Modelling System) that were regularly reported to Gold command.

A cold front stretching across the region brought in some rain and was thought to bring some pollutants from the fires down to ground level. However, this was not confirmed by air monitoring. Air quality monitoring both around the site and through out the south east of England was conducted and collected by a number of agencies, including local authorities, the Health and Safety Laboratories, Bureau Veritas, NETCEN and the Environmental Research Group (ERG) at Kings College London. This information was used in conjunction with the modelling information for risk assessment and was reported regularly to Gold command. Soil and grass samples were collected and analysed to reinforce the air quality data by determining whether any chemicals from the smoke had grounded.

Health effects

Although the plume was not known to have grounded, there was concern about the potential for such a large incident to cause adverse health effects in both occupational groups and in members of the public. In particular, there was concern about the potential effects of exposure to particulate matter causing cardiac or respiratory effects. Due to concerns about the plume grounding, a decision was made at Gold to close local schools from Monday until Wednesday for ten miles around the site.

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Modelling the plume from the Buncefield Oil Depot fire

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The incident

An explosion occurred at the Buncefield oil depot in Hemel Hempstead, Hertfordshire, UK (51.76N 0.429W) just after 6am on Sunday 11th December 2005. The explosion was heard over a wide area and it is thought to have been caused by a leak from a petrol storage tank. The subsequent blaze is the largest industrial fire in Europe that has been seen to date and, at the height of the blaze, 20 tanks, each reported to hold up to 3 million gallons of refined fuel, were on fire. During Sunday 11th December, no efforts were made to bring the main fire under control, as fire crews assessed the situation, determined the best way to tackle the blaze and assembled fire fighting equipment. On Monday 12th December 2005, serious efforts to cool and then extinguish the fire with foam and water were undertaken by the fire brigade. The fire was rapidly extinguished during Tuesday 13th and Wednesday 14th December 2005. By the morning of Thursday 15th December, only a small fire remained at the Buncefield oil plant.

Response by the Met Office

The Met Office's Environmental Monitoring and Response Centre (EMARC) provides an emergency response service 24 hours a day, 7 days a week. EMARC first became aware of the incident at the Buncefield oil depot at 7:30am on Sunday 11th December and began to prepare a CHEMET forecast. CHEMET forecasts are issued at regular intervals during incidents such as this. They consist of a textual forecast including meteorological and other relevant information together with an "area at risk" map based on observations or estimates of near surface winds and atmospheric stability. During the incident, EMARC provided advice and responded to enquiries including issuing CHEMETs and output from the Met Office's atmospheric dispersion model (NAME) predicting the spread of the smoke plume, providing weather forecasts, satellite pictures and collating observations. The Met Office's Atmospheric Dispersion Group were also involved in more extensive modelling of the plume using NAME and the Observations Based Research section took gas and aerosol measurements from within the plume using the FAAM (Facility for Airborne Atmospheric Measurements) BAe146-301 aircraft during Monday 12th and Tuesday 13th December.

NAME modelling of the Buncefield smoke plume

NAME (Numerical Atmospheric dispersion Modelling Environment, Jones et al., 2006) is a complex three-dimensional atmospheric dispersion model which is run operationally within EMARC. The emission of pollutant is simulated by releasing large numbers of model particles into the model atmosphere. The pollutant is advected by the mean three-dimensional wind with turbulent dispersion simulated by random walk techniques. The mass of the pollutant is reduced over time by wet and dry deposition processes, sedimentation, radioactive decay and chemical transformations, as appropriate. In this study, NAME was run using three dimensional meteorological data from the Met Office's numerical weather prediction model (the Unified Model). The mesoscale version of the Unified Model was used which covers an area of the UK and north-west Europe with a temporal resolution of one hour and a horizontal resolution of 12 km.

The precise nature of the release was initially unknown and there is still some uncertainty associated with the source details (e.g. emission rate, species, emission temperature, etc.). Initial NAME modelling assumed an arbitrary unit release rate of a tracer. The initial predicted concentrations were not expected, therefore, to be representative of actual concentrations within the plume but the results are useful in predicting the geographical spread of the plume. The smoke plume was highly buoyant due to the heat of the fire and was reported to be rising vertically upwards to a significant height where it became trapped aloft preventing most material from coming back down to ground. Estimates of the plume height were required for accurate modelling of the plume. The plume was clearly visible on satellite imagery (see for example Figure 1) and particular weather conditions on Sunday 11th December enabled the plume height to be estimated from comparisons of model predictions with satellite imagery.

During the incident high pressure dominated the weather over the south of the UK and the atmosphere was, in general, stable suppressing vertical mixing. On Sunday 11th December, there were significant levels of vertical wind shear with a north-westerly wind at lower levels, transporting the plume south-eastwards, and a north-easterly wind at higher levels, transporting the plume south-westwards. The resulting plume captured on satellite imagery had a fan-like appearance (Figure 1). Comparisons of NAME model predictions with satellite imagery (see Figures 1 and 2) suggested that the plume reached a height of 3000 m. This was verified by a report from a commercial airline shortly after 10am on Sunday 11th December, indicating that the plume was rising to a height of 9,000 ft.

Throughout the incident, NAME modelling of the plume was refined to incorporate additional information as and when it became available. Emission rates calculated from estimates of the amount of fuel on site were used to give more realistic in-plume concentrations. Observations from within the plume taken by the Facility for Airborne Atmospheric Measurements (FAAM) BAe146-301 aircraft, operated jointly by the Met Office and NERC, on Wednesday 13th December provided crucial information on the constituents and concentrations within the plume and the location and height of the plume.

Conclusions

The Met Office played a key role during the incident by providing advice and information throughout in a timely fashion. In this incident, the specific meteorological conditions on Sunday 11th December dictated that three dimensional modelling of the plume, such as that undertaken using NAME, was necessary to capture the full transport of the plume. Simpler dispersion models based solely on near surface meteorological information were unable to correctly predict the upper level transport of the plume. Additional work is being undertaken to further our understanding of modelling highly buoyant plumes from large uncontrolled fires.

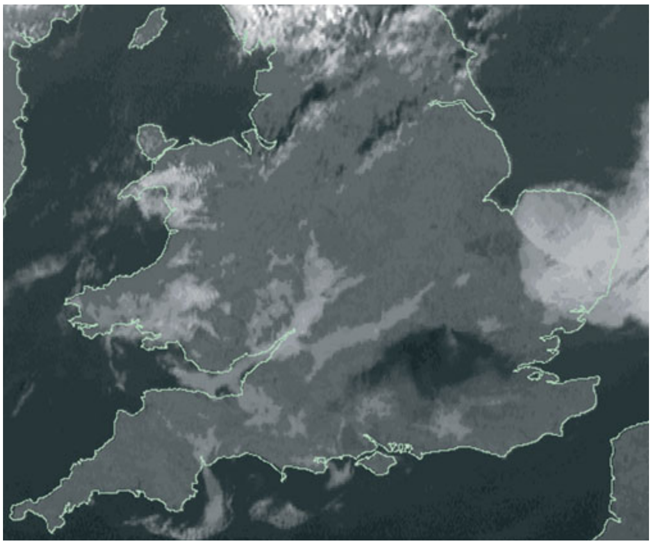

Figure 1: Visible satellite image at 12 noon on Sunday 11th December © Copyright EUMETSAT/Met Office

Reference

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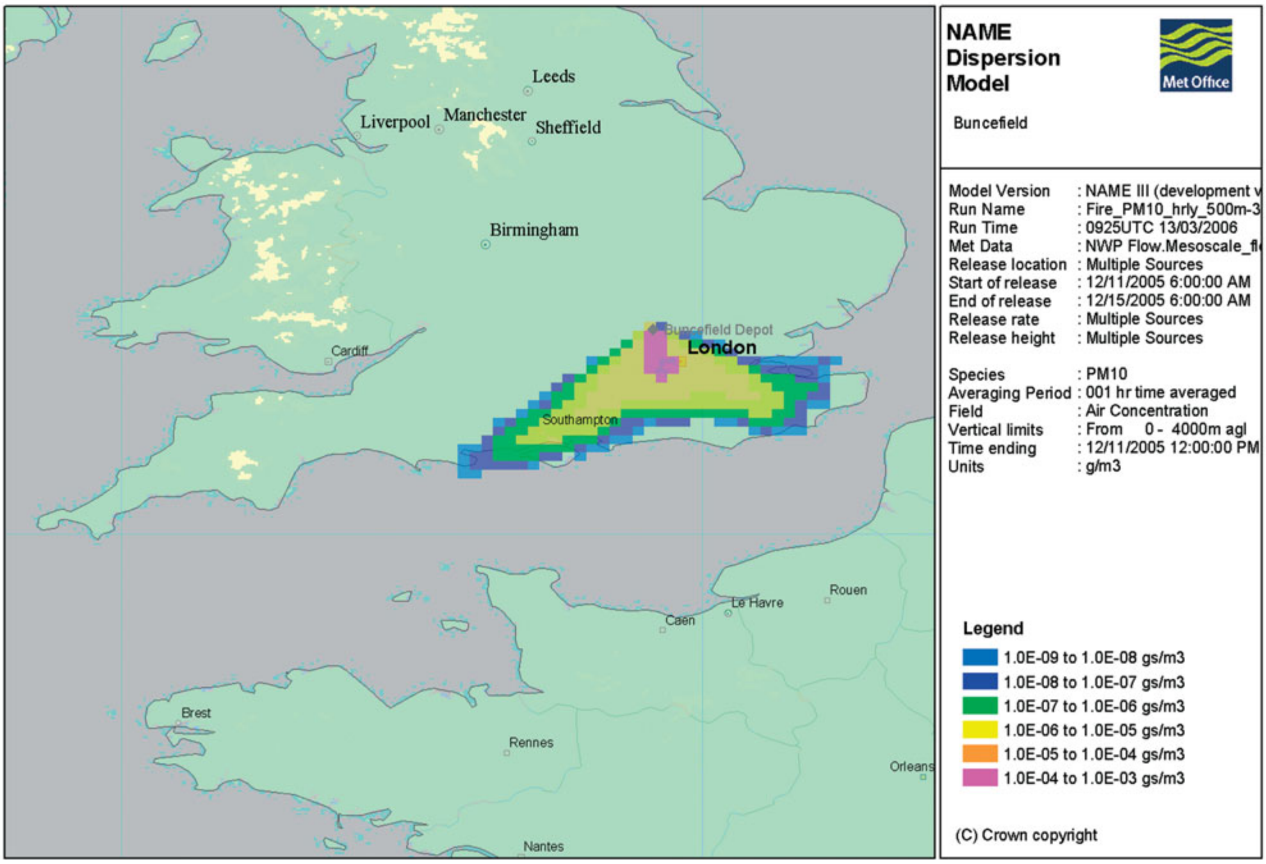

Figure 2: NAME modelled plume at 12 noon on Sunday 11th December 2005

Incident Report: Industrial Fires

Fire in a tyre depot in Barking, NE London

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Introduction

Fires in tyre depots and landfill sites are of a particular concern to the front line emergency services and the staff of Health Protection Agency as they can burn for long periods and provide a host of noxious and dangerous chemicals in their smoke. Here we would like to report a fire in a tyre refitting workshop which bordered residential areas and highlight some of the problems that were encountered.

Incident Summary

On Saturday 12th November 2005, at around 1 AM, a fire started in a tyre refitting depot in Barking, NE London. A total of 15 fire vehicles were at the site. The fire was reported by the London Health Emergency Planning Adviser (HEPA) to the on-call HPU team for NE London area at around 2:15 AM. Simultaneously, CHaPD was also informed by the HEPA. The tyre depot is situated in a light industrial estate with the refitting yard adjacent to a number of houses on its eastern border. The site has a major dual carriage way present on its northern border which is in turn bordered by another housing estate. In addition, within the refitting yard a number of gas cylinders (contents unknown) were observed. It was also reported that a fireworks warehouse was present on the same industrial estate.

At 2:15 AM, the fire brigade commander at Silver command in conjunction with the police commander on site decided to evacuate the people in the street adjacent to the tyre depot. This decision was not due to potential harm of inhaling the smoke, but due to the risk of fire spreading from the yard. The local authority along with the local A&E departments and the PCT director on call were all informed of the situation and a nearby community centre was opened by 3:00 AM. Approximately 30 residents, many of which were elderly, made their way to the community centre.

By 5 AM, local HPU and CHaPD staff were on site to assess potential risk of smoke to the residents and provide health input at Silver command level. Local NHS Direct were informed of the fire and were asked to keep a log of all calls relating to it. By this time the fire was under control. CHEMET report showed that the plume will be moving in a North Easterly fashion. In addition to the above organisations, the Environment Agency was also on-site to evaluate the risk of run off from the site into the local water course.

A Silver command meeting was held at 7:30 AM and it was decided that as the fire was under control, environmental sampling should be undertaken and if the results were satisfactory, local residents should be allowed to reoccupy their properties with the advice that they should stay in their houses and keep all windows and doors closed.

Fire brigade scientific advisers attended the scene and sampled the air in the evacuated residential street. The monitoring showed the following:

Hydrogen sulphide:	<1ppm (8 hour occupational exposure standard is 5ppm)
Sulphur dioxide:	<1ppm (8 hour occupational exposure standard is 2ppm)
Acid gas vapour (HCL):	none detected
Hydrocarbon vapour:	Peak of 20 ppm
Carbon monoxide:	around 10 ppm (8 hour occupational exposure standard is 30ppm)

Based on these results it was agreed to allow the residents back in. The fire brigade remained on site until the afternoon of 13th November to ensure that there were no deep seated residual fires. It was estimated that between 6-8000 tyres burnt during the fire and the sheltering advice for residents was lifted on the morning of the 13th. Enquiries made to the local A&E showed no admission as a result of the fire or the related smoke. There had been no request for help from NHS Direct either.

Residents' meeting

On 1st December 2005, London borough of Barking and Dagenham held a residents' meeting to discuss issues about the fire and the evacuation. In attendance were the local authority emergency planning officer, representatives of the welfare department, police and HPU. This was to identify issues of concern and provide lessons identified.

Lessons Identified

In large fires involving industrial units near residential areas, it is important for the health lead to be present on site. This will help with risk assessment and provision of appropriate timely advice for the emergency services.

During evacuation, it is important to ensure that all relevant services on the ground are aware of the situation. In this case, officers involved in the evacuation were not aware of the location of the community centre, there was no transport available to ferry people to the centre and the residents had to wait outside for an hour before it was opened.

For the residents, the clean-up process after the fire is just as important. One of the major concerns for the residents was the layer of soot covering the nearby streets.

If there is a residents' meeting, it is important that representatives from the local PCT or HPU attend to provide accurate and unbiased information about the potential health effects of the exposure to smoke.

Industrial Fires: What are we missing?

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Introduction

Industrial fires represent a valuable opportunity for local health protection units and the local authority to be jointly involved in minimising the risk to the health of local populations. In order to do this effectively, robust risk assessment needs to be undertaken with the support of multi-agency teams.

A recent incident in Wembley, London has served to highlight the value of a multi-agency team approach and some of the practicalities that require further examination.

Background

A fire occurred in November 2005 in a Chinese food warehouse on an industrial estate. The contents of the warehouse were principally food, oils and plastics. The fire started in the early hours of the morning and was complicated by two gas mains rupturing, which required TRANSCO to control the source. A multi-agency site visit was convened at 10.30am, triggered by the scale of the incident which required eight fire pumps on site. The presence of asbestos cement roofing further added to its potential risk.

Warehouse Fire © CHAPD London, 2005

Findings of the site visit.

The site visit included representatives from the local authority (LA), the local Health Protection Unit (HPU) and the Chemical Hazards and Poisons Division (CHaPD) with the co-operation and the support of the attending fire brigade.

At the time of the site visit, the fire was still burning, but under control, with several fire pumps still in attendance. The site itself was approximately 10,000m^2 and in close proximity to residential houses about 150-200m away. A visual assessment was congruent with a previously issued CHEMET that the plume was drifting in a north-easterly direction towards these houses. Having ascertained that the warehouse did not contain any significantly hazardous chemicals, attention turned to the substantial damage to the roof which was known to contain asbestos cement. The Fire Brigade did not use any additional personal protective equipment for asbestos.

Inspection of surrounding residential properties revealed a layer of fine ash not only on adjacent pavements but also on residents' cars and property. Local weather conditions were cloudy, damp and with a relatively mild surface wind speed.

Immediate Management

The prompt action of the emergency services had led to the recommendation to local residents to shelter and not evacuate. From a wider public health perspective, the presence of fine ash was of concern and it was therefore agreed that the LA would engage independent contractors to sample the dust to confirm or refute the presence of asbestos so that an informed decision over any environmental clean-up could be made.

White asbestos was confirmed in the sampling analysis in the late afternoon. The HPU and the LA had joint discussions to agree an action plan for the asbestos clean-up and to draft written advice to local residents. This was issued to local residents overnight.

Environmental Clean-up

The contaminated area was judged to cover several adjoining streets (in close proximity to one primary school). The main issues arising from the incident management meeting were identified as:

- Organising contractors to undertake the clean-up in a timely and appropriate manner
- Advising local residents regarding the nature of the clean up procedure and their own part in it
- Offering reassurance over possible health effects

The clean-up itself, using local authority contractors, took place early the following morning and was influenced by the damp weather conditions, a decision by the blue light services not to evacuate the public from the affected area and specialist contractor availability.

Discussion

The role of public health in assessing health impacts from fires is an evolving area within the new structures of the Health Protection Agency.

There are over 500,000 fires/year within the UK[(1)] and it is therefore important for local Health Protection Units to assess and advise on health protection measures if needed. Criteria for triggering public health involvement have been published previously and include[1]:

- Size of the fire
- Issuance of a CHEMET
- Presence of toxic chemicals
- Susceptible populations at risk
- Incidents where evacuation has been considered
- Presence of significant numbers of casualties
- Possibility of environmental contamination
- Need for environmental sampling

Although the above list is not meant to be prescriptive, it does serve as both a useful reminder of possible trigger criteria to assist public health input into such incidents.

In this case the primary triggers for the notification of public health was the scale of the incident, the number of fire appliances in attendance and information about the potential hazard of asbestos roofing. The value of attendance at the scene was reflected in the environmental contamination that was subsequently detected. Although the risk to human health of intact asbestos cement is deemed by the HSE to be low[2], this is not necessarily the case in a fire situation. In these circumstances temperatures can become very high, which can cause the cement to explode and fracture, releasing the asbestos fibres which are dispersed in the environment because of the heat and the buoyancy of the fibres.

Shared multi-agency guidance that achieves consistency in the decisions about the extent of health risk, clean up of public and private land would help at future incidents. This guidance should be consistent with the evacuation decisions of the blue light services, which should in turn be consistent with HPA guidance on when to shelter or evacuate (http://www.hpa.org.uk/chemicals/checklists/shelterorevacuation.pdf) which is discussed in a paper by Kinra et al [3,4].

Sampling, analysis and clean-up was conducted only in the streets in close proximity to the fire. Consideration might be given to methods for determining the wider area affected by the fallout of air pollutants and potential impact on the community. Multiple studies have indicated that asbestos is a non-threshold substance. It is therefore important to ensure that any exposure is reduced to as low levels as practically possible.[5,6] The potential health risks from exposure to asbestos cannot be ignored and need to be managed: to do this effectively there needs to be clarity around responsibility for identification and analysis of potential contaminants, consistency around the use of PPE by contractors in areas from which the public have not been evacuated and for the subsequent clean-up if this is needed.

Conclusions

This report underlines the importance of incidents of significant fire incidents being reported to local Health Protection Units. It also emphasises the important role that CHaPD has in providing expert advice on management and clean-up of hazardous materials which carry risks to human health. Appreciation is required of the longer-term environmental hazards which may ensue following fires and of the multi-agency collaborative effort needed to mitigate and prevent harm to human health after such events.

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Warehouse Fire © CHAPD, 2006

Asbestos - Occupation and Environmental legislation an overview in relation to acute exposures.

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Asbestos is a term given to a group of naturally occurring fibrous silicate minerals. Man has mined these minerals to exploit the unique properties that these fibrous minerals possess, i.e. low thermal conductivity, high strength, resistance to chemical attack and good insulation for both heat and sound. Asbestos containing materials (ACMs) are found in a vast array of buildings products and consequently locations in the built environment, even today long after the use of ACMs in the UK ceased.

Asbestos is a problem because of the very properties that man has exploited it for, as mentioned previously it is also persistent in the environment. The fibres released by the disturbance of asbestos are very fine and can be easily inhaled when they become airborne. The inhalation of asbestos fibres leads to diseases such as asbestosis, lung cancer and mesothelioma (Doll & Peto 1985). These diseases have a long latent period between exposure to asbestos and onset. It is for this reason that the regulations controlling the use of asbestos require all commercial properties to maintain a register of the location of all ACMs so that exposures can be prevented during maintenance and repairs. The register also proves valuable for knowing whether ACMs have been involved in an acute incident and aids the subsequent management of any potential exposures.

Legislation relating to occupational exposure

Historical Legislation

The Asbestos Industry Regulations implemented in 1931 were the first Regulations governing the asbestos industry. This essentially required ventilation and cleanliness of premises and allowed for asbestos injury sufferers to first claim compensation. Since then there have been many iterations of the legislation governing the occupational exposure to asbestos fibres. The introduction of the Asbestos Regulations (1969), applied to all workplaces where asbestos was likely to be used. These Regulations repealed the Control of Asbestos at Work Regulations (1987) (CAWR), the first Regulations to apply to any work in which asbestos may be encountered. CAWR (1987) also implemented two European Union Directives, relating to the protection of workers from the effects of asbestos at work and to the labelling of asbestos containing products. The Asbestos (Prohibitions) Regulations (1985 and 1988) included amendments to ban paints and coatings containing asbestos. The next major change to the Regulations was the Control of Asbestos at Work (Amendment) Regulations (1992), requiring plans for working with asbestos and where practicable substitution of ACMs. The Asbestos (Prohibition) Regulations were also amended in 1992, replacing the 1985 and 1988 Regulations, they banned the use of all amphibole asbestos types (brown, blue) and eleven different uses of chrysotile (white) asbestos. They also ban the importation, supply and use of in the UK of chrysotile and all ACMs containing chrysotile, except for certain uses where no suitable alternative is available, for example in gloves for use in the glass industry.

Current Legislation

The main regulations currently controlling work with, and exposure to, asbestos are the Control of Asbestos at Work Regulations 2002 (CAWR), the CAWR (2002) impose many new duties upon property managers and employers (known as duty holders) to manage asbestos within non-domestic buildings and sets out seventeen separate duties that must be undertaken. The most relevant in terms of public health and acute incidents is the duty to have an up-to-date register of all ACMs on commercial/ public premises and have arrangements to deal with accidents, incidents and emergencies so that, should the fire service attend a site, they could identify immediately the locations of ACMs. The CAWR (2002) are supported by three Approved Codes of Practice (ACOPs) that provide guidance for the management of ACMs and to those working with ACMs.

The regulations controlling asbestos have developed over the last 70 years as research has progressed and demonstrated with more certainty that asbestos fibres can cause fatal diseases. The regulations cover all aspects of work involving asbestos from controlling exposure during the manufacture of asbestos products; to those working with asbestos products; through to protecting employees in any workplace or non domestic premises (e.g. school or hospital) where asbestos may be encountered. This has been coupled with the banning of the import of raw blue and brown asbestos and products containing these asbestos types.

The HSE monitor the number of asbestos-related diseases that occur annually and also produce forecasts of the number of expected cases as a result of historical occupational exposure in the building trades (HSE 2006). The number of mesothelioma cases is predicted to peak between 2011 – 2015, due largely to occupational exposures within the building industry. The number of cases of asbestos-related lung cancer however is very difficult to predict due to the synergistic effects of tobacco smoking, although the latest predictions estimate approximately one death from asbestos-related lung cancer per mesothelioma death (HSE 2006).

Environmental Exposure

Environmental exposure to asbestos more commonly occurs following an accidental release, e.g. following a fire (Figure 1). Exposure of bystanders and residents to asbestos fibres during acute incidents such as fires is considered to be relatively low and this is supported by the literature available on the subject (Bridgman 1999, 2000, 2001). For example, it is commonplace for barn fires to involve asbestos, however, as such barns are more often located in sparsely populated areas, the risk is often considered to be low. In larger fires involving industrial and commercial premises the risk of exposure is slightly increased, but the standard message of: 'go in, stay in, tune in' minimises the risk of exposure during the acute phase. The risk of exposure will be higher after the acute phase when residents can come out of their homes and may come into contact with asbestos containing debris from the fire. It is important to provide as much information as possible about what to do if they come across debris on their property and how the authorities intend to facilitate the decontamination.

The HSE guidance sets exposure limits and approved methods of cleaning up asbestos containing contamination following incidents. Of particular relevance are the recently published new guidance documents HSG248 Asbestos: The analyst's guide for sampling, analysis and clearance procedures and HSG247 Asbestos: The licensed contractor's guide clearance procedures. HSG248 stipulates the relevant exposure standards and analytical techniques for asbestos monitoring and HSG247 provides detailed guidance on the methods to be used for the safe removal of ACMs. Both of these guides replace a large number of individual guidance documents and combine them into comprehensive volumes for the asbestos remover and analyst. It is these guides that are of relevance to public health as they contain details of how asbestos should be removed or, in the case of an acute release, cleaned-up.

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Figure 1: Fire at a commercial property involving asbestos. © HPA, 2003

Environmental exposure to asbestos and risk of mesothelioma.

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The association between occupational exposure to asbestos and the risk of mesothelioma is well documented in the literature[1,2]. However, the effect of environmental exposure to asbestos has been less well researched and remains controversial.

Asbestos exists in the environment, both as a natural or manufactured form. Natural asbestos can be released in the environment from the erosion and weathering of asbestos-containing rock. Asbestos has also been widely used in many industries. Exposure can occur, as a result, as part of the maintenance, removal or aging of asbestos cement, roofing and other surface materials used in the building industry. Environmental exposure to asbestos can also be the result from acute incidents such as fires in buildings containing various forms of asbestos that are disturbed to release fibres to the environment in the plume[3,4].

As a result of the perceived risk of the effects of asbestos, exposure to asbestos in the environment can result in considerable anxiety in members of the public and can leave agencies involved with uncertainty about the best management of such incidents[5]. Equally, it could also lead to considerable amount of time and resources spent by both Health Protection Units (HPUs) and the Chemical Hazards and Poisons Division when dealing with incidents of environmental contamination with asbestos.

With this in mind, a search of the published literature was conducted to ascertain any literature reviews or meta-analysis that investigated the relationship of environmental exposure to asbestos and the risk of cancer. The aim was to determine whether a link exists and whether there is a "dose threshold". One literature review and meta-analysis was identified (Bourdès et al. (2000), which is reviewed and summarised here[6].

Summary of the findings

The authors searched Medline from 1966 to 1998 and identified 8 case-control, cohort and ecological studies that assessed the risk of either pleural or mesenteric mesothelioma. Only two of these studies looked at peritoneal mesothelioma but the overall number of cases was low (10 cases in total with a mixture of household and neighborhood exposure) so consequently, a quantitative analysis could not be done. Eight studies provided results on pleural mesothelioma and were included in a meta-analysis

Bourdès et al looked at the association between asbestos and mesothelioma both after household and neighborhood exposure. Five studies reported on household exposure (1 with exposure to chrysotile, 1 amphibole, 3 mixed/unspecified) and their combined relative risk is 8.1 (95% CI, 5.3-12). In addition, 6 studies investigated the link with neighborhood exposure (2 with exposure to chrysotile, 1 amphibole, 3 mixed/ unspecified); their combined relative risk is 7.0 (95% CI, 4.7-11). Although the relative risk of pleural mesothelioma is increased for amphibole and chrysotile, it is only statistically significant for amphiboles, both for household and neighborhood exposure.

Unfortunately, unlike in the occupational setting it is impossible to calculate a dose-effect in this type of environmental setting, mainly because of the difficulty of estimating the average individual level of exposure over time, as most of the studies do not report on this.

Methodological issues

When reviewing the literature, there is great potential to introduce bias and erroneously arrive at an over-estimate of the effect of the association between environmental asbestos and mesothelioma. This review identified both exposures to natural and mining sources of asbestos, but failed to identify studies investigating more common situations (e.g. in buildings, etc.). These latter sources produce relatively low levels of exposure, and as a result the meta-analysis could lead to an over-estimate of the effect.

To minimise the possibility of bias that could be introduced by missing out on published studies not indexed in Medline, the authors sourced references in various ways. Publication bias can also occur if small studies, particularly with a negative finding, have not been published. The authors calculated a funnel plot to exclude this type of bias. This is an acceptable technique to visually inspect for gaps in the published literature. This plot did not suggest that any negative studies were missing.

What does this mean?

Environmental asbestos in communities or households where there is a prolonged exposure appears to be associated with an increase incidence of pleural mesothelioma. Although this meta-analysis could not investigate dose-effect for environmental exposure to asbestos, evidence on this can be drawn from a study in Western Australia, that looked at the incidence of mesothelioma in residents of more than one month near an asbestos industry that were not directly involved in the industry[7]. In this cohort study, the rate increased significantly with time from first exposure, duration of exposure and cumulative exposure.

This meta-analysis only included studies published until 1998. Since there have been further case-control and cohort studies that have also assessed this link. The results of these are consistent with the findings in the meta-analysis reviewed here[7,8,9].

In addition this meta-analysis does not address the issue of the risk of cancers after either an acute exposure to asbestos as a result of incidents when asbestos is released in the environment over a short period of time (e.g. a fire or an explosion), or exposure to commoner, but in a lower level, forms of environmental asbestos (e.g. building materials). Further research is required in this area. However, in view of the evidence of the association of asbestos and cancer those dealing with such incidents would probably be best to adopt a precautionary approach.

Conclusions

- Continuous, long-term exposure to asbestos in the environment could be associated with an increased incidence of pleural mesothelioma.
- Exposure to amphibole asbestos fibres poses a relatively higher risk than that associated with chrysotile.

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Incident Response: London Bombings

Psychological Reactions to the 7 July London Bombings

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Introduction

The explosions on London's public transport network on the morning of 7 July 2005 resulted in 56 fatalities and approximately 700 people attending hospital with a range of injuries. The psychiatric impact of the attacks on the direct victims and first responders is less well quantified, though the NHS Trauma Response Programme is now attempting to screen all those involved in order to identify any who might benefit from treatment for post-traumatic stress disorder, alcohol misuse, travel phobia, or any of the other well-defined psychiatric disorders that are often diagnosed following terrorist attacks.

Even in those intimately involved, however, persistent psychiatric disorders tend to be the exception rather than the rule. Less severe psychological reactions, such as distress, rumination and heightened concern for friends and relatives, are more common, even amongst members of the wider community who may not have been directly exposed to the incident, but who watched events unfold on TV, who have to use public transport every day and who have had their own sense of safety disrupted. Our research into the effects of the 7 July bombings has been to assess the extent of these commonplace psychological reactions and to identify the factors which serve to protect against them. In doing this, it is useful to categorise psychological reactions of the public according to whether they are immediate, short to medium-term, or long-term.

Immediate psychological reactions

When considering the first few minutes or hours following a terrorist attack, the psychological reaction most feared by public health officials, emergency planners and the media is public panic. Fortunately, panic is very rare[1]. Except in certain highly specific circumstances, typically associated with inadequate provision of emergency exists and an urgent need to evacuate, people who find themselves caught up in emergencies do not tend to discard their social norms or display irrational behaviours, and instead act as part of a cohesive group and remain concerned for the well-being of those around them. Even evacuations involving a high degree of distress and fear such as those in the World Trade Centre towers following the 1993 bombing or the 2001 attacks can be characterised as more orderly and efficient than many might assume[1,2]. Although interviews with those who found themselves trapped on the tube during 7 July are still ongoing[3], initial media reports suggest that the situation in London was similar: co-operative behaviours and feelings of unity between fellow passengers seem to have been much more common than any sense of panic (Box 1).

Short- and medium-term psychological reactions

In order to assess short-term psychological reactions to the bombings among the general London population, we conducted a telephone survey of a representative sample of 1,010 adult Londoners[4]. This was conducted 11-13 days after the bombings took place and was completed one day before a second, failed, wave of attacks took place on 21 July. Our primary outcome in the survey was the percentage of respondents who reported experiencing any of five symptoms selected from a previously validated measure of post-traumatic stress disorder[5]. Only those who responded that they had experienced that symptom either 'quite a bit' or 'extremely' as a direct result of the attacks were counted as symptomatic. Overall, 31% of respondents reported such reactions on one or more item (Table 1). By way of comparison, a survey of the US adult population 3 to 5 days following 11 September 2001 and which used identical questions identified substantial stress in 44% of respondents[6].

Several factors increased the likelihood of a Londoner reporting substantial stress. Unsurprisingly, people who had greater exposure to the attacks, believing that either they or a friend or relative might be injured or killed, were significantly more at risk of experiencing stress. Interestingly, however, the most important risk factor we identified turned out to be religion, with Muslims reporting over twice the rates of substantial stress than respondents from any other faith, or respondents with no religion. Other demographic risk factors included being female, being from a lower social class, being poorer, and being from an ethnic minority.

In terms of non-demographic risk factors we found some evidence to support the view that London's previous experience with IRA terrorism had reduced its psychological vulnerability to future attacks[7], as respondents with previous experience of terrorist incidents (either real incidents or false alarms) were significantly less likely to experience substantial stress as a result of 7 July. Communication between members of the public was another key factor in preventing stress: those who managed to use their mobile phones to contact others despite the mobile networks being heavily overloaded were significantly less likely to experience stress than those who had had trouble getting through, while having been uncertain about the safety of others was another significant risk factor.

BOX 1

Did Passengers Panic? Selected Quotations from Tube Passengers on 7 July Reported in the British Media

- "There was no real panic - just an overwhelming sense to get out of the station quickly"
- "Almost straight away our packed carriage started to fill with smoke, and people panicked immediately. Thankfully there were some level-headed people on the carriage who managed to calm everyone down"
- "I felt there was a real sense of unity. We were all trying our best to find a way out of there and reassure each other"
- "One of the things which struck me about this experience is that one minute you are standing around strangers and the next minute they become the closest and most important people in your life. That feeling was quite extraordinary"
- "Many people kept calm and tried to help one another to see if anyone was injured"
- "Passengers with medical experience were found, I found a tool box and we smashed a window, allowing the medical guys to enter the other train"
- "I was very aware of people helping each other out and I was being helped myself"

Table 1: Prevalence of Substantial Stress Symptoms in the General London Population 11-13 days following the 7 July Bombings

As a result of the London bombings, to what extent have you been bothered by...		**Responses in US population following 11 September**
Feeling upset when something reminds you of what happened	25%	30%
Repeated disturbing memories, thoughts, or dreams about what happened	8%	16%
Having difficulty concentrating	4%	14%
Trouble falling or staying asleep	4%	11%
Feeling irritable or having angry outbursts	9%	9%

Communication was also important to our respondents in the weeks that followed the attack, with 71% saying they had spoken to friends or relatives "a great deal" or "a fair amount" about the incident in the weeks that followed. For comparison less than 1% had sought professional help for their feelings about the bombings. These findings are in line with previous work suggesting that most people prefer to turn to their own pre-existing support networks following a traumatic event[8]. Given that randomised controlled trials have consistently shown that psychological debriefing in the immediate aftermath of traumatic events is at best ineffective and at worst counterproductive[9], this finding is reassuring. There are currently no plans for mass psychological outreach programmes such as those that took place in New York following 11 September.

We do not know how stress levels have changed in the months since we originally conducted our survey. However, a follow-up survey of our original respondents is currently underway which will answer that question. In the meantime, our assumption is that stress levels will have reduced over time, possibly quite dramatically[10]. Whether there have been any lasting repercussions on people's travel behaviours is less clear. At the time of our original survey, we asked respondents whether they intended to travel more often, less often or no differently by various means once the London transport system returned to normal. Thirty percent said they now intended to travel less often by tube, 13% less often by train and 20% less often into Central London. London is a city in which many people have no choice but to use public transport in order to get around. It will therefore be interesting to see whether these intentions have translated into actual persistent changes in behaviour, or whether having to make use of the tube again has lessened people's anxieties about it.

Long-term psychological reactions

The management of terrorist incidents, industrial disasters or other traumatic events does not always stop once the final casualties have been treated and the last repairs made to the infrastructure. Instead, occasionally, the social and medical ramifications of an event can linger on for many years, perpetuated by apparent inconsistencies in official versions of events, accusations of cover-up, the setting up of support and pressure groups in the affected communities, the involvement of 'independent scientists' who challenge the reassurances given out by local health officials, and a seemingly never-ending round of enquiries, legal proceedings and political interventions[11]. This quagmire of mistrust and confusion is often triggered by the emergence of a new 'syndrome' amongst those exposed to the incident, a syndrome that is often composed entirely of non-specific symptoms which are attributed by the patients to their exposures to toxic materials, but for which no conventional medical explanation can be found. Gulf War Syndrome, World Trade Centre Syndrome, and the illnesses reported following the Camelford water pollution incident and the 1992 Amsterdam El-Al crash could all serve as examples. Quite why some incidents result in these syndromes, while others involving apparently the same degree of toxic exposure do not, remains a matter for conjecture. Of more immediate relevance is whether we will now witness the emergence of a 7 July Syndrome. We believe that this is unlikely. To date, we are unaware of any major concerns expressed by either the direct victims on the underground trains or the first responders about possible toxic chemical exposures that may have been encountered during the evacuations. Although we do not yet know enough to predict with any certainty when or why a medically unexplained illness will arise, this fact alone would seem to militate against it.

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Environmental sampling and analysis on the London Underground in response to the 7th of July 2005 bombings: lessons identified for major incident management

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Introduction

On July 7th 2005, explosive devices detonated at approximately 08:50 on three trains on the London Underground transport network: Circle Line train number 204 heading eastbound from Liverpool Street station to Aldgate station; Circle Line train number 216 travelling westbound heading from Edgware Road station to Paddington station; and Piccadilly line train number 311 travelling from King's Cross St Pancras to Russell Square southbound.[1] Between 08:45 and 09:00 on Thursday 7 July 2005, over 200,000 passengers would have been travelling on over 500 trains on the London Underground system[1]. Approximately an hour later, a bomb exploded on a double-decker bus in Tavistock Square[2]. The actions of the four suicide bombers who set off the devices led to 52 deaths and approximately 700 injuries.[2]

The London Bombings resulted in a 'major incident' being declared on the morning of July 7th. A working definition of a 'major incident' is provided by the London Emergency Services Liaison Panel (LESLP): 'A major incident is any emergency that requires the implementation of special arrangements by one or all of the emergency services and will generally include the involvement, either directly or indirectly, of large numbers of people.'[3] The command and control structure used during major incident response is summarised by an article in this issue of the CHaPD report by Antony Rowe entitled: 'Management and Coordination of Major Incidents[4].

The events on July 7th led to a complex multi-agency response and the formation of a Strategic Coordinating Group (Gold Command). The organisations involved in responding to major incidents typically include all of the emergency services, the National Heath Service, the Health Protection Agency (HPA), central government and other government agencies. Health Protection staff were involved at all command and control levels during the response to the July 7th bombings. Occupational hygiene and wider environmental sampling and analysis were undertaken to support both occupational and public health risk assessments. The personnel that undertook sampling and/or analysis acted at operational (bronze), whilst under the management of tactical (silver) command. Strategic Coordinating Groups (gold command) had input into environmental sampling and analysis during major incident response. This would now occur in the context of a health advisory team (HAT)[5].

In this paper, a summary is given of the lessons identified during occupational hygiene and wider environmental sampling and analysis on the London Underground network in response to the July 7th bombings. The benefits of having an 'Environment Group' at a strategic command and control level during response to future major incidents are also outlined.

Incident Response

Initial CBRN Screening

The initial response to the explosions reflected an early suspicion that the explosions were a deliberate attack. Initial assessment by personnel from the emergency services who were deployed to the sites of the explosions, led to the events not being classified as a chemical, biological, radiological or nuclear (CBRN) type of attack.

Clinical assessment of patients

Over 700 casualties occurred and some were treated at scene and others were taken to a range of acute hospital trusts. Close liaison with the NHS provided casualty information and treatment locations. As additional confirmation of any risk from a chemical type of incident, consultant medical toxicologists from Chemical Hazards and Poisons Division (CHaPD) of the HPA undertook clinical assessment of the victims of the blasts with consultant colleagues in Great Ormond Street Hospital, University College Hospital, Royal Free, St Mary's Hospital and the Royal London Hospital on July 7th and 8th. There was also liaison between CHaPD and St Thomas' Hospital on the telephone. The patients were found to have trauma and blast injuries but did not exhibit early signs or symptoms typically associated with exposure to chemical agents.

A registry that has been set up for the incident (http://www.hpa.org.uk/explosions/health_register.htm) that will enable long-term health follow up to provide an indication of the nature and extent of any long-term health effects that may have resulted from the bombings.

Hazard and Risk Assessment

In addition to the physical injuries and fatalities caused by the blasts, concern was identified for several potentially hazardous materials that might have posed a risk to health. An initial visual inspection of the blast sites indicated that there had been no discernable fires and that blast debris was present. Personnel from both London Underground (including subcontractors) and Metropolitan Police Service Health and Safety identified potentially hazardous material that may have been released from train carriages due to the explosions, in addition to dust released from tunnels ('tunnel dust').

Train carriage schematics indicated that the Piccadilly line train included the following potentially hazardous materials: asbestos (components of heating panels, resistance grids with asbestos possibly being present between steel plates on underside of carriages); mercury (trip switches for doors -2ml in glass tubes housed in plastic); thermal switches (liquid sodium-potassium alloy in fiberglass cover, surrounded by oil) and banks of acid-lead batteries. Asbestos containing materials only pose a risk to health if they are fragmented or abraded such that fibres are released to air. The other materials only pose a risk if they are disturbed and released such that there could be exposure via dermal or oral/inhalation pathways.

Inspection of the blast areas suggested that these materials were intact after the explosions. It is unlikely that those present immediately after the attacks or in the recovery phase of the incident were significantly exposed to these substances. Therefore, the risk posed to the health of members of the public present on scene immediately after the explosions, the emergency responders or those involved in the recovery phase of the incident appears to be very low.

The most likely chemical exposure for members of the public in the immediate vicinity of the blast appears to have been 'tunnel dust'. This is created primarily by the friction between the train wheels and the rail, and the train brakes and the wheels. It has been extensively studied, the main constituent is iron and it is currently thought that it is unlikely to be harmful to health at the typical exposure levels and time periods experienced by users/workers on the London Underground[6].

Environmental hazard monitoring

Although there appeared to be little or no disturbance of asbestos materials, airborne fibre reassurance monitoring was undertaken on station platforms and in the tunnels in the vicinity of the blast zones in order to ensure that the first responders (emergency services) and those involved in the recovery phase of the incident (undertaking tasks such as site investigation, wreckage removal, cleaning etc.) were not exposed to an extent that posed a significant risk to health. The data also provided an indication of whether members of the public that were present in the vicinity of blast zones could have been exposed. The environmental data are currently being collated and initial assessments suggest that there was a very low risk to the public.

Lessons identified on environmental sampling at Strategic Co-ordinating Group

After the initial response to the incident, an 'Environment Group' was set up outside of the Strategic Coordinating Group in order to share information from environmental and occupational hygiene sampling and to evaluate the response to the incident. This group consisted of personnel from London Underground/Transport for London (including Tubelines and Metronet), CHaPD, and Health and Safety personnel from the Metropolitan Police Service. The Government Decontamination Service[7] also contributed to the group. At the first meeting of this group (19.07.05) strategies for reassurance sampling during the recovery phase of the incident (prior to reopening of the underground network to the public) were discussed.

The concept of an 'Environment Group' proved to be valuable for effective data collation and dissemination. The authors believe that an Environment Group acting at a strategic level during major incident response has the following benefits:

- a clear pathway for multi-agency sharing of scientific data
- a broader skills base in constructing health risk assessments
- improved mechanisms for data collection, analysis, interpretation and dissemination
- the ability to provide communication channels for coherent post-incident reporting in government, academic or other publications.

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Incident Response: Emergency Departments

Acute Chemical Incidents: Not Such a Rarity?

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Introduction

Acute clinicians have long believed that chemical incidents are relatively rare events. In the past it has been estimated that approximately 1000 chemical incidents occur per annum in the UK, however, more recent estimates have suggested that the actual number of incidents may be between 6 and 12 times greater than this[2]. This short report describes a small audit carried out in an urban Emergency Department (ED) which focused on patients who had been chemically contaminated.

Methods

A data collection form was developed and it was widely advertised throughout the ED that information regarding patients believed to have had involvement in a chemical incident was to be collected prospectively. These anonymous forms recorded the following details:

- Chemical agent involved, duration and route of exposure, and time since the incident.
- Clinical features and treatment, including decontamination at the scene and in the ED.
- Outcome for the patients.
- Specialist agencies contacted (such as Toxicology or Public Health)

Data was collected over a three month period between May and July 2005; in addition, ED notes from a three-week period were scrutinised retrospectively to assess if any patients had been missed by the prospective collection. The ED sees between 300 – 350 new patients daily.

Results

Over the three months of the study, 10 patients presented to the Emergency Department following exposure to non-pharmaceutical chemicals; these are listed in Table 1.

Table 1: List of Incidents Presenting to the Emergency Department over the 3 Months Survey Period

	Chemical	Exposure Route & Duration	Treatment	Specialist Help Called	Reason for leaving ED
1	Domestic Bleach	Ocular <5 mins	Eye irrigation	None	Discharged
2#	Carbon Monoxide	Inhalation 18 hours	None	None	Discharged
3#	Carbon Monoxide	Inhalation 18 hours	None	None	Discharged
4	Drain Cleaner (in kitchen at a restaurant)	Ocular <5 mins	Eye irrigation	None	Discharged
5	Chlorine	Inhalation <5 mins	None	CHaPD	Admitted to Clinical Decision Unit. Self-discharged after 2 hours.
6	Smoke (from burning motor-bike)	Inhalation 5-10 mins	Supplemental O_2 & nebulised bronchodilators	None	Discharged
7	Freon (air conditioning system on train)	Inhalation <30 mins	Supplemental O_2	1. NPIS 2. CHaPD 3. Train Operator's Technical Department	Discharged
8	Pepper Spray	Ocular 2-4 hours	Eye irrigation chloramphenicol eye ointment	NPIS	Discharged
9	Smoke (from tunnel fire while waiting in London Underground station)	Inhalation 10-30 mins	Supplemental O_2	None	Discharged
10	CS Spray	Ocular and dermal 60 mins	Showered in ED	CHaPD	Discharged

\# same incident

The results show that all cases involved only one or two patients, but even one contaminated patient can cause considerable disruption to the service provision within the ED[3]. The incidents recorded in the duration of the study were relatively minor; however, it is important not to be lulled into a false sense of security. For example, two incidents involved CS/pepper spray, which is considered to be a short-acting agent with minimal risk to both patient and health-care staff; a recent case report indicated how a single release of pepper spray led to the secondary contamination of 6 individuals[4]. Another report[5] described an episode in which a patient who had been exposed to CS spray a few hours earlier required surgery for debridement and closure of wounds. On recovery from the anaesthetic, the patient suffered profound laryngospasm, and required urgent re-intubation. The anaesthetist was unable to perform this procedure because of eye irritation, and the replacement anaesthetist also suffered eye and throat discomfort.

The Health Protection Agency should be informed in cases where incidents may put other members of the public at risk and the local response is provided by the Health Protection Units (HPUs). It is of concern that the local HPU was not called directly by the ED staff in those incidents that had a potential public health impact (incidents 2-5, 7 & 9), even though the telephone number was available in the department. It is important for EDs to have the phone number of their local HPUs readily available and remember to use it; alternatively, CHaPD have a list of HPUs and can notify the appropriate team during an incident.

Conclusions

Although this is a small survey, it indicates that chemical incidents may be more common than realised: it suggests that 40 patients per year would present to the department following a chemical incident (which equates to 1 patient for every 3000 new patients). The data was collected during the early summer, a season in which people are less likely to use their central heating, resulting in a lower risk of carbon monoxide poisoning. In addition, the catchment area of the hospital does not have any significant industry, so the risk from this source is also less than in other departments. Although relatively minor, these incidents can cause significant disruption to EDs, as shown through experience. A further, larger pilot study is planned to assess the number and severity of chemical incidents presenting to a number of departments over a longer period. The long-term objective is to develop a database of chemical incidents to improve understanding of the clinical effects of different agents and to assist in surveillance.

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Emergency Planning

Management and Co-ordination of Major Incidents

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Introduction

Almost all organisations identify extraordinary events that place inordinate pressures on themselves and partner services/agencies. Each relevant organisation usually has its own definition of a Major Incident, or a crisis that requires it to invoke special measures or involve other agencies in order to resolve that crisis and 'return to normality'.

These bespoke definitions are encapsulated within Section 1 of the Civil Contingencies Act 2004 (CCA) as 'an Emergency'[1]. This definition permits both spontaneous Major Incidents (typically transportation, industrial & terrorism), that often involve large numbers of casualties and/or damage as well as 'rising tide' events where 'notice' long or short may be received (foot and mouth disease, SARS, avian influenza, tidal flooding etc) to be included. The definition thus also includes 'internal major incidents', where one organisation is required to take special or extraordinary measures to maintain its service to the public. It is worth noting that the CCA requires certain organisations, including all emergency services and local authorities, to be able to deal with an Emergency as well as continuing to provide their normal service as far as is reasonably practicable.

Key and core to the implementation of Major Incident (Emergency) Plans is planning itself. Leadership, management, co-ordination, awareness and training across a whole organisation is required as well as understanding the various roles and responsibilities of partner (inter-agency) organisations that may be involved in resolving the incident are clearly vital in order to produce a truly pre-planned co-ordinated response.

Prior to discussing the management and co-ordination of Major Incidents it is worth noting, very briefly, the fact that inter-agency management and co-ordination has existed among the emergency services, local authorities and a number of other organisations for over thirty years. The intervening years have seen the process honed and refined as the result of major incidents, typically, but not exclusively involving 'spontaneous events', including transportation, industrial and terrorist occurrences sometimes resulting in large numbers of casualties. However, one of the considerable strengths of the co-ordination process is undoubtedly the fact that those management structures used to deal with Major Incidents are precisely the same at those used, for example, at over six hundred multi-agency events that take place within London on an annual basis, ranging from state ceremonials to Notting Hill Carnival and New Year's Eve events, sporting occasions and stadium events, marches, demonstrations and occasional public disorder.

The development of the London approach to both strategic and tactical Command, Control and Co-ordination can be found within the London Emergency Services Liaison Panel (LESLP) manual (www.leslp.gov.uk)

Many of the practices identified within LESLP have been refined and incorporated into HM government non-statutory guidance 'Emergency Response and Recovery' (Chapter 4 - 'Management and co-ordination of local operations'). This suggests a process that establishes a common national set of objectives, responses to and recovery from Emergencies. This document is supported by the CCA, the Civil Contingencies Act 2004 (Contingency Planning) Regs 2005 and the statutory guidance, 'Emergency Preparedness (www.ukresilience.info).

Clearly planning and the development of individual and corporate plans, based on risk assessment, intelligence and information is the key to dealing with Major Incidents either anticipated (rising tide) or declared (spontaneous).

Major incidents/events tend to follow the same pattern:

- The initial response
- The consolidation phase
- The recovery phase
- Restoration of normality
- An overarching investigation to establish causes, followed, as necessary, by trials, public enquiries, inquests or other hearings.

1. Sec 1 CCA defines 'An Emergency' (inter alia) as a event or situation which threatens serious damage to human welfare in a place in the UK only if it involves loss of human life, human illness or injury, disruption of services relating to health etc

This pattern is a valuable planning tool where there is a need for two or more organisations to work together to achieve a satisfactory outcome for the benefit of the community at large.

Management of large-scale incidents/events involving two or more agencies, whether spontaneous or rising tide (events where information/intelligence provides early warning of the possibility) is based on 'co-ordination' – this means that effectively there is no single person or organisation 'in charge'.

Co-ordination depends on all personnel at every level not only knowing their own capabilities and responsibilities, but also having an awareness of the capabilities of others services/organisations and from where necessary additional help and assistance, in terms of personnel, material and advice may be obtained.

Such co-ordination and trust is not spontaneously achieved but results from extensive multi-agency pre-planning, documentation, training, exercise, practice and use, (e.g. at the events described above). Thus personnel are familiar with their responsibilities, those of partner organisations and the processes involved when required to deal with a Major Incident, from whatever cause.

The co-ordination and management framework at any incident identifies three layers or tiers of inter-linked leadership and co-ordination (Figure 1):

- **Gold** - Strategic
- **Silver** - Tactical
- **Bronze** - Operational

It is clearly vitally important that all organisations fully understand and adopt the meaning of this terminology as recommended in 'Emergency Response and Recovery' as a part of the 'national response', as meanings can sometimes vary from organisation to organisation.

Gold

Each organisation (Fire, Police, Ambulance, Local Authority, Transportation Agency, public utility etc) involved in resolving an incident will appoint a 'strategic manager' titled 'Gold' to have strategic responsibility for the completion of their own strategic objectives. That person will ensure that their objectives are presented when the inter-agency (multi-agency) strategy is designed, drafted and subsequently reviewed. Each Gold has overall responsibility of their own resources, but delegates tactical responsibility (at the scene(s)) to Silver.

Gold Meetings

The 'Gold' representative from each service/organization is responsible for the achievement of their individual goals against the background of corporate strategic objectives. Therefore a corporate group of Golds (representation all agencies deployed to resolve the incident) will be established to determine and agree the overall strategic aims through a meeting process known as the Strategic Co-ordinating Group (SCG) also known as the Gold Group. This Group will meet, usually at pre-determined intervals during the currency of any incident to consider a number of matters including progress to resolve the incident and to review the strategic objectives that may by consensus change during the resolution of the event.

In terms of spontaneous major incident, typically involving numbers of casualties or extensive damage, the SCG is usually, but not exclusively co-ordinated (chaired) by the Police Gold. At SCG each Gold represents their own organisation and relies on a process of consensus and discussion to reach decisions that will ensure that the implementation of corporate and individual strategic aims can be delivered as tactics by the Silver (Tactical) and Bronze (Operational) tiers.

As well as supporting the inter-agency involvement in the reconciliation of the Major Incident, each Gold will also be constantly advised about their own organisation's ability to service the incident whilst continue to provide a seamless service to the remainder of the public. Each Gold therefore constantly assesses or benchmarks their contribution to the resolution of the incident against other demands placed on their respective service.

Silver

Each organisation appoints a Silver manager who generally attends the scene but does not physically get involved in activity. Silver sets tactics that support the decided Gold strategy through directions to the Bronze managers (see below). At multi-seated incidents there will be an identified person from each Service at each site who can be identified as the 'scene Silver' possibly reporting back to a 'Silver coordinator' deployed elsewhere and over-viewing the totality of events.

Each organisational Silver, fully aware of the capabilities of their own personnel and of partner organisations will adopt appropriate tactics to ensure the Gold (SCG) strategy is implemented. Thus, by way of simple example; in a transportation incident, whilst all agencies have a responsibility to save life, among other things:

a. The police will co-ordinate the emergency services etc, secure the scene and control sightseers, investigate the incident and deal with 'casualty information' thus allowing
b. The Fire Brigade to be involved in life saving through rescue and search, fire fighting and safety management of the inner (safety) cordon.
c. The ambulance service will enter the safety cordon when requested to provide treatment, stabilisation and care of the injured, whilst providing appropriate medical staff, equipment and transportation for the injured.
d. Local authorities will establish evacuation / rest centres etc as required
e. Thus nobody unnecessarily gets in each other's way.

Silver Meetings

As with the Gold Group, all 'Silvers' will come together at the scene and hold their own tactical meetings at which progress will be discussed and requests made of the other organisations and services present. These can usually be decided upon and implemented at the time or forwarded to Gold and on to the SCG, if necessary, for a single service or corporate decision.

Each service Silver is responsible for ensuring that their service has sufficient resources are available to support the tactics that have been adopted and to request additional resources from Gold if/as required.

Bronze

Each service deploys Bronze managers to the actual scene to implement and carry out the tactics as determined by Silver. These are the 'front end' managers deployed to physically resolve the incident by way of rescue, fire fighting, securing damaged property, implementing cordons etc. Each Bronze is responsible for ensuring that their service has sufficient resources to undertake the tasks identified and request additional personnel, equipment, specialist advice etc if/as required from their own Silver. Each service deploys an adequate number of Bronzes to each scene to undertake a variety of bespoke roles. It is quite likely that the area of the incident will be divided into 'Sectors', either geographically, or in the event of a railway train possibly by carriage, or by the fall of debris in an aircraft incident. It is vitally important that each organisation adopts not only the same sector areas but also the same designation (e.g. Sector 1 – 2 – 3 or A – B – C etc).

Thus each service appoints a Bronze manager (reporting to Silver) to be in command of their own resources within each Sector. It is vital that each Bronze is easily identifiable to their own colleagues as well as to those from other services (coloured tabards are a common means of identification), so that if/when inter-agency advice is required or activity requested it follows the proper chain of command through the designated Bronzes and does not pass haphazardly, arcing organisational chains of command.

This ensures the safety and well-being of the personnel from each service whilst ensuring that appropriately skilled personnel are deployed to deal with differing aspects of the same incident. Thus an individual Sector Bronze can communicate with other Bronze managers from sister organisations working within the same Sector to make requests, as well as passing requests, updates and details of resources required/stood down etc to their own respective Silver.

Specialist advice including Health

Many incidents require specialist advice from a variety of sources to be provided to the various tiers of co-ordination. Whilst the above has concentrated upon the roles of the primary emergency services, the flexibility of the structure permits specialists and experts to be introduced at each and every level to provide vital advice to Gold, and at the Silver and Bronze tiers. Thus structural engineers, transportation engineers, and other experts can be introduced and deployed as required.

It is worth noting that within the Health Service, health advice will now be provided to the Strategic Co-ordinating Group (SCG) by the Health Advice Team (HAT) led by the designated Public Health Adviser (PHA)[2].

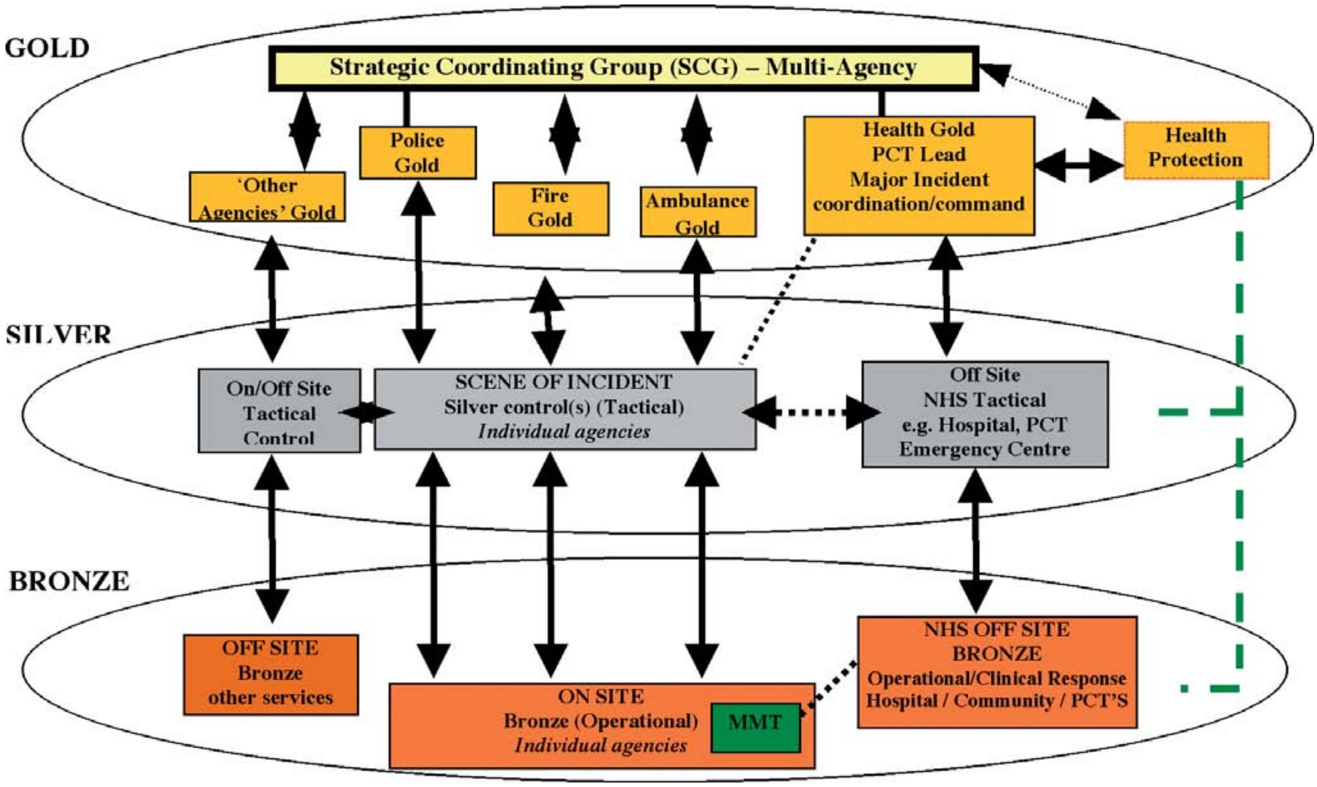

Figure 1 Command and Control Structure for Major Incident Response (Courtesy of Gareth Holt)

2. See NHS Emergency Planning Guidance – Oct '05 – 5.5 Health Advice Team

Towards Recovery

It is appreciated that the 'recovery phase' begins almost as soon as a Major Incident is declared, albeit initially only in a planning and preparation mode. The overall processes described will continue through the response and consolidation phases with (probably) the police Gold continuing to co-ordinate the strategy until such time as events seamlessly and deliberately move into the 'recovery phase'. At this point the SCG may consider it appropriate for the role of Gold to move to another agency, typically the Local Authority, an Airport Authority or a Railway agency to continue aspects of recovery until such time as 'normality has been restored'.

Internal Scenarios

Single service or internal major incidents/emergencies can also be managed using the structures and processes discussed above. It is however emphasised that successful management of an incident is predicated upon planning, preparation and exercise. The short line of communication from the Gold in overall charge is well suited to speedy communication through Silver to the various Bronzes within any organisation under pressure from whatever cause. As a result a range of relevant priorities can be identified and decisions made based on the nature of the Emergency and updated information/intelligence received by Gold, who is able to maintain an overview of the whole organisation.

Conclusion

The co-ordination processes described above have a tried and tested history and have emerged through a large number of challenges as an acceptable method of initiating and maintain inter-agency co-operation in the most trying of circumstances. The process allows organisations to co-operate both internally, up and down a short line of command, whilst simultaneously co-operating with inter-agency colleagues within similar spans of command in the achievement of jointly agreed corporate goals.

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Ability of emergency physicians to recognise victims of bio-chemical attack

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Introduction

The sarin attack on the Tokyo underground in 1995 highlighted the risks of deliberate release of harmful biological or chemical agents[1] and since the terrorist attack on the World Trade Centre these concerns have increased further[2]. Such deliberate releases may be overt, where it is immediately apparent that the release has occurred, or covert. In a covert release the first indication of such an event will be the presentation of people with unusual illness[3].

Doctors working in Emergency Departments (EDs) have a crucial role in the identification of such releases[2-5] and the Heath Protection Agency (HPA) highlights the importance of maintaining a high index of suspicion to enable early recognition of covert deliberate releases[3, 4]. Clinical awareness of the common presentations of potential biochemical agents is required [2,4, 6] but so is vigilance for unusual patterns of presentation, such as multiple patients presenting with similar symptoms over a relatively short period and from a similar geographical area.

Guidelines and information regarding deliberate release substances are widely available on the internet[4, 5]. In particular, the HPA in the UK and the Center for Disease Control (CDC) in the USA have a role in providing training to clinicians in these issues. Despite this it has previously been noted that acute specialty clinicians are poorly prepared to identify victims of chemical or biological agents[7] and concern has been expressed about the lack of inclusion of these diseases in formal training schemes[8]. Previous articles examining preparedness have covered all aspects of the response from recognition to decontamination and management[7, 9]. This paper focuses on the key task of recognition of victims of chemical and biological agents; the objective was to assess the ability of doctors in a large urban teaching hospital emergency department to recognise patients who were showing signs and symptoms of exposure to biological and chemical agents.

Methods

Nine clinical cases were presented, in the form of a quiz, to the senior house officers and middle-grade doctors in the Emergency Department during their weekly teaching sessions. There was one case for each of the agents listed in Box 1. The biological agents tested are CDC Category A agents[5] with the exception of SARS. The chemical agents selected were deemed likely to be used in a deliberate release by both the HPA and CDC[4, 5]. Each clinical case tested the ability of the doctor to identify the agent, as it would present to accident and emergency in a covert release and, where possible, clinical slides and x-rays found on the HPA website[4] were used.

Box 1. Agents Used in Test 1

Biological
Anthrax – pulmonary & cutaneous
Botulism
Pneumonic Plague
SARS
Smallpox
Tularaemia

Chemical
Nerve Agent
Mustard Gas

The clinicians were not pre-warned about the subject of the test, and their answers were marked immediately, before a formal teaching session was given, using the information and pictures found on the HPA website[4]. One mark was given if the agent was correctly identified in the differential diagnosis; half a mark was given if another unusual clinical condition was recognised but the specific correct diagnosis was not mentioned.

Once the test had been marked, a tutorial was presented, again using the information found on the HPA's website.

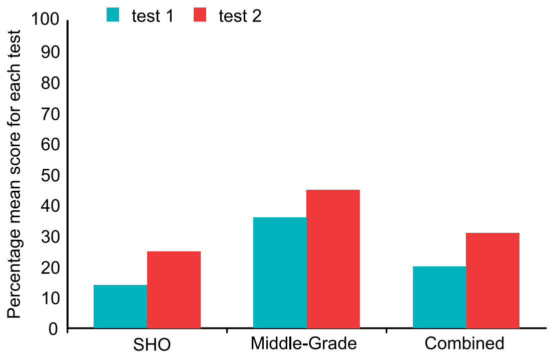
Two months later, a second quiz was undertaken, with the questions hidden amongst other clinical scenarios (x-rays, ECGs and non-chemical/biological clinical scenarios). The same marking format was used.

Box 2. Agents Used in Test 2

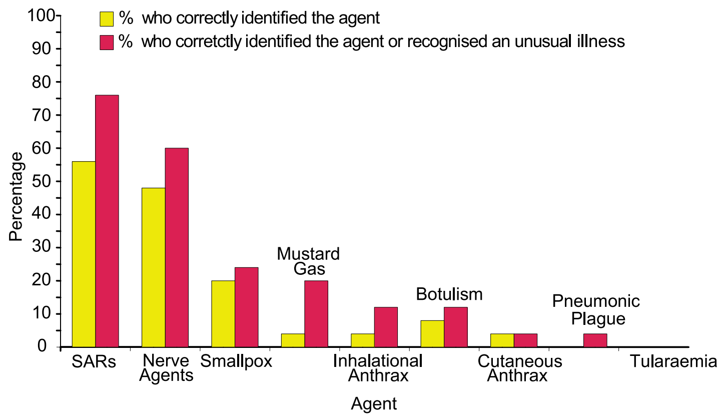
Biological
Anthrax - pulmonary
Botulism
Pneumonic Plague
SARS
Tularaemia
VHF

Chemical
Nerve Agent
Ricin

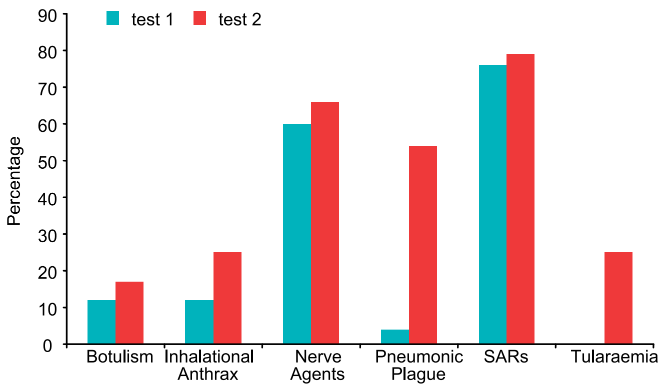
Graph 1. Mean score of each test as a percentage for SHOs, Middle Grades and combined



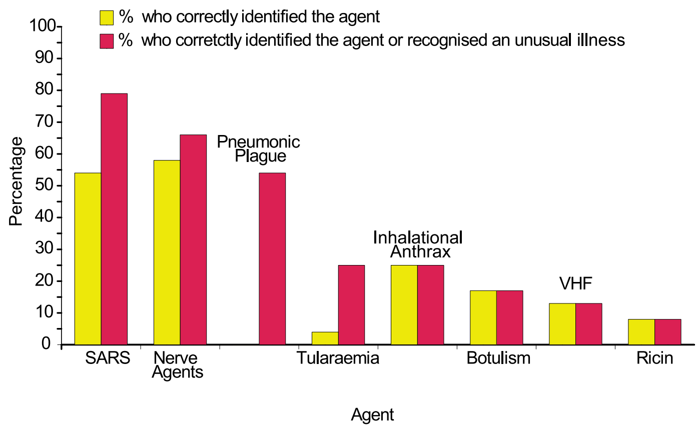
Graph 3A. Test 1: Results of each scenario tested for SHOs & Middle-Grades combined



Graph 2. Percentage of correct answers for all doctors for each condition



Graph 3B. Test 2: Results of each scenario tested for SHOs & Middle-Grades combined



Results

The scores obtained in both tests for SHOs and middle-grades is shown in Graph 1. Although 25 doctors (19 SHOs and 6 middle-grades) attended the first test and tutorial and 24 undertook the second test (17 SHOs and 7 middle-grades), only 9 were present for both sessions (all SHOs). The partial introduction of the Foundation Year programme has meant that some of the SHOs are employed for 4 months and some for 6 months; similarly, the clinical fellows have staggered periods of employment, with a constant introduction of new staff.

Graph 2 shows the results of the scenarios that were used in both tests; overall in test 1, 24% of the questions were recognised as chemical or biological weapons scenarios; this figure increased to 36% after test 2; for the 9 clinicians who had attended both tests and the tutorial, this figure was not significantly improved (38%).

A full break-down of the results for each test is found in Graphs 3A, and 3B.

Discussion

Clinicians in the Emergency Department do not have a high level of knowledge about the clinical effects of chemical and biological agents; despite availability of information from sources such as the HPA, this audit suggests that it is not reaching front line accident and emergency doctors.

There are significant gaps in knowledge with some diagnoses not even being considered: pneumonic plague and tularaemia are all CDC category A agents[5] and botulism is occasionally seen in normal clinical practice in intravenous drug users. Although, thankfully, all of these conditions are rare, they do need to be considered in the differential diagnosis, particularly in cases of severe sepsis and respiratory disease[2, 4, 5]. Unfortunately, their rarity means that they have a low priority in both undergraduate and postgraduate training; as previously stated, the HPA web-site has comprehensive and useful information on the recognition and treatment of these conditions. Unfortunately, many junior doctors do not seem to be aware of its existence and at the tutorial given as part of this audit, none of those present were aware of the educational function of the HPA and more than half were not even aware of its existence. Recent initiatives have been undertaken to address this, such as the development of training modules on the Doctors.net website.

In addition, the difficulty of doctors starting their period of employment in individual departments at different times means that training sessions should be repeated more frequently than 6 monthly; this may also help to raise the awareness of these rare conditions amongst the staff.

For the UK to mount a rapid response that successfully limits the effects of a covert deliberate release, swift recognition of possible chemical or biological agents is essential by front-line clinicians, which includes doctors in Emergency Departments, as well as primary care and public health staff. It is with this in mind that the recognition stage was focused on in this paper. Other studies have looked at administrative plans, training, physical resources, decontamination procedures[7, 9, 10]. For example, Wimbush and colleagues[7], surveyed UK doctors' knowledge of presentation, decontamination and management of nerve agent victims and found that more than a third of doctors surveyed were unsure of the symptoms and signs that a nerve agent would induce. To the authors' knowledge this is the first paper to specifically explore the ability of doctors to recognise agents likely to be used in a bioterrorist incident as well as a deliberate chemical release.

The authors recognise that this was a small audit confined to a single department, but there is no reason to suspect that the levels of awareness of these low-probability but high-impact conditions, is significantly better elsewhere. In addition, it did not attempt to ascertain the level of awareness amongst nursing staff who perform triage, another area of the department which requires a high level of vigilance for these conditions. The aim of this report is to promote discussion at a local level so that individual emergency units consider how they address their own educational needs.

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Cross-National Research on Multiagency CBRN Coordination[1]

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Introduction

Health agencies and law enforcement have been required to assume new and overlapping roles after the World Trade Center and the anthrax attacks in 2001 (DOJ & CDC, 2005; Reuland & Davies, 2004; Butler, Cohen, Friedman, Scripp, & Watz, 2002; Fine & Layton, 2001; National Research Council, 2002; GAO, 2000, 2004). These agencies share a number of common responsibilities in the preparation and response to chemical, biological, radiological, and nuclear (CBRN) events. Most importantly, both have the primary mission of saving lives through careful pre-event planning and effective event response. They also share the common objectives of identifying chemical/ biological agents, preventing the spread of disease, preventing public panic, and assisting in the apprehension of those responsible for an attack.

The lack of understanding of the expertise, resources, and roles of other agencies and the failure to establish communication and response procedures in advance can greatly impair interagency preparedness for major incidents. A major terrorist attack, especially one that targets simultaneous sites, requires a quick and coordinated response from multiple agencies. The specific response tactics employed must draw on existing plans and protocols tailored to the specific type of threat (e.g., chemical, biological, radiological, nuclear, or conventional). This response specificity requires advance coordination of roles and responsibilities and strategic planning of resource allocation, communication models, and training and networking.

In 2003, the National Institute of Justice[3] (NIJ) provided a grant to the US Research Triangle Institute (RTI International) for research on multiagency coordination in the United States, the United Kingdom, Canada, and Ireland. The primary objective was to identify a set of promising practices to help health and law enforcement agencies improve multiagency preparation and response to CBRN events. The following sections describe our research methods, the results of the study, and potential directions for future research. A more detailed description of the methods and results can be found in the full project report at http://www.ncjrs.gov/pdffiles1/nij/grants/212868.pdf

Research Methods

The study was conducted in three phases to identify existing examples of coordinated planning across agencies in each of the four countries. In the first phase, RTI used public documents to compile a database to describe the potential and realised coordination in the development and application of health and law enforcement surveillance systems. A total of 113 systems were identified and classified: 73 in the United States, 13 in the United Kingdom, 21 in Canada, and 6 in Ireland. In the second phase, RTI conducted confidential, in-person, interviews with practitioners and policy makers from law enforcement and health agencies. The interviews were structure to determine the nature of the multiagency coordination in each country, as well as to identify barriers and solutions to the coordination problem. Forty-three interviews were completed: 14 in the United States, 8 in the United Kingdom, 14 in Canada, and 7 in Ireland. In the third phase, an expert panel of subject matter experts from each country was asked to assess the feasibility and practicality of the study's conclusions.

Results

The primary purpose of the project was to identify promising strategies and mechanisms for improving interagency coordination in all or some of the countries included in the study. These strategies or mechanisms were grouped into four conceptual categories: cultural strategies, legal and structural strategies, communication strategies, and leadership strategies.

Cultural Strategies

The liaison model. The liaison model is the process of placing staff from one agency in another agency's office for the purpose of improving cross-agency communication and planning. Crossover training and assignments allows staff to develop a social network across agencies, develop an understanding of the resources and capabilities of the other agency, and facilitate crises communications by establishing points of contact and developing a common lexicon. To be effective, host agencies should include the liaison staff as part of the event management team, assign clear duties, and treat them as a trusted partner with full access to relevant information. It is also essential that the liaison staff have the necessary inter-personal skills to succeed in a new social environment, a strong understanding of their agency's resources, and the authority to make decisions in crisis situations.

Public-private partnerships. Potential terrorist targets cover a range of private industries, including airline, nuclear plant, shipping, and food industries. These groups must be incorporated in interagency planning

1 The research was supported by grant 2003-IJ-CX-1023, awarded by the National Institute of Justice, U.S. Department of Justice.

2 RTI International (www.rti.org) is an independent, nonprofit, 501(c)(3) corporation with a distinguished history in scientific research and technology development. All our activities, both in the United States and abroad, are guided by RTI's mission: To improve the human condition through objective, innovative, multidisciplinary research, development, and technical services, setting the standard for scientific and professional excellence.

3 NIJ (http://www.ojp.usdoj.gov/nij/) is the research, development, and evaluation agency of the U.S. Department of Justice and is dedicated to researching crime control and justice issues. NIJ provides objective, independent, evidence-based knowledge and tools to meet the challenges of crime and justice, particularly at the State and local levels.

4 The authors would like to thank the response community from London and the U.K. for their advice and assistance during our study of the July events. We are particularly indebted to Malcolm Baker and the Metropolitan Police, Kevan McCrone and the City of London Police, and Peter Simpson and the London Fire Brigade.

and response activities in order to produce a unified security plan that hardens all targets. Inclusion of these groups has the residual benefit of additional information sharing between public and private sector security, and the potential to introduce alternative funding and organisational mechanisms from business into the public sector.

Legal and Structural Strategies

Joint training exercises and planning. Some stakeholders credited joint training with helping improve appreciation of other agencies and their roles, establishing trust among parties, bringing attention to details, and forcing participants to ask difficult questions that arise during crisis situations. Joint training was also credited with: 1) providing actual testing of procedures, 2) helping agencies learn how to respond and react collectively, and 3) helping automate behavioral patterns involved in crisis response.

Adoption of a unified incident command structure. The incident command structure was developed in the 1970s to aid interagency response to catastrophic events, and its purpose and value can be taught to health officials during joint training and education. This type of approach can greatly facilitate interagency response and be applied to a range of events requiring joint response actions, including large-scale car accidents, serial crimes, and terrorist attacks. One key is to recognize the common themes regarding the best preparations for and responses to diverse major events. Developing responses to various scenarios can help forestall disorientation in command responses to overwhelming incidents. Most importantly, preplanned interagency responses to a wide variety of events can build on common relationships and strategies.

Communication Strategies

Establishing a joint media component. Establishing a joint agency spokesperson for the media can facilitate consistent and timely release of information to the general public, while avoiding the pitfalls described above. This approach was evident during the 2005 London bombings, when the London Metropolitan Police Service (MPS) assumed the position of media liaison. The MPS spokesperson provided the public with a constant stream of information that apparently not only contributed to identification of the bombers in the first set of terrorist incidents but also calmed the public. Emergency phone numbers for hospitals and agencies were included in the police briefings so that family and friends could attempt to trace potential victims.

Establishing communication networks before the event. Cross-agency relationships should be built and cultivated in advance of crises. Informal relationships are essential because they establish trust, mutual respect, contacts, and an understanding of collaborating agency roles.

Future Research

Many of the preferred practices identified in this study were identified during discussions with stakeholders in the U.K. in general, and specifically in London. As a result, the current study is being extended to examine the coordinated response surrounding the July 2005 attacks in London to identify specific practices and solution mechanisms carried out in the London response[4]. The goals of the London study are to: 1) Identify effective approaches and solutions to the multiagency coordination problem implemented in response to the July 2005 London terrorist attacks; and 2) Apply lessons learned from the London case study to the U.S. coordination problem to develop protocols for improving coordination. The final report can be provided by the authors on request from July 2006.

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Government Decontamination Service

Dr Dudley Hewlett (Head of Science)
Government Decontamination Service

The Government Decontamination Service (GDS) forms part of the Government's commitment to building the UK's resilience in dealing with the consequences of a range of emergencies. It has been established as part of the cross-government CBRN Resilience Programme, led by the Home Office.

The intention to set up a decontamination service was announced on 25 January 2005 by Elliot Morley, Minister for the Environment, and the Government Decontamination Service (GDS) was launched as an executive agency of the Department for Environment, Food and Rural Affairs (Defra) on 1 October 2005. The agency has a UK-wide remit to provide assistance to local or other authorities responsible for clearing up after a Chemical, Biological, Radiation and Nuclear (CBRN) incident, or after a significant hazardous material (HAZMAT) event that overwhelms established arrangements. The GDS will assist the authorities both to prepare for such events and to help them meet their responsibilities should an event occur. If there is a CBRN or major HAZMAT incident, the authorities will be able to call upon GDS to facilitate arrangements with a range of specialist companies able to provide decontamination services.

The GDS will fulfill three principal roles. It will:

1 Provide advice and guidance to responsible authorities during their contingency planning for CBRN or significant HAZMAT incidents, and help them validate the arrangements they have in place;

2 Assess the ability of companies in the private sector to carry out decontamination operations, and ensure that responsible authorities have ready access to those services through a Framework of Specialist Suppliers, should the need arise;

3 Be the Government's eyes and ears on the national capability for decontamination and provide advice to central government in the event of a major release of CBRN materials.

These functions will be underpinned by a solid scientific foundation. The GDS's in house scientific team will work to improve environmental decontamination capabilities, technologies and techniques through a cross-government research programme and collaboration with academia, industry, other governments and organisations both within the UK and world-wide.

Following the successful completion of a procurement process the GDS Framework of Specialist Suppliers is now in place. Tenders from industry for inclusion on the Framework were evaluated by a multidisciplinary team of government and procurement specialists, and contracts were awarded to those companies that demonstrated they could deliver relevant decontamination services. The companies' capabilities will be further validated whilst they remain on the Framework to provide additional assurance to responsible authorities and central government.

The GDS will not be able to assume responsibility itself for decontamination of an affected area, or be able to pay for the work. This responsibility lies with the local or other responsible authority. For this reason, contracts for undertaking decontamination work would be let between the responsible authority and the Framework Supplier(s) concerned. GDS will be able to facilitate this process by establishing templates for such contracts and by working with responsible authorities and the Suppliers to ensure both sides are familiar with the processes, structures and issues that will arise. However the service is provided for the responsible authorities to use should they wish – there is no obligation.

The capabilities and remit of the GDS will no doubt evolve with time. At present its focus is on decontamination of the built (urban) and rural (green) environment, which includes transport infrastructure such as stations, trains and vehicles. The GDS's remit does not include providing assistance in the decontamination of people, animals or foods, for which responsibilities lie elsewhere.

For more information on the GDS please see:
http://www.defra.gov.uk/environment/risk/cbrn/gds/index.htm or email the team at gds@defra.gsi.gov.uk

CHaPD Developments and Recent Work by COMEAP

Department of Health's Air Pollution and Noise Unit transfer to the HPA

The Department of Health's Air Pollution and Noise Unit transferred to the HPA on the 1st January 2006. Heading up the unit is Dr Bob Maynard, who, with his team of 4: Dr Heather Walton, Miss Inga Mills, Miss Julia Cumberlidge and Mrs Isabella Myers, will be moving to the Chilton site later this year.

Contact details (until further notice):
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Committee on the Medical Effects of Air Pollutants

One of the main roles of the air pollution unit is the Secretariat support it provides to the Committee on the Medical Effects of Air Pollutants (COMEAP). COMEAP is an Advisory Committee of independent experts that provides advice to UK Government Departments and Agencies on all matters concerning the potential toxicity and effects upon health of both outdoor and indoor air pollutants on the basis of data currently available. COMEAP also assesses the need for further research and liaises, as necessary, with other Government bodies to assess the effects of exposure to human health.

The independent members are supported in their work by the Secretariat, whose scientific expertise enables them to provide members with comprehensive background information and briefing papers that inform the decision-making processes of the Committee. The final view of the Committee, provided as advice, is presented in reports or statements all of which including supporting papers written by the Secretariat, can be found on the COMEAP website.
Website address: http://www.advisorybodies.doh.gov.uk/comeap

Committee on the Medical Effects of Air Pollutants (COMEAP) - Recent Work

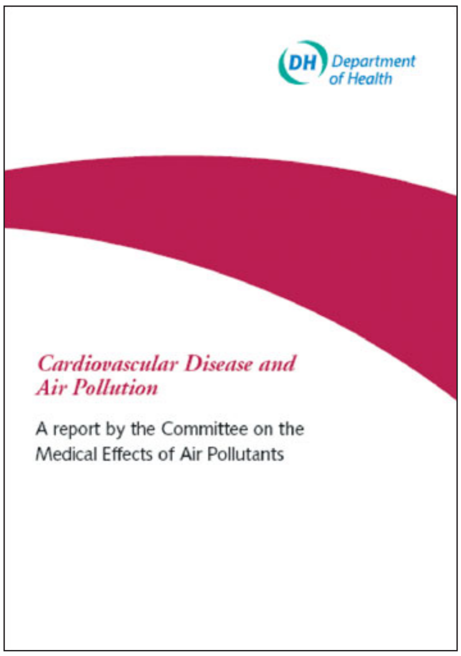
REPORT - CARDIOVASCULAR DISEASE AND AIR POLLUTION 2006

Dr Robert Maynard, Dr Heather Walton, Mrs Isabella Myers, Miss Julia Cumberlidge

That air pollution has a significant effect on health in the UK is widely accepted. Until recently, it was believed that these effects were mainly on respiratory mortality and morbidity. However, work in the United States, which is now being repeated in Europe, suggested that long-term exposure to fine particles ($PM_{2.5}$) and perhaps other pollutants has an important effect on deaths from cardiovascular disease. Cardiovascular disease is a very common cause of death and even a small effect on this will have a significant impact on public health.

COMEAP has recently published a major report on this subject. The report runs to more than 290 pages and contains considerable original work. This report is the first of its kind in Europe. The full report has been published on the COMEAP website[1] and highlights from the report are re-produced below. The report is the latest in a series of State of the Art reports published by COMEAP.

1 Department of Health. Committee on the Medical Effects of Air Pollutants. (2006) Cardiovascular Disease and Air Pollution. http://www.advisorybodies.doh.gov.uk/comeap/state.htm



Cardiovascular Disease and Air Pollution – Highlights

- Daily variations in concentrations of several air pollutants and long-term average concentrations of fine particles, sulphate particles and sulphur dioxide are associated with and are likely to be the cause of a range of effects on the cardiovascular system.
- The impacts on public health implied by these associations, though not as large as those arising from factors such as family history, active smoking and hypertension, are important and that a precautionary approach should be adopted in future planning and policy development.
- Clear associations have been reported between both daily and long-term average concentrations of air pollutants and effects on the cardiovascular system, reflected by a variety of outcome measures including risk of death and of hospital admissions[1].
- Many of these associations are likely to be causal in nature. Because of the implications for public health, a precautionary approach should be adopted in future planning.

[1] This conclusion is based upon the large number of studies that have yielded positive and statistically significant associations and is supported by the results of formal meta-analysis.

Two suggested mechanisms

- That the inhalation of particles found in the air set up an inflammatory response in the interstitium of the lung, provoking an increase in the likelihood of blood to clot and/or atheromatous plaques to rupture, leading to heart attack.
- That a reflex effect on the heart to particles is provoked by the interaction of pollutants, or secondary factors produced by inflammation, with receptors in the airways and lung, subtly affecting the control of the heart's rhythm.

The hypotheses should not be regarded as mutually exclusive.

Quantifying The Effects of Air Pollutants on Health

Dr Heather Walton, Miss Inga Mills, Dr Robert Maynard

One of the major tasks of the Air Pollution Unit is to provide estimates of the impacts of air pollutants on health that can be used in development of the Defra-led Air Quality Strategy. Developing these estimates forms an important part of the work of COMEAP. COMEAP has published two reports in this area[1,2] and is currently updating these. This is a large task and will take up to a further two years to complete. The first aspect of the problem to be considered is the relationship between long-term exposure to fine particles ($PM_{2.5}$) and mortality. COMEAP will be publishing a report on this and on the association between long-term exposure to air pollutants and morbidity later this year. A statement of Members' advice on the former association has been published on the COMEAP website[3], highlights of which are reproduced in box 1.

1. Department of Health. Committee on the Medical Effects of Air Pollutants. Statement and Report on Long-Term Effects of Particles on Mortality. London: The Stationary Office, 2001. Statement available at: www.advisorybodies.doh.gov.uk/comeap/statementsreports/longtermeffects.pdf

2. Department of Health. Committee on the Medical Effects of Air Pollutants. Quantification of the Effects of Air Pollution on Health in the United Kingdom. London: The Stationary Office, 1998. Report available at: http://www.advisorybodies.doh.gov.uk/comeap/statementsreports/airpol7.htm

3. Department of Health, Committee on the Medical Effects of Air Pollutants. Quantification of the Effects of Air Pollutants on Health in the UK. Interim Statement 18th January 2006. http://www.advisorybodies.doh.gov.uk/comeap/state.htm

BOX 1

Highlights from COMEAP statement

QUARK II Members' advice on the relationship between long-term exposure to fine particles ($PM_{2.5}$) and mortality

Our interim conclusion is, then that the effects on mortality of long term exposure to a mixture of air pollutants, represented by $PM_{2.5}$, are best characterised by the following coefficient, expressed in terms of the percentage change in Relative Risk of all-cause mortality per 10µg/m3 change in annual average $PM_{2.5}$:

1.06 (95%CI: 1.02-1.11)

- We note that this represents a change from that provided in our last report. This reflects the expansion of the evidence-base in this area and our deeper understanding of the effects of pollutants, and other factors, on health.
- Calculations should focus on the benefits likely to be delivered by changes in $PM_{2.5}$ rather than on estimating the total impact on health of current $PM_{2.5}$.
- Although the evidence is limited, our judgement tends towards a greater proportion of the effect occurring in the years soon after pollution reduction rather than later.
- The coefficient is based on the averaged exposure period reported by Pope et al[1] as our best, current estimate of that linking $PM_{2.5}$ and all cause mortality in the UK.

1. Pope, C.A.III, Burnett, R.T., Thun, M.J., Calle, E.E., Krewski, D., Ito, K. and Thurston, G.D. (2002) Lung cancer, cardiopulmonary mortality and long-term exposure to fine particulate air pollution. JAMA. 287(9), 1132-1141

Other reports produced by COMEAP include:

- Report: Guidance on the Effects on Health of Indoor Air Pollutants - 2004
- Executive summary of report: Do particulates from opencast coal mining impair children's respiratory health? - 1999
- Report : The quantification of the effects of air pollution on health in the United Kingdom - 1998
- Report : Non-biological particles and health - 1995
- Report : Asthma and outdoor air pollution - 1995

Statements produced by COMEAP include:

- Interim statement on the Quantification of the Effects of Air Pollutants on Health in the UK - 2006
- Statement on the Use of Substitute Fuels in Cement Kilns - 2005

These and other reports and statements produced by COMEAP can be found on the COMEAP website: http://www.advisorybodies.doh.gov.uk/comeap/state.htm

Future reports for 2006 – 2007

Quantification on the Effects of Air Pollutants on Health in the UK - II
Does Air Pollution Cause Asthma?
Ozone – Health Implications in the UK

Conference Reports

Dioxin 2005 – 25th International Symposium

ISPAC 20 – 20th International Society for Polycyclic Aromatic Compounds, 21–26 August 2005

FLUOROS – An International Symposium on Fluorinated Alkyl Organics in the Environment

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Three international symposia took place in Toronto in August 2005. The centrepiece was Dioxin 2005, which was run over six days in parallel with the 20th annual meeting of the International Society for Polycyclic Aromatic Compounds (ISPAC). These were preceded by Fluoros, the first major international symposium to be held on fluorinated alkyl organics in the environment.

In recent years the scope of the international Dioxin symposium, which has taken place annually since its inaugural meeting in Rome in 1980, has been extended to cover other halogenated POPs (persistent organic pollutants) such as polychlorinated biphenyls (PCBs), chlorinated naphthalenes and, more recently, brominated flame retardants (BFRs). Perfluorinated compounds were also introduced for the first time, as the subject of a plenary session. The ISPAC symposium was run concurrently with Dioxin 2005. Polycyclic aromatic hydrocarbons (PAHs) meet some of the criteria for POPs, being persistent and toxic, although they have less tendency to bioaccumulate since they are quite readily metabolised by most vertebrates. The two symposia merged very effectively

Attendance provided the opportunity to meet fellow scientists from around the world with similar interests, and to learn about progress in key areas of interest as well as about emerging issues – in my case relating to food safety and dietary exposure. About four hundred oral presentations were delivered in up to nine parallel sessions running at any one time, and 400 posters were displayed over two 2-day sessions.

There were toxicology-related sessions on dioxins, covering epidemiology, the diversity of toxic effects, metabolic pathways, Ah receptor signalling and the impacts of dioxin-like chemicals on reproduction and development, as well as sessions on the toxicity of flame retardants and on the mutagenicity, bioavailability and metabolism of PAHs. Two sessions dedicated to human poisoning included a well-attended account of the dioxin poisoning of the unfortunate Mr Yushchenko (J J Ryan, Health Canada) and a presentation of the latest follow-up studies from Seveso (P Mocarelli, Milano Bicocca University). Two plenary lectures were among the highlights of the symposium. Stephen Safe (Texas A & M University) took us through the history of research into dioxin toxicity and modes of action, and the efforts to understand how such exceedingly low doses of dioxin can have endocrine disrupting effects. In an entertaining and provocative talk on the final morning, Martin Van Den Berg (Iras Utrecht University) argued the case that advances in analytical chemistry, particularly great leaps in sensitivity, were driving the regulatory agenda whilst the international toxicology community was damaging its own reputation by failing to reach a consensus on the best way to conduct risk assessment in order to properly identify health risks.

Three hundred delegates attended Fluoros. The organisers had originally planned for less than one hundred and the high attendance gave an indication of the rapid rise in interest in this field. Four main presentation sessions, covering environmental fate and transport, analytical chemistry and monitoring, toxicology and risk assessment and regulatory policy, were each followed by an accompanying poster session. Despite the amount of work already being conducted and reported, it was apparent that there are a lot of knowledge gaps regarding fluorinated POPs (persistent organic pollutants). Although they have a range of toxicological actions and some are potentially harmful by ingestion, there is a lack of available information about either their precise mode(s) of action or effective dose levels. There is also very little reported about their presence in food. The Food Standards Agency's first total diet study of PFOS and related compounds is due for publication in Spring 2006.

The 2006 Dioxin symposium will be taking place in Oslo in late August (http://www.dioxin2006.org/), before moving to Tokyo for 2007. In 2008 it comes to the UK and will be held at the National Exhibition Centre in Birmingham. Preparations are already underway.

Contaminated Land Update, Birmingham NEC, 14 February 2006.

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This conference was organised by the National Society for Clean Air and Environmental Protection (NSCA) and included a wide-range of interesting topics related to land contamination. The presentations covered planning, economic development, contaminated land guidance/policy, public communications, site investigation methods and contaminated land in conveyancing transactions. The speakers presenting at the conference work in a range of different roles, in both the public and private sectors. Of particular interest to environmental public health were the presentations on planning guidance, contaminated land guidance/policy and 'good practice' in developing strategies for communicating with the public during remediation.

Following the opening remarks by David Rutland (NSCA Land Committee), an interesting presentation was given by Paul Pearse from the planning subgroup of Chartered Institute of Environmental Health Standing Conference on Land Contamination (SCLC). This presentation included a case-study which illustrated difficulties encountered due to land contamination on a site undergoing redevelopment. He referred to recently developed planning guidance that should lead to a greater consideration being given to the potential for land contamination during the planning process. One key guidance document is Planning Policy Statement 23 (2004)[1] This includes that where contamination is known or suspected, planning applicants should provide information as to determine whether a development can proceed and recommends the use of a tiered risk assessment (CLR 11)[2]. PPS 23 further states that local planning authorities should refuse permission if the information available suggests the possibility of contamination or of unacceptable risk. In addition to PPS 23, the SCLC is developing complimentary guidance for planning in England and is developing a PPS23 training tool. One of the main aims of this work is to increase awareness of land contamination during the planning process.

A technical, policy and legislation update on contaminated land was given by Steve Griffiths from Defra (Department for Environment, Food and Rural Affairs), who discussed developments towards a Directive on Environmental Liability and proposed changes to the Water Framework Directive. With regard to Part IIA, considerations are underway on what is 'significant' with regard to pollution of controlled waters. In addition, the first version of RCLEA (for assessing radioactively contaminated land) is now available[3] (see website for further details) and work is underway on the inclusion of radiation in Part IIA of the Environmental Protection Act[4]. The presentation ended with a report on future developments, which are to include the ongoing release of new soil guideline values (three new draft SGVs are reportedly being peer-reviewed). In addition, it was mentioned that Defra were considering possible options put to it by Soil Guideline Value Taskforce on developing further guidance for assessing the 'significant possibility of significant harm' associated with land contamination.

A very interesting presentation was given by Christina Leafe (from Atkins Consultants) on communicating with the public during the remediation of housing estates under Part IIA. The presentation included two case studies to illustrate 'good practice'. From these studies she recommended that local authorities, Primary Care Trusts, the Health Protection Agency and private consultants should be jointly involved with public communications.

In summary, the diverse nature of the conference programme provided a good overall view of current land contamination issues from the perspectives of those working in government on guidance/policy development and those working in the public and private sectors on contaminated land risk assessment. It also provided a usual overview of current issues faced by environmental health officers/contaminated land officers. The conference also illustrated that partnership working is most likely to result in the most appropriate management of land contamination issues.

To obtain further information about the National Society for Clean Air and Environmental Protection courses please see http://nscaorguk.site.securepod.com/shop/index.cfm?obj=8

1. Planning Policy Statement 23 (2005), Office of the Deputy Prime Minister http://www.odpm.gov.uk/index.asp?id=1143917
2. DEFRA and Environment Agency (2002) Model procedures for the management of land contamination (CLR 11)
3. For information on assessing radioactive land contamination*: http://www.defra.gov.uk/corporate/consult/radioactivity-rclea/index.htm
4. For information on radioactivity and land contamination and Part IIA*: http://www.defra.gov.uk/environment/radioactivity/conland/index.htm

*last accessed on 27/02/2006

Water Contamination Events: Communication with Consumers. Inaugural conference of the Institute of Public Health and Water Research, USA. Houston, Texas, USA. 30-31 January 2006.

Dr John Gray, Deputy Chief Inspector, Drinking Water Inspectorate
Professor Virginia Murray, Chemical Hazards and Poisons Division, Health Protection Agency

The inaugural conference of the Institute of Public Health and Water Research IPWR) was held in Houston, Texas in January 2006. IPWR is a new organisation based in Illinois, USA. The IPWR mission statement is to improve public health through quality drinking water.

The conference was a workshop of forty invited experts from the USA, Canada, Australia, Israel, South Africa, Peru, Porto Rico and UK. Formal presentations were made covering issues associated with communications with water consumers. Systems in the various countries were reviewed such as Veronica Blette from the Environment Protection Agency, US and Dr John Gray from the Drinking Water Inspectorate. By using examples of microbiological and chemical events, issues about communication with consumers were considered. Twenty two stimulating presentations were followed by pertinent wide ranging discussions.

Microbiological outbreaks summarised

Dr Steve Hrudey, University of Alberta, Canada presented an overview of a number of microbiological water contamination events including the May 2000 Canadian Walkerton incident where E. coli 0157:H7 and Campylobacter bacteria caused 7 deaths and more than 2,300 cases of waterborne disease. He considered that lessons of these incidents had been identified but were still not learned[1]. Other incidents presented included a part summary of the recent Welsh Cryptosporidium incident and the contamination with Cryptosporidium and Giardia of drinking water supplies to Sydney in 1998. In this incident, Paul Byleveld of the New South Wales Department of Health (NSW DH), Australia, reported that advice to boil water was issued over a period of two months to some three million consumers. Increased surveillance by NSW DH did not demonstrate an increase in disease. During the incident, protocols were developed to guide public health decisions, including advice to boil water. Subsequent review of the protocol allowed development of local protocols for E. coli and chemical contamination.

Chemical incident summary

Several chemical incidents were presented. Of note, Dr Gary Winston, Chief Toxicologist, from the Ministry of Health, Israel, reported on a high turbidity incident. This resulted from the dumping of 5,000 tonnes of ammonia near the main water pipe leading to contamination of the Dan Region water system in Israel in 2001[2]. The Department of Health, using the precautionary principle, advised the population not to drink the water until the source of the contamination was identified. This resulted in all local commercial bottled water supplies being rapidly exhausted. Initial investigation could not identify clearly a cause and only subsequent analytical investigation identified ammonia levels at concentrations up to 60µg/l. Bowsers (tanker trucks), meant to provide water supplies of 3 litres per day to the population, were not required although it was found that those who would fill the tanks did not know from where they should fill them. No adverse health effects were reported in comparison to the Lowermoor Treatment Works incident in the UK in 1988. Indeed the Israelis had incorporated the lessons identified from Lowermoor and used these in developing their preparedness. Gaps in readiness in planning identified from this incident were identified and these have now been remedied. Winters went on to state that no matter how minor the contamination event or short term disruption of safe drinking water, medical, psychological and public health impacts can be significant. He emphasised the need for details of each incident to be published so that others can learn from mistakes. He questioned the need for a journal dedicated to environmental crises and sharing the information with the scientific community.

WHO guidance for Water Safety Plans

Dr David Dury, Drinking Water Inspectorate, UK and Paul Byleveld, NSW DH, Australia described the key components of the WHO water safety plans (WSPs). WSPs take a risk prevention approach to the management of water supply systems from catchment to the tap. This Framework replaces the usual emphasis on end-point testing with an holistic assessment of all risks to identify early and then correct potential problems.

Tsunami 2004 emergency response for water provision

Paul Byleveld, NSW DH, Australia, reported his experiences in responding to the 26th December 2004 tsunami in the Indian Ocean. He and colleagues went to Banda Aceh, Indonesia, which had had a reticulated supply from a water filtration plant (for 25,000 households) with smaller treatment plants, household wells and bottled water prior to the tsunami. Many supplies became unuseable with the distribution systems destroyed with the well published problems associated with the provision of shelter and health care and the management of the dead. Military and non governmental organisations from many countries were sent to Banda Aceh. Some organisations provided mobile water treatment plants producing clean water which was tankered to displaced persons camps. In addition, bottled water was quickly distributed. Local coordination and communication pointed to the vital need for regular water and sanitary network meetings between Indonesian Government officials and the community, the NGOs and other volunteers to make sure that the support was that which was needed by the community. For example, historically Indonesia expects that all households will boil their drinking water and it was important that these local systems were respected and maintained.

Communication with consumers

From these and other presentations it was clear that issues relating to communication were the theme of the meeting.

• Potential issues for water companies

Jeanne Bailey from Fairfax Water presented with the American Water Works Association a summary of communication concerns for water companies. These concerns were sharpened by the experience of the power failure in Fairfax, Virginia, on September 18th 2003 at 23.18 hours. This caused ultimate water pressure failure leading to a boil water notice and failure of the water supply to homes, hospitals and businesses. Recovery of the system was completed within 24 hours. However, there was on-going concern about potential backflow in the distribution system which thus potentially required relevant toxicological investigations. The issues identified included

- Was the message ‘boil water’ useful when consumers, as well as the water utility, had no power?
- What are the triggers for public health messages in potential infective and/or chemical water contamination situations?
- Clarification of communication methods via clear command and control systems is essential and should be pre-planned and take into account power outage issues.

• Pointers towards successful crisis communications

Professor Paul Hunter, University of East Anglia, UK, by use of a range of incident examples, brought together the problems relating to decisions about when to ‘go public’ and tell the local population of potential health risks. He said that it is one of the most difficult decisions in incident management since every microbiological and/or chemical water incident is unique. Therefore decisions about when to ‘go public’ should not be an issue for a water utility in isolation but should be taken by the local public health community. Importantly, public health professionals must ‘go public’ if there is any risk to public health and especially if the public are able to reduce risk, possibly by boiling water. However it is important to remember ‘going public’ can cause more harm than it prevents should those boiling water being scalded or burnt. He stated that the decisions about ‘going public’ should be based on a risk assessment unbiased by commercial or political interference. He also expressed concern about the fact that there were often limited opportunities for junior public health professionals to gain experience in outbreaks and chemical incidents and thus to be able to experience the making of the decision about ‘going public’.

Professor Pat Kendall, Colorado State University, US quoted Peter Sandeman’s comment: ’the risks that kill people are not the same risks that frighten and anger people’. She considered that communicating about risk should generate rational alertness rather than irrational hysteria. However, rapid crisis communication is difficult because:

- many needed facts are often unknown
- communication channels may be damaged either by lack of power or even population evacuation
- multiple agencies involved may disagree on how best to proceed

Therefore Kendall supports experts who recommend that risk communications should avoid ‘finger pointing’ comments, acknowledge uncertainties and limits of expertise, accept emotions as legitimate, carefully consider the presentation format, be careful about making cross-hazard comparisons and accept that risk decisions are better when the public shares the power.

Dan Rutz, Special Assistant for Communications, National Centre for Infectious Diseases, Centre for Disease Control and Prevention, US, in his presentation of ‘Engaging the media – influencing the public during high risk events’, stated that science needs communication expertise. He considers it is important to connect with those who matter, particularly the consumer, and to remove barriers to co-operation and to relieve tensions. Early information sharing in a developing incident, even if insufficient data is available, is essential along with the ability to be able to communicate uncertainty safely. He considers it vital that those public health professionals providing advice on an incident provide the relevant data rather than allow others to fill any gap. He recommended working with other responding agencies and organisations so that consistency is apparent. He agreed with Kendall recommending developing ‘partnerships’ with the public so that they are clearly part of any required communication. He quoted Lee Clarke, Rutgers University Sociologist, who has stated that ‘disasters, even worst cases, are normal parts of life’.

• Towards communication with vulnerable communities

Dr Phyllis Nsiah-Kumi, Division of General Internal Medicine, Northwestern University, Chicago, US, eloquently discussed the issues of providing information for vulnerable communities. She quoted the Institute of Medicine’s 2002[3] report that ‘to maximise communication effectiveness, one should adapt message formats, sources, channels and frequency of exposure for different audiences. Factors such as age, gender, race/ethnicity and sexual orientation all draw on different interactions with the world and lead to different understandings of what is important and what is appropriate.’ She recommended working with community leaders to develop, evaluate and refine messages, ensuring that they are appropriate for the targeted audience before they are released to the community as a whole.

- How well do consumers receive and respond to public health water communications?

Hurricane Katrina and Hurricane Rita in the autumn of 2005 had a major impact on the citizens of the Gulf States of the US. Dr Ram, State University of New York at Buffalo, presented an elegant project on the awareness of and compliance with boil water notices from relevant local water companies after Hurricane Rita. A cross sectional survey of 196 residents from randomly selected mobile home communities in the Calcasieu and Cameron Parishes in south western Louisiana was undertaken. The findings pointed to poor awareness of the boil water notices by the 97 responders who were still subject to the notices, with only 30 (31%) aware of the orders. Of these, 10 (42%) reported actually boiling their water. Disruption to the gas and electricity will force alternate disinfection systems and Ram recommended that these should be planned for in preparing public health warnings before a known or expected event such as a hurricane or for a microbial contamination or a chemical incident.

Conclusions

This valuable meeting has shown that there is a real need for coordinated work to consider a range of issues relating to communicating with consumers. Proposals to develop clear strategies for communicating public health messages during water contamination incidents were now thought to be urgent. The topics that most need to be addressed were:

- How to undertake hazard and risk assessment to provide initial assessment; this should include the water provider, public health officials and the regulator working together and with others if required
- What type of notice and its content
- When should these be issued
- How to communicate and the advantages and disadvantages of different means of communication
- Who should give messages, with particular emphasis on issues relating to communication with vulnerable populations, ethnic minorities and native people
- What may be different if more chronic persistent recurring problems

Plans are in place to publish the proceedings and the report on the deliberations of the conference in a peer reviewed journal. Further research topics were also identified and from the chemical point of view there is a need to undertake an international review of acute and chronic water chemical incidents to consider the identification of, response to and communication with consumers.

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7th International Health Impact Assessment (HIA) Conference: Making the difference 5th-6th April 2006, Wales Centre for Health and the Welsh Health Impact Assessment Support Unit

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On the day preceding the formal conference, there was a short training session which introduced the screening tools that can be used to assess whether a comprehensive HIA is required. A variety of HIA guidance tools were used to assess different proposals in two groups, but there was little structured guidance to help those inexperienced with HIA to benefit from others with more experience. The conclusion of both groups was that the toolkits simply containing boxes to write in were too unstructured and a more ordered checklist approach was the most user-friendly, such as that produced by the Greater London Authority (GLA). A number of HIA guidance tools, including the GLA toolset, can be accessed using the links below:

http://www.hiagateway.org.uk/page.aspx?o=501787
http://www.who.int/hia/tools/toolkit/en/

The conference itself consisted of 21 presentations, 10 workshops and 5 plenary sessions, which presented a great opportunity to gain valuable information, though it proved a demanding schedule. Delegates from across Europe, America and the Far East lent a distinctively international flavour to the talks and although the attendees were mainly health professionals, there were enough representatives from other areas (e.g. planning) to provide a rounded view of the issues.

The conference commenced with some excellent presentations highlighting the particular need to focus on inequalities in health within HIA. Background information was provided regarding key policies in Wales that aim to mitigate health inequalities, and the Sustainable Health Action Research Programme (SHARP) was detailed. Subsequently, some words of caution were provided regarding the effectiveness of policies that are meant to improve health. A frank discussion highlighted some of the areas where HIA had not worked and other areas where it had been successful. An example of the former was the scheme to increase childhood instruction in bicycle road safety in Scotland that resulted in a higher number of accidents, especially in the deprived children that the HIA was hoping to assist. Whilst an example of the latter was the redesign of town centres, with the help of HIA, that improved a large number of health determinants. The overall message was one of exercising caution when using expert judgement, as 'plausible assumptions' are often wrong. Sensible ideas like using CCTV cameras in city centres, toughened beer glasses in pubs and raids on crack houses in the US, lead to, respectively, no lowering in crime, an increase in the number of injuries in bars and a complete waste of police resources. In general structural interventions are likely to be more effective than educational and behavioural interventions. Health assessment data should provide feedback to improve the health impact assessment process, using for example systematic literature searches and randomised control trials.

The role of HIA informing a variety of planning decisions is increasing and good practice was identified from other related areas, including Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA). The information gained was helpful in the development of the Health Protection Agency's guidance on integrating health into the SEA process. The latest version of the two-page guidance document on SEA and health should be available for downloading from the Chemical Hazards and Poisons Division's website[1] in the next few weeks. (http://www.hpa.org.uk/chemicals/)

We both found the event extremely informative and many useful contacts were made. Next year's event will be held in Ireland and I believe the proposal is to bring a 'friend', this will ideally be a planner so that the exercise will be less one of exchanging ideas between the converted and more about directly influencing the mindset of planners and decision-makers.

Environmental and Occupational Epidemiology 2nd one day UK & Ireland meeting, Friday February 17th, LSHTM

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In April 2005, the first one-day spring meeting on Environmental and Occupational Epidemiology took place in London and attracted 75 people[1]. The meeting was judged a great success and enabled cross-fertilisation between those with an interest in environmental and occupational epidemiology. To further develop these disciplines in the UK and promote collaborative working, the second one-day meeting took place on 17 February 2006, at the London School of Hygiene and Tropical Medicine, attended by over 100 people. The Health Protection Agency agreed as last year, to help in meeting preparation and organisation, and this meeting is integrated into the training provision of CHaPD, London. The next 1 day meeting is intended to be held during Spring 2007.

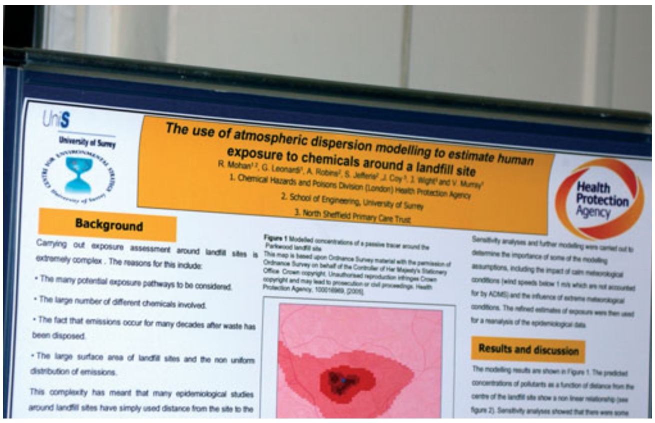
The day is aimed towards those with an interest in both environmental and occupational epidemiology, from the UK, Ireland and internationally. The recent and rapid expansion of occupational and environmental epidemiology and health risk assessment looks set to continue in line with growing public, government and media concern about occupational and environmental health issues, and a scientific need to understand better and explain the effects of occupational and environmental pollutants on human health. The aim of the meeting is to examine various topics in a more informal environment to encourage discussion and collaborative networking between academics and public sector workers with an interest in appraising environmental and occupational epidemiology, for risk management and standard setting. As well as enabling the showcasing of current work through poster presentations coupled with a short oral presentation of the work, and two plenary sessions with invited speakers.

The lectures given in the plenary sessions in the morning were, Illness in the absence of underlying demonstrable pathology, by Professor David Coggon; followed by Methods for quantifying the burden of occupational cancer, by Dr Lesley Rushton.
In the afternoon session we heard about: Manufacturing uncertainty: science, (EU) policy, and particles, by Professor Bert Brunekreef; Post script: Health Impact estimates of policies to reduce exposure to particles in EU and in UK, by Fintan Hurley; and finally, The myth of over-adjustment for confounding in occupational and environmental epidemiology, by Dr Ben Armstrong.

[1] **http://www.lshtm.ac.uk/pehru/envoccepi/**

Twenty posters were presented in two sessions, under four key headings: 1) Registries, surveillance and risk assessment and impact, 2) Occupational studies, 3) Respiratory health and stroke, and 4) Studies of point sources. Finally, an award was presented to Richard Mohan of CHaPD, London for the best poster presented at the meeting, as chosen by the conference organising committee. His poster was titled: The application of atmospheric dispersion modeling and Geographical Information Systems (GIS) to improve estimates of human exposure to chemicals around a landfill site for an epidemiological study, and was based on his doctoral thesis written on work undertaken for the HPA.

HPA staff discussions © Anne Koerber, 2006



Award winning poster © Anne Koerber, 2006

Protecting children from established and uncertain chemical threats: Tools and mechanisms for information towards prevention, WHO Workshop, 17-19 October 2005, WHO, Geneva, Switzerland.

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This workshop was convened by WHO to explore mechanisms for collecting data and disseminating information on preventive actions to protect children from hazardous exposure to chemicals[1]. This was a response to one of the recommendations of the Fourth Session of the Intergovernmental Forum on Chemical Safety held in 2003 in Bangkok, "Governments and stakeholders should commit to sharing information on options for taking effective action to protect children from established chemical threats and from chemical risks where there is a degree of uncertainty".

Delegates presented case studies from India, Indonesia, South Africa, Zimbabwe, Tanzania, Ecuador, and international campaigns to illustrate

- methods used to communicate with different audiences
- strategies for communicating uncertain risks
- factors influencing successful communication of risk

Communicating with different audiences

Information about chemical threats can be complex and difficult for non-scientists to understand. The importance of making sure that the target audience understands information given to them, and that it is culturally appropriate and relevant to their circumstances, was emphasized by several speakers.

Two presentations described how professional communicators had been involved in the development of campaign messages and materials to increase the effectiveness and acceptance of the message. The Global Mercury Project[2], working to reduce children's exposure to mercury in the gold mining areas of Tanzania, Zimbabwe and Indonesia, sought advice from anthropologists about the best approach to communication with the local community. The Paraffin Safety Association of Southern Africa[3] used adult education specialists to develop campaign messages, methods of communication and education materials. As a result they have produced printed materials that are attractive, lasting and able to create sustained interest; while also being sensitive to age, language, literacy levels, gender issues, rural and urban needs, and socio-economic status.

Communications experts also have a role in making scientific information accessible to people without scientific training. Ms Dumanoski, a professional writer and journalist, described her collaboration with two scientists to write a popular book about endocrine disrupters[4], that brought together evidence scattered across many scientific disciplines and raised public awareness of a previously unrecognized risk.

Communication of uncertain risks.

Three presentations described the problems of risk communication when the risk is uncertain. A case study from India illustrated the difficulty of communicating complex chemical risks. In this case, women and children were using a hazardous solvent in the production of incense sticks in home workshops. The women were told that there was a risk of mutagenicity, genotoxicity, and possibly carcinogenicity, but, because they were unable to see any obvious evidence of harm, and faced with the threat from their employers of losing their work if they agreed to take part in health studies, the women took no action to reduce their own or their children's exposure.

A better response was obtained by a team in Ecuador concerned with communicating to agricultural workers the risk from exposure to low levels of pesticide. The team focussed on demonstrating exposure rather than communicating a message about health effects. A fluorescent tracer was used to provide striking visual evidence of contamination.

Similarly, an international campaign that successfully motivated activities to prevent exposure to phthallates, avoided focussing on uncertain health effects. Instead the campaign messages focussed on raising awareness of sources of exposure, the potential vulnerability of children, and ways to prevent exposure, such as using safer alternatives.

Involving the community in risk management

Two presentations described the effectiveness of involving local people in risk management.

The ILO-IPEC Footwear Project[5] working in collaboration with the Lowell Center for Sustainable Production at the University of Massachusetts Lowell, successfully reduced the numbers of children working with harmful solvents in footwear workshops in Indonesia. A key factor in the success of the project was the strategy of training local people to deliver health and safety information to their communities and to undertake workplace monitoring. They visited families and workshops, gathering detailed information, not only about working conditions but also about social needs. Their understanding of local concerns and ability to communicate effectively with the local community were important factors in building mutual trust and good relationships. The Project also facilitated organization of the community to address social problems and improve child education and welfare, training local people in community-level advocacy. The Paraffin Safety Association in South Africa also developed a strategy for training local people to be community messengers.

The outcome of the Workshop will be a document providing guidance on mechanisms for communication intended to stimulate action to protect children from exposure hazardous chemicals.

Relevance to the UK.

The issues discussed at the Workshop are also the subject of current discussion in the UK. For example, an evaluation of the effectiveness of a providing a counselling and advisory service to support the community in Weston affected by land contamination[6] concluded that health protection teams dealing with this type of incident should always include social scientists to advise on communication and work alongside communities to identify their needs. Communications experts should be more involved in the risk communication process to help identify what people know and what they are concerned about[7].

In a recent article about the current state of toxicology in the UK, the greater involvement of the public in making decisions about risk was said to be one of the main challenges. Experts need to give the public the information they need to become more involved in making decisions about their own risk profile, and make informed choices, and at the same time they need to listen to what the public are saying and embrace their concerns[8]. Improving communication between experts and the public will be the key to the implementing such a strategy.

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Spill 06 exhibition & the Interspill 2006 conference March 21-23, 2006, London Excel, Royal Victoria Dock, London E16 1XL

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The Chemical Hazards and Poisons Division is regularly asked for advice on the public health impacts of oil spills. The Interspill 2006 conference and Spill 06 exhibition was a key international platform for discussing and sharing experiences on how to prevent and respond to oil spills and focused on the delivery and exchange of practical and real-life information and dialogue. (http://www.spill06.co.uk/) It was aimed at professionals concerned about environmental issues related to oil spill pollution and prevention. It sought to assist the international exchange of information and technology with reference to the prevention, control, behavior and clean-up of oil spills.
The main theme of the conference was exploration of best practice regarding prevention and response to port, maritime, coastal, estuarine and inland oil spills. It considered spill surveillance, emergency response, dispersion and containment, computational modelling and monitoring, clean up, remediation and rehabilitation and salvage. Set within a framework of policy development and implementation, emergency preparedness and response, scientific research and development and environmental impact assessment, it had a wide appeal to international delegates.

Although not a major component of the conference, it was clear that public health implications of oil spills are an important consideration and underlines the strategic importance of the emergency planning and preparedness that is well established between the Health Protection Agency, the Maritime and Coastguard Agency and Environment Agency and others. The conference provided an opportunity to understand further important aspect of oil spill management, enhancing understanding and reinforcing integrated emergency planning. It was well supported by an impressive exhibition of salvage equipment, meteorological surveillance equipment, boons, dispersant technology and computational modelling software.

Training

HazMat Training For Emergency Departments

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[On behalf of the Ad hoc Emergency Department HazMat / CBRN Training Committee: Simon Clarke (ED Consultant St Thomas' Hospital), Jenny Kelly (LAS), Aidan Kirkpatrick (SpR Public Health NW Region), David Langley, Andres Marten (ED Consultant, Royal Free Hospital), Virginia Murray (CHaPD, HPA), Anna Prygodzicz (HPA), Mark Rainey (LAS), Roberto Vivancos (SpR Public Health, Eastern Region), Steve Waspe (LAS / ASA)].

Recent scrutiny by the National Audit Office (NAO) in 2002 of emergency department preparedness for an incident involving either chemical, biological or radiological agents found that there was scope for improvement.[1] There is a need to provide a focused and engaging way of raising emergency department awareness to the risks of hazardous materials (HazMat) including chemical, biological, radiological and nuclear (CBRN) agents. Since the NAO report, there have been a number of important developments.

In 2002, a Department of Health initiative issued chemical personal protective equipment (CPPE) and decontamination tents to all emergency departments and acute ambulance trusts. The NHS Structured Approach to Chemical Casualties was also provided for training in use of CPPE and decontamination techniques (rinse-wipe-rinse). During 2003 the Department of Health, as part of its goal at reducing Emergency Department (ED) waiting times, introduced the 4 hour target. This resulted in a significant demand on staff and administrative resources. Other performance indicators, this time introduced by the British Association of Emergency Medicine (BAEM), include the audit of three markers of clinical care – management of paracetamol poisonings, treatment of fractured hips and paediatric analgesia. During this period, standards of emergency preparedness were audited on an ad hoc basis although responsibility for this service provision remains with the Strategic Health Authorities through the acute hospital trusts' chief executives.[2,3]

In 2005, the Civil Contingencies Act came into force. This Act requires acute hospital trusts to have plans in place not only to respond to incidents (medical support) but also to maintain business continuity. The implications of this legislation for the emergency department are that:

- staff should be trained to manage these incidents using best practice
- clinically effective medical management of casualties (using evidence-based practice)
- maintaining a normal emergency medicine service during incidents and includes the prevention of the department being compromised by contamination

Competency themes

Educational needs should follow a competency framework identifying the knowledge and skills required to meet defined aims and objectives. This framework should also be compatible with the NHS knowledge skills framework (KSF), which in turn has implications for Agenda for Change and individual job descriptions for Emergency Department staff. Additional work on competency frameworks also identifies that certain attitudes may also be necessary especially when dealing with challenging situations such as a HazMat incident or undertaking tasks such as decontamination. Much of this work has been incorporated into pre-hospital care training.[4-6]

A review of current literature suggests that there is a minimum knowledge level expected of clinical staff when dealing with hazardous materials. Much of the information is based on nursing continuing education, but the competencies are appropriate to all clinicians (nursing, medical and ambulance). Non-clinical staff should also be included as their role during an incident may include initial recognition (receptionists), cordon control (security) and general support (estates and portering staff). Global levels of competency are therefore necessary to provide an overall department capability. The HazMat competency themes are listed in Table 1.[7-13]

Table 1 – HazMat competency themes

1. HazMat / CBRN awareness
2. STEP 1-2-3
3. Detection / screening
4. Personal protective equipment
5. Dealing with contaminated / contagious cases
6. Triage
7. Pattern recognition / diagnosis (4Is)
(Intoxication, infection, irradiation, injuries)
8. Chemical management
9. Biological management
10. Radiological management
11. Psychological management
12. Antidotes
13. Respiratory support
14. Pre-hospital response
15. Hospital response
16. Clinical leadership

Emergency Department staff and areas identified

Within the Emergency Department, there are a number of entry points where early recognition of either a contaminated or contagious patient is vital. These points should ideally be outside the department with importance on early notification by ambulance services. Other key areas in a department are those where unannounced patients may present – reception, waiting room, resuscitation room and ambulance reception area in some department's 'majors' area. Competencies should therefore include all emergency department staff from receptionist through to consultant. The themes also have application for other specialties throughout the casualty's management from pre-hospital through to the operating theatres and critical care units. Further work is intended to provide continuity in the knowledge and skills for clinicians dealing with patients exposed to hazardous materials and CBRN agents.

Areas of high risk may also require additional reminders and aide-memoirs to assist in the recognition, diagnosis and treatment of casualties. These areas give rise to the concept of geographical competency with themes including: awareness, decontamination and advanced life support. An example of an emergency department's areas of competency is shown in Table 2.

Table 2 - Geographical competencies and adjuncts

Area of competency	HazMat / CBRN Awareness	Decontamination	Advanced Life Support
Area of competency	Reception / Waiting Room Triage / Initial assessment Ambulance Reception Area Resuscitation Room	Decontamination Unit	Resuscitation room
Area Adjuncts	Awareness module Awareness posters	PPE module Screening/detection module Decontamination module Aide-memoirs	Pattern recognition module Clinical modules Aide-memoirs Patient group directives

Emergency department competency requirements

Specific HazMat competency themes can be applied to the departmental staff generating a matrix of department competencies that can be used for training and educational planning. Certain themes can be grouped into modules (A – I). These modules allow flexible training and tailoring to specific groups.

Table 3 - Emergency department competency matrix

COMPETENCES (EMERGENCY DEPT)		1 Awareness	2 STEP 1-2-3	3 Detection / screening	4 PPE	5 Dealing with C2 cases	6 Triage	7 Pattern recognition	8 Chemical management	9 Biological management	10 Radiological management	11 Psychological management	12 Antidotes (PGDs)	13 Respiratory support	14 Pre-hospital response	15 Hospital response	16 Clinical leadership
MODULES		A	B	C			D	E	F						G	H	I
Nursing	Senior nurse	●	●	●	●	●	●	●	○	○	○	○	○	○	○	●	●
Nursing	ED Nurse Practitioner	●	●	○	○	○	○	●							○	●	○
Nursing	Junior nurse	●	●	○	○	○	○	○								●	○
Nursing	Technician	●	●	○	○	○	○	○								●	
Nursing	Decon team member	●	●	●	●	●	○	○								●	
Med	Consultant	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	●
Med	SpR / middle grade	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●	○
Med	Junior doctor (SHO)	●	●				○	○	○	○	○	○	○			●	
Med	Medical student	○	○													○	
Non-clinical	Receptionist	●	●														
Non-clinical	Decon team member	●	●	●	●	●										●	
Non-clinical	Porters / Security	●			○	○										○	
Non-clinical	Senior / site manager	●														●	

KEY
● Essential, ○ Desirable

Pre-hospital competency requirements

Using the same themes applicable to the Emergency Department, competency requirements can be identified for pre-hospital practitioners. As well as ambulance service personnel, other organisations may be required to provide medical support to special incidents including hazardous materials (i.e. British Association for Immediate Care, Helicopter Emergency Medical Services, voluntary organisations). In both the pre-hospital and hospital environment, clinical themes will have similar or identical components. There are however, operational differences between the two environments and these are likely to be reflected in training and course provision.

Table 4 - Pre-hospital competency matrix

COMPETENCES (PRE-HOSPITAL)		1 Awareness	2 STEP 1-2-3	3 Detection / screening	4 PPE	5 Dealing with C2 cases	6 Triage	7 Pattern recognition	8 Chemical management	9 Biological management	10 Radiological management	11 Psychological management	12 Antidotes (PGDs)	13 Respiratory support	14 Pre-hospital response	15 Hospital response	16 Clinical leadership
MODULES		A	B	C			D	E	F						G	H	I
Ambulance	Frontline Ambulance staff	●	●	r	○	b	●	○						○	●	○	
	Ambulance Incident Officer	●	●	○	○	○	○	○	○	○	○	○	○	○	●	○	●
	Bronze Decon Officer	●	●	●	●	●	●	●	○	○	○	○	○	○	●	○	●
	CBRN practitioner	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	
	TSO (CBRN)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	ECP	●	●	r	○	b	●	○	○	○	○	○	○	○	●	○	
	Patient transport staff	●	●														
Med	Immediate Care physician*	●	●	●	●	●	●	●	○	○	○	○	○	○	●	○	●
	Medical Incident Officer	●	●	●	●	●	●	●	○	○	○	○	○	○	●	●	●
	Hot zone MIO / practitioner	●	●	●	●	●	●	●	●	●	●	●	●	●	●	○	●

KEY

● Essential, ○ Desirable, r = radiological, b = biological * includes BASICS, pre-hospital nursing staff

Training Methods

There has been much research into the best training methods for this area of emergency response. Again, work from nursing educators suggests that face to face training is preferred. The retention of knowledge and skill fade are cause for concern especially when HazMat incidents are infrequent.[14-15] As well as training, exercises are important not only to reinforce principles learnt but to also act as an assessment tool. A regular exercise programme will also help to refresh individual memory. Exercises can be used as a way of fine-tuning local plans based upon a generic training programme. Suggested exercises include tabletops, walkthroughs, real-time run-throughs as well as full-scale exercises with simulated casualties.[16-18]

Table 5 – Training methods (ranked)[14]

1. Face-to-face
2. Online web-based courses
3. Self-instruction
4. Videotapes
5. Videoconferencing
6. CD/DVD for the computer
7. Satellite broadcasts
8. Newsletters, pamphlets, reference cards

Summary

The application of a HazMat / CBRN competency framework into the Emergency Department achieve will have two effects. It will not only enhance emergency response to these rare but potentially catastrophic events but will also provide additional skills and knowledge to enhance an individual's portfolio. The framework is a working document and additional modules could be created to reflect new developments in the response to new threats, such as blast injuries and urban search and rescue. The overall capability of an Emergency Department to respond to significant events and maintain a normal emergency service can be seen as a form of health resilience.

The complete HazMat competency framework is available from CHaPD(L) and the author for further information and discussion. It provides a framework to develop department training and exercises.

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Hanover Command Band Exercise 3-4 February 2006

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Introduction

The Anti-Terrorist Branch of the Metropolitan Police Service hosts regular exercise with key partner agencies and other stakeholders to develop successful multi agency working. Along with other organisations the Health Protection Agency (and pre-existing parent bodies) has over the past five years continued to engage and contribute to the highly successful weekend exercises. These exercises usually reflect local, national and international events and address a series of issues to improve multi agency working.

The programmes include pertinent presentations relating to the scenario on Day 1 followed by a full morning on the scenario with several groups playing at Silver and one group playing at Gold. All groups then report back on the afternoon of Day 2 and shared lessons are identified.

Police, Fire and Ambulance are key players but others have included industry, scientific advisers, local authorities, government agencies and international observers. Over the years they have been good enough to allow the National Health Service and the Health Protection Agency to attend and contribute to the play in the scenarios. These scenarios have contributed extensively to the constantly improving multi-agency working which is required in all major incident response in London and elsewhere in the UK

The February 2006 scenario

Since the Buncefield fire occurred in December 2005 it was considered pertinent to play a scenario based on this incident. A superb presentation by Roy Wilshire, Chief Fire Officer, Hertfordshire Fire Brigade showed the issues identified at Buncefield fire was used to set the scene. A report from the Chemical Hazards and Poisons Division of the Health Protection Agency on their work at Buncefield fire Gold was provided. A report on the Urban Search and Rescue developments in the Fire Brigade showed the exciting developments that are occurring in this area of work. An industry based representative discussed the workings at an oil depot on which the scenario was based.

Learning identified

Some of the issues identified from the scenario are listed below:

- The need for Early Alerting project in London was highlighted (Paddock, 2005)[1]. This project has been set up in order to improve and shorten the lead time for notification of a chemical incident in order to preparing for response more rapidly.
- Environmental sampling issues were discussed. In part these are being addressed by the current mobile laboratory project being developed by the London Fire Brigade to provide scientific support units.
- It was considered that there was a need for the development of evidence base for understanding the size of cordons and any potential evacuation zone that might be needed. In principle where possible the Government guidance of 'Go in, Stay in, Tune in'[2] was supported as the best strategy to follow if possible.
- Front line responders may potentially require personal protective equipment to minimising exposure to potential respiratory toxins. These issues have been identified from other incidents such as the World Trade Centre events on 11th September 2001[3].
- Occupational health co-ordination between all responding agencies was considered to be a priority and it was suggested that it would be important for Gold to request early that the Health Advisory Team should facilitate such collaborative work across all agencies and then to report back to Gold.
- The need for long term follow up after Gold has completed its task and stood down was considered. It was suggested that under Civil Contingencies Act it may be important for a coordinating science group, if needed depending on the incident, could continue to report to the Local Government Office such as the London Resilience team.

As far as preparedness was concerned, issues relating to COMAH planning to involve the NHS and the Health Protection Agency were identified. NHS may need to consider hospital preparedness and for them to include the locality of the hospital and awareness of any local COMAH sites and their potential risks.

Conclusion

Attendance at Hanover Command Band CT exercises are to be commended to all who are likely to be working at Strategic (Gold) level or at Tactical (Silver) Level in a major incident. They provide an excellent opportunity for learning in a multi-agency forum. The success of these weekends in undoubtedly due to the commitment shown by all participants both in the scenario led exercises but also on the informal discussions and networking opportunities that take place over the weekends. The individual and agency interactions and building of professional relationships has proven to be a key factor in the successful resolution of major incidents. The Health Protection Agency Health Emergency Planning Advisers can provide further information for those who may wish to participate.

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Training Days for 2006

The Chemical Hazards and Poisons Division considers training in chemical incident response and environmental contamination for public health protection a priority. The 2006 programme is being developed to offer basic and more detailed training, along with the flexibility to support Local and Regional Services initiatives as requested.

How to Respond to Chemical Incidents

28th November, Sherman Education Centre, Guy's Hospital, London
(For all on the on-call rota including Directors of Public Health and their staff at Primary Care, other generic public health practitioners, Accident and Emergency professionals, paramedics, fire and police professionals and environmental health practitioners)
The general aims of these basic training days are to provide:

- An understanding of the role of public health in the management of chemical incidents
- An awareness of the appropriate and timely response to incidents
- An understanding of the interactions with other agencies involved in incident management.

These training days also have specific educational objectives. These are, to be aware of

- The processes for health response to chemical incidents,
- The type of information available from CHAPD (L) to help the health response
- The resources available for understanding the principles of public health response
- The training needs of all staff required to respond to chemical incidents.

A maximum of 40 places are available.

Introduction to Environmental Epidemiology Short Course

18th - 22nd September, London School of Hygiene & Tropical Medicine, London
(This course is designed for those working in public health, health protection or environmental health and who have an interest in or experience of environmental epidemiology and would like to improve their skills).

The aims of this short course is to summarise the key concepts in environmental epidemiology, to explore the key concepts in exposure assessment and cluster investigation, to examine the scope and uses of environmental epidemiology in local agency response to public health and health protection issues. Also it will show how to explore study design and the practical consequences of choices made when planning and undertaking an environmental epidemiological study. This will include an appreciation of the influence of finance, politics and time constraints on the choice of study, to review the advantages and difficulties of multi-disciplinary and multi agency working in environmental epidemiology and to use strategies for communicating risks concerning investigation of environmental hazards. The fee for this course will be around £500. A maximum of 20 places are available.

Contaminated Land Training Day

27th September, Gassiot House, St Thomas' Hospital, London
(For Consultants in Health Protection, CsCDC, CsPHM and Specialist Registrars in Public Health Medicine and Local Authority Environmental Health Officers)

Land incidents are of considerable concern and present extremely interesting and important issues for public health protection. Occasionally land contamination may arise from acute events (such as spills, leaks etc) but most public concern now concentrates on chronic long-term contamination issues (waste disposal including landfills, an abandoned factory site, or other brownfield sites). These have resulted in chemical contamination of the soil and present, or have the potential to present, a risk to human health. It is anticipated that this training should provide delegates with the tools and information required to provide an appropriate and timely response to chemical incidents that result in land contamination. A maximum of 40 places are available for each course.

Environmental and Public Health Training Day – advanced update to include Integrated Pollution Prevention and Control (IPPC)

26th October, Sherman Education Centre, Guy's Hospital, London
(For the HPA Environmental Network, Consultants in Health Protection with a special interest in environmental contamination and Local Authority environmental health practitioners).

The general aim of this training day is to raise awareness of some recent developments in environmental science. The specific educational objectives include familiarising participants with current issues relating to environmental sciences including modelling, monitoring, risk assessment and relevant research topics. Using the IPPC regime as an example, the course will describe many if the key risk assessment tools and sampling methodologies used by industry and regulators. Case studies will include the Environmental Agency's H1 assessment tool and the use of air dispersion modelling in IPPC and Local Authority air quality review and assessment reports. A maximum of 40 places are available.

Those attending CHAPD (L) courses will receive a Certificate of Attendance and CPD/CME accreditation points.

The cost of the training days are £25 for those working within the Health Protection Agency and £100 for those working in organisations outside the Health Protection Agency. Places will be confirmed as reserved upon receipt of the fees. These charges are to cover lunch, training packs and administration costs.

All training events can be viewed on our website at
http://www.hpa.org.uk/chemicals/training.htm

For booking information on these courses and further details, please contact Karen Hogan, our training administrator on 0207 759 2872 or email chemicals.training@hpa.org.uk.

CHAPD (L) staff are happy participate in local training programmes or if you would like training on other topics, please call Virginia Murray or Karen Hogan to discuss on 0207 759 2872.

NETCEN Seminar on air quality impacts of the Buncefield fires

On Sunday 11th December 2005, there was a major explosion at the Buncefield oil depot; this caused one of the largest fires seen in Europe over the last 50 years, with massive plumes of smoke, particles and other pollutants seen from many kilometres away, and also clearly identified in satellite images. The event gathered saturation media attention and a groundswell of public concern about possible environmental and health impacts. However, a wide range of modelling and ambient monitoring studies showed that there were minimal ground-level impacts on air quality. Why was this? This is a key question that was addressed at a seminar on the Buncefield fires, organised by Netcen and Met Office for Defra and the Devolved Administrations. This event was held at the John Adams lecture theatre at Culham Science Centre, Oxfordshire, on Thursday 22nd June. A range of monitoring, modelling and health impact assessments were examined to provide a definitive picture of the incident and its aftermath.
http://www.airquality.co.uk/archive/news/buncefield_flyer2.doc

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