

Supra Regional Unit (Chilton), Centre for Radiation, Chemical and Environmental Hazards (Head Office), HPA, Centre for Radiation, Chemical and Environmental Hazards, Chilton, Didcot, Oxon, OX11 0RQ, [www.hpa.org.uk](http://www.hpa.org.uk).

## **Summary**

Centre for Radiation, Chemical and Environmental Hazards (CRCE) is continually striving to improve the data capture and utility of the on-line national Chemical Incident Surveillance System (CISS) through an ongoing programme of review, revision of the system and training of responders. The information extracted from CISS (refer to Appendix 1 for a description of this database) together with data from other surveillance systems (Local and Regional Services (LaRS) surveillance system (IRIS), the South West Environmental Surveillance System (SWESS) and National Chemical Emergency Centre (NCEC)) is used to inform HPA planning and the development of interventions. The information contained in this report is a summary of the analyses of chemical incidents reported for the period 1 January – 31 December 2009. The key findings for the 12 month period of 2009 include:

- **An estimated 220,000 people lived within 250m of reported uncontained chemical incidents in England and Wales including an estimated 57,000 children (0-19 years).**
- **967 chemical incidents were managed and recorded for the reporting period.**
- **There were an unusually high number of fatalities (22) resulting from nineteen separate acute chemical incidents reported in this period. Two-fifths (, ) of the deaths were suicides with cyanides ( )'UbX'phosphine ( ' ). Four fatalities each were attributed to carbon monoxide poisoning and smoke inhalation during fires.**
- **16% (154) of acute chemical incidents resulted in evacuation of the nearby population.**
- **The chemical group most frequently identified was products of combustion (31%, 315) with the majority being designated as fires. This is followed by "other organic" chemicals (14%, 133) and "other inorganic" chemicals (10%, 94).**

- **28% (263) of acute chemical incidents occurred in residential settings, followed by 24% (247) for industrial sites and 15% (133) for commercial locations.**
- **For the reporting period, chemical incidents were most frequently reported in London (25%, 231), followed by the South East (11%, 111) and then by the West Midlands (11%, 106) and the East Midlands (10%, 100).**
- **The most common sources of reports (notifying organisation) for chemical incidents, reported in Section 3.8, were Health Protection Units (25%, 219) followed by the Fire Service (17%, 163) and HPA Centre (8%, 74).**

## 1. Introduction



The Centre for Radiation, Chemical and Environmental Hazards (CRCE) of the Health Protection Agency manages an on-line chemical incident surveillance system (CISS) for England and Wales. This report provides a summary of the characteristics and distribution of acute chemical incidents recorded in England and Wales for the period 1<sup>st</sup> January – 31<sup>st</sup> December 2009.

## 2. Method

The method used to carry out all the collation, analyses and interpretation of the surveillance data has been described in the previous surveillance reports<sup>1</sup>. Data are primarily obtained from the on-line Centre for Radiation, Chemical and Environmental Hazards incident management system supplemented by information from the Local and Regional Services (LaRS) surveillance system (IRIS), the South West Environmental Surveillance System (SWESS) and National Chemical Emergency Centre (NCEC), and is described in more detail in Appendix 1.

### Box 1: Definition of chemical incident

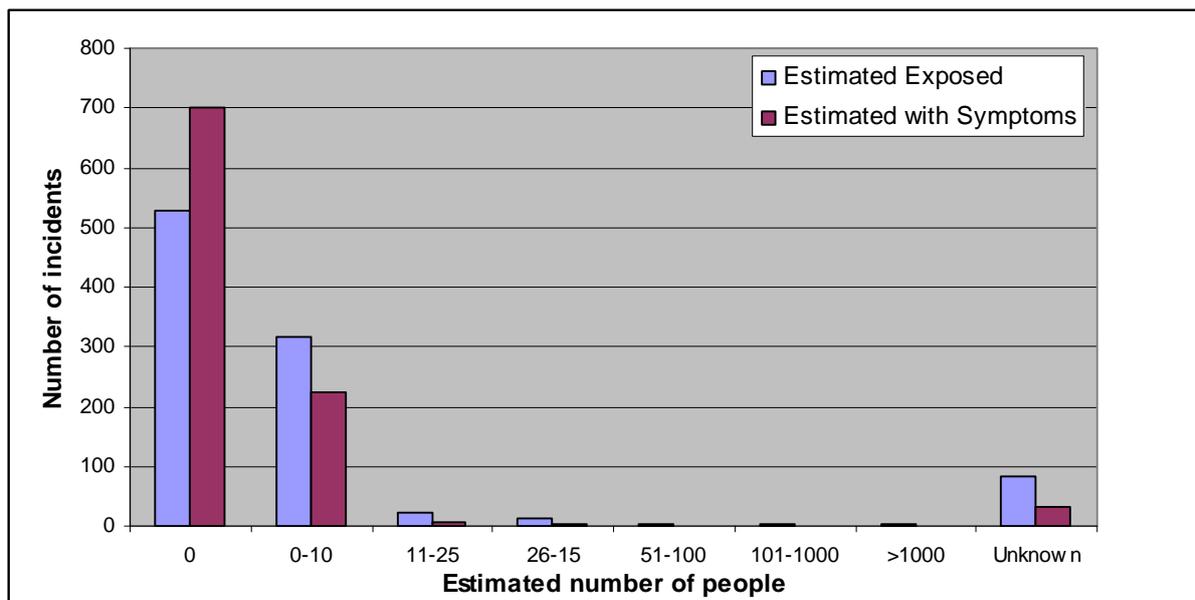
All incidents representing “*an acute event in which there is, or could be, exposure of the public to chemical substances which cause, or have the potential to cause ill health*” meet the CRCE definition of a chemical incident. Chemical incidents also include all events with an off-site impact as well as on-site incidents where members of the public (hospital staff and emergency services personnel should be regarded as members of the public) are affected.

## 3. Results

After screening for duplicates, exercises, events outside the geographical region of England and Wales and those not meeting the Centre’s definition of a chemical incident (see Box 1), 967 chemical incidents were recorded for the period 1 January through to 31 December 2009 in England and Wales. A summary of the characteristics and distribution of the chemical incidents is outlined below.

<sup>1</sup> <http://www.hpa.org.uk/Publications/ChemicalsPoisons/ChemicalsSurveillance/>

### 3.1. Estimated exposure count at time of incident



**Figure 1:** Number of people estimated exposed to chemical incidents and those exhibiting symptoms for 2009

Between 1400 and 8500 people were estimated to have been exposed with 400 - 2500 reporting symptoms. The exposure numbers exclude more than 1000 people who were exposed in two separate events involving a cloud of sulphurous gas over a region and mains water entering a gas supply, to avoid providing a distorted impression (of exposure numbers). Sixteen per cent (213) of chemical incidents resulted in evacuation of nearby populations during 2009 which is marginally less than that for 2008 which was twenty-one per cent. There were an unprecedented 22 fatalities as a result of chemical incidents in England and Wales, nine of which were suicides. There were 4 carbon monoxide poisonings (2 less than in 2008) but unfortunately the incidence of this type of event remains at 5% despite all the programme and initiatives of public health bodies to raise awareness among the public.

### 3.2. Nearby populations

There were 352 uncontained chemical incidents (that is, potentially having a wider public health implication); however, sufficient information was recorded in the logs to enable the postcode to be determined for 82% of such events. It is estimated that over 220,000 people lived within 250 m of uncontained incidents in 2009 of which

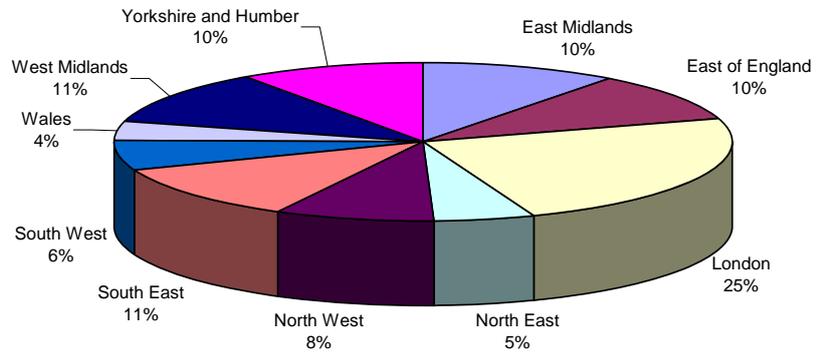
approximately 57,000 are children under the age of 19 years. Therefore one in four individuals potentially exposed during a chemical incident is a child.

### 3.3. Regional Distribution of Chemical Incidents

Incidents are reported most frequently in London (25%) followed by the South East and the West Midlands (11%) and then East Midlands (10%). The lowest numbers (of incidents) were recorded in Wales and the North East (refer to Table 1). Figure 2 shows the regional distribution of the chemical incidents for 2009 and Figure 3 illustrates the regions in England and Wales. Despite a number of ongoing issues with the CISS database, the ascertainment of the geographical location field has been maintained at 100% for another consecutive year.

**Table 1:** Regional distribution of chemical incidents and rate per 1,000,000 population (2009)

<b>Geographical Region</b>	<b>Total number of incidents</b>	<b>Rate per 1,000,000 population</b>
North East	51	17
North West	82	11
Yorkshire & The Humber	95	11
East Midlands	100	25
West Midlands	106	16
East of England	95	14
London	231	39
South East	111	15
South West	58	15
Wales	38	13



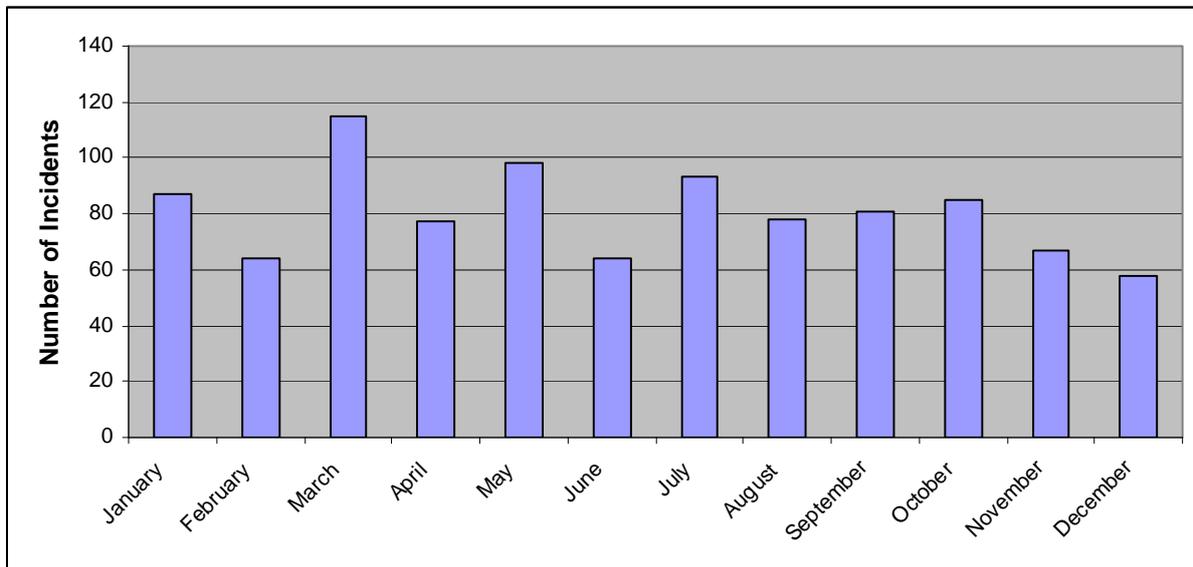
**Figure 2:** Regional distribution of chemical incidents in 2009



**Figure 3:** Map illustrating regions in England and Wales with responsible CRCE Supra Regional Units superimposed

### 3.4. Temporal Trend

Figure 4 shows that there is no clear trend for the monthly distribution of chemical incidents reported in 2009. In the previous two years (2007 and 2008) most incidents were reported in July whereas for 2009 it was during March.



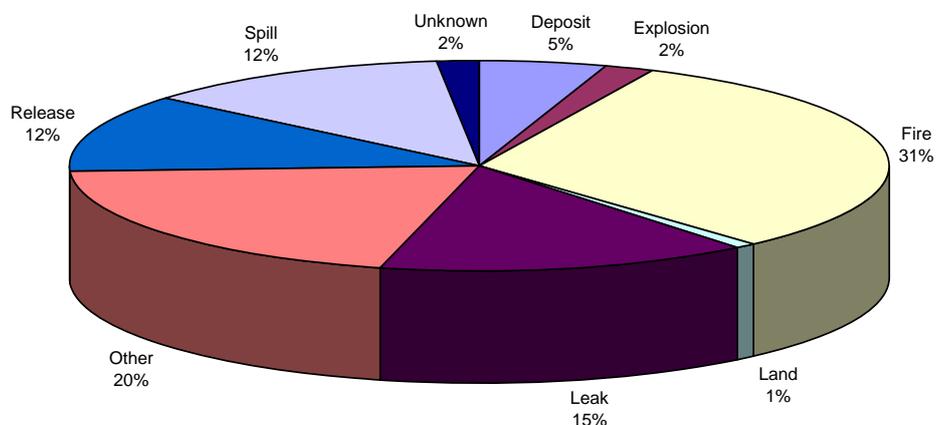
**Figure 4:** Monthly distribution of chemical incidents in 2009

### 3.5. Type of chemical incident

Figure 5 shows that fires (31%, 306) were the most common type of incident during 2009, resulting in the release of chemical(s), classed as products of combustion. This is followed by “other” (20%, 195) which includes events such as water contamination events, ingestion of chemicals, odour and other air quality issues, then leaks (15%, 142) and releases and spills (13%, 118 and 117 respectively). 13% (39) of fires involved cylinders, a marginal decrease from 2008 (17%); however, the procedure for the management of this type of incident is well documented and known by all responders. Approximately 18% of fires involved the combined release or potential release of asbestos while 5 events involved both cylinders and asbestos.

More noticeable is the occurrence of fires involving tyres (6%, 17) which can have huge public health implications as they often persist for many days and can result in use of monitoring equipment and setting up Air Quality Cells (AQC). It is also noteworthy that 7 (40%) of the tyre fires occurred in the North East and East Midlands regions which are under the remit of CRCE Nottingham Supra Regional

Unit. There is the need to investigate the trends and circumstances surrounding these events to determine whether they can be prevented in the first instance.



**Figure 5:** Types of chemical incident in England and Wales in 2009

### 3.6. Chemicals involved



The various types of chemicals involved in incidents during the reporting period are shown in Figure 6. Although recording of chemicals involved in chemical incidents has improved, rising from 82% in 2005 when the system was implemented, the number of incidents in which this parameter is not known remains high at 7%. The chemical group most frequently reported during the period was products of combustion (31%, 314) followed by “other organics” (14%, 133), “other organics” (10%, 94) and metals (7%, 70).

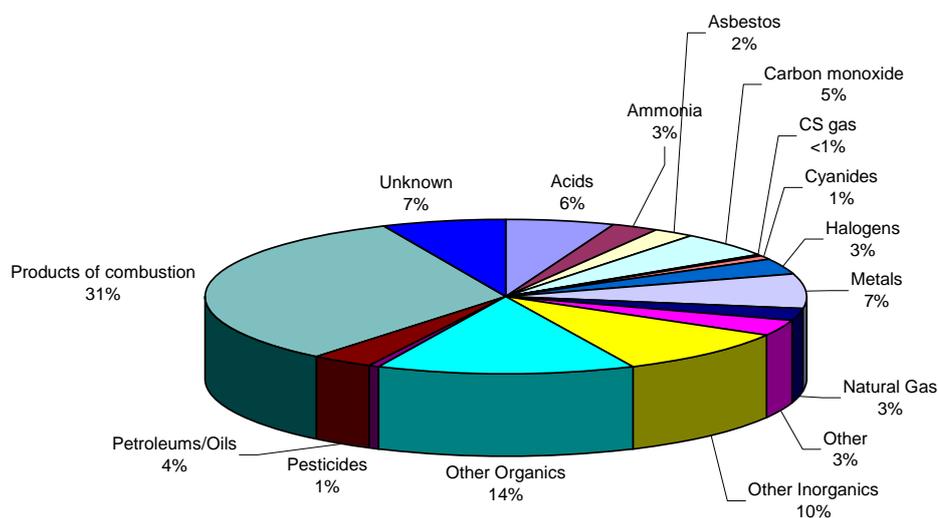


The number of events featuring mercury spills was reduced from 75% (43) in 2008 to 50% (36) in 2009 of all incidents involving metals. Trend analyses show that the majority of the events involving mercury take place in residential settings. CRCE has

published guidance on the management of mercury spills<sup>2 3</sup> on the HPA website which is clear and concise so the reduction in reported mercury spills may be due to the public accessing the documents and undertaking the clean-up independently. Frequently, in the events which are reported to CRCE, the public is seeking reassurance that the clean-up was undertaken correctly and there would be no health implications for resident family members.

Despite ongoing efforts of the Agency to raise public awareness with regard to carbon monoxide poisoning, it has been found that the number of incidents involving carbon monoxide has risen from 1% in 2006 to 3% in 2007 to 5% in 2008 and 2009. 80% (42) of all incidents involving carbon monoxide occurred in residential settings. This highlights the need for more effort to be dedicated to the development of policies/interventions to address this issue in collaboration with current public awareness and education programmes being undertaken.

It is noteworthy that 60% of all incidents involving the release of halogens occur in swimming pools settings as a result of accidental spill/handling/use/storage of chemicals. A similar situation was noted in 2008 and it was highlighted as an area for further work.



“Other” includes odour and air quality issues, water contamination, ingestion of chemicals

**Figure 6:** Chemicals involved in chemical incidents in 2008

<sup>2</sup> [http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb\\_C/1195733821650?p=1158313435037](http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1195733821650?p=1158313435037)

<sup>3</sup> [http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb\\_C/1207293983993?p=1158313435037](http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1207293983993?p=1158313435037)

### 3.7. Chemical incident location



In 2009, chemical incidents most frequently occurred in residential settings (28%, 263) followed by industrial (24%, 247) and commercial properties (15%, 133). The number of fires reported in residential locations has fallen from approximately 20% in previous years to 14% in 2009. Sixteen per cent of incidents in residential settings involved the leak of carbon monoxide which resulted in 4 fatalities in 3 separate events. Chemical incidents occurring at COMAH sites remain low at <1% which indicates that the process control measures at these sites are effective.

to 14% in 2009. Sixteen per cent of incidents in residential settings involved the leak of carbon monoxide which resulted in 4 fatalities in 3 separate events. Chemical incidents occurring at COMAH sites remain low at <1% which indicates that the process control measures at these sites are effective.

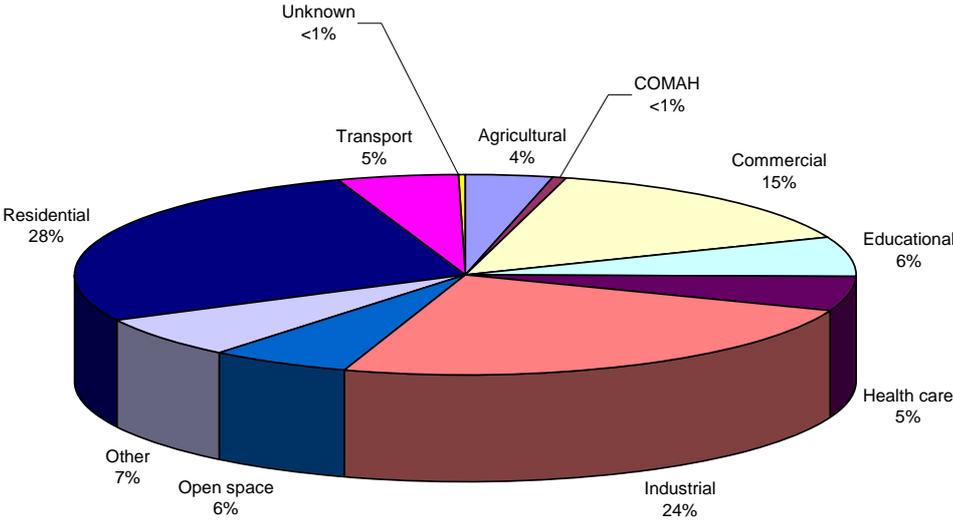
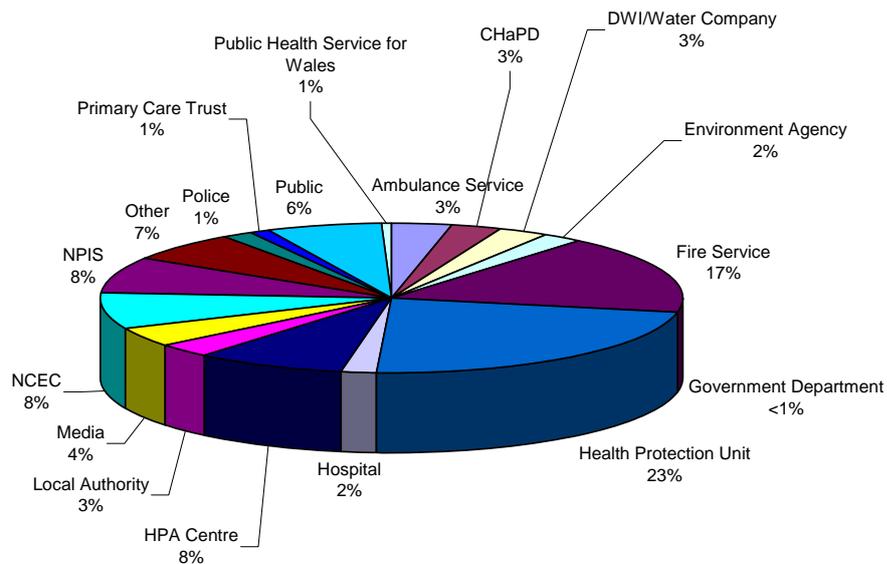


Figure 7: Location type of chemical incidents in 2009

### 3.8 Notifying organisation of chemical Incidents



Figure 8 shows the proportion of chemical incidents by the reporting organisation. Health Protection Units reported 23% (n=219) followed by Fire Service (17%, 1163) and HPA Centre, NCEC and NPIS (8%, n=80, 74, 74 respectively). NPIS operates a 24 hour service and manages the CRCE chemicals hotline. However, users are being trained to ensure that the originating agency is effectively recorded and NPIS numbers are not inaccurately inflated. The completion of this field has been maintained at 100% for 2008 and 2009.



Abbreviations:

NPIS	National Poisons Information Service
NCEC	National Chemical Emergency Service
DWI	Drinking Water Inspectorate
Other	Notification by Chemets, Hazmeds reports <i>etc</i>

**Figure 8:** Notifying organisation of chemical incidents in 2009

#### **4. Related Activities**

Information extracted from the CISS continues to be used to undertake a number of research projects as well as to identify the development of public health information and protocols for chemical incident management.

The need for monitoring capabilities during ongoing events lasting for more than 8 hours was identified. Hence in April 2010 new arrangements were made with regard to the setting an Air Quality Cell (AQC) in such events. Therefore there is currently a memorandum of understanding (MOU) between the HPA and the Environment Agency (EA) regarding implementing AQC. There are also other government organizations involved such as HSL, Met Office and FSA.

A new surveillance has been developed and will be hosted internally on the HPA server. It is anticipated that the system will be implemented in autumn 2010 following further beta testing. The new system will provide additional features for users and will enable the independent generation of reports and running queries.

A Chemical Classification Group which was established last year has overseen the classification of chemicals included in the database for implementation in the new system. This will improve the reporting of chemicals involved in incidents and reduce the number falling into the "other" category.

A study was recently undertaken by a SpR (Specialist Trainee Registrar) which analysed the response of staff involved in a small sample of chemical incidents in 2009. The details of this study will be published in the next issue of the Chemical and Hazards Report.

CRCE is expanding its Geographical Information System (GIS) capabilities to enable more effective and efficient management of chemical incidents and will be incorporated into the new system.

## **APPENDIX 1: Background to Chemical Incident Surveillance System (CISS)**

A multi-agency environmental public health surveillance system which was established in Wales in 1993 developed into an effective mechanism for identifying chemical hazards with potential public health implications and for informing policy development. A similar system was established in England in the West Midlands by the Chemical Hazard Management and Research Centre at the University of Birmingham. This surveillance system also supported Health Service emergency planning and response through the real time notification of serious incidents.

Given the success of the Welsh and West Midlands surveillance systems, the National Focus for Chemical Incidents based at the University of Wales Institute in Cardiff developed a national surveillance programme for England and Wales. Data were provided by regional chemical incident response units based in Cardiff, London, Newcastle and Birmingham, the Scottish Centre for Infection and Environmental Health (SCIEH), Ambulance Service Association (ASA), the Police (Hazchem scheme), the National Chemical Emergency Centre (NCEC), and the Maritime and Coastguard Agency (MCA).

The Environmental Health and Risk Assessment Unit (EHRA) of the Centre for Radiation, Chemical and Environmental Hazards (CRCE) became responsible for the national surveillance of chemical incidents programme in 2005 and implemented an on-line national Chemical Incident Surveillance System (CISS). CISS is closely linked to the Scottish Environmental Incident Surveillance System (SEISS) systems and they are the only national population based surveillance systems in the world. CISS has a number of fields to capture details such as regional location of incidents, type of incidents, numbers of people exposed during an incident, source (notifying organisation) of an incident *etc.*

The information recorded in CISS is used in conjunction with information from HPA Local and Regional Services (LaRS) surveillance system (IRIS), HPA South West Environmental Surveillance System (SWESS) and National Chemical Emergency Centre (NCEC) to inform HPA planning and the development of interventions.

For further information, please contact Lorraine Stewart ([lorraine.stewart@hpa.org.uk](mailto:lorraine.stewart@hpa.org.uk))