Chemical Hazards and Poisons Division

Public Health Surveillance of Chemical Incidents

Surveillance report 1st April – 30th June 2006

Environmental Health and Risk Assessment Unit, Chemical Hazards and Poisons Division (Head Office), HPA, Centre for Radiation, Chemical and Environmental Hazards, Chilton, Didcot, Oxon, OX11 0RQ, Tel +44 (0)1235 822895, Fax +44 (0)1235 822614, www.hpa.org.uk.

Summary

The Chemical Incidents Surveillance System for England and Wales is maintained by the Chemical Hazards and Poisons Division (CHaPD) of the Health Protection Agency (HPA). The web-based element of the system has now been in operation since July 2005 and all incidents for the reporting period 1st April – 30th June 2006 have been extracted from the database.

The Division has a programme of continuous improvement of surveillance and introduced specific measures in May 2006 to improve data ascertainment, completeness and analysis. The key findings for this quarter (Q2 2006) include:

- **An estimated 2.2million people lived within 1km of reported uncontained chemical incidents in England and Wales in Q2 2006 including over 552,000 children (0-19 years).**
- **296 chemical incidents were managed and recorded in the on-line database. Thirty-one (31) incidents were excluded as duplicates, exercises or as not meeting the CHaPD definition of a chemical incident and five were not located in England or Wales. For Q2 2005, there were 430 reported incidents with 103 removed as not meeting the definition.**
- **Of the 260 reported incidents included in the analyses in this report, 149 were designated 'actual', 72 'potential' and 39 for 'information'.**
- **There were three fatalities resulting from one acute chemical incident reported in this period. 81 reported acute incidents resulted in an estimated 420-1345 people being exposed and in a reported 50 incidents an estimated 105-585 people showed symptoms. The estimation of population exposure was 67% (n=179), an improvement from Q2 2005 when it was 48% (n=157). Evacuation was reported in 16% (n=42) of incidents.**
- **The chemical group most frequently identified was products of combustion (32%, n=82) with 96% (n=79) being designated as fires and the remaining 4% were explosions. This is followed by other inorganic chemicals (14%, n=37) and other organic chemicals (11%, n=28).**
- **For the reporting period, chemical incidents were most frequently reported in London (34%, n=87), followed by the South West (14%, n=37) and then by the South East (13%, n=35).**
- **The most common sources of reports for chemical incidents (notifying organisation) were National Poisons Information Service and Health Protection Units (15%, n=39) followed by the Fire Service (14%, n=38).**

Introduction

1. This report summarises the distribution and characteristics of chemical incidents recorded in the on-line database[1] between the 1st April and 30th June 2006.

2. The on-line database allows incidents to be classified as **actual** (an incident which has occurred and in which a chemical with the potential to cause harm to human life was released into the environment), **potential** (an event which could result in the exposure of the public to chemical substances and endanger public health), **information** (general enquiries for factual material, advice or data not relating to a specific chemical incident) and **exercises**. During the reporting period three exercises were logged but together with a further twenty-one incidents were excluded as not meeting the definition (see Box 1) applied by CHaPD.

Box 1: Definition of 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"* should be included in the National Database. All incidents with an off-site impact are to be included, as well as on-site incidents where members of the public are affected. (For the purposes of the definition, hospital staff and emergency services personnel should be regarded as members of the public).

3. Retrospective analysis of all the incidents for this reporting period was carried out to ensure that the potential of the database is maximised and enable effective development of policies *etc* to efficiently manage chemical incidents.

Results

4. After screening for duplicates (n=3), exercises (n=3), incidents outside the geographical region of England and Wales (n=5) and incidents not meeting the definition (n=25), 260 acute chemical incidents were recorded for the period 1st April through to 30th June 2006 in England and Wales. The results of the analyses of the characteristics of the chemical incidents for the quarter are outlined in the sections below.

Exposure, morbidity and mortality associated with chemical incidents

5. It is estimated that 420-1345 people were exposed as a result of 81 reported chemical incidents. One event in the South East involved the exposure of an estimated 101-1000 people to noxious odours. Figure 1 shows that 1-10 people were reported as being exposed to a chemical hazard in 24% (n=62) of the incidents, that is, between 62 and 620 people exposed. No one was reported to have been exposed to a chemical agent in 36% (n=94) of incidents. In 33% (n=85) of chemical incidents it was not reported and impossible to impute the number of people who were exposed, an improvement on the 52% (n=170) recorded for the corresponding period in 2005 (refer to Figure 2).

6. The number of people exposed and exhibiting symptoms as a result of 50 reported chemical incidents was estimated to be 105-585. In 56% (n=150) of reported incidents no symptoms were reported and in 24% (n=65) the number of symptomatic cases was not known (refer to Figure 1). There was a significant improvement ($p \leq 0.01$) in the reporting of morbidity status of individuals during chemical incidents

[1] http://www.publichealth.bham.ac.uk/chapd/staffpages/index.htm

in Q2 2006 (76%) in comparison to Q2 2005 (28%). Figure 3 shows the comparison between the morbidity data for Q2 2005 and Q2 2006.

7. Figure 4 shows the geographical distribution of 228 (88%) of the 260 reported chemical incidents which occurred during the reporting period, where the postcode of the incident was reported or subsequently ascertained. 188 of the 228 chemical incidents were uncontained and resulted in potential population exposure. More than 2.2 million people are estimated to live within 1km of the uncontained incidents in England and Wales.

8. Table 1 shows that more than 552,000 children (0-19 years) are estimated to be living within 1km of uncontained incidents which occurred in England and Wales. This suggests that one in every four person potentially exposed during a chemical incident is a child which is similar to that for the previous quarter (Q1 2006). The regional population within a 250m, 500m, 750m and 1km radius of each incident is also shown in Table 1. On average 74,000 people (within a 1km radius) was exposed to a chemical incident in this reporting period.

Table 1: Population within 250m, 500m, 750m and 1km of chemical incidents in Government Office Regions (GOR) of England and Wales.

	0-250m	250-500m	500-750m	750-1000m	Total within 1km
North East (GOR) – 4 incidents					
Population	22	1246	2333	2037	5638
0-19 years	6	321	599	485	1411
North West (GOR) – 13 incidents					
Population	6452	21382	35487	48981	112302
0-19 years	1541	5913	9703	12974	30131
Yorkshire & Humber (GOR) – 11 incidents					
Population	3892	12540	18464	27923	62819
0-19 years	913	3120	4684	7714	16431
East Midlands (GOR) – 12 incidents					
Population	3257	13436	22448	23284	62425
0-19 years	850	3395	5618	5674	15537
West Midlands (GOR) – 16 incidents					
Population	15079	34646	60333	84332	194390
0-19 years	4800	10404	17588	25485	58277
East of England (GOR) – 13 incidents					
Population	3966	14860	18997	21125	58948
0-19 years	813	3128	4303	4884	13128
London(GOR) – 66 incidents					
Population	96209	284542	459234	636789	1476774
0-19 years	23101	67399	110071	155648	356219
South East (GOR) – 22 incidents					
Population	7789	28383	46965	63649	146786
0-19 years	1954	7100	11036	15451	35541
South West (GOR) – 24 incidents					
Population	9273	19712	29110	36853	94948
0-19 years	2016	4131	6201	8059	20407
Wales – 7 incidents					
Population	2488	4052	4516	5958	17014
0-19 years	720	1223	1292	1573	4808

Total Incidents = 188; Total population within 1km = 2,687,758; Total 0-19 years within 1km = 657,062

9. There were three (3) fatalities during one (1) chemical incident for this reporting period.

Source of chemical incident reports

10. 15% (n=39) of chemical incidents were reported by the National Poisons Information Service and local Health Protection Units (each), 14% (n=38) were reported by the Fire Service, 12% each via the media (n=31) and the Ambulance Service (n=30). Figure 5 give the statistics for all reporting organisations.

11. Retrospective analyses of the database have improved completion of this field from 87% in Q2 2005 to 95% for this reporting period. There have been no significant changes in the proportion of incidents reported by notifying organisations from Q2 2005 to Q2 2006.

Chemicals involved in incidents during reporting period

12. Figure 6 demonstrates that during the reporting period the most frequently reported primary chemicals which were released during chemical incidents were products of combustion (32%, n=82) followed by other inorganic chemicals (14%, n=37), other organic chemicals (11%, n=28), halogens (5%, n=13), and metals (4%, n=10). The chemical was unknown in 13% (n=34) of reported chemical incidents, down from 18% in the corresponding reporting period in 2005.

13. Figure 7 illustrates that during the corresponding period for 2005 the most frequently reported chemical that was released was organic compounds (16%, n=52) in contrast to products of combustion (32%, n=82) for this period. There was a significant difference ($p \leq 0.05$) in the proportions of incidents involving the release of products of combustion for the Q2 2006 (32%, n=82) and Q2 2005 (9%, n=29). Although the proportions for the other chemical groups were marginally different this difference was not statistically significant.

Regional distribution of chemical incidents

14. Figures 8a and b show that 35% (n=89) of incidents occurred in London, 14% (n=37) in the South West and 13% (n=35) in the South East, similar to that for the same period in 2005 (2005 percentages are shown in red font on the map in Figure 8b). Table 2 shows the total number of incidents occurring in each region for Q2 of 2005 and 2006.

Table 2: Number of incidents occurring in the 9 regions of England and Wales for Q2 2006 and 2005.

Geographical Region	Number of Chemical Incidents	
	2006	**2005**
North East	6	7
North West	14	13
Yorkshire & The Humber	15	10
East Midlands	15	20
West Midlands	21	26
East of England	20	29
London	89	85
South East	35	65
South West	37	49
Wales	8	3

15. The regional geographical location for *all* incidents has been described. and a major improvement has been observed on the same period for 2005 when the location of 6% of incidents was unknown.

16. Figure 9 illustrates the monthly distribution of acute chemical incidents for the reporting period. 50% of the incidents in the north-east, north-west and East Midlands occurred during April whereas in the case of London the distribution was fairly even.

Chemical incident location type

17. Chemical incidents were primarily reported in commercial and residential locations (20.5%, n=53 each) followed by industrial (20%, n=51). There was no single dominating type of incident in residential and commercial locations, however, 67% (n=36) of incidents occurring on industrial premises were fires. Figure 10 shows that in 6% (n=15) of the incidents the location was unknown. Transportation accounts for 10% (n=25) of the chemical incidents of which 40% (n=10) were classed as spills.

18. There were no significant difference between the types of locations of chemical incidents for Q2 2006 and Q2 2005 (Figure 11). The proportion of incidents in which the location type was unknown was reduced from 12% for Q2 2005 to 6% in Q2 2006.

Types of chemical incidents

19. Figure 12 demonstrates that the most common type of chemical incident is fire (30%, n=79), followed by release (13%, n=34) and spill (11%, n=28). This trend is similar to that observed for both annual and quarterly periods. The incident type was undefined for 10% (n=27) of acute chemical incidents of which 57% (n=17) were DC75 alerts (chemical incidents alerts in London).

Discussion/Recommendations

20. Retrospective analysis of the chemical incident database is now an ongoing exercise and has resulted in significant improvements in data completion, for example, the reporting of morbidity among exposed populations has significantly improved ($p \leq 0.01$).

21. Collaboration with the GIS team in the Centre for Emergency Preparedness and Response at Porton Down has facilitated sharing of data which has enabled the estimation of exposed populations with 250, 500, 750 and 1000m of chemical incidents.

22. The next quarterly report for the period 1st July to 30th September 2006 will be published in March 2007.

23. The annual review for 2005 was published in February.

24. The unit has been approached by ATSDR to work on a joint project on causes of chemical incidents.

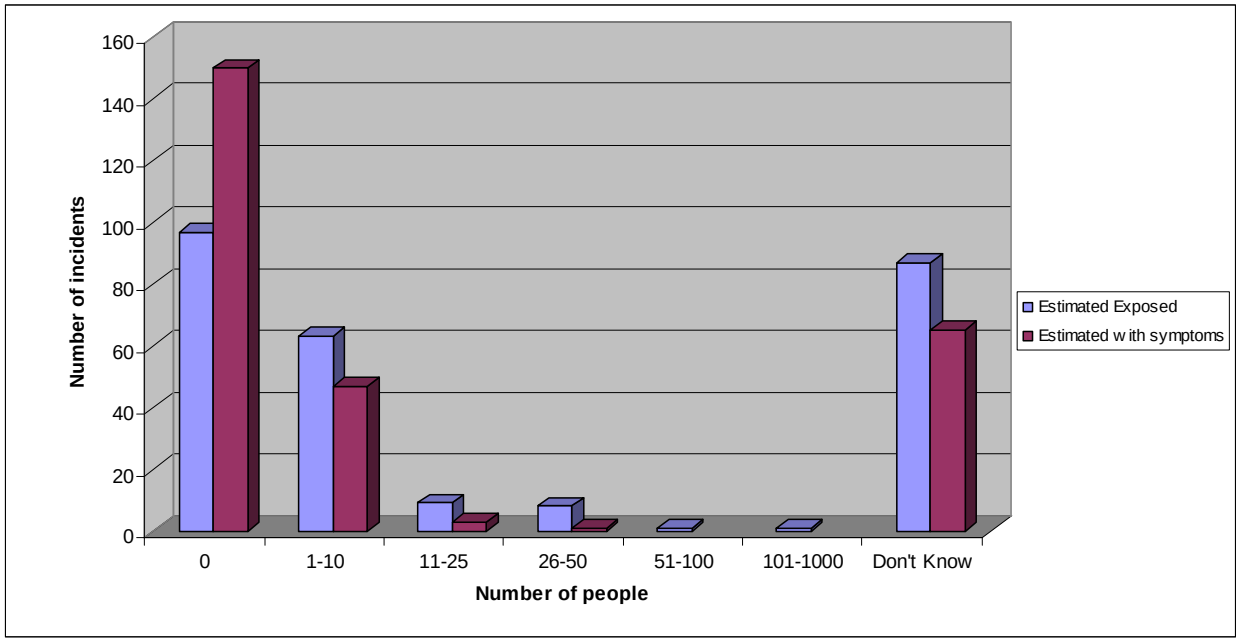

Figure 1: Number of people exposed and experiencing symptoms from a chemical incident reported between 1st April and 30th June 2006 (n=260).

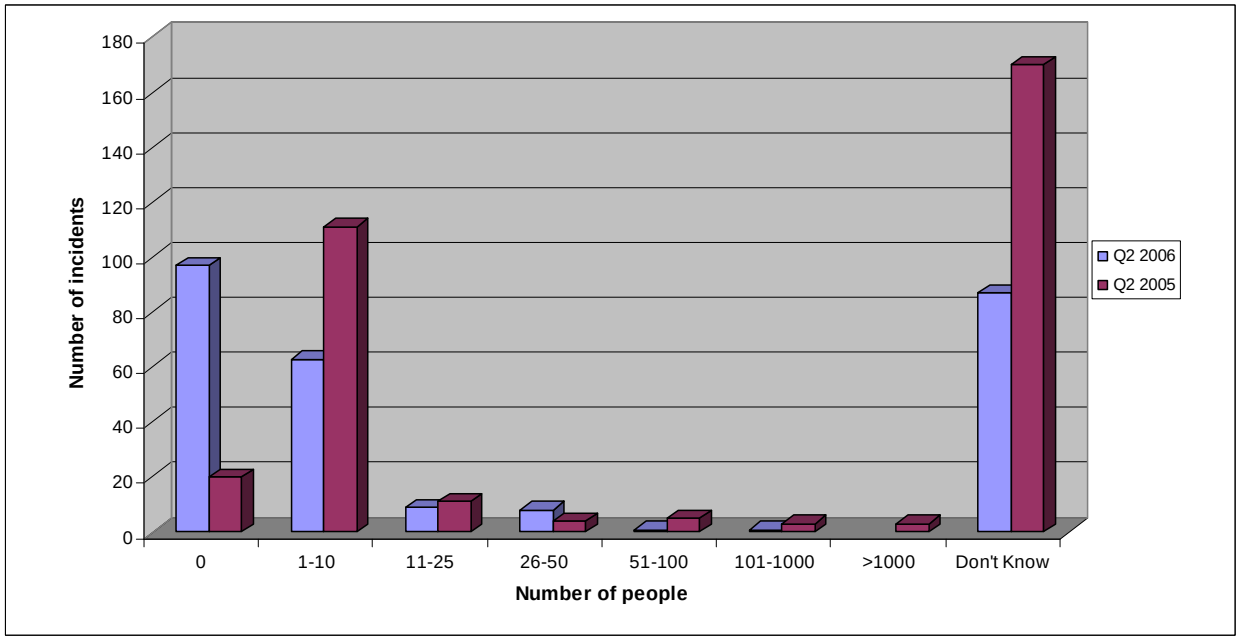

Figure 2: Number of people exposed during chemical incidents reported between 1st April and 30th June for 2006 (n=260) and 2005 (n=327).

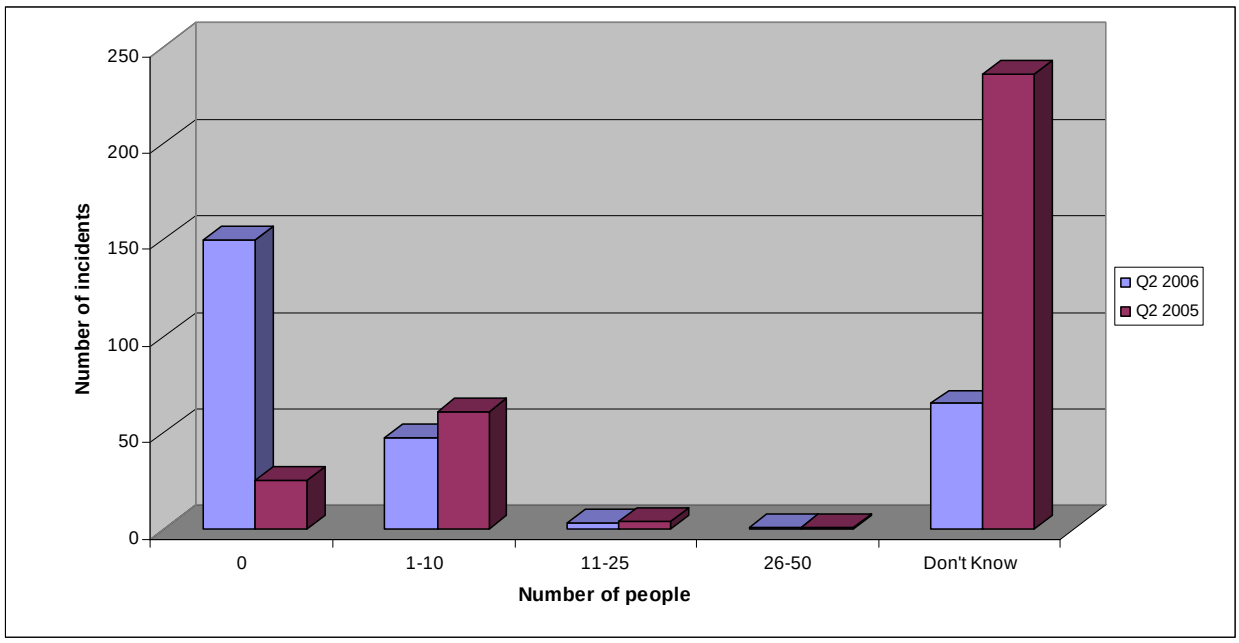

Figure 3: Number of people exposed and experiencing symptoms during chemical incidents reported between 1st April and 30th June for 2006 (n=260) and 2005 (n=327).

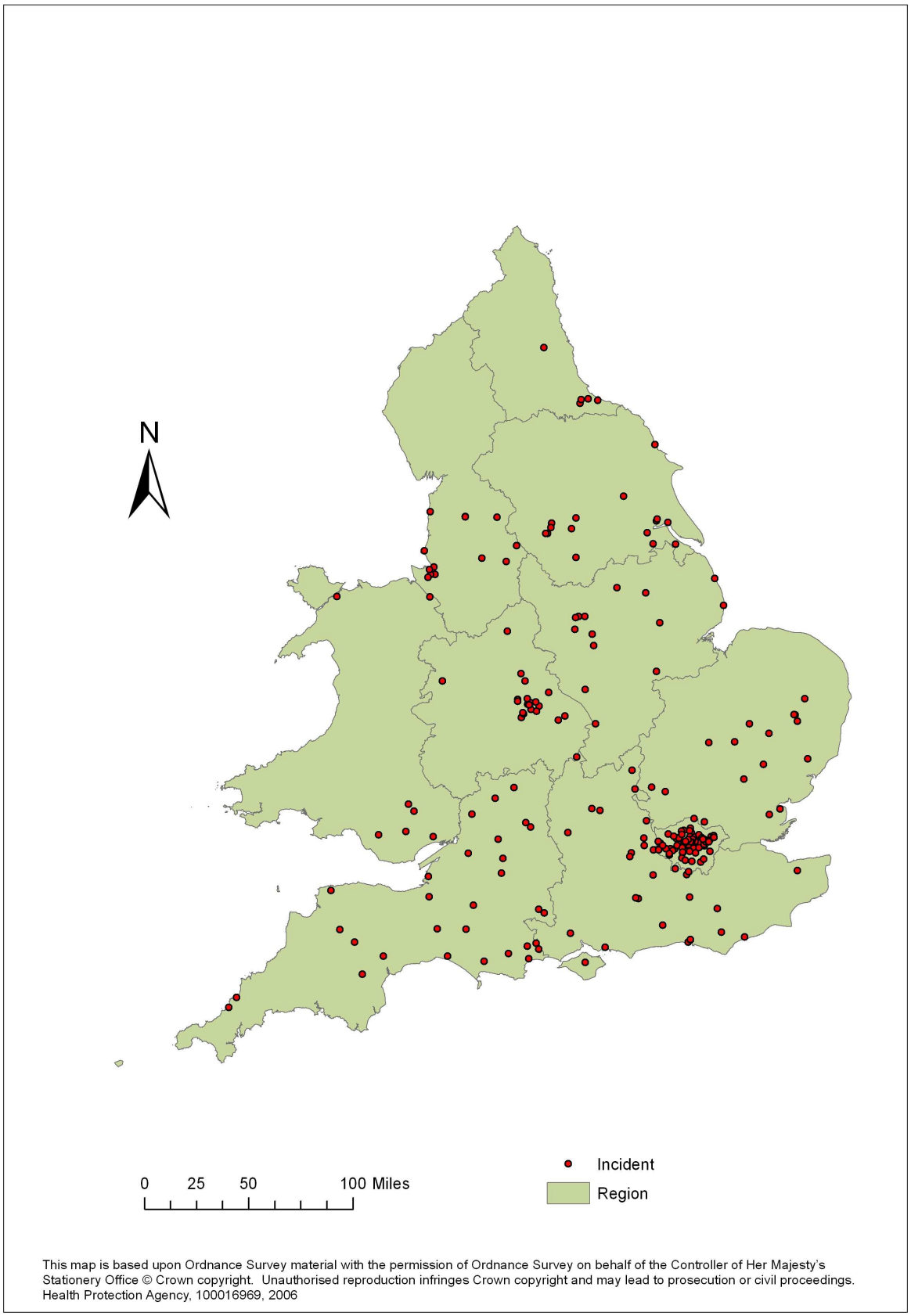

Figure 4: Illustration of the location of 228 incidents with geographical reference which occurred between 1st April and 30th June 2006.

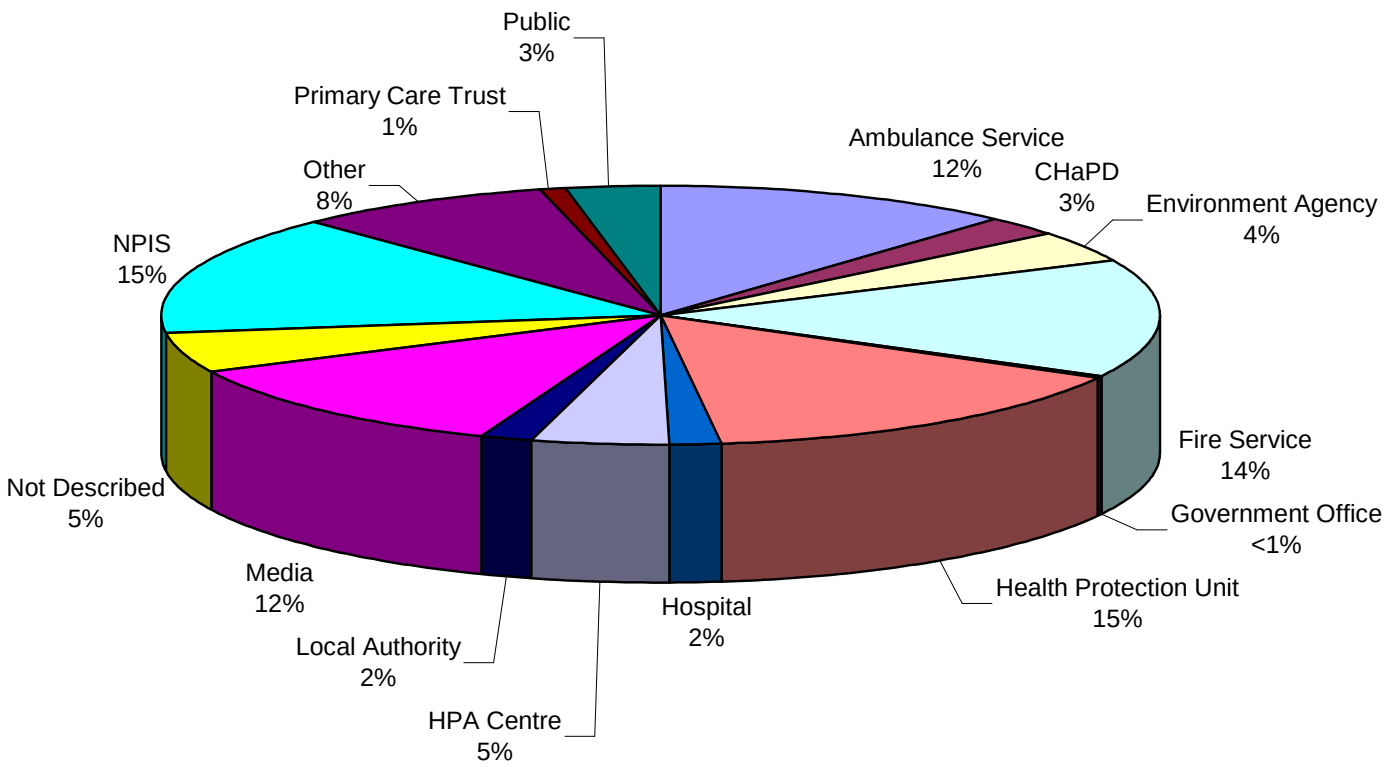

Figure 5: Notifying organisation of chemical incidents reported between 1st April and 30th June 2006 (n=260). Abbreviations: Chemical Hazards and Poisons Division (CHaPD), National Poisons Information Service (NPIS), Health Protection Agency Centre (HPA Centre). Other includes groups such as General Practitioner and Nurse practitioner.

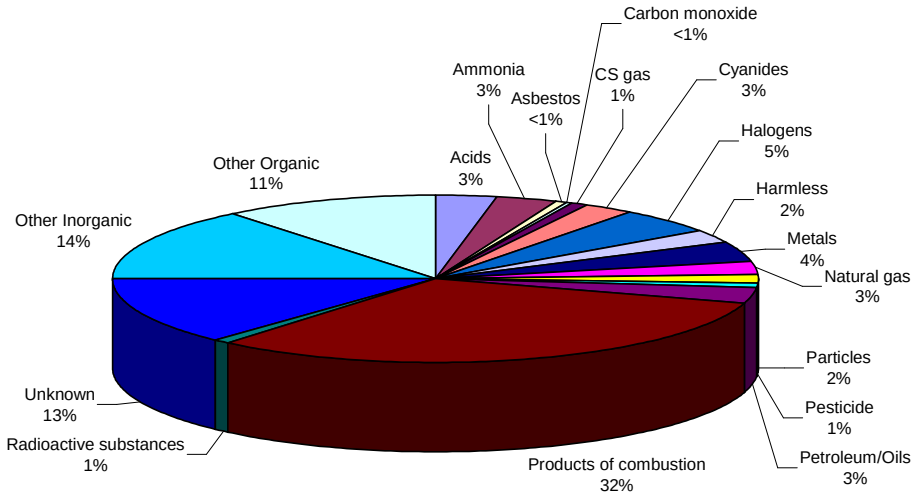

Figure 6: Chemicals involved in incidents reported between 1st April and 30th June 2006 (n=260).

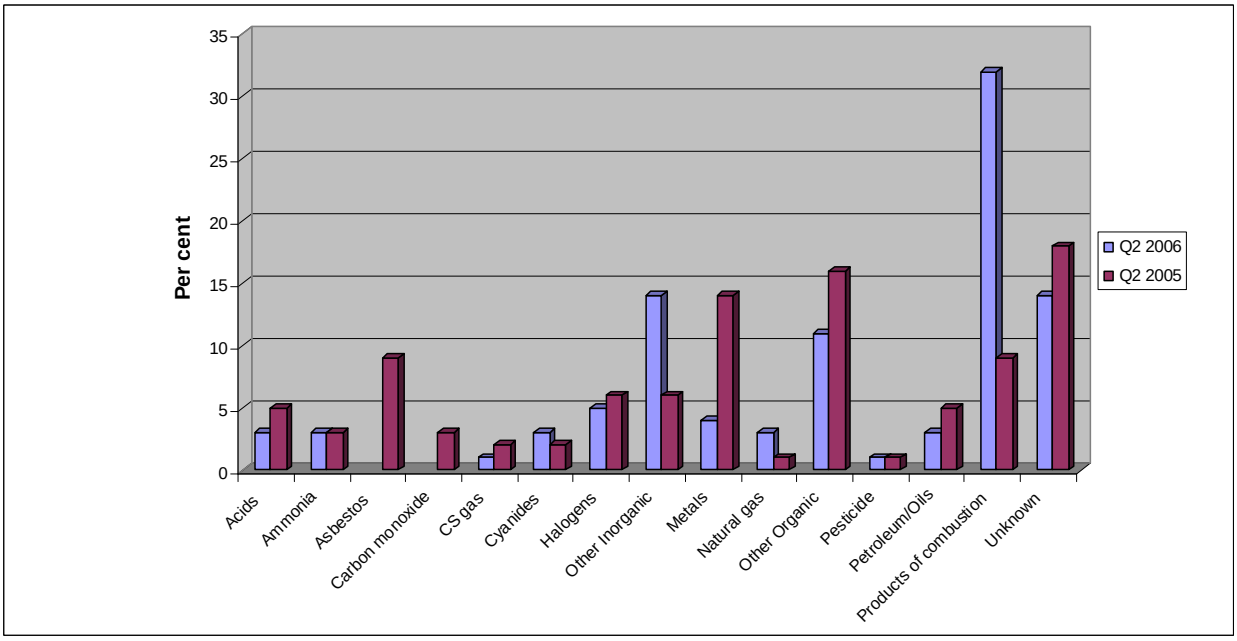

Figure 7: Chemicals involved in incidents reported between 1st April and 30th June for 2006 (n=260) and 2005 (n=327).

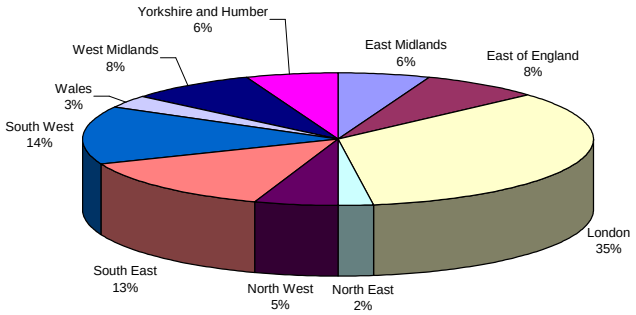

Figure 8a: Regional distribution of chemical incidents reported to CHaPD between 1st April and 30th June 2006 (n=260).

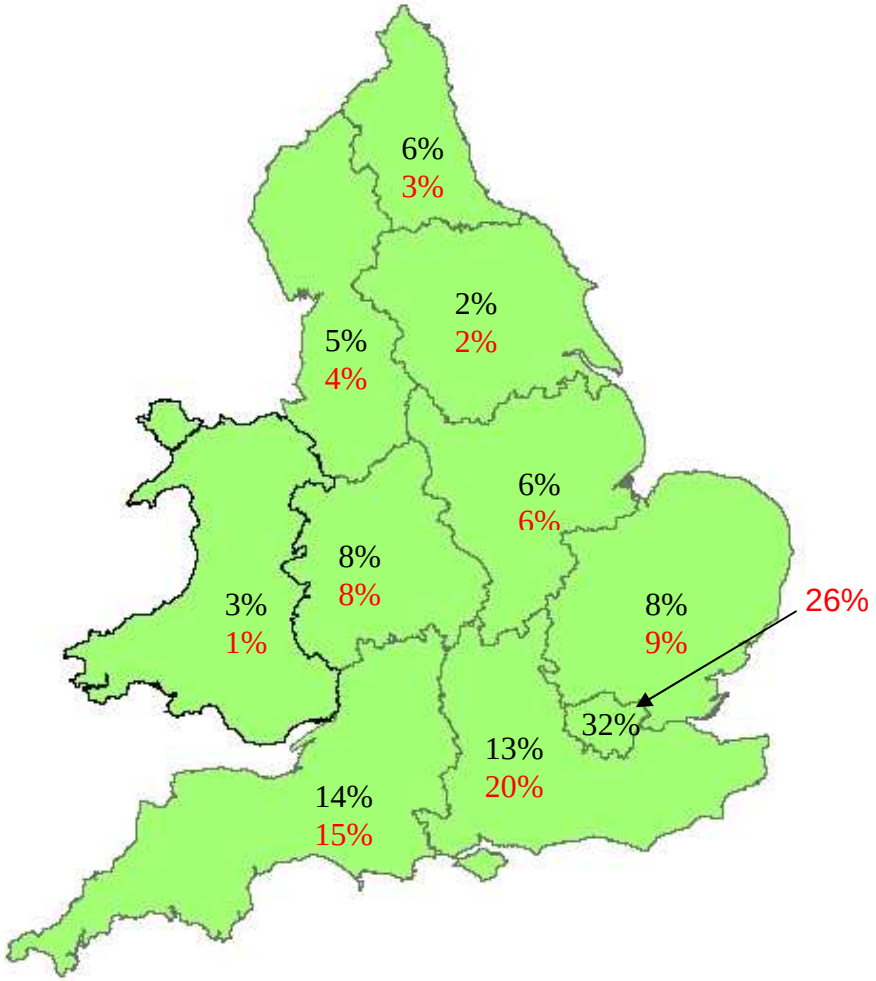

Figure 8b: Regional distribution of chemical incidents reported in England & Wales between 1st April and 30th June 2006 (black font) and 2005 (red font).

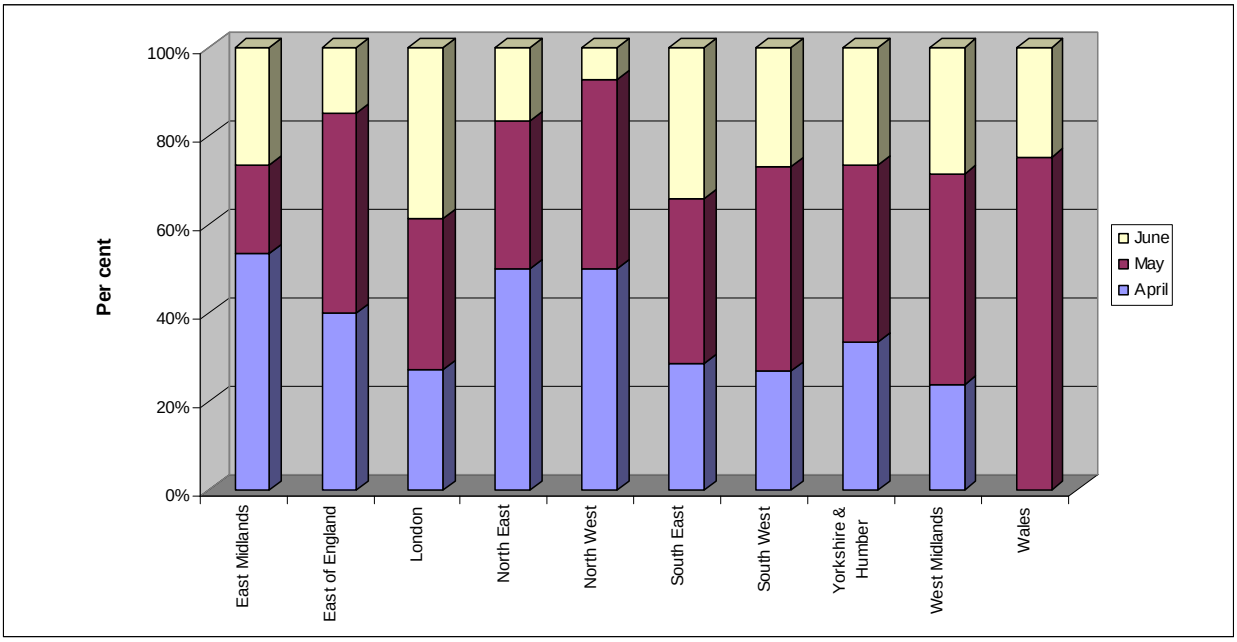

Figure 9: Chemical incident location type for chemical incidents reported in England and Wales between 1st April and 30th June 2006 (n=260).

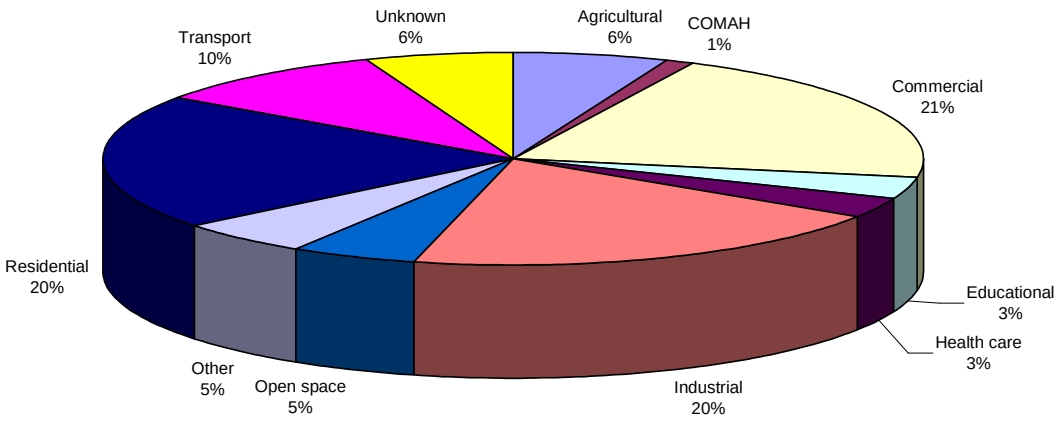

Figure 10: Chemical incident location type for chemical incidents reported in England and Wales between 1st April and 30th June 2006 (n=260).

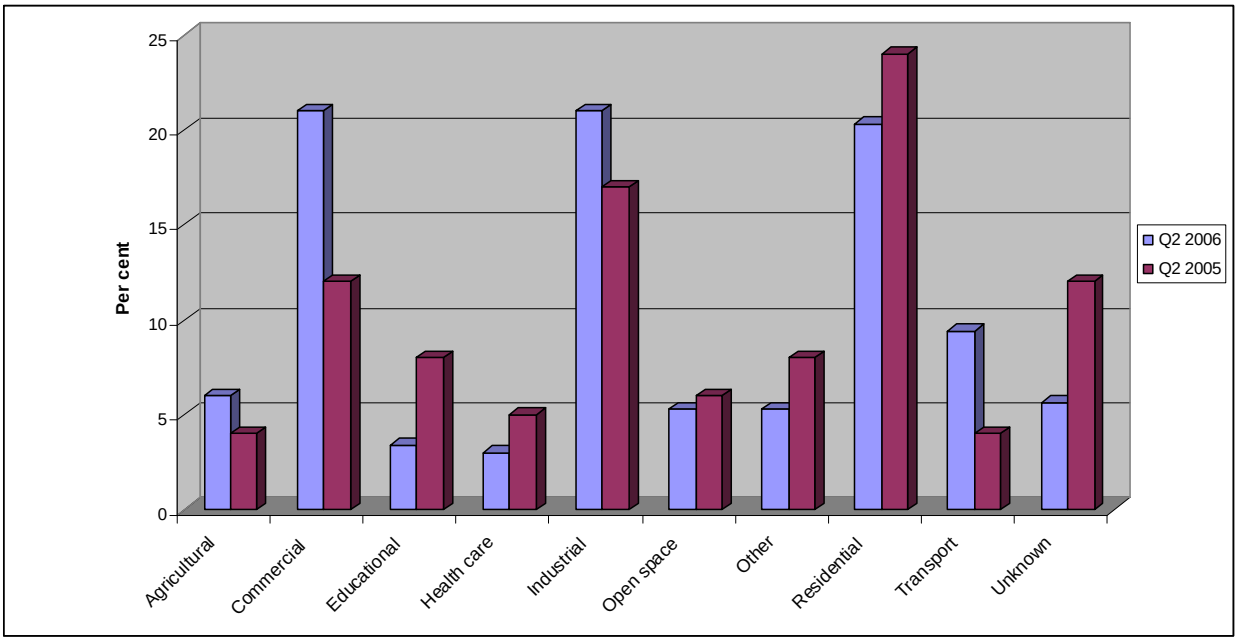

Figure 11: Chemical incident location type for chemical incidents reported in England and Wales between 1st April and 30th June 2006 for 2006 (n=260) and 2005 (n=327).

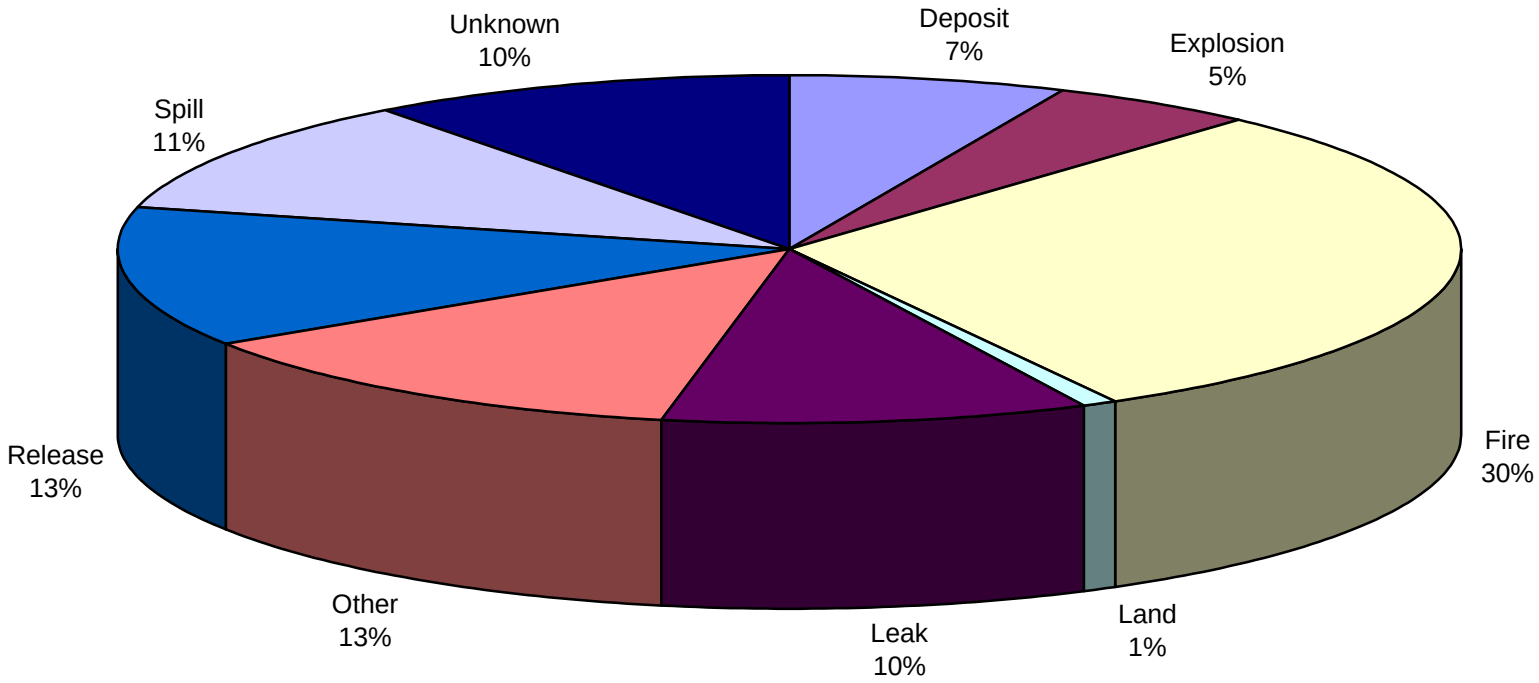

Figure 12: Chemical incident type for chemical incidents reported in England and Wales between 1st April and 30th June 2006 (n=260).