



Public Health Surveillance of Chemical Incidents

Surveillance report 1st January – 31st March 2006

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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 incident management element of the system has been in operation since July 2005 and captures real time information on the management of chemical incidents.

The Division has a programme of continuous improvement of surveillance and introduced specific measures in May 2006 to improve data ascertainment, completeness and analysis. Key issues for this quarter (Q1 2006) include:

- An estimated 1.1 million people lived within 1km of chemical incidents in England and Wales in Q1 2006 including over 279,000 children (0-19 years).
- 228 chemical incidents were managed and recorded in the on-line database. Forty-five incidents were excluded as duplicates or as not meeting the CHaPD definition of a chemical incident and a further two as not being located in England or Wales. 167 incidents were recorded during Q1 2005 and 30 were removed as not meeting the definition.
- Of the 181 reported incidents included in this report, 136 were designated 'actual', 27 'potential' and 18 for 'information' (see Section 2 for definition).
- No fatalities were reported. 36% (n=65) of the reported incidents resulted in an estimated 1-10 people being exposed and in 28% (n=50) an estimated 1-10 people showed symptoms. Estimating population exposure is an important part of incident management and this has greatly improved from Q1 2005 when it was 54% (n=74) to 64% (n=118) for this reporting period.
- Evacuation was reported in 19% (n=34) of incidents.
- The chemical group most frequently identified was products of combustion (24%, n=45) which corresponds to the 24% of incidents designated as fires. This is followed by organic chemicals (18%, n=34) and inorganic chemicals (16%, n=29).
- Chemical incidents were most frequently reported in London (33%, n=61), an increase on Q1 2005 (24%, n=33), followed by the South East (18%, n=33) and then by the South West and West Midlands (10%, n=18).
- The most common source of reports for chemical incidents (notifying organisation) was the Ambulance Service (18%, n=34), Health Protection Units (17%, n=33), Fire Service (13%, n=24) and National Poisons Information Service (10%, n=19).

Introduction

1. This report summarises the distribution and characteristics of chemical incidents recorded in the on-line database¹ between the 1st January and 31st March 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 four exercises were logged together with a further forty incidents but were excluded as not meeting the definition applied by CHaPD. The analyses carried out in this report; include only those chemical incidents which meet the definition (see Box1).
3. CHaPD and the Environment Agency (EA) have developed a memorandum of understanding and service level agreement to enable an exchange of data on national pollution incidents reported to the EA. The EA reported approximately 6000 pollution incidents between 2001 and 2005. Further work is underway to identify those incidents with a potential impact on human health. Data provided by LaRS has been presented in the HPA Chemical Incident Surveillance report for 2005 to be published in December 2006.

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).

Source of chemical incident reports

4. 18% (n=34) of chemical incidents were reported by the Ambulance Service, 17% (n=33) were reported by local Health Protection Units, 13% (n=24) via the Fire Service, 10% (n=19) by the National Poisons Information Service and 8% (n=15) via the media. The sources of chemical incidents by organisation type are shown in Figure 1. Retrospective analyses of the database have improved completion from 93% in Q1 2005 to 97% for this reporting period.

Chemicals involved in incidents during reporting period

5. Figure 2a demonstrates that during the reporting period the most frequently reported primary chemicals which were released during chemical incidents were products of combustion (24%, n=45) followed by ‘other’ organic chemicals (19%, n=34), ‘other’ inorganic chemicals (15%, n=28), metals (5%, n=9), and acids (6%, n=10). The chemical was unknown in 14% (n=25) of incidents.
6. Figure 2b illustrates that during the corresponding period for 2005 the most frequently reported chemical that was released during chemical incidents were also

¹ <http://www.publichealth.bham.ac.uk/chapd/staffpages/index.htm>

products of combustion (15%, n=21). However, this proportion was less than that for this reporting period.

Regional distribution of chemical incidents

7. Figures 3a and b show that 33% (n=61) of incidents occurred in London, 18% (n=33) in the South East and 10% (n=18) in the South West and West Midlands similar to that for the same period in 2005 (2005 percentages are shown in red font on the map in Figure 3b). The total number of incidents occurring in each region for Q1 of 2006 and 2005 is given in Table 1.

Table 1: Number of incidents occurring in the 9 regions of England and Wales for Q1 2006 and 2005.

Geographical Region	Number of Chemical Incidents	
	2006	2005
North East	5	4
North West	11	12
Yorkshire & The Humber	7	4
East Midlands	10	4
West Midlands	18	10
East of England	14	12
London	61	33
South East	33	16
South West	18	12
Wales	4	4

8. The regional geographical location for **all** incidents has been described and is a major improvement on the same period for 2005 when the location of 9% of incidents was unknown.

Chemical incident location type

9. The most frequently reported location types were residential (23%, n=42), commercial (17%, n=30) and industrial (15%, n=27). Figure 4a shows that in 9% (n=17) of the incidents the location was unknown, a marginal improvement on 2005 (11%). Transportation accounts for 6% (n=11) of the chemical incident of which 73% (n=8) were classed as spills. There was no single dominating type of incident in residential locations but in the case of industrial premises 50% (n=14) were fires.
10. For the same period in 2005 the proportions of incidents attributed to the various location types were similar to that for this reporting period with the exception of residential (18%, n=25) and industrial (24%, n=33). A graphical comparison between this reporting period and Q1 2005 is given in Figure 4b.

Types of chemical incidents

11. Figure 5 demonstrates that the most common type of chemical incident is fire (25%, n=45), followed by leak (15%, n=27 each), release (14%, n=26) and spill (13%, n=23).

Numbers of people exposed and fatalities during chemical incidents

12. Assessment of the information provided in the incident log enabled a major improvement in the estimation of number of people exposed and showing symptoms in comparison to Q4 of 2005 (the first complete quarter after implementation of the on-line database).
13. Figure 6a shows that 1-10 people were reported as being exposed to a chemical hazard in 36% (n=65) of the incidents, that is, between 65 and 650 people exposed. In 35% (n=64) of chemical incidents it was not reported and not possible to impute the number of people who were exposed in comparison to 46% (n=63) for the corresponding period in 2005. No one was reported to have been exposed to a chemical agent in 20% (n=36) of incidents.
14. The number of people exhibiting symptoms as a result of chemical incidents ranged from 1-10 in 28% incidents (n=50), that is, between 50 and 500 people symptomatic; no-one showed symptoms in 31% (n=57) incidents; and in 37% (n=70) of chemical incidents it was not known how many people were symptomatic (refer to Figure 6a for further details). Figures 6b and c show the comparison between population exposure and those exhibiting symptoms for Q1 2005 and Q1 2006.
15. Figure 7 shows the geographical distribution of 144 of the total 181 incidents which occurred during the reporting period, where the postcode of the incident was reported or subsequently ascertained. 102 of the 144 chemical incidents were uncontained and resulted in potential population exposure. More than 1.1 million people are estimated to live within 1km of the uncontained incidents in England and Wales.
16. Table 2 demonstrates that there was a total of 279,230 children (0-19 years) estimated to be living within 1km of uncontained incidents which occurred in England and Wales. The regional population within a 250m and 1km radius of each incident is also shown in Table 2. The analysis shows that approximately 1 in every 4 person living in proximity to a chemical incident is a child.

Table 2: Population within 250m and 1km of uncontained chemical incidents in Government Office Regions (GOR) of England and Wales.

	0-250m	Total within 1km
North East (GOR) – 4 incidents		
Tot. Population	225	4328
0-19 years	27	1450
North West (GOR) – 7 incidents		
Tot. Population	4052	71231
0-19 years	910	18445
Yorkshire & The Humber (GOR) – 4 incidents		
Tot. Population	1440	26343
0-19 years	308	7066
East Midlands (GOR) – 8 incidents		
Tot. Population	1663	29252
0-19 years	459	7975
West Midlands (GOR) – 12 incidents		
Tot. Population	5287	116759
0-19 years	1790	38470
East of England (GOR) – 4 incidents		
Tot. Population	2590	38636

0-19 years	699	9439
London (GOR) – 32 incidents		
Tot. Population	40404	630432
0-19 years	9527	148459
South East (GOR) – 17 incidents		
Tot. Population	7713	105241
0-19 years	1645	24211
South West (GOR) – 16 incidents		
Tot. Population	8400	90484
0-19 years	1972	21826
Wales – 2 incidents		
Tot. Population	138	6816
0-19 years	35	1870

17. There were no fatalities during any chemical incidents during this reporting period, however, there were 6 for the corresponding period in 2005.

Discussion/Recommendations

18. Retrospective assessment of the incident management log is now an ongoing exercise and has resulted in a major improvement in the completeness of reported incidents. Previously, incomplete database fields resulted in under-reporting of the characteristics of chemical incidents and in particular, of the chemicals involved in incidents and the geographical location. Data extraction from the incident log drafted by the first and second tier responders has enabled completion of some of the missing database fields. However, despite this, details with regards to causes of incidents are difficult to ascertain from the information in the log. It is essential to know the causes of incidents in order to effectively utilise the database and to develop effective intervention strategies.

19. It has also been recognised that the incident management database should facilitate identification of vulnerable populations during an event. Consequently CHaPD in collaboration with the GIS team in the Centre for Emergency Preparedness and Response at Porton Down are in the process of introducing GIS functionality into the chemical incident database. A strategy to improve the utility of the database has been developed including:

- i) Retrospective analysis of a random sample of 20-30 chemical incidents from this reporting period in order to develop a strategy to enable more accurate quantification of exposure, morbidity and mortality.
- ii) Investigation into the primary and secondary causes of acute incidents in the random sample mentioned above.
- iii) Mapping of incidents using GIS to identify potentially exposed populations for future tracking.
- iv) The unit currently operates ArcGIS 9.1 and is moving towards the installation of a dedicated server to support ArcGIS SDE.

20. This will be discussed in more detail in the forthcoming report describing incidents in 2005. The next quarterly report for the period 1st April to 30th June 2006 will also be published in December 2006.

Recent developments

21. After migrating the on-line incident management database to the HPA server access to the system will be expanded to include individuals in other Divisions.

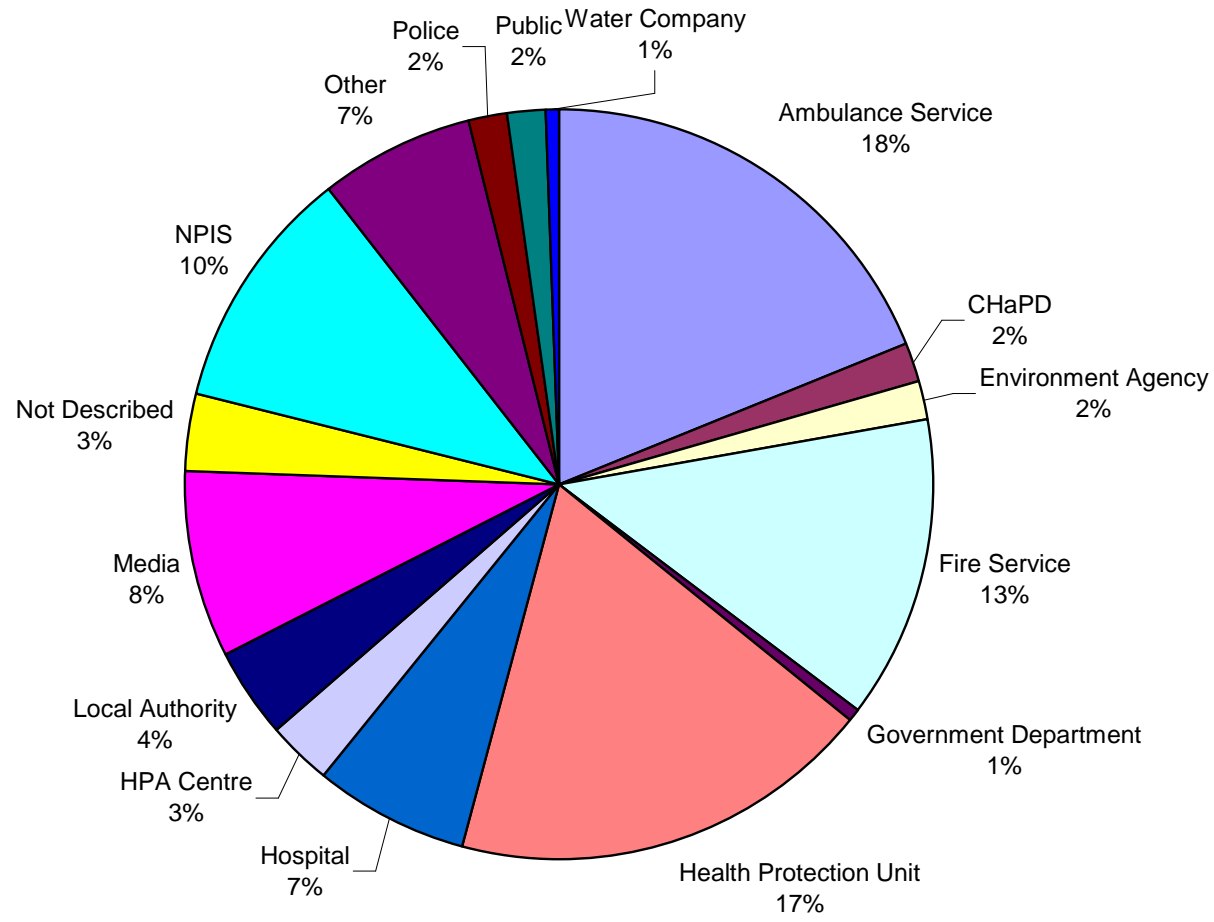


Figure 1: Notifying organisation of chemical incidents reported between 1st January and 31st March 2006 (n=181). Abbreviations: Chemical Hazards and Poisons Division (CHaPD), National Poisons Information Service (NPIS), Health Protection Agency Centre (HPA Centre). Other includes groups such as General Practitioner and Nurse practitioner.

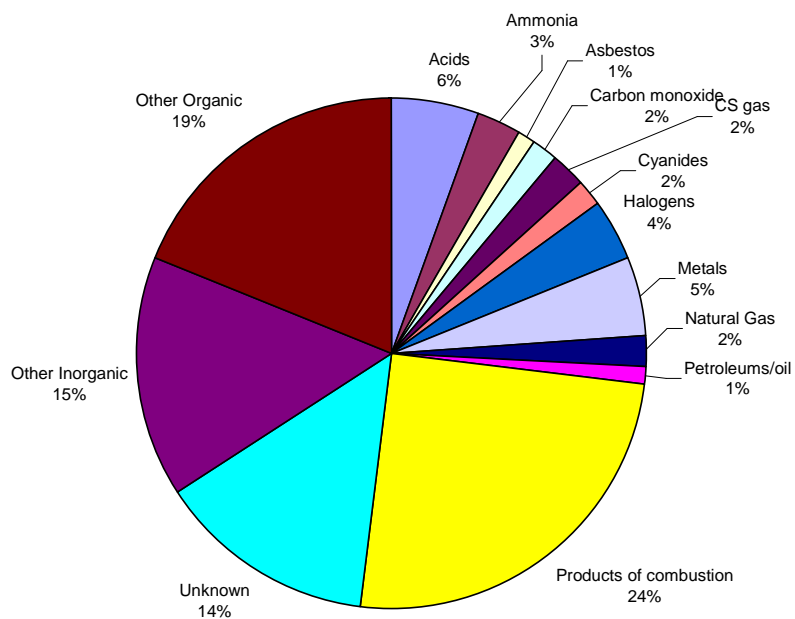


Figure 2a: Chemicals involved in incidents reported between 1st January and 31st March 2006 (n=181).

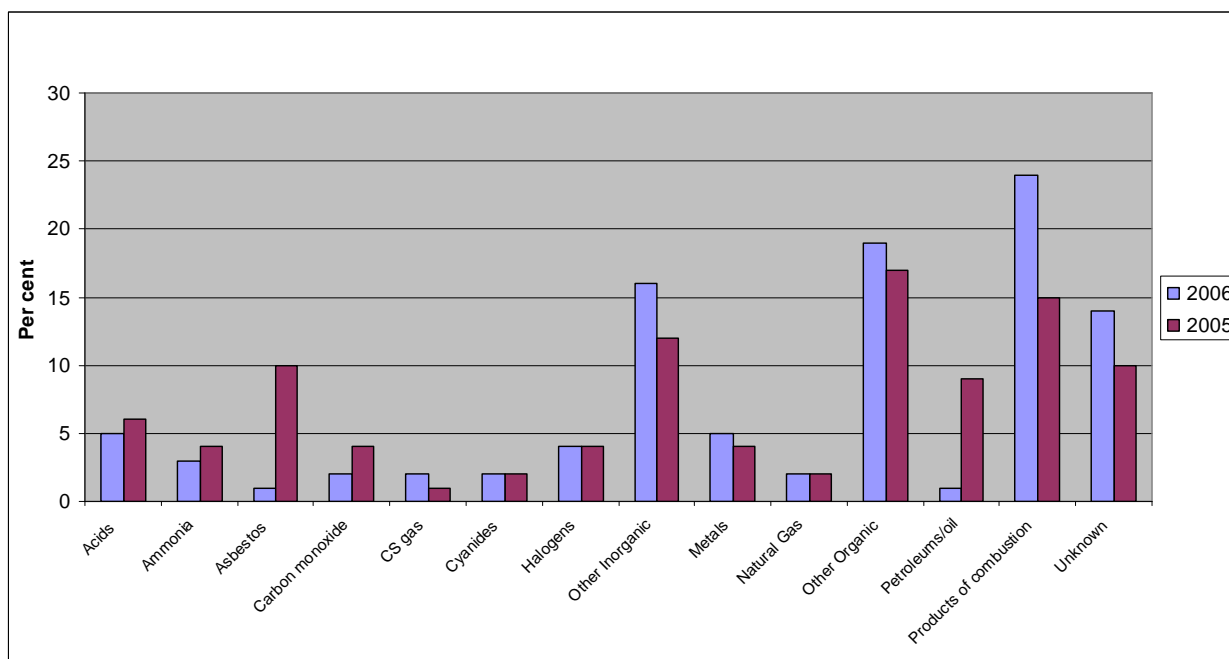


Figure 2b: Chemicals involved in incidents reported between 1st January and 31st March for 2006 (n=181) and 2005 (n=137).

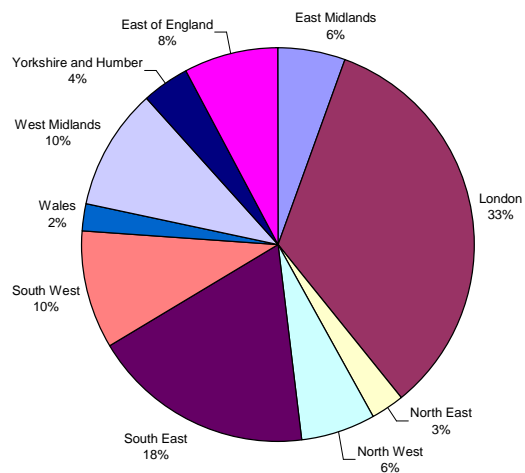


Figure 3a: Regional distribution of chemical incidents reported to CHaPD between 1st January and 31st March 2006 (n=181).

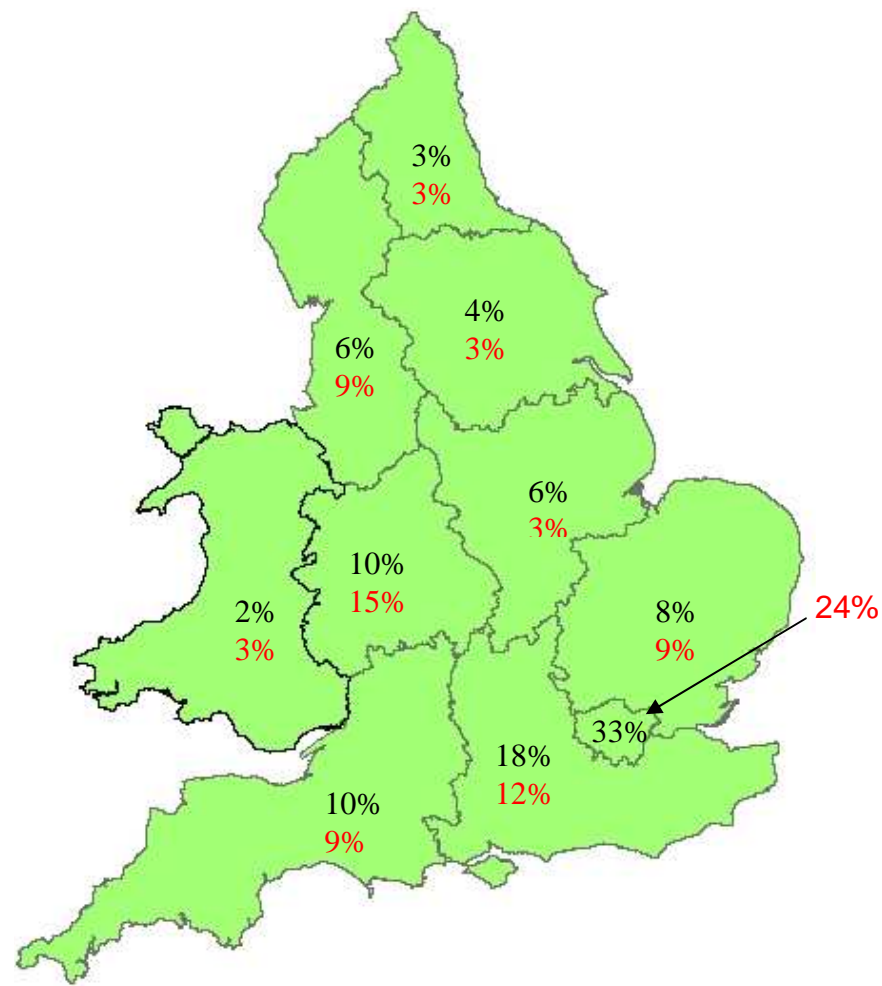


Figure 3b: Regional distribution of chemical incidents reported in England and Wales between 1st January and 31st March for 2006 (n=181) and 2005 (n=137). Per cent presented in black font for 2006 and red font for 2005.

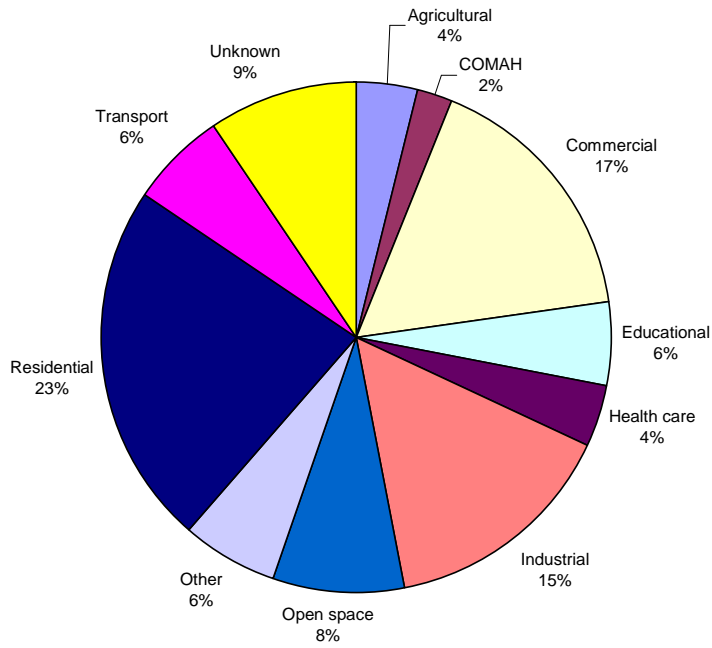


Figure 4a: Chemical incident location type for chemical incidents reported in England and Wales between 1st January and 31st March 2006 (n=181).

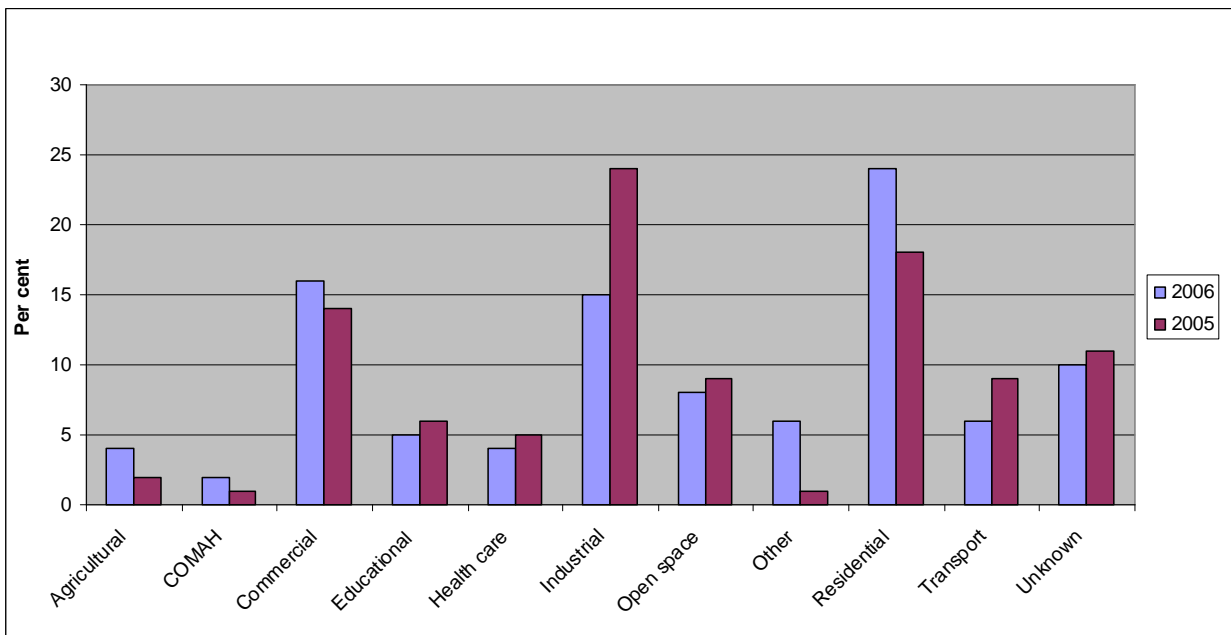


Figure 4b: Chemical incident location type for chemical incidents reported in England and Wales between 1st January and 31st March for 2006 (n=181) and 2005 (n=137).

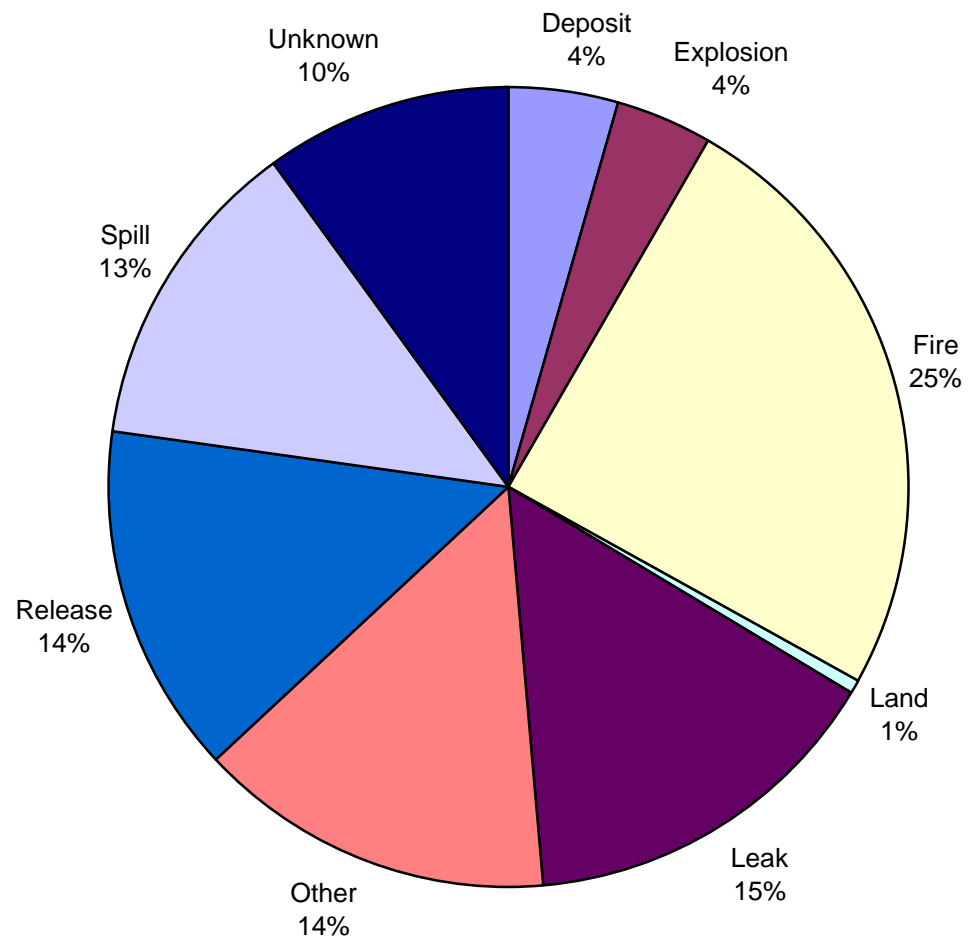


Figure 5: Chemical incident type for chemical incidents reported in England and Wales between 1st January and 31st March 2006 (n=181).

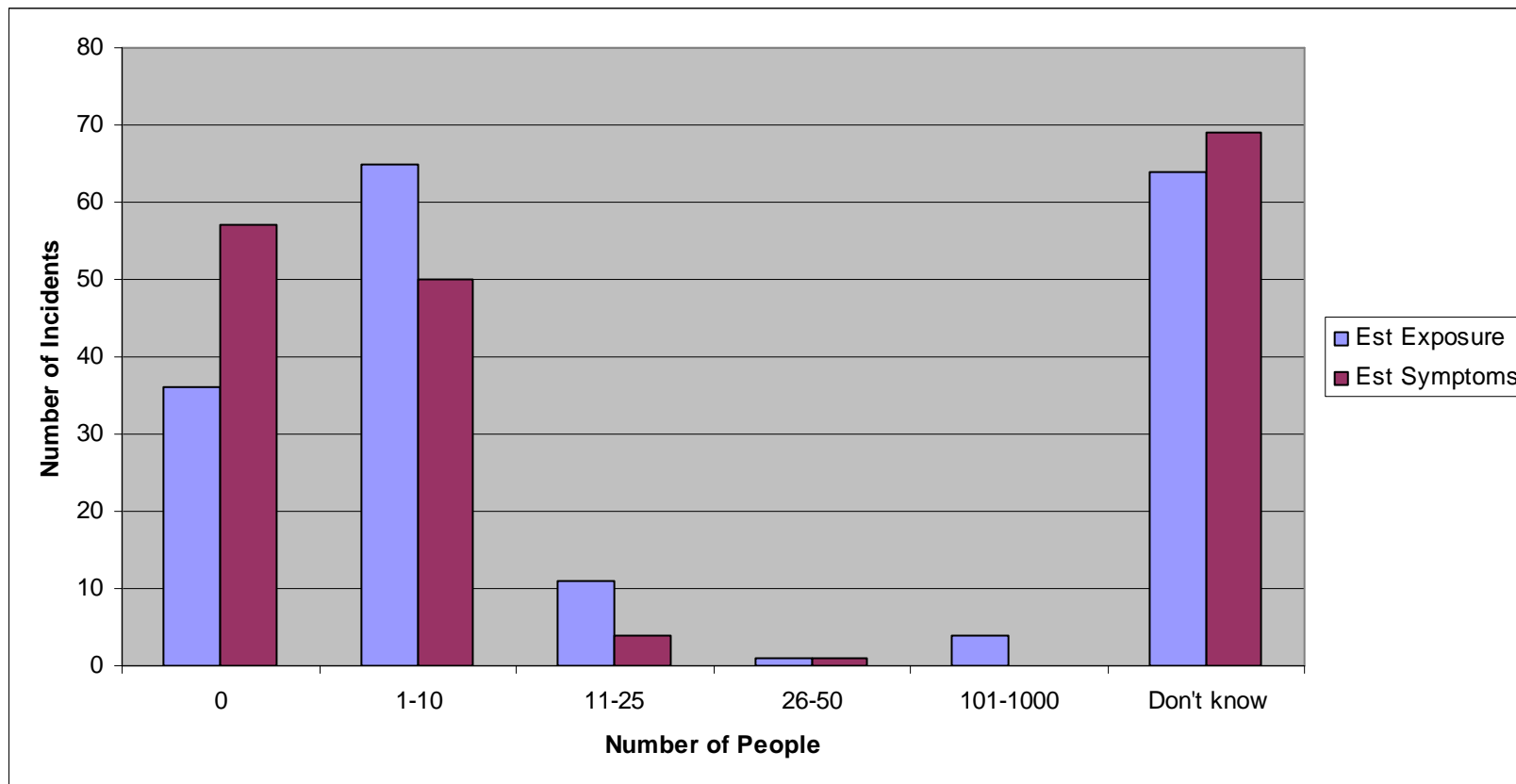


Figure 6a: Number of people exposed and experiencing symptoms from a chemical incident reported between 1st January and 31st March 2006 (n=181).

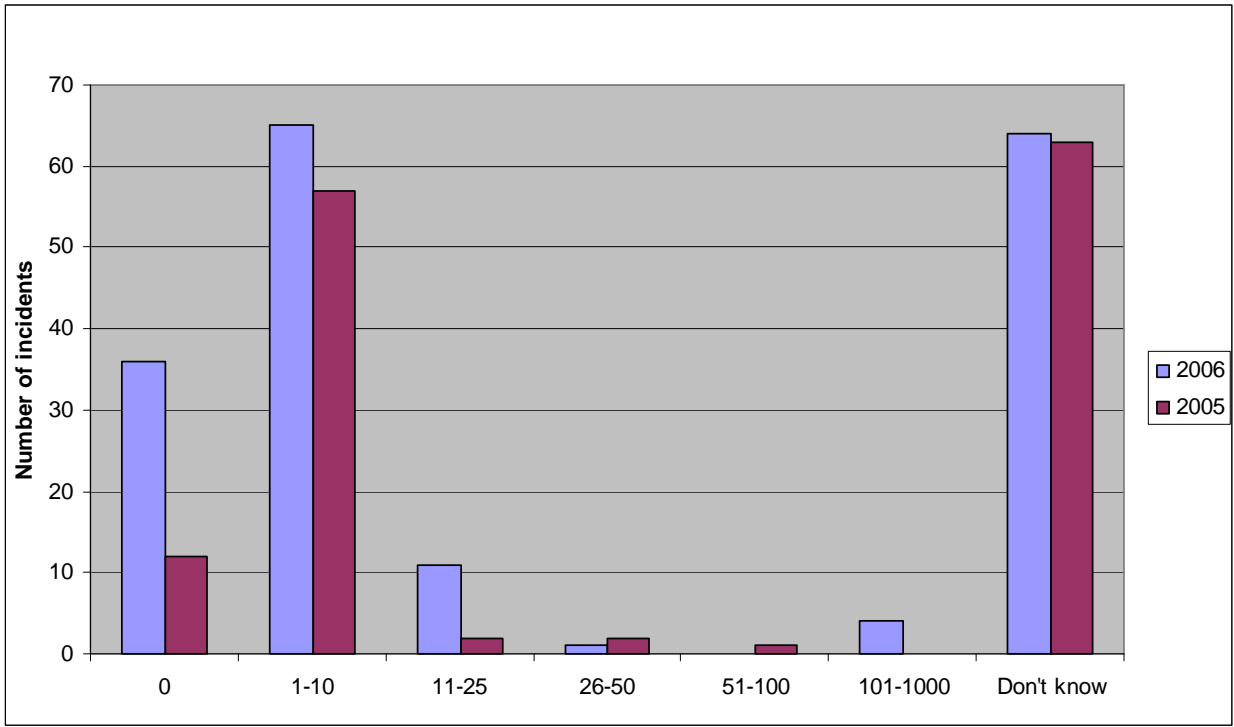


Figure 6b: Number of people exposed during chemical incidents reported between 1st January and 31st March for 2006 (n=181) and 2005 (n=137).

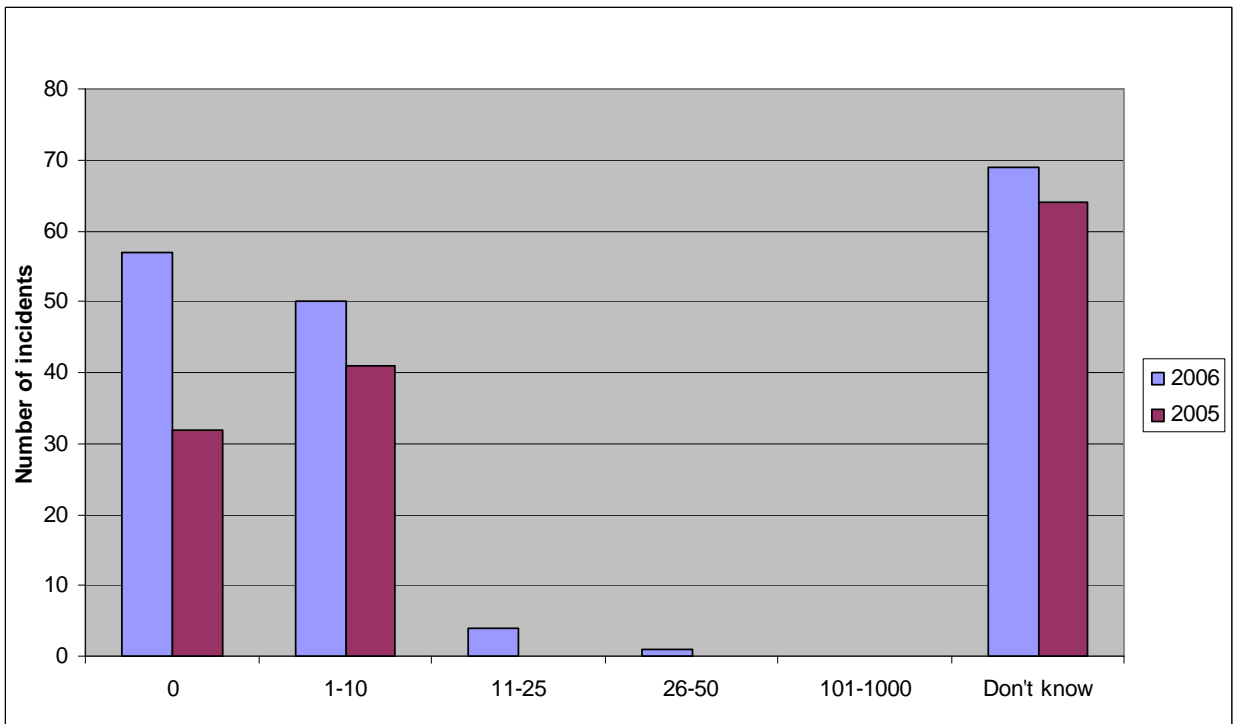


Figure 6c: Number of people exposed and experiencing symptoms during chemical incidents reported between 1st January and 31st March for 2006 (n=181) and 2005 (n=137).

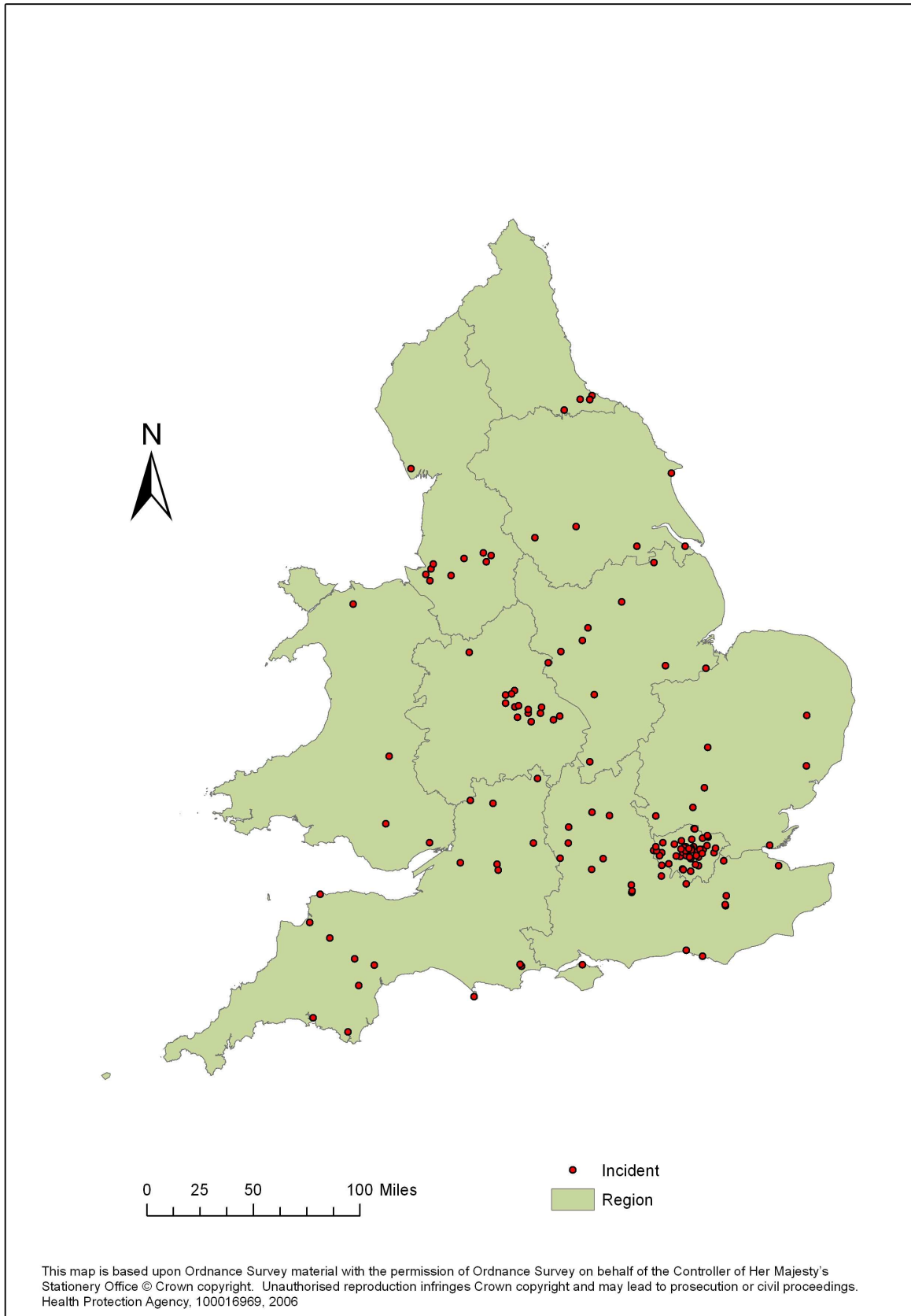


Figure 7: Chemical incidents, with geographical location described, which occurred during the period 1st January to 31st March 2006.