Surveillance report

Scottish Environmental Incident Surveillance System (SEISS)

2017 Annual Report

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NHS National Services Scotland

Highlights of 2017

- 178 incidents recorded on SEISS.
- Smoke was the most commonly reported chemical hazard.
- Cyanobacteria (blue-green algae) continues to be the most commonly reported microbiological agent.
- Residential sites were the most common locations for incidents involving chemical hazards.
- Recreational sites were the most common locations for incidents involving microbiological agents.
- Region 4 (NHS Greater Glasgow & Clyde and associated Local Authorities) recorded the highest number of incidents.

SEISS

SEISS provides a national level knowledge management system designed to provide information on a wide range of environmental incidents. The aim is to create a source of information that agencies can interrogate to discover who else has had to manage incidents, what information was helpful in managing incidents and what lessons were learned. SEISS is a database holding details of incidents reported by participating agencies, on situations involving a risk to public health due to the release into the environment of chemical, microbiological, radiation or other physical agents.

SEISS is currently the only web based system available in Scotland that enables the reporting of environmental incidents across all of Scotland from a range of different reporting agencies. This annual report provides a summary of the incidents reported via SEISS that have occurred in Scotland during the past year.

Health Protection Scotland

Figure 1: SEISS functions.

Environmental incidents reported in 2017

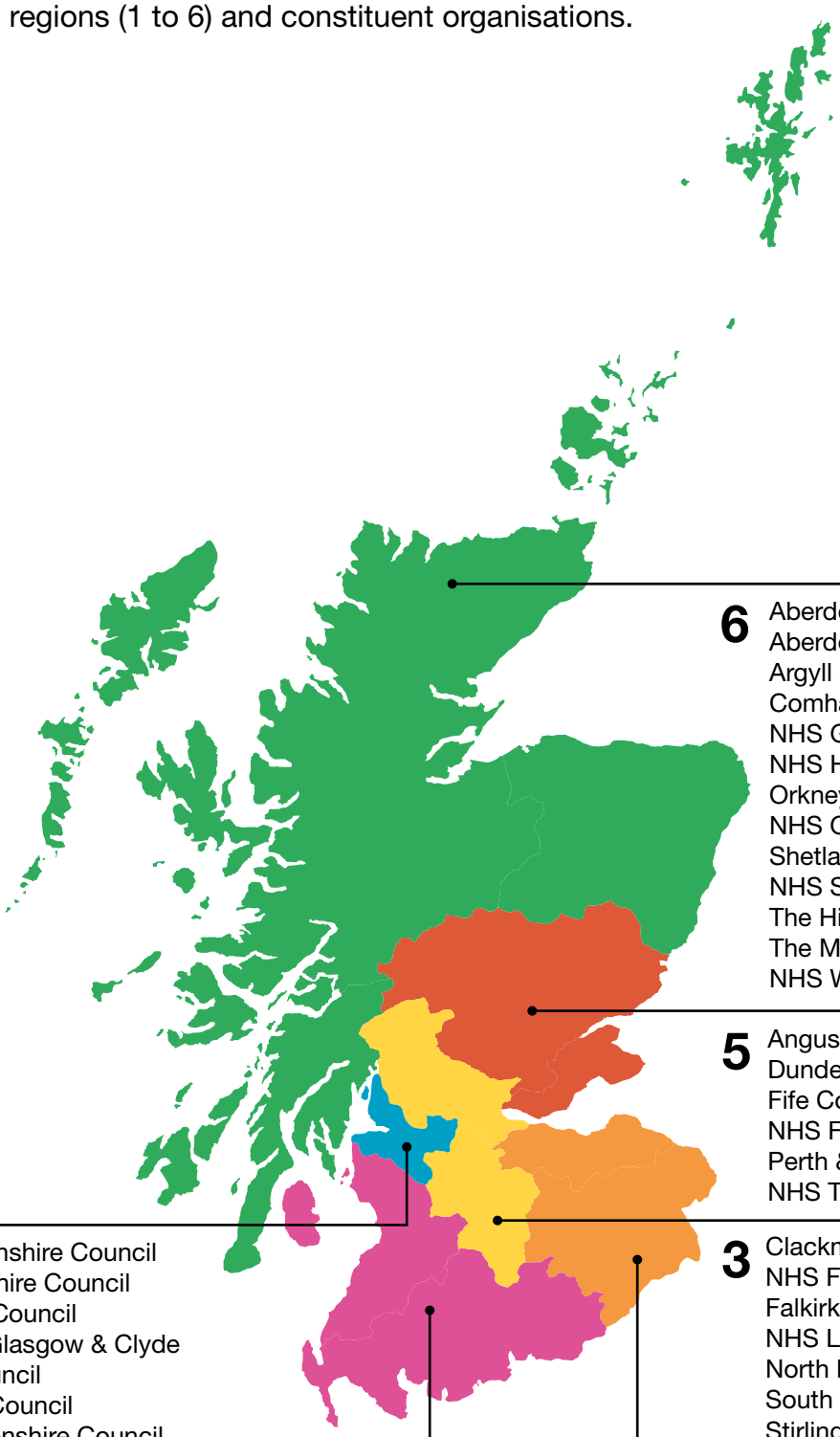
During 2017, a total of 193 validated incident reports were recorded on SEISS; 15 of these reports included multiple reporting of 11 actual incidents by more than one agency, giving a revised total of 178 individual incidents recorded in 2017.

Of the 178 incidents, most (151) involved chemical hazards. A further 27 incidents involved microbiological hazards. This follows a similar pattern to previous years.

As well as recording incidents by the individual reporting agency, SEISS groups the incident reports into six geographic regions within Scotland (Figure 2) based on combinations of local authorities and NHS board areas. This is designed to allow agencies to follow reports by neighbouring agencies of incidents in their immediate local region. A breakdown of the incidents by region, incident type and pathway of exposure is given in Table 1. Region 4 recorded the highest number of incidents which is understandable as it incorporates the City of Glasgow.

The number of incidents reported in each region per 100,000 of the population are Region1 (2.5); Region 2 (2.8); Region 3 (3.6), Region 4 (5.2); Region 5 (1.7); and Region 6 (3.0).

Figure 2: SEISS regions (1 to 6) and constituent organisations.



6
Aberdeen City Council
Aberdeenshire Council
Argyll & Bute Council
Comhairle Nan Eilean Siar
NHS Grampian
NHS Highland
Orkney Islands Council
NHS Orkney
Shetland Islands Council
NHS Shetland
The Highland Council
The Moray Council
NHS Western Isles

5
Angus Council
Dundee City Council
Fife Council
NHS Fife
Perth & Kinross Council
NHS Tayside

4
East Dunbartonshire Council
East Renfrewshire Council
Glasgow City Council
NHS Greater Glasgow & Clyde
Inverclyde Council
Renfrewshire Council
West Dunbartonshire Council

3
Clackmannanshire Council
NHS Forth Valley
Falkirk Council
NHS Lanarkshire
North Lanarkshire Council
South Lanarkshire Council
Stirling Council

1
NHS Ayrshire & Arran
Dumfries & Galloway Council
NHS Dumfries & Galloway
East Ayrshire Council
North Ayrshire Council
South Ayrshire Council

2
NHS Borders
City of Edinburgh Council
East Lothian Council
NHS Lothian
Midlothian Council
Scottish Border Council*
West Lothian Council

National: SEPA*, Scottish Water*, National Poison Information Service (Edinburgh), Scottish Ambulance Service
Multi-regional: Glasgow Scientific Services
* Agencies with four regional offices contributing to SEISS

Table 1: Incident occurrence data for agencies participating in 2017.

SEISS Region	Total No. of Incidents	Chemical								Microbiological				Radiation
		Air	Land	Water	Air & Land	Land & Water	Air & Water	Air, Land & Water	Indoor Environment	Water	Air, Land & Water	Food	Air	
1	13	3	3	0	1	0	0	0	4	2	0	0	0	0
2	28	5	0	0	3	0	0	0	18	2	0	0	0	0
3	35	9	0	0	1	1	1	0	14	9	0	0	0	0
4	60	15	3	0	5	0	1	0	30	6	0	0	0	0
5	13	7	0	0	0	0	0	0	6	0	0	0	0	0
6	29	12	1	1	0	0	0	0	7	7	0	1	0	0
Total	**178**	**51**	**7**	**1**	**10**	**1**	**2**	**0**	**79**	**26**	**0**	**1**	**0**	**0**

Chemical hazards

In 2017, the chemical hazards most frequently implicated included: smoke, asbestos, ammonia, sodium hydroxide, carbon monoxide and methane (Table 2a-b). There were also a wide range of other chemical agents involved in reported incidents; 29 different chemicals were involved once (e.g. ammonium oxide, formalin, potassium nitrate, sodium hypochlorite and urea).

Analysis of cumulative data from 2002 to 2017 shows that asbestos, smoke, ammonia, mercury, carbon monoxide and petroleum/diesel are consistently the top six most frequently reported hazards involved in incidents, with asbestos being consistently the single most commonly cited agent. The top chemical incidents have been ranked (1 to 6) to show the trend across all years and across each of the last 5 years (Table 3a-d).

Over 16 years of SEISS reporting, residential sites have remained the most commonly reported location for chemical incidents (23% (426/1822)), followed by industrial and commercial sites (Table 4a-b). During 2017, the most commonly cited agents involved at residential locations were carbon monoxide (three), fentanyl (three), nitrogen (three) and asbestos (two). Commercial sites accounted for 17% (26/151) of the incidents reported, the most common agents being smoke (four) and asbestos (two) and chlorine (two).

Table 2a: Frequency of chemical agent citations in incident reports for 2017.

Chemical Agents	Frequency
Smoke	27
Asbestos	10
Ammonia	8
Sodium hydroxide	6
CO	5
Methane	5
Chlorine	4
Hydrochloric acid	4
Mercury	4
Nitrogen	4
Fentanyl	3
Hydrogen sulphide	3
White powder	3
Butane	2
Diesel	2
Magnesium	2
Nitric acid	2
Petrol	2
Refrigerant gas	2
Occurrences of incidents involving chemical agents cited once	53

Table 2b: Frequency of microbiological agent citations in incident reports for 2017.

Microbiological Agents	Frequency
Blue-green algae (all species)	24
Occurrences of incidents involving microbiological agents cited once	3

Table 3a: Total number of incidents from 2002-2017 (chemical agents).

Chemical Agent	Total 2002-2017	2013	2014	2015	2016	2017
Asbestos	272 (1)	13 (2)	24 (1)	17 (1)	25 (1)	10 (2)
Smoke	237 (2)	16 (1)	18 (2)	15 (2)	18 (2)	27 (1)
Ammonia	103 (3)	4 (4)	6 (3)	4 (4)	6 (4)	8 (3)
Mercury	67 (4)	3 (5)	3 (4)	7 (3)	3 (5)	0
Carbon monoxide	66 (5)	4 (4)	2 (5)	7 (3)	7 (3)	5 (4)
Gasoline or petrol	59 (6)	5 (3)	2 (5)	1 (5)	3 (5)	2 (5)
Diesel	49	0	3	1	1	2
Chlorine	48	3	2	3	3	4
Hydrochloric acid	36	0	6	1	4	4
Oil	35	2	2	1	3	0
Gas	29	0	3	1	3	0
Sulphuric acid	26	0	0	2	5	1
Solvents	25	0	0	0	1	0
Fuel oil	19	0	0	0	0	1
Lead	17	0	0	3	0	0
Refrigerants	16	0	0	2	0	2
Sodium hydroxide	16	0	0	1	0	6
Kerosene	13	0	0	0	4	1
Nitric acid	12	0	1	1	0	2
CS Agent	9	0	0	0	0	0
Styrene	7	0	0	0	0	0
Formaldehyde	7	0	0	0	0	0
Hydrogen chloride	6	0	0	0	0	0
Cyanide	6	0	0	0	0	0
Other	776	38	41	26	51	76
Total	**1856**	**88**	**113**	**93**	**137**	**151**

Table 3b: Total number of incidents from 2002-2017 (microbiological agents).

Microbiological Agent	Total 2002-2017	2013	2014	2015	2016	2017
Blue-green algae (all species)	670	32	60	70	41	24
Cryptosporidium	35	0	0	0	0	0
E.coli O157	14	0	0	0	0	1
Legionella	12	1	0	0	0	0
Sewage pathogens	12	0	2	0	0	0
Suspect white powder	8	0	0	0	0	0
Coliforms	5	0	0	0	0	0
Pseudomonas	5	0	0	0	0	0
Anthrax	2	0	0	0	0	0
Campylobacter	1	0	0	0	0	0
Other	18	3	2	2	3	2
Total	**809**	**36**	**64**	**72**	**44**	**27**

Table 3c: Total number of incidents from 2002-2017 (radiological agents).

Radiological Agents	Total 2002-2017	2013	2014	2015	2016	2017
Radon	2	0	0	0	0	0
Caesium 137	2	0	1	0	0	0
Iodine 131	1	0	0	0	0	0
Other	13	1	1	1	1	0
Total	**18**	**1**	**2**	**1**	**1**	**0**

Table 3d: Total number of incidents from 2002-2017 (all agents).

Agent	Total 2002-2017	2013	2014	2015	2016	2017
All Chemical	1856	88	113	93	137	151
All Microbiological	809	36	64	72	44	27
All Radiological	18	1	2	1	1	0
Grand Total	**2683**	**125**	**179**	**166**	**182**	**178**

Table 4a: Total number of incidents by year for each type of location (chemical locations).

Chemical Locations	2013	2014	2015	2016	2017	Total 2002-2017
Agricultural	5	8	5	4	8	71
Commercial	14	19	11	24	26	315
Educational	5	4	8	8	8	125
Healthcare	5	2	7	4	4	73
Industrial	7	26	13	14	22	315
Open Space	7	4	2	25	24	144
Recreational	10	7	7	8	6	111
Residential	25	31	26	39	37	426
Transportation	9	9	10	8	15	196
Water Supply	1	3	4	1	1	46

Table 4b: Total number of incidents by year for each type of location (microbiological locations).

Microbiological Locations	2013	2014	2015	2016	2017	Total 2002-2017
Agricultural	0	1	0	1	0	13
Commercial	2	0	2	0	1	19
Educational	0	0	0	0	0	3
Healthcare	0	0	0	0	0	5
Industrial	0	0	0	0	0	0
Open Space	1	2	5	1	0	53
Recreational	32	57	64	40	24	558
Residential	1	0	0	0	0	19
Transportation	0	0	0	0	0	1
Water Supply	0	4	1	2	2	159

Microbiological hazards

Microbiological incidents accounted for 44 of the 178 report in 2017, and mainly involved cyanobacterial (blue-green algae (BGA)) contamination of recreational locations, accounting for 93% (41/44) of these reports. Table 5 shows the number of incidents by type and location.

Table 5: Incidents by Type and Location for 2017.

Location	Chemical	Microbiological	Radiation	Other	Total
Agricultural	8	0	0	0	8
Commercial	26	1	0	0	27
Educational	8	0	0	0	8
Healthcare	4	0	0	0	4
Industrial	22	0	0	0	22
Open Space	24	0	0	0	24
Recreational	6	24	0	0	30
Residential	37	0	0	0	37
Transportation	15	0	0	0	15
Water Supply	1	2	0	0	3
Total	**151**	**27**	**0**	**0**	**178**

Typical incidents reported during 2017

In January, several agencies investigated a fuel spillage into the Dalmarnock sewer system. A number of reports of odours from members of the public resulted in attendance by the Scottish Fire and Rescue Service, Scottish Water and SEPA (http://www.eveningtimes.co.uk/news/15006393.Scottish_Water_launch_probe_after_fuel_ends_up_in_sewer_system_in_Glasgow___s_East_End/).

In February, firefighters were called out to a barn fire at a farm near Earlston. No people or livestock were harmed but the barn suffered “substantial damage” including the collapse of its roof (http://www.bbc.co.uk/news/uk-scotland-south-scotland-39050858).

In March, emergency services responded to a chemical incident at Inveralmond Industrial Estate. Three individuals were treated for breathing difficulties (https://www.dailyrecord.co.uk/news/local-news/emergency-services-called-chemical-incident-10092684).

In April, a suspicious package was delivered to the SNP offices in Kirkintilloch. Upon examination, the material within the package was found to be urea.

In May, firefighters tackled a wildfire on moor and grassland south of Inverness. Six appliances were initially sent to the scene and thick black smoke could be seen rising from the blaze (http://www.bbc.co.uk/news/uk-scotland-highlands-islands-39920679).

In June, July, August and September, there were reports of toxic blue-green algae at various locations across Scotland. Warning notices were posted advising people to avoid contact with the water. BGA incidents typically happen in the “warmer” summer months.

In June, Scottish Water warned residents on Whalsay, Shetland not to drink or use their tap water due to excessive levels of aluminium. Bottled water was offered to residents while Scottish Water dealt with the problem, which is thought to have affected about 300 people (https://stv.tv/news/north/1391222-warning-over-high-levels-of-aluminium-in-tap-water/).

In July, more than 50 firefighters tackled a large blaze at a construction yard near Glasgow Airport. The fire produced a large amount smoke, but there were no reports of any injuries (http://www.bbc.co.uk/news/uk-scotland-glasgow-west-40547621).

In August, a major emergency response was triggered in the village of Tarbert after Royal Mail staff were affected by suspected chemical inhalation. Six staff members suffered breathing problems at around 8.30am as mail arrived in Tarbert from Lochgilphead. Scottish Ambulance Service paramedics and fire and rescue decontamination and scientific assessment units attended (https://www.obantimes.co.uk/2017/08/22/mystery-tarbert-chemical-scare-triggers-major-response/).

In September, Scottish Water reported that drinking water supplies in the Carron Valley area were affected with Geosmin (see later for further information). Customers had complained about an earthy or musty taste or odour in the water supply (http://www.scottishwater.co.uk/about-us/media-centre/media-centre/carron-valley-geosmin).

In October, firefighters tackled a large fire on an industrial estate in Lanarkshire. Large plumes of thick black smoke were observed at the incident.

http://www.eveningtimes.co.uk/news/15583497.Large_fire_breaks_out_on_industrial_estate/

In November, firefighters were called to a blaze in a community centre in Blantyre. Eight fire engines, including two aerial appliances, were sent to the scene. There were no reports of any injuries (http://www.bbc.co.uk/news/uk-scotland-glasgow-west-41966348).

In December, emergency services dealt with a spillage of formalin outside a hospital in Glasgow. A cordon was put in place after formalin, used to preserve human tissues, leaked from a van. Two members of staff were treated by paramedics. More than 20 firefighters as well as police were called (https://stv.tv/news/west-central/1404347-chemical-scare-at-hospital-as-car-park-cordoned-off/).

Knowledge management

SEISS is not intended to be just a passive system that partners report incidents to. It is designed to provide access to information on incidents across Scotland for local agencies with responsibility for incident management. Users are encouraged to add information likely to be of use to colleagues across Scotland who may have to deal with similar incidents. SEISS is therefore both a surveillance tool and a knowledge management resource. The more incidents that partners report, the more useful the system will be.

Incident themes in 2017

Smoke from fires

A number of incidents reported during 2017 related to large fires which resulted in large plumes of smoke being carried over built up areas. This frequency causes alarm and requests for advice on how to avoid adverse health effects especially for those with respiratory illness such as asthma and COPD.

The main substances of concern in the smoke are carbon monoxide, formaldehyde, particulates and acrolein.

Carbon monoxide is an odourless, colourless gas.It affects the body by reducing the oxygen carrying capacity of the blood. Initial exposure symptoms include headache, nausea, dizziness and weakness.

Particulates from fire smoke are predominantly (90%) respirable. Over exposure to particulates causes irritation of mucous membranes and a decrease in lung capacity and function over time.

Formaldehyde is produced during the combustion of wood, cotton, paper and some plastics. Low-level exposure causes irritation of the eyes, a stuffy nose and a sore throat. Higher levels cause irritation to spread to the lower respiratory tract.

Acrolein is also produced during the combustion of wood, cotton and paper. Low-level exposure causes severe irritation of the eyes and upper respiratory tract, producing stinging and tearing of the eyes.

Further information is available in the HPS Briefing Note on Products of Combustion (http://www.hps.scot.nhs.uk/resourcedocument.aspx?id=2114).

Geosmin in drinking water

An incident reported during 2017 involved contamination of water supplies with geosmin.

Geosmin is a harmless, naturally occurring organic compound associated with the breakdown of algae and other micro-organisms in the raw water sources. It has a distinct earthy/ musty taste and odour and is present in some foods such as beetroot, spinach, and mushrooms. It contributes to the strong acrid odour that occurs in the air when rain falls after a dry spell of weather or when soil is disturbed.

Although the taste and odour can be unpleasant, geosmin is not harmful to health. The water is safe to use as normal and does not pose a risk to public health. The threshold for human detection is approximately 15 nanogrammes per litre. However variations in an individuals perception of taste or odour, may result in some individuals detecting geosmin at concentrations as low as 5 nanograms per litre in drinking water.

Heating the water increases the volatility of these compounds. This is why the smell is more easily detected when showering or when contaminated water is used for hot drinks.

Further information is available from Scottish Water (http://www.scottishwater.co.uk/about-us/media-centre/media-centre/carron-valley-geosmin).

Cyanobacteria (BGA) in lochs

The majority of incidents reported during 2017 related to cyanobacteria (or blue-green algae (BGA)). Incidents of BGA occur mainly during the months of April to October. At a number of lochs and recreational waters, warning signs were put up advising members of the public that there was a risk of physical (dermal) contact with algae or exposure to cyanobacterial toxins via ingestion or inhalation.

Instances of actual harm to humans remain exceptional. Animals, specifically pet animals (especially dogs), are at more risk of harm. The latest version of the Scottish Government's guidance on cyanobacteria is available at http://www.scotland.gov.uk/Publications/2012/04/6625.

(Note: the current guidance, published in 2012, is under review with a new version due for completion by the end of 2018).

SEISS User Group

The SEISS User Group meets twice a year to discuss the operation of SEISS and to suggest improvements to the system. Members of the group are drawn from HPS, NHS boards, local authorities, the National Poisons Information Service (Edinburgh), SEPA, the Scottish Ambulance Service and Glasgow Scientific Services (representing the whole of Scotland via the Scottish Fire and Rescue Service contract). New members are always welcome (please contact the SEISS Team at NSS.HPSSEISS@nhs.net).

Conclusions

SEISS remains the only multi-agency web based confidential system providing information on local environmental incidents in Scotland. SEISS always relies on the active participation of all its partners. There is always scope for improvement in the completeness of the data collected. The value of the system lies in using this unique resource to share knowledge and experience as well as to help identify where local expertise in dealing with a particular type of problem may be found. The active engagement of users therefore remains essential to the continued development of SEISS. While the user group provides guidance on users' views on the scope for improving SEISS, additional suggestions are always welcome from any users or interested individuals.

For more detailed information on SEISS please refer to the SEISS web-site (http://www.hps.scot.nhs.uk/enviro/ssdetail.aspx?id=107) or contact either Ian Henton or Colin Ramsay at HPS on 0141 300 1100.

HPS Surveillance Report

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