The Hemel Hempstead oil depot explosion demonstrated the environmental scientific community's ability to mobilise at a moments notice.

Action stations

Image processed by NERC's Satellite Receiving Centre, Dundee University

Europe's largest peace time explosion, at the Buncefield depot in Hemel Hempstead, near London, registered 2.4 on the British Geological Survey's seismogram at 6.01, 11 December. The fire burnt out of control for many hours creating a black plume of smoke clearly visible from space. NERC's Satellite Receiving Station at Dundee University produced many of the most useful images of the blast and subsequent cloud.

Atmospheric conditions pushed the plume high into the atmosphere minimising health risks and environmental damage in the area immediately surrounding the depot. 'The cold conditions and lack of wind meant there was a low level inversion layer of air lying fairly still near the ground, protecting locals,' explained Neil Cape from the Centre for Ecology & Hydrology, in *New Scientist*.

'The blaze shot its smoke straight through this layer and into the troposphere, where particles were dispersed over hundreds of miles, washing out in the rain,' he added.

NERC scientists provided high-level support to the emergency response team who needed information on the chemical composition of the plume to judge the best way to tackle the blaze. The NERC/Met Office BAe146 scientific aircraft, based at NERC's Facility for Airborne Atmospheric Measurements, monitored the dispersion of the cloud and analysed its chemical composition.

The first flight tracked the limits of the cloud along the south coast of England and confirmed that at the extremities of the plume, levels of carbon monoxide, carbon dioxide, sulphur dioxide, nitrous oxides and ozone were relatively low, and the bulk of the plume was composed of soot particles (particulates).

The second flight penetrated the plume to provide information for the forecasters and emergency teams.

Centre for Ecology & Hydrology scientists worked closely with the media providing hour-by-hour information on the hazards posed by this accident, helping to ensure reporting of the incident was, for the most part balanced and accurate. Their initial assessment was that long-term damage to the environment may be minimal as it was unlikely there was anything in the cloud that was not already present in the environment, and the plume was too small to have any direct effects on climate. Dan Osborne said, 'The biggest potential difficulty could be caused by attempts to put the fire out. When a mass of water goes into the ground, it can flush older contaminants out. There is also concern about the materials in fire-fighting foam.'

The emergency team planned to contain the run-off mixture of foam, water and fuel within temporary reservoirs to avoid water supply contamination.

Once extinguished, another remote sensing aircraft operated by the NERC Airborne Research and Survey Facility (ARSF) was due to map the surface and subsurface pollution for the cleanup operation.

Scientists at Cambridge University requested an instrument known as a 'MicroTop' from NERC's Field Spectroscopy Facility in Edinburgh to help monitor aerosols and pollution. Fran Taylor from the facility said, 'Timescales were really tight but we were able to turn around the equipment for use in the field within three hours.'

Tamsin Mather from Cambridge University's Earth Sciences Department said, 'We asked for the instrument to look at the distribution of particle sizes in the plume. We use similar techniques to monitor volcanic plumes, but we want to see if they can be used to measure man-made atmospheric pollution. They can give us a great deal of information on particle size, which tells us how long particles will remain in the atmosphere.' NERC's British Atmospheric Data Centre at Rutherford Appleton Laboratories will hold all data gathered from NERC instruments and aircraft.

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