

SCIENTIFIC ADVISORY GROUP FOR EMERGENCIES (SAGE)

VOLCANIC ASH DISRUPTIONS

**MINUTES of a Meeting held in 35 Great Smith Street
On 24 June 2010 at 14:00**

PRESENT

**Professor Sir John Beddington
Government Chief Scientific Adviser
And SAGE Chair**

Dr Thor Thordarson	University of Edinburgh
Dr David Thomson	Met Office
Professor Stephen Mobbs	Natural Environment Research Council (NERC)
Professor Hugh Coe	University of Manchester
Dr Jennie Gilbert	University of Lancaster
Dr Sue Loughlin	British Geological Survey
Professor Stephen Belcher	University of Reading
Professor Steve Sparks	University of Bristol
Professor Marge Wilson	University of Leeds
Dr Matt Watson	University of Bristol
Professor David Spiegelhalter	University of Cambridge
Professor David MacKay	Department of Energy and Climate Change
Dr Hilary Walker	Department for Health
Dr Andy Brown	Met Office
Dr Janet Dixon	Department for the Environment, Food and Rural Affairs

Observers

Susan Hamilton	Department for Transport
John Perry	Ministry of Defence
Ray Elgy	Civil Aviation Authority
Susan Atkinson	Cabinet Office

Secretariat

Catherine McCloskey	Go-Science
Chris McFee	Go-Science
Felicity Oswald	Cabinet Office
Anita Friend	Cabinet Office

Apologies

Professor Adrian Simmons	European Centre for Medium-Range Weather Forecasts (ECMWF)
Professor Brian Collins	Department for Transport and Department for Business, Innovation and Skills
Dr Willy Aspinall	University of Bristol
Dr Bob Maynard	Health Protection Agency
Dr Miles Parker	Department for Environment, Food and Rural Affairs
Dr Penny Bevan	Department for Health
Professor Julia Slings	Met Office
Professor Mark Welland	Ministry of Defence
Professor Bob Watson	Department for Environment, Food and Rural Affairs
Professor Bill McGuire	University College London
Dr David Kerridge	British Geological Survey
Dr Gudrun Larsen	Iceland Institute of Earth Sciences
Dr Jordan Giddings	Department for Transport
John McColl	Civil Aviation Authority
Professor Alex Halliday	University of Oxford
Professor David Clary	Foreign and Commonwealth Office

Item 1 – Welcome and review of actions

The minutes from the previous meeting were accepted subject to reflecting Professor Adrian Simmon's comments and updating the attendance lists.

Actions 3.1 to 3.3 were discussed as part of Agenda Item 2. Regarding **Action 3.4**, Stephen Mobbs informed the group that an order had been placed for an additional Light Detection and Ranging (LIDAR) system, and the radiosonde was ready to be deployed whenever necessary. **Action 3.5** was closed, since this work has gone ahead without the need for a letter. **Action 3.6** was complete, and work was progressing. **Actions 3.7, 3.8, and 3.10** were discussed under Agenda Item 2. **Action 3.9** was progressing using simplified fluid dynamics models. The National Centre for Atmospheric Science (NCAS) was investigating how the ash plume behaves in layers. **Action 3.11** was complete. **Action 3.12** was discussed as part of Agenda Item 3, and **Action 3.13** is ongoing.

Item 2 – Situation report and update from subgroups

British Geological Survey

From a volcanological point of view, the eruption was still ongoing. However, there was no longer any ice in contact with hot material, so there was no plume of ash being formed. Steam was still being emitted from the volcano.

It was reported that a few of the Global Position System (GPS) network monitoring deformation around Eyjafjallajökull had measured a complete return to pre-eruption levels. However, others had shown some unexplained signals. There were some shallow earthquakes occurring, and these were probably related to near-surface processes.

If the eruption was to significantly increase in strength, the first sign would probably be from the GPS signals. The warning could be a few days to a week.

The British Geological Survey (BGS) was also working with the Icelandic Met Office on monitoring other volcanoes in Iceland. At present, there were around 4 or 5

primed volcanoes in Iceland – some of which were well monitored, others of which were not. The BGS had invested [REDACTED] in seismic monitors to be distributed across several sites. It also wanted deformation and gas monitoring capability, which would cost an additional [REDACTED].

Met Office

The Met Office had signed a Memorandum of Understanding (MOU) with the Icelandic Met Office, which was helping work between the two to progress.

The Met Office was currently working to develop a more robust justification for the assertion that uncertainties in the NAME model interact to mostly cancel each other out. This had been observed in practice, but was not yet entirely understood.

It was working with Rolls Royce to determine the relationship between mean ash concentration, and peak concentration, over a specified area. There were still some large uncertainties in this, and the work emphasises the need for good observational evidence – the models themselves are not enough.

Aviation subgroup

The Department for Transport's aviation subgroup met for second time last week. Its work is focussed on the "grey zone" (time limited zone) and the ash tolerance of engines.

The group was working with EU partners, and on deciding how best to use the limited resources available for this work. Funding was still an issue, and DfT was producing a paper addressing this issue. Regarding European cooperation, DfT noted that the EU LIDAR network does not include any UK LIDARs. The Met Office stated that they were engaged with the EARLINET¹ lidar network, but that it was primarily focussed on research, rather than routine real time monitoring.

¹ The European Aerosol Research Lidar Network

ACTION: MET OFFICE to confirm their level of engagement with EARLINET1 (European Aerosol Research Lidar NETwork) and report back to the group.

Sulphur dioxide sub-group

The sulphur dioxide subgroup reported on the outcomes of their first meeting. The worst case scenario they considered was an eruption similar to the Laki eruption in 1783. They calculated that the 24h-mean peak sulphur dioxide concentrations would be 2-5ppm at flying height (10km). This would be sufficient to cause respiratory problems for passengers, and in some cases heart problems. Hourly means could be very much higher than the 24 hour mean.

The model used by this group was a global model capable of including the chemistry of the sulphur dioxide. It had quite coarse resolution.

The Met Office NAME model is capable of much finer resolution, however it currently only has the capability to model sulphur dioxide as a passive tracer – it cannot include the relevant chemistry. It was currently looking into the possibility of incorporating Sulphur Dioxide (SO₂) chemistry into the NAME model.

The idea of creating a “catalogue” of various models was raised. A workbook covering a range of scenarios with different volcanoes, eruption sizes, and sulphur dioxide characteristics was also raised. This had a generally positive response among the group but was not taken forward at this stage.

Item 3 – Planning Assumptions

The SAGE secretariat tabled an updated Planning Assumptions paper for discussion.

The group offered their views on likelihood scores as a starting point, but further work is necessary.

ACTION – VOLCANIC HAZARDS ASSESSMENT SUBGROUP and BRITISH GEOLOGICAL SURVEY to work with GOVERNMENT OFFICE FOR

SCIENCE and the CIVIL CONTINGENCIES SECRETARIAT to develop Planning Assumptions.

It was suggested that scenario 3 was changed on the basis that eruptions of a magnitude bigger than that seen in April 2010 were unlikely to be long lasting. It was considered reasonable that these VEI 5 eruptions would last up to 5 days. For this reason the consequences were very similar to those outlined in scenario 2. The group suggested that scenario 3 could be adapted to cover a big explosive eruption, which was currently underrepresented in the scenarios.

ACTION: CIVIL CONTINGENCIES SECRETARIAT to redraft this scenario, with input from THOR THORDARSON, MATT WATSON and STEVE SPARKS; then submit to the group for scoring.

The group noted that Laki type events covered by scenario 4 had occurred twice in the last 1100 years. Given there were only two data points that was a high degree of uncertainty about the frequency of these events. For prolonged eruptions of this type, the variability of the meteorological conditions becomes much less important.

The Sulphur Dioxide subgroup had produced a paper SAGE(10)(06)(06) which estimated sulphur dioxide levels in the UK as the result of a Laki type event.

ACTION - CIVIL CONTINGENCIES SECRETARIAT to reflect the finding in this paper in scenario 4,

The issue of heavy metals emitted during an eruption of this type was raised.

ACTION – THOR THORDARSON to contact the Secretariat with details of a paper on heavy metals in the Laki ice core.

Item 4 – Research Priorities

The meeting did not have a full discussion of this item due to time limitations. Some detail on the future of SAGE was covered in the Chair's closing remarks.

Item 5 – Any Other Business

No other business was raised.

Closing remarks

Professor Beddington noted that it was unlikely that SAGE would meet again formally, unless there was a change in the situation. However, he expected that some work would still be necessary from the group in order to take things forward. He thanked members for their attendance and expertise to date.