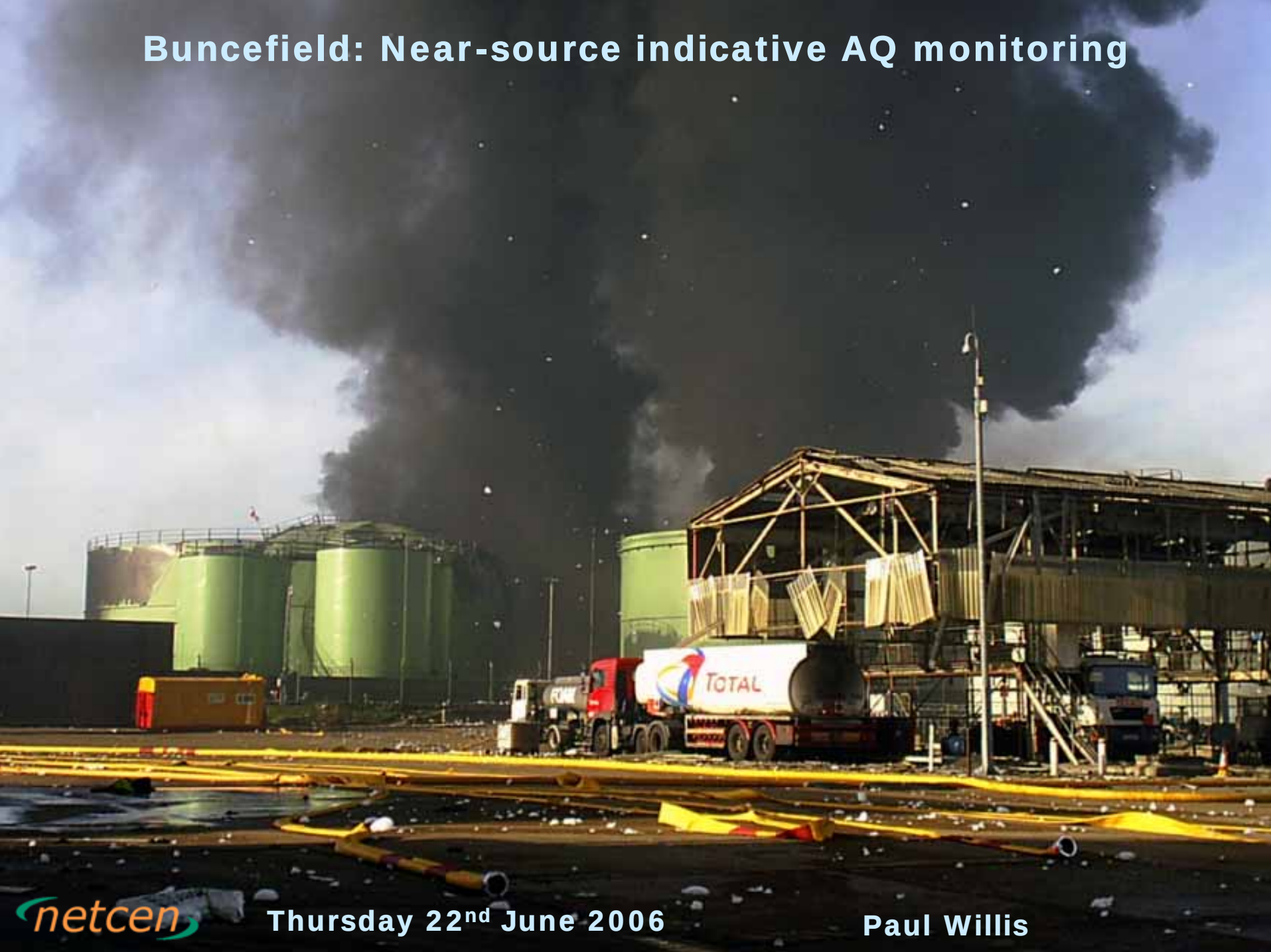
Buncefield: Near-source indicative AQ monitoring



netcen

Thursday 22nd June 2006

Paul Willis

Background

- Netcen has no formal "emergency response" role for Air Quality Monitoring in incidents such as these.
- We assist with monitoring if required by Defra or other organisations.
  - Previously we helped Defra during the Foot and Mouth outbreak.
- From early on Monday December 12th 2005, Netcen was in discussions with Defra over what could be done to monitor air quality close to the fire.
- By midday, when it was clear that the fire was going to continue burning for some time, our monitoring team was asked to go to the area.

What Problems Did We Face?

- Access → Due to the tight security
- Power → Mains supply, Generator, Battery
- Location → Where to monitor?

Solutions

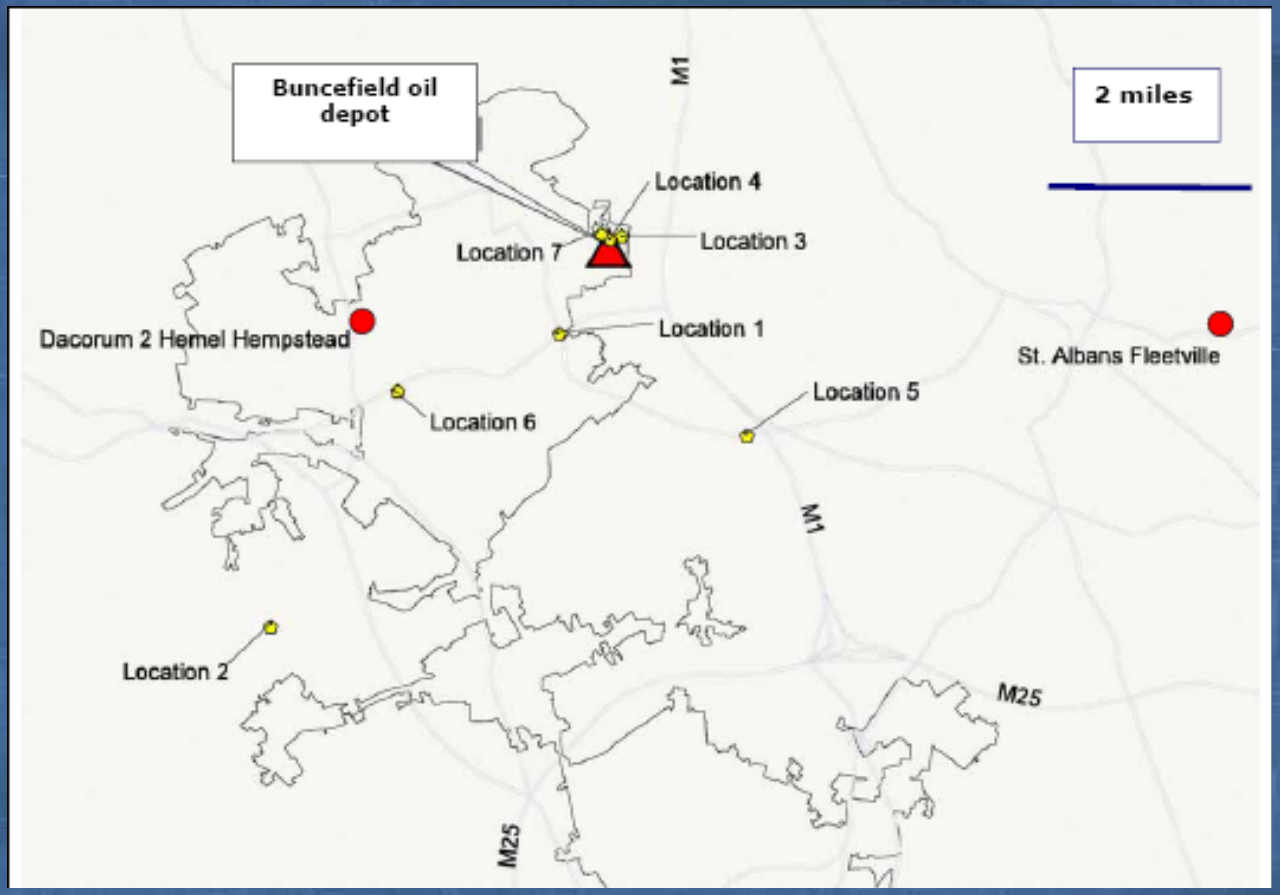
- We were given contacts with GOLD team for access.
- Battery-powered portable monitoring equipment was selected:
  - Mains power would be difficult to source.
  - A generator may produce interfering emissions.
  - AURN equivalent monitors weren't available/tested.
- Remit
  - Look for any evidence of plume-grounding in residential areas.
  - Monitor maximum levels near source.

Equipment Used

- A portable dust analyser (GRIMM 1.101) was used to record 1-minute averaged concentrations of particulate matter. The GRIMM dust monitor is capable of simultaneously measuring in real time the Inhalable (PM_{10}), Thoracic ($PM_{2.5}$) and Alveolic (PM_1) dust masses.
- Grab sampling of VOCs, with the samples collected in stainless steel canisters of 1.6 litre volume. The internal surfaces of the canister had been electro polished and passivated by the SUMMA process in order to ensure their inertness. The sampling technique meets the requirement of the USEPA method TO-14A.
- Air samples in the stainless steel canisters were analysed using a gas chromatograph fitted with flame ionisation detectors (GC/FID).

Monitoring Locations

- A GPS was used to log the positions where monitoring was undertaken on each day.

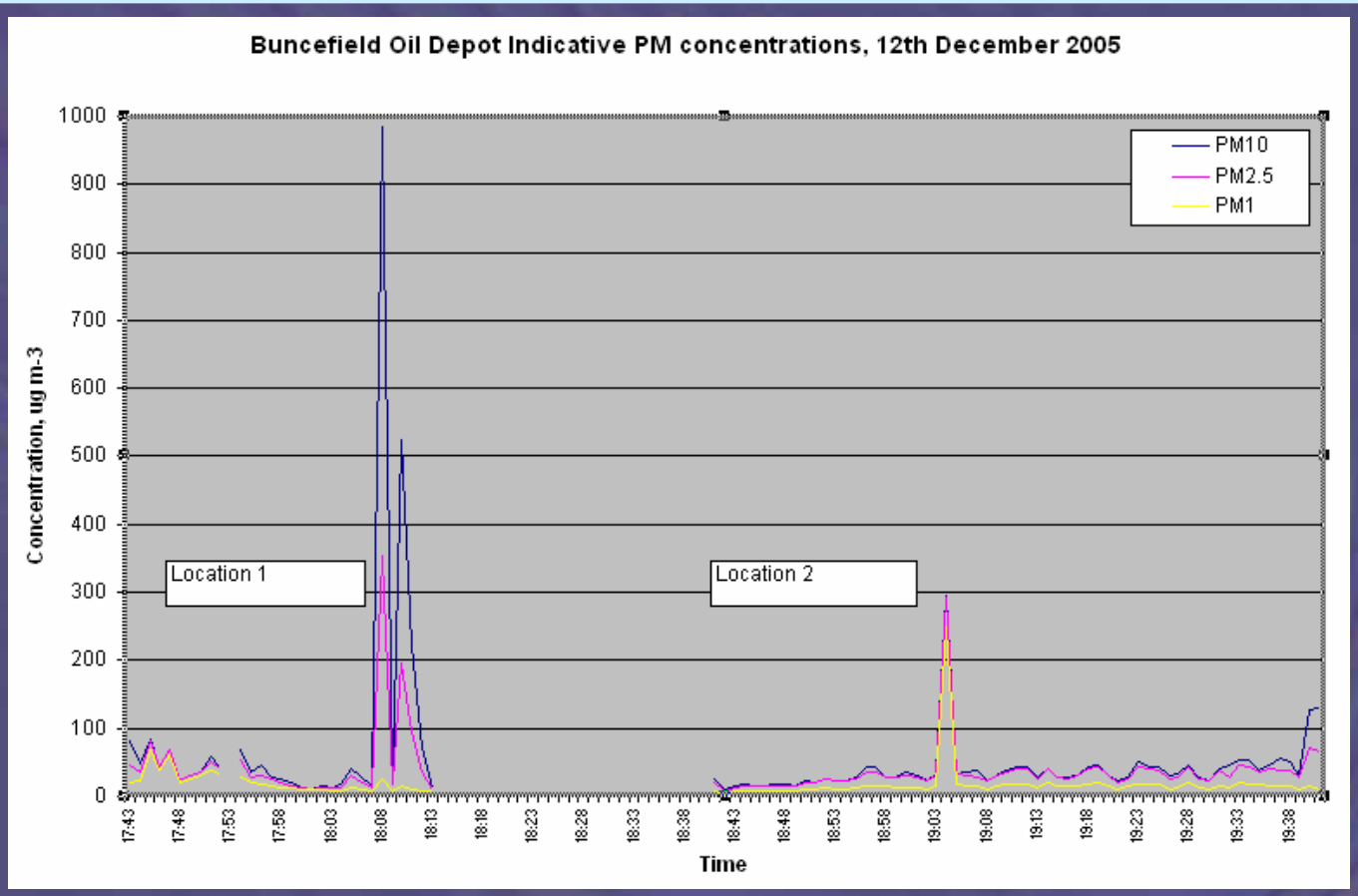


- Day 1:
Locations 1 and 2.

- Day 2:
Locations 3, 4, 5 and 6.

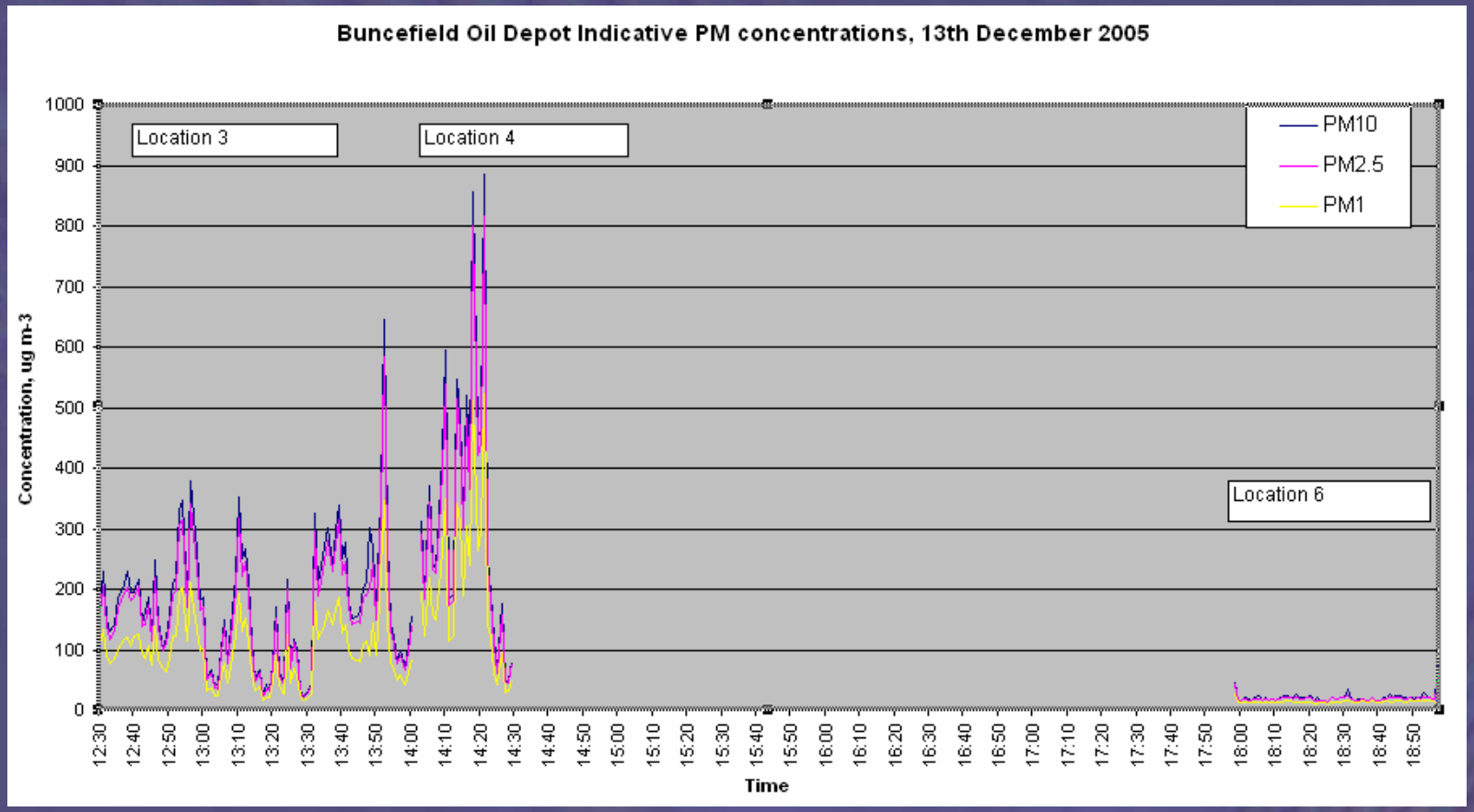
- Day 3:
Location 7.

Indicative PM Monitoring 12/12/2006



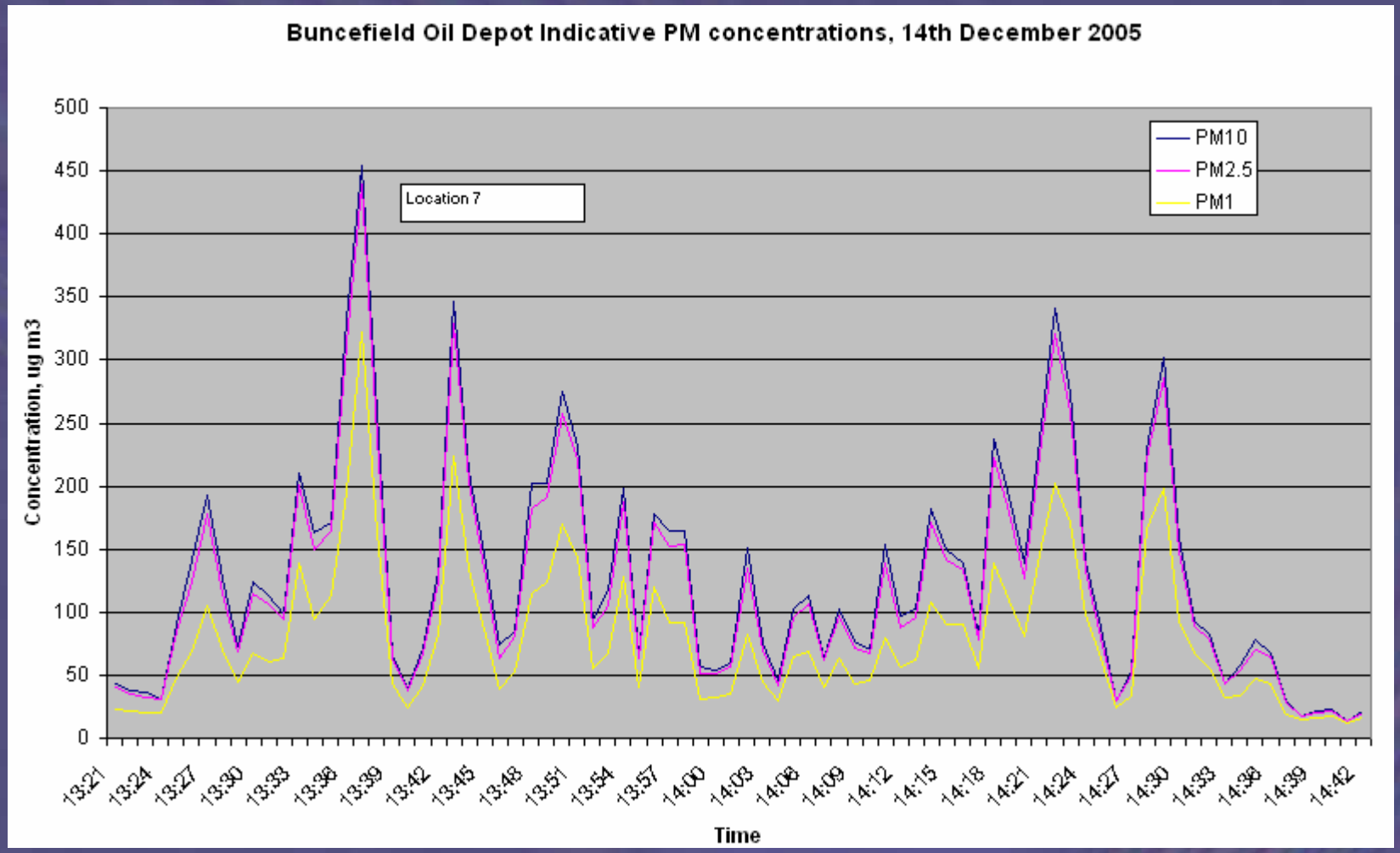
- Due to the security situation access to near the fire was not possible.
- Location 1 was as close to the exclusion zone as we could get, approximately 1 mile to the south-west of the fire, directly under the plume.
- Location 2 was on a hill 5 miles to the south-west of the fire and overlooking the A41. The Netcen team observed that the plume appeared to be grounding here which is why we went to investigate.

Indicative PM Monitoring 13/12/2006



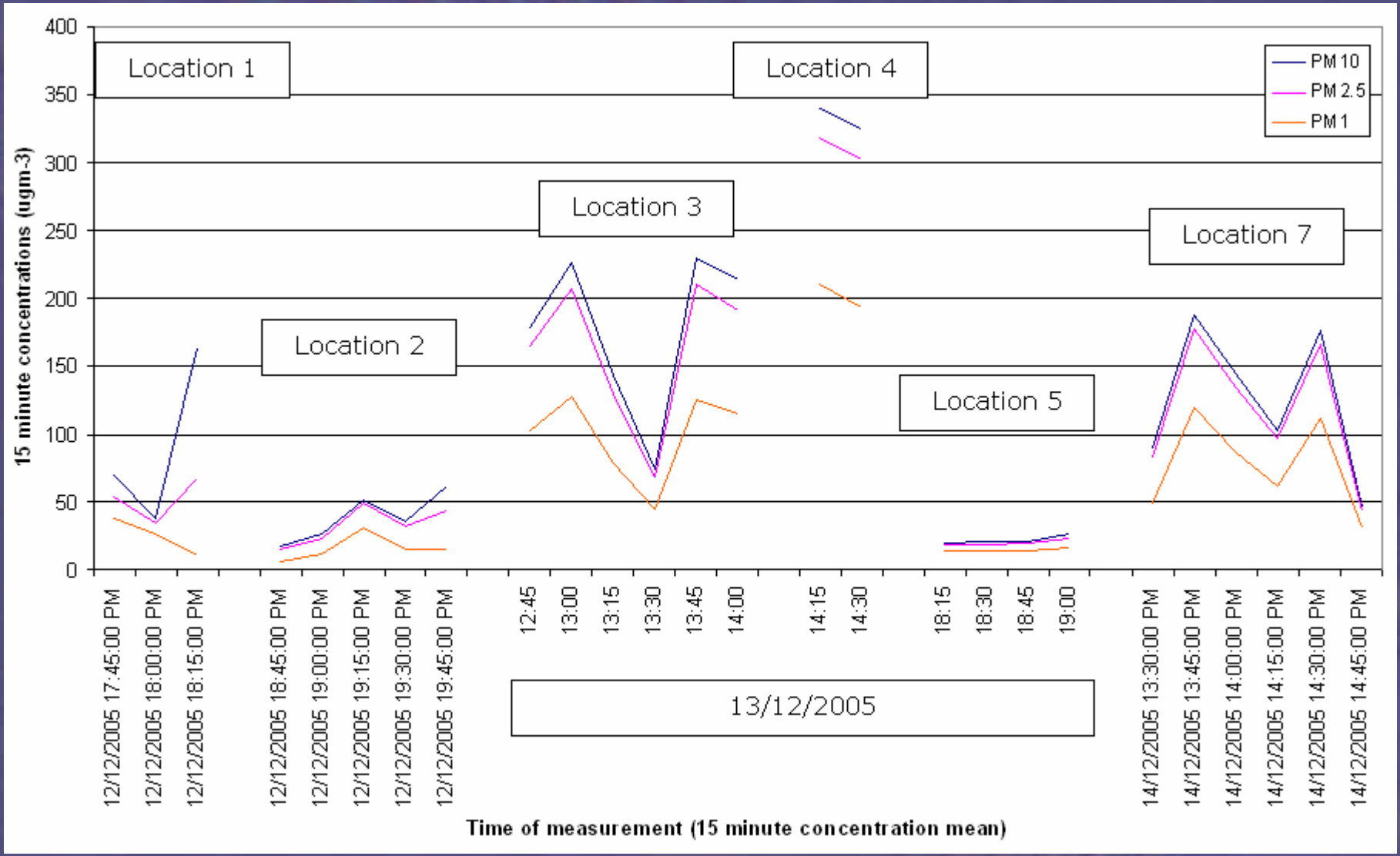
- Locations 3 and 4 were within 200m of the fire and showed high 1-minute averaged PM concentrations.
- Location 6 was in a nearby residential area where the plume appeared to be close to grounding, but measured concentrations remained low.

Indicative PM Monitoring 14/12/2006

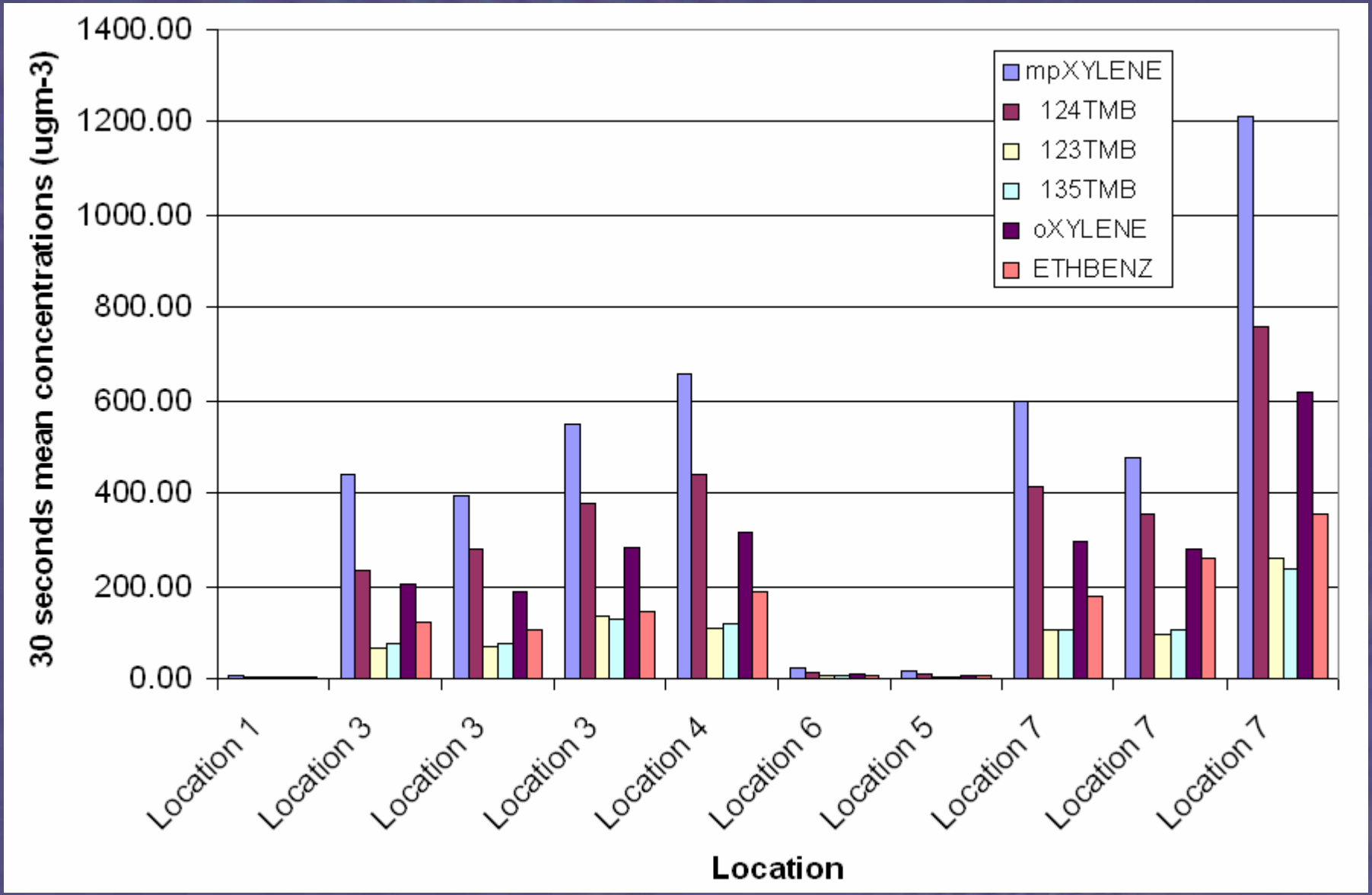


- Measurements were carried out on the depot as close as possible to where the few remaining fires were burning. Concentrations were lower than the previous day.

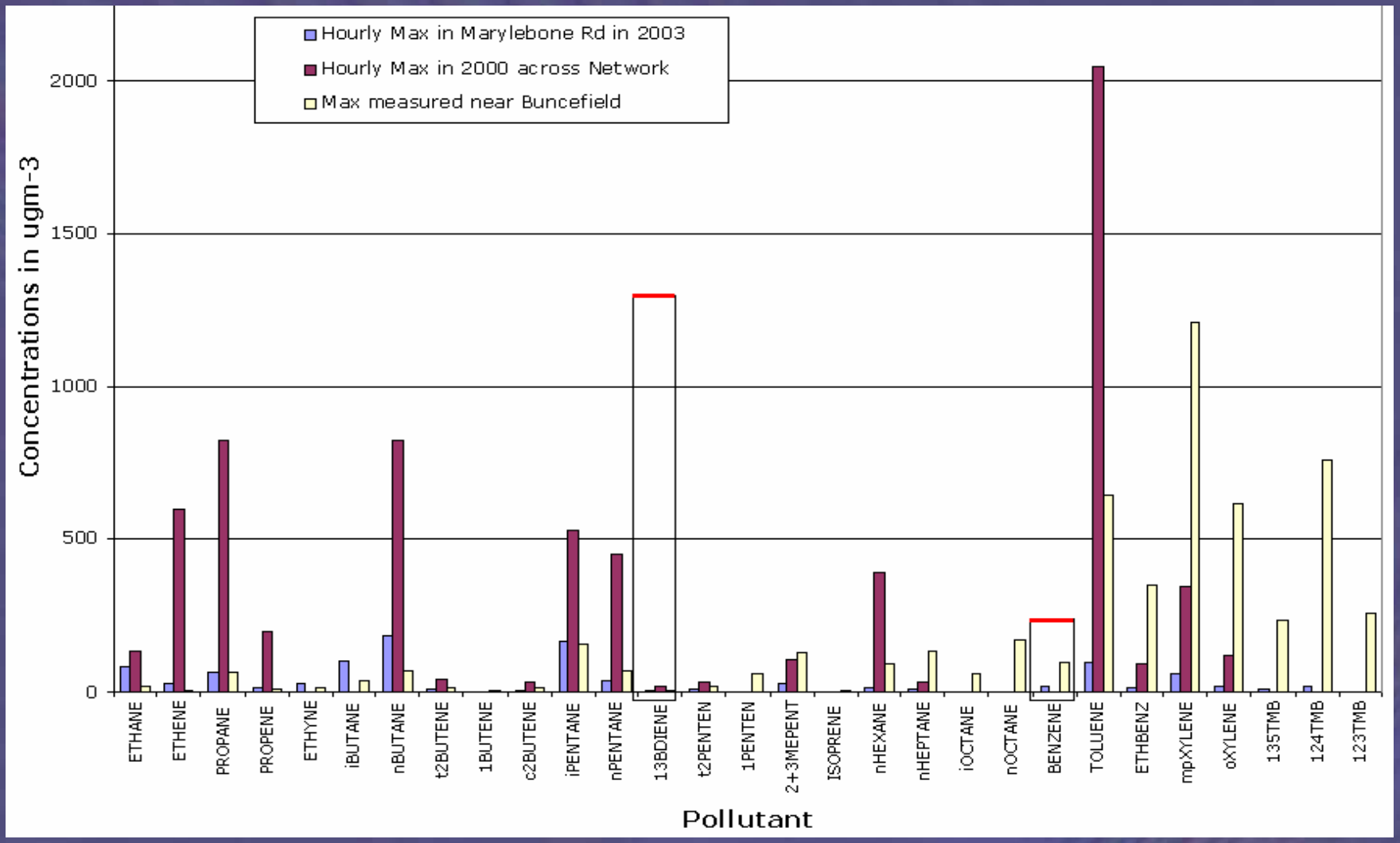
Indicative PM Measurements as 15-minute means



VOCs Grab Sampling Results



VOCs Grabs Compared to UK Monitoring



- The VOCs fingerprint around the depot was typical of unburnt fuel, with increased levels of m+p-xylene, o-xylene, ethylbenzene, 1,2,3-trimethylbenzene, 1,2,4-trimethylbenzene and 1,2,5-trimethylbenzene.

Summary

- Netcen provided near-source indicative AQ monitoring, at request of Defra, on Dec 12th, 13th and 14th 2005.
- AURN equivalent monitoring facilities were not available.
- 1-minute averaged PM_{10} levels up to 985 ug/m^3 were recorded close to the fire.
- 15-minute averaged PM_{10} concentrations were not exceptionally high.
- The VOCs fingerprint was typical of un-burnt fuel.
- VOCs concentrations were not exceptional (for most species) compared to the UK network in 2000.
- Netcen could not detect high concentrations in residential areas surrounding the fire.
- Monitoring was carried out during daytime only, and using our best judgement of where highest concentrations appeared to be.

Thank you-
any questions?