The Public Health Management of Chemical Incidents

Case Study

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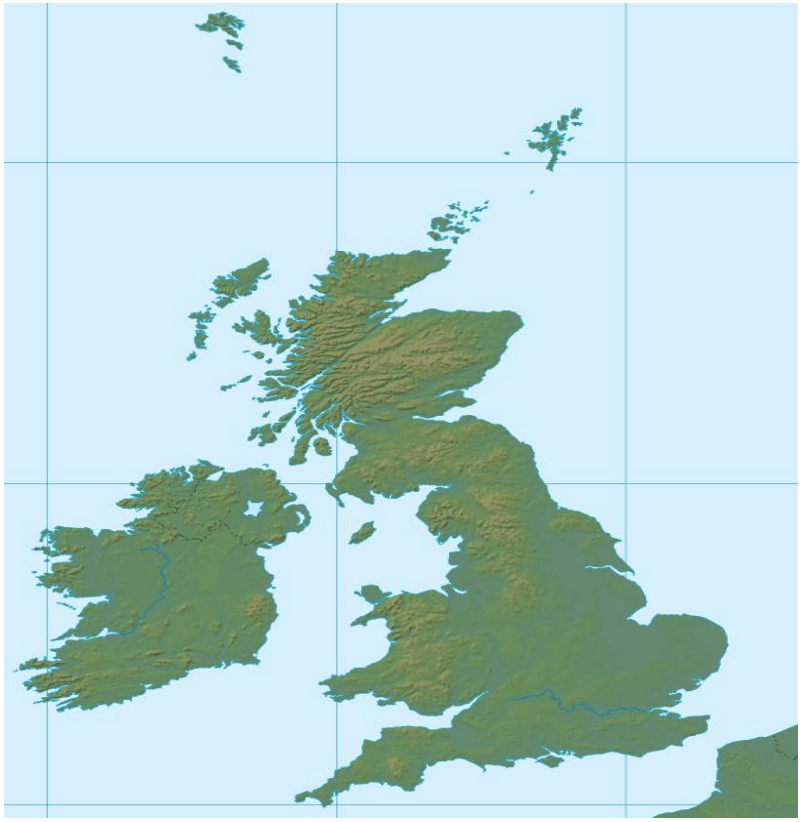
World Health Organization

Location



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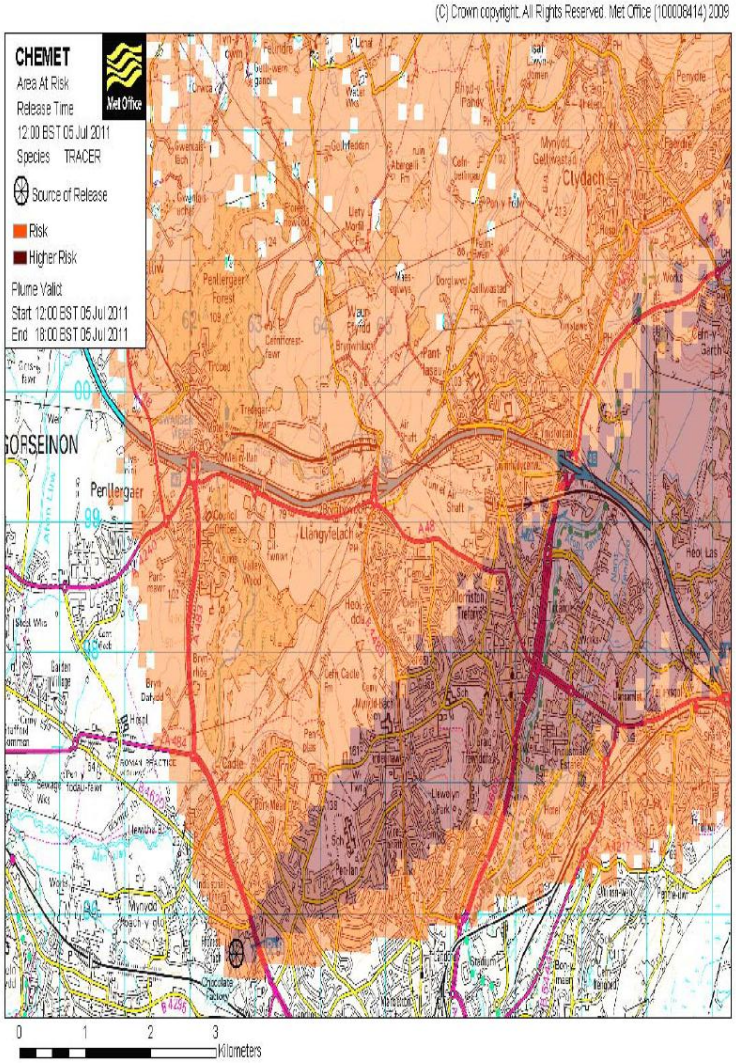
Fforestfach tyre fire

- Tyre fire at warehouse on industrial estate (16/6/11)
- Source material est. 5,000 tonnes of tyre flock
- Dark, dense smoke plume
- Burned for over 3 weeks
- Air quality monitoring established at outset
- Plausible that all within a 2km radius were exposed
- Novel fire fighting techniques required
- Major incident declared

Pathways



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Receptors

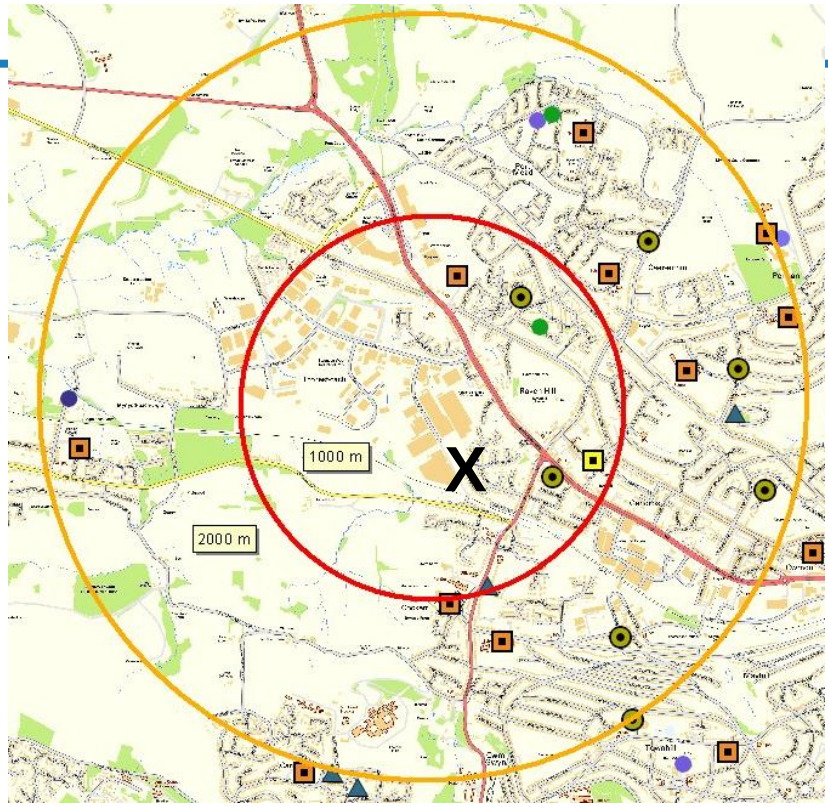
Sensitive Receptors

Areas and specific buildings under plume that may have residents more sensitive to pollutants including

Schools / nurseries (children)•
Care Homes (elderly / infirm)•
Hospitals / health centres (ill/pregnant)•

Other Receptors

General Residential Communities•
Commercial Properties•



Schools

Sheltered Complexes

Nursing Homes

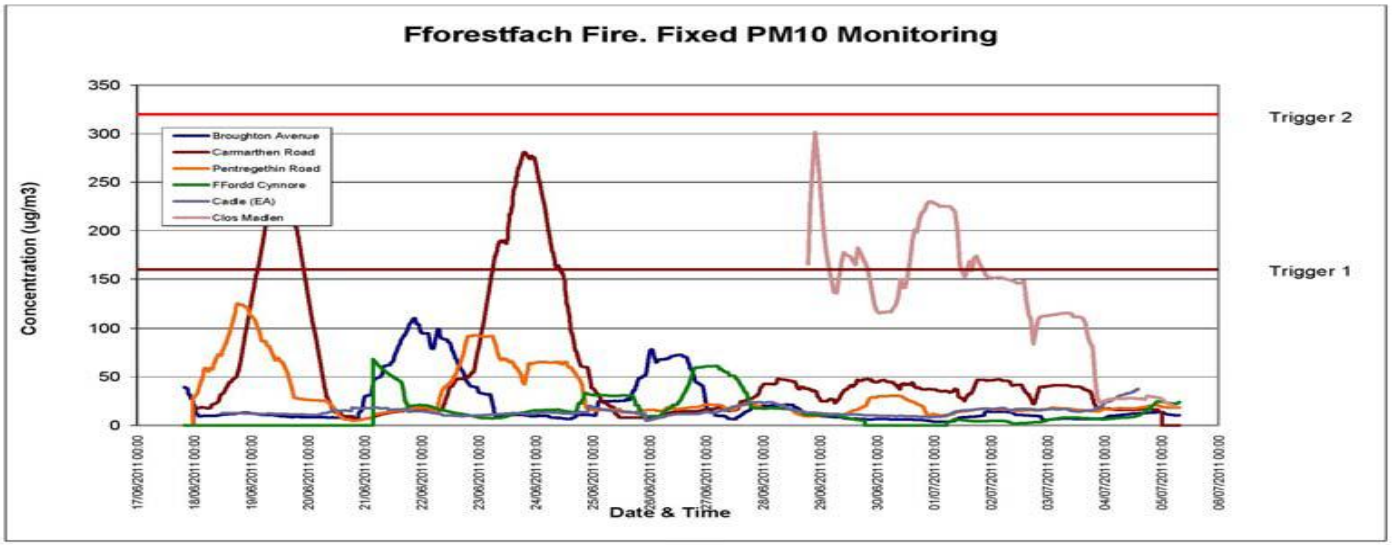
Air quality monitoring

General principles:

- Environmental monitoring (sampling) during acute chemical incidents informs public health risk assessment.
- Monitoring provides a measure of the environmental concentrations of selected chemicals over time.
- Monitoring is most useful when carried out at receptor locations (i.e. places where people are - exposed)
- Environmental concentrations can be compared to health-based exposure standards
- Monitoring can provide reassurance

PM_{10} monitoring results

Monitoring Data – Particulates (Running 24 Hour Means)



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Threshold Levels

- Action levels developed in 2009.
- Guidelines based on scientific theory
- 24-hour average values of 160-180ug/m^3 identified as levels to consider evacuation vs sheltering.
- 24-hour values of 320-360 ug/m3 identified as threshold for which immediate public health intervention may be needed.
- **Based on prolonged duration i.e. days or weeks.**

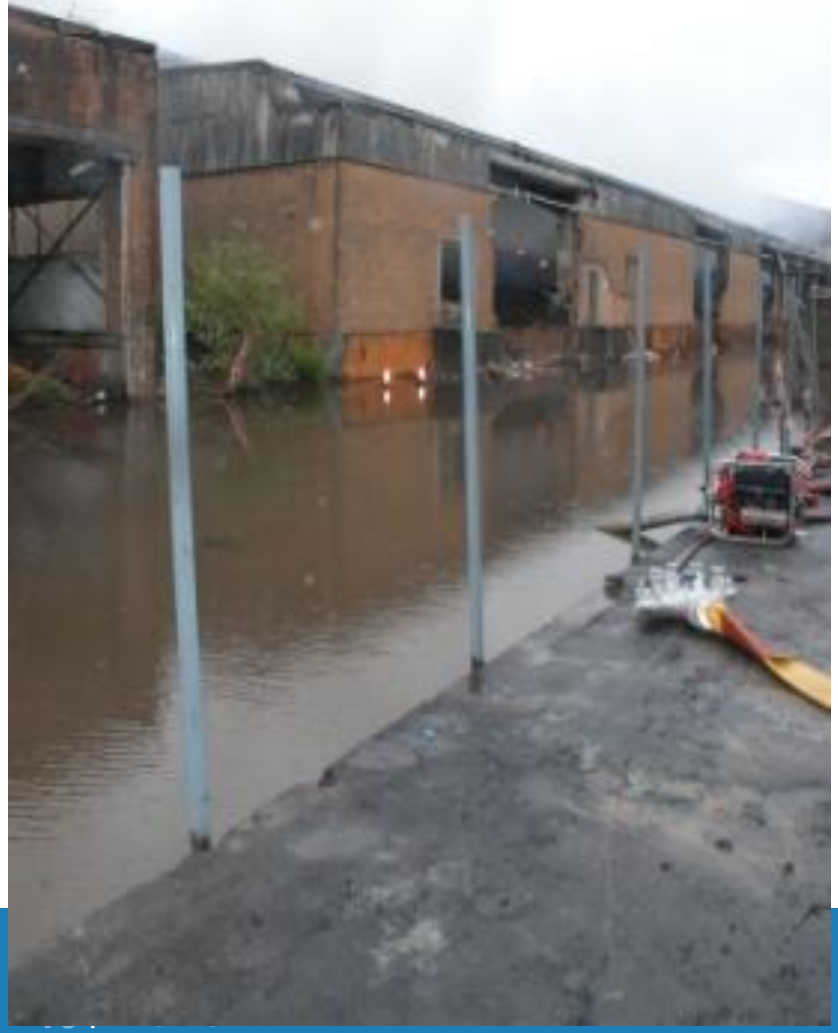
Potential emissions

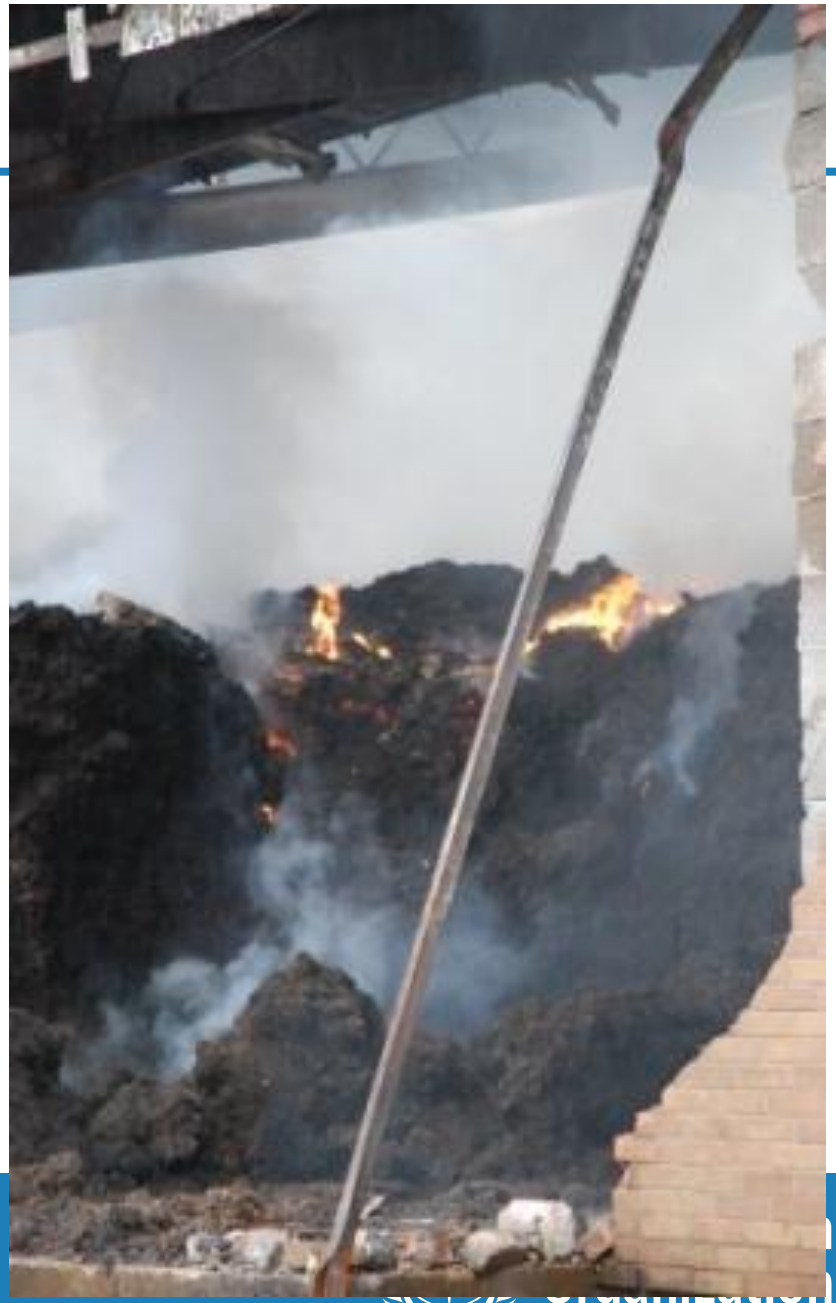
- Potential impacts on health and environment
- Gaseous pollutants, smoke and particulates
- Plume constituents vary – uncertainties about nature of burning material, fire characteristics, combustion temperature, oxygen availability, ventilation
- Generally: PM; SO2; heavy metals; CO; PAHs; organics e.g. benzene, phenols, styrene; inorganic irritants e.g. Polychlorinated dibenzo-p-dioxins and dibenzofurans

Public health context

- PM – respiratory and cardiovascular morbidity and mortality, child health and development.
- Combination of PM-borne, persistent organics and metals can lead to biological interactions and cancers
- SO2 – constriction of airways of lung
- CO reduced capacity of red blood cells to carry oxygen
- Benzene – known carcinogen (increased leukaemia risk)
- Chromium, nickel, arsenic – known carcinogens
- PAHs – toxic, carcinogens, mutagens and reproductive toxins; BaP exposure linked to lung and skin cancer.

Recovery





Epidemiological evidence

Studies indicate 10 µg/m^3 increase in PM10 (24-hour average) is associated with a 0.75% increase in all-cause mortality (*COMEAP*)

Public health messages

- Widespread advice to shelter
- When outdoor concentrations of PM10 are predicted to be greater than an average of 160µg/m^3 over a 24 hour period schools, nurseries, day care facilities for the elderly should be closed
- When outdoor concentrations of PM10 in an area have been greater than an average of 320µg/m^3 over a 24 hour period, AND it is predicted that will continue for at least another 24 hours then adverse health effects are likely to be significant and evacuation of that area should be considered
- Decision to return should NOT be based on a simple reversal of criteria.

Public health follow-up

Cross sectional survey

- To measure the mental health impacts associated with the Fforestfach fire
- To assess what information and advice about the incident was received by people in affected areas, and what sources of information were
- To identify a cohort of individuals that can be followed up in the future to assess psychological morbidity associated with the Fforestfach fire in the medium (12 months) and longer term (2 years)

Prospective cohort study

- To determine impact of the Fforestfach fire on acute and chronic health outcomes within the local population, using routinely collected information held in health and other dataset.


SPRINGFIELD
TIRE FIRE
EST.1989