

# Public Health Issues from the Remediation of Contaminated Land



Yolande Macklin<sup>1</sup>, Andy McParland<sup>2</sup>

<sup>1</sup> HPA, Environmental Hazards and Emergencies Department,  
CRCE Birmingham/Manchester

<sup>2</sup> HPA, Environmental Hazards and Emergencies Department,  
CRCE Nottingham/Newcastle

# Introduction



- **HPA is frequently contacted for advice on public health issues surrounding remediation projects**
- **Particular concern where volatile gases or dusts likely to be generated and residential areas are in close proximity**
- **Corby case has raised both public/stakeholder awareness of public health issues around remediation of land contamination**
- **Key issues surrounding:**
  - Monitoring strategy
    - Suitable monitoring criteria
    - Monitoring methods
  - Odour issues
  - Communication of results to public

# Monitoring Strategy



- **Important part of the Environmental Monitoring Plan (EMP)**
- **Monitoring strategy needs to ensure people not exposed above health based criteria**
- **Monitoring strategy to identify real time triggers for interventions e.g. temporary suspension of works**
- **Needs to include actions to rectify any odour and nuisance issues**

# What monitoring method?



- **Choice of monitoring equipment important for interpreting any health effects:**
- **Photoionisation detector (PID)**
  - Gives total volatiles- real-time, portable
  - No information on individual contaminant concentrations
  - Lamp needs to be correct range for contaminants being measured
- **Diffusion tubes**
  - Average exposure over a particular duration (days or weeks)
  - Peaks in exposure unknown.
  - Not real time - Can take a up to 7 days to report
  - Reassurance not intervention?

# What monitoring method? Cont'd



- **Active sampling**
  - Sorbent tube with pump - exposure over short period
  - May be useful during period of higher risk activities on site
  - Reassurance not intervention?
- **Real-time monitoring**
  - Good quality data- allows intervention
  - Need to ensure sufficient low detection limits (can be problematic)
  - May need several monitors if several contaminants are of concern
- **Onsite GCMS**
  - Good quality data - allows intervention
  - Expensive and requires expertise to use
- **Dusts**
  - Usually Frisbee gauge- can work out concentrations of contaminants in deposited material e.g. metals
  - Not directly comparable to AQS

# Monitoring Criteria



- **Remediation activities can last several months even years (e.g. Olympics)**
- **Can be problematic as to what criteria to use:**
- **Short term criteria-** e.g. AEGLs, WELs....
  - May have a role in assessing peak exposure
- **Chronic criteria-** Air Quality Guidelines, EALs, HCVs selected from toxicological reports
  - what is health significant of exceeding a chronic criteria? – albeit for a short time
- **Mixed exposures** - (several different substances likely to be encountered) – how to assess health impact of mixtures – additivity ?
- No HCVs for some commonly encountered chemicals - notably trimethylbenzenes

# Odours



- **Often a problem at sites with VOCs**
- **Can be health effects below odour threshold**
- **Can cause perceived or real health concerns by local residents**



# Case Study 1: Former Dry Cleaning Works

# Case Study: Former Dry Cleaning Site



- **Mixed chlorinated and hydrocarbon solvent contamination**
- **Site situated in North West England**
- **Proposed to be redeveloped as retail and apartments**
- **Site investigation indicated large number of VOCs present at the site, including TCE, VC and benzene**
- **Remediation planned to take up to 12 months to complete**



Primary school

● Monitoring locations

# Consultant proposed approach

- Use of site boundary PID monitoring to confirm that all mixed solvent emissions would be below each individual HCV
- A “total solvent” limit (HCV total) was calculated using the reciprocal calculation procedure (RCP) outlined in HSE EH40:

$$\frac{1}{\text{HCV}_{\text{total}}} = \frac{\text{FR}_a}{\text{HCV}_a} + \frac{\text{FR}_b}{\text{HCV}_b} + \frac{\text{FR}_u}{\text{HCV}_u}$$

- Assumes constant solvent mixture in air with fixed relative fractions (FR) of key solvents
- Different HCV total values set for 3 different areas of the site (different solvent mixtures)
- PID reading < “HCV total” indicates all individual HCVs met –intervention strategy if boundary PID level exceeded
- Confirmatory diffusion sampling also proposed at site (long term averages)

# Key Issues



- Mixed solvent approach only valid if mixture constant
- Suggested a surrogate chemical marker approach instead – marker dependant on soil concentration information for areas being excavated
- Asked consultant to explore chemical - specific real time monitoring for chosen surrogate
- Concerned about short –term peak exposures (particularly benzene and VC) and how these would be detected and evaluated.
- Communicating results to local residents



# Case Study 2: Avenue Coking Works

# Avenue Coking Works - Chesterfield



- **Coking took place between 1956 and 1992. At the height of operations 2,175 tons of coal a day was carbonised a day.– producing approximately:**
  - 1,400 tons of smokeless fuel
  - 65 tons of sulphuric acid
  - 35 tons of ammonium sulphate
  - 20,000 gallons of crude benzole
  - 250 tons of Tar



# Condition in 1996



# Site Redevelopment



- **Site transferred to English Partnerships in December 1996**
  - Objective to bring the site back into productive use, including residential, commercial, public open space and a wetland habitat
- **Site transferred to East Midlands Development Agency (EMDA) in April 1999 and then to the Homes and Communities Agency**
  - Main issues
    - Hazardous derelict chemical plant
    - Gross contamination
      - air, land and water, including pollution to the river Rother

# Investigation and Remediation



# Remediation



- Remediation techniques: thermal desorption, bioremediation, complex sorting and soil washing.
- Process undertaken over many years.
- Regulated by Standard Environmental Permit.
- Multi-agency liaison group meet regularly to discuss progress and issues, inc. local community liaison.
- Routine suite of monitoring undertaken at locations on and off-site.

# HPA Input



- Part of multi-agency group.
- Input into community liaison materials.
- Review of off-site monitoring data against health based standards.
- Advice to Regulator to support and revise standards.
- Support Regulator in engagement with operator to revise monitoring and reporting protocols, inc. standards used and rationale.
- Independent public statements communicating risk.

# HPA Public Statement



- A comparison of *...the presented data...* with relevant health based standards indicates that remediation activities undertaken at the site during the monitoring period are very unlikely to have caused any health effects within the local population.
- Providing that concentrations of airborne pollutants measured at off-site locations remain within the relevant health based standards, the Health Protection Agency considers that ongoing remediation activities are very unlikely to cause any health effects within the local population.
- It is recognised that on-site remediation activities continue to be the cause of odours. For the vast majority of chemicals the odour detection and odour recognition thresholds are below those for which there is a direct toxicological effect. Odours can cause nuisance and annoyance amongst the population, and as such, the Health Protection Agency continues to recommend that all efforts are taken to reduce odours to as low as is reasonably practical and for anybody with health concerns to consult their GP to ensure that they are adequately assessed and followed up as necessary.
- For general health advice or advice on managing symptoms, people should contact NHS Direct on 0845 4647 or [www.nhsdirect.nhs.uk/](http://www.nhsdirect.nhs.uk/)

# Summary



- Remediation of contaminated land sites can release dust and volatiles- potential exposure of nearby residents
- Levels at nearest receptor should be below appropriate Health Criteria Value (HCV)
- Monitoring strategy needs to ensure people not exposed above HCV- consideration of duration and impacts of peaks
- Monitoring equipment used needs to reflect data requirements
- Monitoring strategy to identify real time triggers for interventions e.g. temporary suspension of works