Practical aspects of chemical risk assessment

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Approach

Classical descriptive epidemiology seeks to answer questions about ‘who’ is affected, by ‘what’ and under ‘what’ circumstances.

Who, what, where, where, how (person, place, time)

Same approach can be applied to chemical risk assessment.

Exposure assessment a major challenge.
Risk = hazard + exposure

In other words:

1. The amount of chemical present in the environment
2. The amount of exposure a person has with that chemical
3. The toxicity or severity of the chemical
Hazard

What is it?

What health problems can be caused by exposure to the chemical

Characterize the evidence (the data) between adverse effects and the chemical

• Epidemiological studies
• Toxicology studies (humans, animals etc)

Extrapolation from animal to human studies, occupational to public health etc.
Hazard

How a chemical behaves in the body and environment

Assess toxicity for different exposure scenarios

Dose – response relationship (effect causes by different doses of chemicals over different time periods)

No effect levels, thresholds etc

Requires access to specialist knowledge, databases etc

• Public Health Wales, CRCE Wales
• Toxbase, chempendium, MSDS, chemknowledge, Toxnet etc
Concentration of substance in environment
Time – duration of exposure
Behaviour – how exposure occurs

**Who**, **What**, **When**, **Where**

Exposure

Exposure = f (Concentration, Time, Behavior)

EPA Guidelines for Exposure Assessment (1992)
Who is at risk

Define exposed population

Understand how people are exposed

Approaches

1. Clinical symptoms

2. Measure pollutants in the bodies of the exposed people or the effects of exposure (biological monitoring)

3. Measure the levels of pollutants in the environment (environmental monitoring)

4. Proxy measures – proximity, residence, environmental history, self reported symptoms

Usually exposure has to be INFERRED!
Measuring Exposure - approaches

<table>
<thead>
<tr>
<th>Types of Data</th>
<th>Approximation to actual exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Residence in a defined geographical area (e.g. county) of a site</td>
<td>Poorest</td>
</tr>
<tr>
<td>2) Residence in a geographical area in proximity to a site where exposure is assumed</td>
<td></td>
</tr>
<tr>
<td>3) Distance or duration of residence</td>
<td></td>
</tr>
<tr>
<td>4) Distance and duration of residence</td>
<td></td>
</tr>
<tr>
<td>5) Quantified surrogate of exposure (e.g. estimate of drinking-water, food)</td>
<td></td>
</tr>
<tr>
<td>6) Quantified area measurements in vicinity of the residence (e.g. air)</td>
<td></td>
</tr>
<tr>
<td>7) Quantified personal measurement</td>
<td>Best</td>
</tr>
</tbody>
</table>

Baker D, et al., Environmental Epidemiology: A Textbook on Study Methods and Public Health Applications, 1999
Environmental sampling and modelling

Air, water, soil, food
Proxy for population / individual exposure
Costly
May not be timely
Whose responsibility?
Capacity and capability?
Modelling can be an option
Can help identify exposed v non exposed
A pollutant linkage

Source
e.g. arsenic in surface soils

Pathway
e.g. soil ingestion by young children

Receptor
e.g. young children

- Source – the location from which contamination is or was derived (in this case, the contaminant)
- Pathway – the mechanism by which a receptor is being or could be exposed or affected by an identified contaminant
- Receptor – that which may be adversely affected by the contaminant(s)
Pollutant linkage

e.g. arsenic in top 20 cm of soil

(1) Source

- e.g. arsenic contaminated soil

(2) Pathway

- e.g. soil ingestion

(3) Receptor

- e.g. young children

**What** is it

How was I exposed

**Who** was exposed?

**When** was I exposed

**Where** were they exposed
Pollutant linkage

e.g. arsenic in soil at 5 metres depth

(1) Source  (2) Pathway  (3) Receptor

e.g. arsenic contaminated soil  e.g. soil ingestion  e.g. young children
Pollutant linkage

e.g. arsenic in soil at 5 metres depth

(1) Source

- e.g. arsenic contaminated soil

(3) Receptor

- e.g. young children
Case study 1 - wildfires

Fforestfach, 2011 (source: South Wales Evening Post)

Trealaw, RCT April 2015 (source: Wales on line)
Grass fire, Abercynon. Source: Wales Online
Grass fire, Abercynon. Source: Wales Online
Grass fire, Abercynon. Source: Wales Online
Hazard

Wildfire smoke contains particles (PM2.5), carbon monoxide
Respiratory irritants such as acrolein and formaldehyde
Elevated ozone from secondary reactions?
It is NOT non-toxic!
Equi-toxic to ambient air pollution
Cardiovascular and respiratory effects
Children, adults with pre-existing conditions most vulnerable
Hazard characterisation

Evidence from other countries demonstrates smoke from wildfires can result in exceedences of air quality standards.

Strong epidemiological studies that exposure to wildfire smoke causes the same health effects as ambient air pollution:

- Increase in respiratory and cardiovascular effects
- Hospital admissions, attendance at primary care

Sydney (Australia), USA, Europe
### Table 2  Peer-reviewed studies investigating the association between bushfire smoke events and respiratory health effects in Australia

<table>
<thead>
<tr>
<th>Location</th>
<th>Study</th>
<th>Study period</th>
<th>Study area</th>
<th>Exposure variable(s)</th>
<th>Health outcome and study population</th>
<th>Analytical methodology</th>
<th>Study result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Victorian fires, 2002-2003</td>
<td>Tham et al., 2009⁹</td>
<td>October 2002-April 2003</td>
<td>Melbourne and Gippsland region</td>
<td>PM₁₀, API</td>
<td>ED presentations and hospital admissions for respiratory disease</td>
<td>Time series analysis adjusting for temperature, humidity and day of the week</td>
<td>A 9.1 μg/m³ increase in PM₁₀ was associated with a 1.8% (95% CI: 0.4–3.3%) increase in respiratory-related ED presentations in Melbourne. No association with hospital admission was found after adjustment for confounders.</td>
</tr>
<tr>
<td>New South Wales fire, 1994</td>
<td>Cooper et al., 1994⁶⁷</td>
<td>January 1994</td>
<td>Sydney</td>
<td>—</td>
<td>ED presentations for asthma at three inner-city hospitals</td>
<td>Comparisons between case and control periods and time series analysis</td>
<td>No increase in asthma presentations compared with before the event. No association between asthma presentations and PM₁₀ from bushfire smoke. No association between the bushfire period or daily PM₁₀ and evening PEFR was found.</td>
</tr>
<tr>
<td>New South Wales fires 1994-2002</td>
<td>Jalaludin et al., 2000¹²</td>
<td>January 1994</td>
<td>Sydney</td>
<td>PM₁₀</td>
<td>PEFR in 32 children with wheeze</td>
<td>Time series analysis adjusted for temperature, humidity, time spent outdoors and pollen count</td>
<td>Increase of 35 μg/m³ same day bushfire PM₁₀ was associated with an evening wet cough (OR 2.04, 95% CI: 1.37–3.04). None of the other symptoms were significant and neither was medication use.</td>
</tr>
<tr>
<td>New South Wales fires 1994-2002</td>
<td>Jalaludin et al., 2004¹³</td>
<td>January 1994</td>
<td>Sydney</td>
<td>PM₁₀</td>
<td>Evening recorded symptoms (wheeze, dry cough and wet cough) and beta agonist use in 32 children from three schools in Sydney with a history of wheeze</td>
<td>Time series analysis adjusted for temperature, humidity, number of hours spend outdoors, pollen count and inhaled corticosteroid use</td>
<td>A 10 μg/m³ increase in bushfire PM₁₀ was associated with a 1.24% (95% CI: 0.22–2.27%) increase in all respiratory hospital admissions. Comparing hospital admission on high PM₁₀ days (&gt;20 μg/m³) to low PM₁₀ days (&lt;15 μg/m³) showed an increase in respiratory hospital admissions of 19% (95% CI: 9–30%) for bushfire days and of 13% (95% CI: 6–23%) for background days.</td>
</tr>
<tr>
<td>Queensland fires</td>
<td>Chen et al., 2006¹⁵</td>
<td>July 1997-December 2000</td>
<td>Brisbane</td>
<td>PM₁₀</td>
<td>Hospital admissions for respiratory disease</td>
<td>Time series analysis adjusted for average temperature, day of the week, seasonality, long-term trends (years) and influenza</td>
<td>Time series analysis adjusting for temperature, humidity, day of the week and flu epidemic</td>
</tr>
</tbody>
</table>

**Respirology** (2011) 16, 198–209
Exposure

Prolonged wildfires can have significant impact on air quality. Studies (USA, Australia) report PM levels can well exceed air quality guidelines.

- Size of fire
- Distance from residential area
- Weather conditions? Still?
- Topography? Valleys?
- Overnight temperature inversions?
- Duration? Days, weeks?
Figure 5-34 Time series plot of hourly ozone and daily PM$_{2.5}$ concentrations measured during the wildfire events in summer 2006/2007 and the autumn prescribed burning season in 2007.
Assessing exposure

Air Monitoring? AURN, networks? Air Quality Cell

Visibility a proxy measure?

Proximity? Duration

Other studies?

Table 1 Estimating particulate matter concentrations from visibility assessment

<table>
<thead>
<tr>
<th>Categories</th>
<th>Visibility in Miles</th>
<th>Particulate Matter Levels* (1-hour average, $\mu g/m^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>11 miles and up</td>
<td>0 - 38</td>
</tr>
<tr>
<td>Moderate</td>
<td>6 to 10</td>
<td>39 - 88</td>
</tr>
<tr>
<td>Unhealthy for Sensitive Groups</td>
<td>3 to 5</td>
<td>89 - 138</td>
</tr>
<tr>
<td>Unhealthy</td>
<td>1 1/2 to 2 3/4</td>
<td>139 - 350</td>
</tr>
<tr>
<td>Very Unhealthy</td>
<td>1 to 1 1/4</td>
<td>351 - 526</td>
</tr>
<tr>
<td>Hazardous</td>
<td>less than 1 mile</td>
<td>over 526</td>
</tr>
</tbody>
</table>

*In wildfire smoke, most particles are less than one micrometer, so the values obtained by measuring either PM$_{10}$ or PM$_{2.5}$ are virtually interchangeable, and are treated as such in this document. Therefore, in the table above, the different particle levels can be measured using either PM$_{10}$ or PM$_{2.5}$ monitors.
**Source:** Wildfire

- Air monitoring
- Visibility
- Wind direction

**Pathway:** Inhalation

- Proximity to wildfire
- Duration of fire
- Inhalation rate
- Age / sex / pre-existing disease

**Receptor:** Asthmatic/child

- Signs and symptoms
- Biomonitoring / biomarkers

**Dose**
Risk assessment

Smoke presents toxic hazard

Monitoring may not be available, look at other methods of exposure assessment

Evidence suggests large wild fires can result in local air pollution events

UK Air Quality Index could be used to help assess risk

USEPA regularly refers to their AQI during wildfires

If visibility is poor, PM levels could be HIGH to VERY HIGH

Duration – days?

Air pollution event equivalent to large prolonged waste fire
Assessing toxicity

UK Air Quality Strategy objectives:
Short term exposure to PM10 is 50 µg m\(^{-3}\) (running 24 hour mean not to be exceeded >35 times per year)
Long term exposure to PM10 is 40 µg m\(^{-3}\) (annual mean)
Long term exposure to PM2.5 is 25 µg m\(^{-3}\) (annual mean) (to be ratified)

WHO Air Quality Guidelines for Europe (2005):
Set a series of 24-hour average interim targets for developing countries that experience higher levels of particulate matter.
The highest target on their list is 150 µg m\(^{-3}\) as a 24-hour average.
This is described as ‘relating roughly to a 5% increase in mortality, an impact that would be of significant concern and one for which immediate mitigation actions would be recommended.’
<table>
<thead>
<tr>
<th>AQI Category (AQI Values)</th>
<th>PM2.5 or PM10 Levels (µg/m³)</th>
<th>Visibility - Arid Conditions (miles)</th>
<th>Recommended Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good (0 to 50)</td>
<td>1-3hr avg 0 – 38, 8 hr avg 0 – 22, 24 hr avg 1 0 – 12</td>
<td>&gt;11</td>
<td>▪ If smoke event forecast, implement communication plan</td>
</tr>
<tr>
<td>Moderate (51 to 100)</td>
<td>39 – 88, 23 – 50, 12.1 – 35.4</td>
<td>6 – 10</td>
<td>▪ Issue public service announcements (PSAs) advising public about health effects and symptoms and ways to reduce exposure</td>
</tr>
<tr>
<td>▪ Distribute information about exposure avoidance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unhealthy for Sensitive Groups (101 to 150)</td>
<td>89 – 138, 51 – 79, 35.5 – 55.4</td>
<td>3 – 5</td>
<td>▪ If smoke event projected to be prolonged, evaluate and notify possible sites for cleaner air shelters</td>
</tr>
<tr>
<td>▪ If smoke event projected to be prolonged, prepare evacuation plans</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unhealthy (151 to 200)</td>
<td>139 – 351, 80 – 200, 55.5 – 150.4</td>
<td>1.5 – 2.75</td>
<td>▪ Consider “Smoke Day” for schools (i.e., no school that day), possibly based on school environment and travel considerations</td>
</tr>
<tr>
<td>▪ Consider canceling public events, based on public health and travel considerations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Unhealthy (201 to 300)</td>
<td>352 – 526, 201 – 300, 150.5 – 250.4</td>
<td>1 – 1.25</td>
<td>▪ Consider closing some or all schools (Newer schools with a central air cleaning filter may be more protective than older, leakier homes. See “Closures”, below.)</td>
</tr>
<tr>
<td>▪ Cancel outdoor events (e.g., concerts and competitive sports)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous (&gt; 300)</td>
<td>&gt;526, &gt;300, &gt;250.5-500</td>
<td>&lt;1</td>
<td>▪ Close schools</td>
</tr>
<tr>
<td>▪ Cancel outdoor events (e.g., concerts and competitive sports)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ Consider closing workplaces not essential to public health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>▪ If PM level is projected to remain high for a prolonged time, consider evacuation of sensitive populations</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1Revised 24 hour average breakpoints from the Revised Air Quality Standards for Particle Pollution and Updates to the Air Quality Index, US Environmental Protection Agency, December 14, 2012. Available at http://www.epa.gov/airquality/particlepollution/actions.html#dec12.

USEPA recommended advice for wildfires
Intervention

Health advice
Identify most vulnerable
Shelter when air quality is poor
Avoid strenuous activity
Brief GPs, healthcare workers
Pre prepared messages for communities at risk
Education “pre-season”
Climate change preparedness
Case study 2 – marine pollution
MV Tempest

*MV Tempest* a 50,000 tonne container ship

Position 10 nautical miles off Pembrokeshire coast

Captain has reported that heavy seas have resulted in the loss of at least one container.

Cargo manifest available.

The ship is not in difficulty and is continuing on its journey to Halifax, Nova Scotia.

Summary of the shipping manifest for the MV Tempest

<table>
<thead>
<tr>
<th>NAME OF VESSEL</th>
<th>TEMPEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>FLAG</td>
<td>LIBERIA</td>
</tr>
<tr>
<td>MASTER</td>
<td>JACQUES SMITH</td>
</tr>
<tr>
<td>ARRIVAL (X)</td>
<td>6 September</td>
</tr>
<tr>
<td>DEPARTURE (X)</td>
<td>1 September</td>
</tr>
<tr>
<td>VOY NUMBER</td>
<td>274X</td>
</tr>
<tr>
<td>PORT OF LOADING</td>
<td>TUNIS, TUNISIA</td>
</tr>
<tr>
<td>PORT OF DISCHARGE</td>
<td>HALIFAX, NOVA SCOTIA, CANADA</td>
</tr>
<tr>
<td>PIER LOADED AT</td>
<td>CONTAINER PORT</td>
</tr>
<tr>
<td>DATE SAILING</td>
<td>1 September</td>
</tr>
<tr>
<td>D/P IDENTIFIER CODE</td>
<td>9231</td>
</tr>
<tr>
<td>AGENT CODE, U.S.</td>
<td>321G</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dangerous Goods</th>
<th>UN number</th>
<th>Volume</th>
<th>Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlorine</td>
<td>1017</td>
<td>248 180 litres</td>
<td>Pressurised cylinder</td>
</tr>
<tr>
<td>Disinfectants</td>
<td>1903</td>
<td>94 300 litres</td>
<td>Sealed plastic containers</td>
</tr>
<tr>
<td>Calcium resinate</td>
<td>1313</td>
<td>259 tonnes</td>
<td>Sealed drums</td>
</tr>
<tr>
<td>Aluminium phosphide</td>
<td>1397</td>
<td>15 tonnes</td>
<td>Sealed bags</td>
</tr>
<tr>
<td>Fish meal</td>
<td>2216</td>
<td>24 tonnes</td>
<td>Sealed bags</td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td>1710</td>
<td>104 050 litres</td>
<td>Pressurised cylinder</td>
</tr>
<tr>
<td>Helium</td>
<td>1963</td>
<td>45 900 litres</td>
<td>Pressurised cylinder</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General Goods</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Textiles</td>
<td>-</td>
<td>465 containers</td>
<td>ISO container</td>
</tr>
<tr>
<td>Motorbikes</td>
<td>-</td>
<td>88 containers</td>
<td>ISO container</td>
</tr>
<tr>
<td>Preserved food products</td>
<td>-</td>
<td>47 containers</td>
<td>Bagged, ISO container</td>
</tr>
<tr>
<td>Sheet metal and metal products</td>
<td>-</td>
<td>502 containers</td>
<td>Palletised, ISO container</td>
</tr>
<tr>
<td>Fresh food products</td>
<td>-</td>
<td>43 containers</td>
<td>Refrigerated container</td>
</tr>
<tr>
<td>Televisions</td>
<td>-</td>
<td>60 containers</td>
<td>ISO container</td>
</tr>
</tbody>
</table>
Information

Beached containers reported by member of the public walking their dog at Whitesands Bay.

Containers damaged and contents exposed including industrial drums and IBCs.

Type of drums unknown but member of public has reported that there seems to be a hazardous sign on the drums.

There are also pallets scattered along the beach, with a range of consumer goods.

Details passed to Local Police.
Whitesands Beach:

Campsite located close to beach and still open at this time of year. Recreational beach popular with surfers and walkers using coastal path.
Information

First responders identify cylinders with hazard symbols amongst shoreline debris.

UN Number identified on cylinders: 1017 and / or 1710

Weather is sunny and clear. Temperature 17ºC. Light on shore winds.

Several dozen members of the public on the beach and in the water.

Large numbers of people reported to be arriving at beaches following social media messages around valuable consumer goods washed on shore.

Modelling of tide conditions suggest containers may also travel further south to Ramsey Sound close to important commercial mussel beds supplying local businesses.
Results for Free stuff on the beach

Twists

EXERCISE EXERCISE EXERCISE

@tiah_back just scored a free TV, computer and microwave oven from the #surfingcompetition beach. Come and help yourself to the plastic containers with skull and cross bone on them...told a few of those too!

September 8, 2012 at 05:43am

@HRMCoast @Surfingcompetition line up to get onto the beach - feel a bitsorry for the surfers, no one is watching them now. Washed up freebies around the corner from the beach restaurant.

September 8, 2012 at 04:54am

@Tiah_back Oh go free for all at the beach! If you are in the area, head on down to the beach. Forget the surfing - just grab what you can...also spotted some containers with scary stickers with skulls on them...would give those a miss!

September 8, 2012 at 04:46am

@Surfing_Oz Too right - loads of stuff - am digging my way through it now - just spotted a practically spotless motorbike - strong ocean smell but it will wash right off. I reckon!

September 8, 2012 at 04:17am

@BeauJo Just spotted a bike, telly and a fridge washed up on the beach. Knew #surfingcompetition has some great freebies but this takes it to a whole new level!

September 8, 2012 at 03:55am

@BeauJo The sun is still and I am ready for some #Blake surfing action for the #surfingcompetition - got a great view right at the water's edge

September 8, 2012 at 03:47am

@gjelhouse Am so excited! #Blake is due to make his move on the waves soon. Can hardly see the beach for all the crowds - bet to be a great day.

September 8, 2012 at 03:44am

@BeauJo Where r u - can't u for all the crowds. R u at the beach hunt??

September 8, 2012 at 03:37am

@vogli_13 Heading to the beach for a great day of watching surfers do their thing on the waves - hundreds of people expected to come and watch. Foul footbags as well

September 8, 2012 at 03:36am

@BeauJo Surfs up for my b-friend #Blake - some and check him out! #Blake is warming up at the beach as we speak, might get a free tshirt #surfingcompetition

September 8, 2012 at 03:33am
Hazard ID and characterisation

Drums warning signs suggest they contain chlorine and trichloroethylene (TCE)

Fire and Rescue Service should be able to confirm contents

Chlorine and TCE toxic and volatile

Ingestion/contact with TCE causes irritation, burning.

Inhalation of TCE can also headaches, dizziness, heart problems

TCE is a probable carcinogen

Chlorine a severe irritant
HPA Compendium of Chemical Hazards

Chlorine

Key Points

Fire
- Non combustible, but enhances combustion of other materials
- Use fire water spray and liquid-light protective clothing and breathing apparatus

Health
- Due to its gaseous nature inhalation and ocular exposure are most likely
- Toxic and irritating
- Contact with liquidated gas can cause frostbite
- Lung or eye irritation may occur following acute exposure to chlorine
- Acute inhalation may result in respiratory distress due to pulmonary oedema
- Chronic inhalation may result in impaired pulmonary function

Environment
- Dangerous for the environment
- Inform Environment Agency of substantial incidents

Prepared by R F Chilcott
C/E HQ, HPA
2011
Version 3

Trichloroethylene

Key Points

Fire
- Non flammable
- Reacts with strong oxidizing and reducing agents and alkali metals
- Emits toxic fumes of hydrogen chloride, phosphine and chlorinated hydrocarbons in presence of light and moisture
- In the event of a fire involving trichloroethylene, use fire water spray and normal fire kit with breathing apparatus

Health
- Toxic by inhalation and ingestion
- Irritant and probably carcinogenic and mutagenic. Possible risk to the unborn child
- Symptoms following inhalation or ingestion include excitement, dizziness
- and headache followed by drowsiness and coma. Coughing or shortness of breath may also occur
- Ingestion causes a burning of the mouth and throat and stomach pain
- Skin contact causes irritation, burns and pain
- Eye contact may cause immediate burning and stinging
- Trichloroethylene is classified by the International Agency for Research on Cancer as probably carcinogenic to humans

Environment
- Harmful to aquatic organisms and may cause long-term adverse effects
- Inform Environment Agency of substantial incidents

Prepared by K Foxall
CHAPE HQ, HPA
2008
Version 1
Exposure

Chemical risk from washed up drums.

Dermal and possible inhalation hazard

Condition and number of drums important in determining likelihood of exposure

Monitoring? Fire Rescue Service HazMat?

Risk to beach goers? How many people attend the beach? How much time on the beach?

Evidence of contact / exposure?

Weather conditions – CHEMET? Tide forecast?

Foodchain? Environmental sensitivity?
Risk assessment

Contents presents toxic hazard

Manifest / warning signs help identify hazard

Contact / inhalation hazard

Risk to beach goers, local residents?

Other containers at other beaches?

Environmental impact?

Tourism? Long term impacts?
- Hazard ID – warning signs
- FRS HazMat
- Cargo manifest
- Tide, weather conditions

- How many people have been to the beach
- Location and condition of drums
- How long have they been ashore
- Demographics of people age / sex / pre-existing disease

- Signs and symptoms
- Biomonitoring / biomarkers

Dose
Interventions

Secure scene(s)
Remove containers
Clean-up
Health advice
Track beach goers?
Environmental advice – water quality, beach contamination? local fisheries?
Frequently Asked Questions

What is trichloroethylene?
Trichloroethylene is a colourless, volatile liquid with a sweet odour. The main use of trichloroethylene is as an industrial solvent in metal cleaning and degreasing.

How does trichloroethylene get into the environment?
Trichloroethylene may be released into the environment from its use. The majority of trichloroethylene released enters the air. Trichloroethylene may also occur in ground water and surface water.

How will I be exposed to trichloroethylene?
People may be exposed to very small amounts of trichloroethylene through exposure to contaminated air, drinking water or food.

If there is trichloroethylene in the environment will I have any adverse health effects?
Following exposure to any chemical, the adverse health effects you may encounter depend on several factors, including the amount to which you are exposed (dose), the way you are exposed, the duration of exposure, the form of the chemical and if you were exposed to any other chemicals.

Ingestion of trichloroethylene can cause burning of the mouth and throat, nausea, vomiting and diarrhea. Eye contact with trichloroethylene vapour or liquid causes immediate burning and stinging. Skin contact may lead to irritation. More severe exposure to trichloroethylene by inhalation or ingestion may cause dizziness, drowsiness, heart problems, coma and in some cases death.

Long-term inhalation exposure to trichloroethylene can cause headaches, dizziness and liver damage. Dermatitis (inflammation of the skin) may develop following repeated skin contact.

Can trichloroethylene cause cancer?
The International Agency for Research on Cancer (IARC) has classified trichloroethylene as probably carcinogenic to humans.

Does trichloroethylene affect children or damage the unborn child?
Children will be affected by trichloroethylene in the same way as adults. Exposure to trichloroethylene at concentrations that do not affect the mother, are unlikely to affect the health of the unborn child. However, exposure to trichloroethylene during pregnancy should be avoided because of its general toxic effects.
Risk assessment summary

Understand the hazard

- Expert advice
- Evidence base

Exposure assessment can be difficult

Direct measures may not be available

Consider indirect proxy measures as an initial starting point

- Visibility (smoke), proximity, residence etc
Managing Public Health Risks from Environmental Incidents: Guidance for Wales

This guidance aims to strengthen collaborative action to manage the public health aspects of environmental incidents in Wales by:

- defining what constitutes an environmental incident;
- clarifying agency roles and responsibilities;
- outlining incident notification and management procedures, and
- describing what resources are available to inform action.

It sets out arrangements for managing the public health risks associated with environmental incidents in Wales (through an Incident Management Team (IMT)), for minor localised incidents through to the early stages of potentially major incidents which escalate into full major command and control-led national incidents.

This guidance is designed to support all relevant organisations fulfil their duties in relation to the management and control of the public health aspects of environmental incidents but is not intended to duplicate existing Civil Contingencies Command and Control level plans or other incident response arrangements e.g. Standing Environment Group for maritime incidents.

Download: Managing Public Health Risks from Environmental Incidents: Guidance for Wales [docx, 3.3MB]

Training

Environmental Incidents Management Training Programme

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