Chlorinated Hydrocarbons – A Widespread Issue

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Overview: Chlorinated hydrocarbons

- TCE (as the most toxic is the risk driver)
- Multiple historic uses
  - metal degreaser/cleaner
  - dry cleaning
  - anaesthetic
- CHCs do not readily degrade in the environment
Degradability & breakdown products

- **PCE/TCE/DCE**
  - anaerobic degradation
  - relatively stable in environment (do not degrade quickly)
  - various levels of toxicity
  - TCE is risk driver (most toxic)
- **VC**
  - aerobically degrades
  - highly toxic
- **Ethene**
  - not toxic
Chlorinated vs Petroleum

**CHC**
- limited understanding
- limited guidance (almost always requires site specific assessment)
- do not degrade readily
- DNAPL
- more difficult to predict movement in the environment
- vapour plumes not necessarily reflective of groundwater plumes

**PHC**
- better understanding
- NEPM/CRCCARE guidance
- degrades rapidly in presence of oxygen
- LNAPL
- simpler to predict movement in the environment
2014…

- Numerous chlorinated hydrocarbon plumes in the spotlight
- Large areas where land use mixed, with residential adjacent to industrial
- Heightened community interest and awareness in relation to TCE
- Varying groundwater depths
- Significant soil vapour detections
- EPA advice at all these sites is to not extract groundwater for any use until further notice
Glenelg East

- Likely single source
- Shallow groundwater ~3.5m
- Former dry cleaner (since early 1950’s)
- Predominantly PCE source
- Evidence of degradation with TCE/cis DCE increasing with distance from site
- ~300 properties provided with information
Hendon

- Multiple sources
- Shallow groundwater ~3.7m
- Multiple activities including:
  - Ammunitions manufacturing
  - Electronic components manufacturing
  - Electroplating
- PCE/TCE/DCE/VC in groundwater
- PCE/TCE/DCE in vapour
- Appears to be significant preferential pathways
- ~3000 properties provided with information
Beverley

- Likely multiple sources
- Groundwater ~7m
- Whitegoods manufacturing
- Metal finishing/dgreasing
- Predominantly TCE
- ~3000 properties provided with information
- EPA Assessment Area smaller
Marleston

- Single source
- Groundwater ~ 9m
- Chemical storage
- Mixture of PCE/TCE/DCE
- ~300 properties provided with information by TAFE
- Site Contamination Auditor engaged
Keswick

- Potential multiple sources
- Shallow/perched groundwater ~ 6m, but groundwater depth ~ 10m
- Whitegoods manufacturing
- Predominantly TCE
- ~800 properties provided with information
Allenby Gardens

- Groundwater Prohibition Area (GPA) established June 2013
- Single source
- Groundwater ~9m
- Former pughole
- 2009 Site Audit Report (site suitable for medium-high density residential)
- Change in proposed land use triggered need for new audit (site contamination auditor is engaged)
- Currently undertaking additional groundwater / soil vapour assessment
Clovelly Park

- Multiple source areas
- Shallow groundwater ~8-14m and deeper groundwater ~18-20m
- Automotive and parts manufacturing
- Surficial waste disposal and potentially waste burial areas
- TCE in groundwater and soil vapour
- Site contamination auditor engaged
Summary of public health risk

• EPA receive draft VIRA on 16 May 2014
• EPA and SA Health discuss report
• SA Health declared public health risk to residents in 25 tenanted dwellings (two private owners)
  – chronic exposure based on carcinogenic criteria of WHO 2µg/m³
  – potential non-carcinogenic exposure – application of US EPA 2µg/m³
Summary of public health risk

- Government’s response to urgent intervention recommendation from EPA/SA Health = temporary relocation

- EPA/SA Health/Housing SA and Environment Minister doorknock residents commencing 6:30pm 2 July 2014
What’s happened – initial assessment program

July 2014

- two week timeframe to prepare request for quote
- two week tender timeframe
- three day review period and appointment of consultant
- EPA holds community information sessions (offered to 1400 residents)
- EPA hotline available 8am-8pm
GROWING CONCERN: Mitchell Park’s Samson Singarayan, with his son Brentan and daughter Abigail, is worried their backyard vegetable garden is contaminated. Picture: TOM HUNTLEY
Sick sisters fear poison hit playtime
ILLNESSES MAY BE LINKED TO CONTAMINATION

Concerns over impact of toxic chemical

Were the household cancers linked?

Hollow vow on health checks

Students wait for test results

Eye on toxic health concern

You’re safe from toxins, schools told

Revealed: New toxic threats as first victim forced out of home

Worried residents still want answers
More homes to be tested
Contamination search widens

Plea to residents as toxic anger grows

Toxicity fears hit house values

Save Our Suburbs
Residents want action as fears escalate

Soil fears spread to new area

Toxic chemical alarm spreads to near suburb

Regions deemed at risk from rising chemicals

No compo as toxic zone grows
Residents meet to demand answers over Clovelly Park, Mitchell Park contamination

Sky falls after knock at door
Contamination threat to house sales

Anywhere, just out of there

Residents say empty homes a ‘yobbo’ lure

Tenants call for answers

Public housing rent review on wishlist

Clovelly meeting next week

70-year timebomb

Toxic sites number in thousands

Residents offered homes in suburbs on EPA watchlist

Residents wary over the latest alert

Residents to be moved from ‘toxic’ homes
Labor in hot seat
Month-long delay to toxic zone evacuation call
No excuse for not coming clean on Clovelly pollution
AFTER WEEKS OF CONFUSION SURROUNDING THE GROWING TOXIC SCANDAL, MINISTER SAYS:
We’ll co-design a new engagement paradigm
Toxic heat on minister as tenants look for out
Failure to explain made matters worse
Apology for toxic inaction
CLOVELLY SCANDAL Residents tell Government to come clean
WE WANT ANSWERS
ALP has ‘pervasive culture of secrecy’
POLL: Should Environment Minister Ian Hunter be sacked?
YES 79% NO 21%
Just do your job and give us the facts
Debacle descends to weasel words
Toxic delay not our fault: EPA

Richardson: The EPA just doesn’t get it

Marshall hollers for EPA chair’s head

Toxic scandal ‘handballed’

EPA's focus more on money than environment, say Libs

Officials to face grilling over contamination

SA: EPA relocates residents

Toxic checks moving slowly

Looking for answers

JACKSON GOTE-SNAPE

“For every person who says we should get companies to do an audit and remediation, high-value sites are more likely”

Suburbs’ worried residents take contamination concerns to officials
Carmaker in frame for a second toxic plume

Toxic waste: Time for heat on industry
EPA Assessment

August 2014

• Commenced EPA Assessment work 27 August 2014
• Completed all drilling activities 26 September 2014
  – total of 237 drilling locations:
  – 37 groundwater wells,
  – 30 soil boreholes,
  – 170 soil vapour probes (mixture of shallow and clustered depth intervals)
EPA Assessment

September 2014

• Then we did some more… sub-slab (1m and 2m), preferential pathways soil vapour assessment, soil moisture, more geotech, indoor air, local weather station…

• Thought we completed sampling activities 31 October 2014.

• Did a little more last week
Mitchell Park
Search for toxic lake to begin next week

Nervous wait as test zone expands

Toxic drilling starts - two weeks late, over budget

Fears grow as EPA orders further tests

Drilling test finally starts
Community engagement

- Environmental Management Project Team – appointed 18 August 2014
  - Provide assistance and to co-ordinate the whole of State Government response
- Community information sessions
- EPA hotline (24-hour), letters, fact sheets, new website, emails, doorknocks
- Community reference group established
Feedback from community

- Good general understanding of assessment program
- People understand the timeline and are prepared to wait for results
- Disappointment with the ongoing media portrayal of the issue – is causing confusion, unnecessary concern and has created a negative stigma for the two suburbs
- Some disappointment about the politicisation of the issue
- Many long-term and outer residents believe they are not affected and as such are not interested
What’s next…

Groundwater, soil vapour, indoor air data, geotechnical data pending

Then…

Vapour Intrusion Risk Assessment & Human Health Risk Assessment

Then…

Discuss results and findings with the community
Role of EPA

Determine liable person(s)…

then

…regulate liable person(s)

• Enforce the *Environment Protection Act 1993*
• Orders/Voluntary Proposals/Non-statutory arrangements
  – May request auditor be engaged
  – May request additional assessment works
• Review environmental assessments and remediation option reports
• Review and make determination of complying 83A notifications
• Provide updates and maintenance of the EPA Public Register
EPA stakeholder engagement

- Engagement with SA Health (Public Health Toxicology Dept.)
  - Assist with the determination of public health risk(s) associated with site contamination

- Ensure adequate community engagement by liable persons

- EPA Assessment Areas – community and stakeholder engagement
  - letter correspondence
  - community information sessions
  - one-on-one discussion or presentations
  - media release/statements
  - television/radio
Role of SA Health

• Where there is the potential for a public health risk:
  – SA Health Public Health Toxicology (PHT) Department is engaged
  – EPA seeks toxicological / risk assessment advice
  – PHT is an independent risk adviser
  – PHT undertakes a review of data / reports where public health risk

• Where liable parties are not determined, PHT has involvement in development of sampling plan/methodologies
What is a public health risk

Generally speaking,

- Where off-site properties / land uses are impacted by site contamination from a source site that presents a potential risk to human health
  - where this is the case, EPA will require liable persons to engage a site contamination auditor to address risk to human health
  - where there is no liable person (orphan site), EPA will engage SA Health PHT to provide advice on health risk/sampling/assessment of EPA Assessment Area

- EPA engagement with liable persons
- Community engagement is vital – the public need to be kept informed
Stakeholder engagement

• The liable person will generally be responsible for engagement / consultation with all relevant stakeholders
• EPA will provide input and support
• The site contamination consultant or site contamination auditor may be required to provide technical advice
• Regular updates are essential
• Where liable person/s are not determined, EPA will take the lead i.e. EPA Assessment Areas
Role of site contamination consultant

- Assessment work to be undertaken in accordance with the NEPM / Guidelines
- Need to be acting with their competencies (ASC NEPM, Sch. B9)
- Reporting in accordance with S103ZA & S103ZB
  - land use considerations with statements about site contamination (S103ZA)
  - must not provide false or misleading statements (S103ZB)
- Timely provision of information to client, site contamination auditor, EPA is vital where public health risk identified
- Timeliness of reporting / provision of information is driven by the risk
- May be requested to provide technical advice for stakeholder engagement
Role of site contamination auditor

• Needs to be abreast of the progress of assessment at the audit site
• Obligation to report significant hazardous circumstance (SHC) to EPA
• SHC is where the auditor believes that there is an actual or potential risk to land users resulting from contamination
• Vital that site contamination consultants provide information to site contamination auditors in a timely manner where public health risk
• Site contamination auditor considers multiple lines of evidence for the preliminary risk assessment
• The timeliness of reporting / assessment is driven by the risk
• Auditor may be required to provide technical advice for stakeholder information
Conceptual Site Models

• Vital in building understanding of source, pathway, receptor relationships
• Iterative process – should always be revisited / updated as necessary
• Will in most cases start of as simple CSM, becoming more complex as additional information obtained
• Multiple lines of evidence
• Visual or written (ASC NEPM Sch. B2)
CVI Assessment

- Conservative Interim HIL’s in ASC NEPM
  - Most sites with chlorinated hydrocarbon contamination will lead to site specific assessment
- Screening assessment
  - Use of modelling from groundwater/soil vapour data
- Detailed assessment
  - Further site specific investigations
  - May include sub-slab/crawl space/indoor air
  - Indoor air as a final line of evidence
- Must understand complexities around indoor air sampling
Multiple Lines of Evidence

- Source(s) location identified - characterisation
- Assessment of all pathways including preferential pathways
- Site specific data collection
  - DQO
  - SAQP
- Plan ahead – know what you intend to do with the data before it is collected
- Agreement on the screening criteria before commencing work
- Various media – soil/groundwater/soil vapour
- Iteration of CSM with data collection (eg. high definition site characterisation)
- Mass flux / discharge
Treat/contain/remove/manage

- Recommend undertake targeted remediation option(s)
- Consider coupling remediation options
- Source characterisation and source removal
- Commence with a trial
- Hindmarsh Clays and CHC remediation – efficacy of source removal – practicability vs impracticability??

- Validate the remediation option(s) – did it work?

- Revise the CSM
  - If CSM still presents risk to human health/environment, discuss again with auditor/EPA/client/community
• Is the outcome of an ROA the recommendation of a GPA??

• **Groundwater prohibition areas (GPAs) are not intended to be primary remediation option**

• GPA can manage current or future risk to human health as a mitigation measure
Controls on third party land

- Third party (off-site) land owners should be engaged with early in the assessment process.
- Where contamination affects third party land, EPA expects that engagement with land owners / relevant parties is documented.
- If audit recommends controls on third party land, must demonstrate and document engagement with land owners / relevant parties.
Remediation vs risk

- Where third party land affected (and potential for risk), remediation / mitigation required

- It is appropriate that the land holder of the adjacent properties are able to enjoy a reasonable unencumbered use of residential land

- Sometimes, planning conditions are put in an audit report and the Council/EPA is unable to implement

- Integration between the environment and planning, but for now consultation with EPA that conditions or remediation outcomes will address offsite risk
Feedback to consultants

- TCE is not naturally occurring / not considered to be background
  - Any detection of non-naturally occurring chemical substances will trigger requirement for S83A notification
- Important to understand potential source(s) – site history
- Take care with units when reporting
- Timeliness in progressing assessment
- Be wary about making final risk conclusions on limited sampling – should have sufficient information to have well developed CSM using multiple lines of evidence to support the risk assessment
- Statement of suitability for sensitive use sites (AUDITORS ONLY)
- Draft reports & public register
- Report titles – reflect what done
2015…

Continue engagement with persons liable for site contamination

Progress of work at EPA Assessment Areas

Continue working on establishment of GPAs

Find time to continue progress of draft guidelines

….and sleep
Questions