Unveiling Air Toxics Analyses: Safeguarding Aotearoa New Zealand's Environment through Cutting-edge Laboratory Practices

Jonathon Angell – General Manager - QLD

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What’s that smell?

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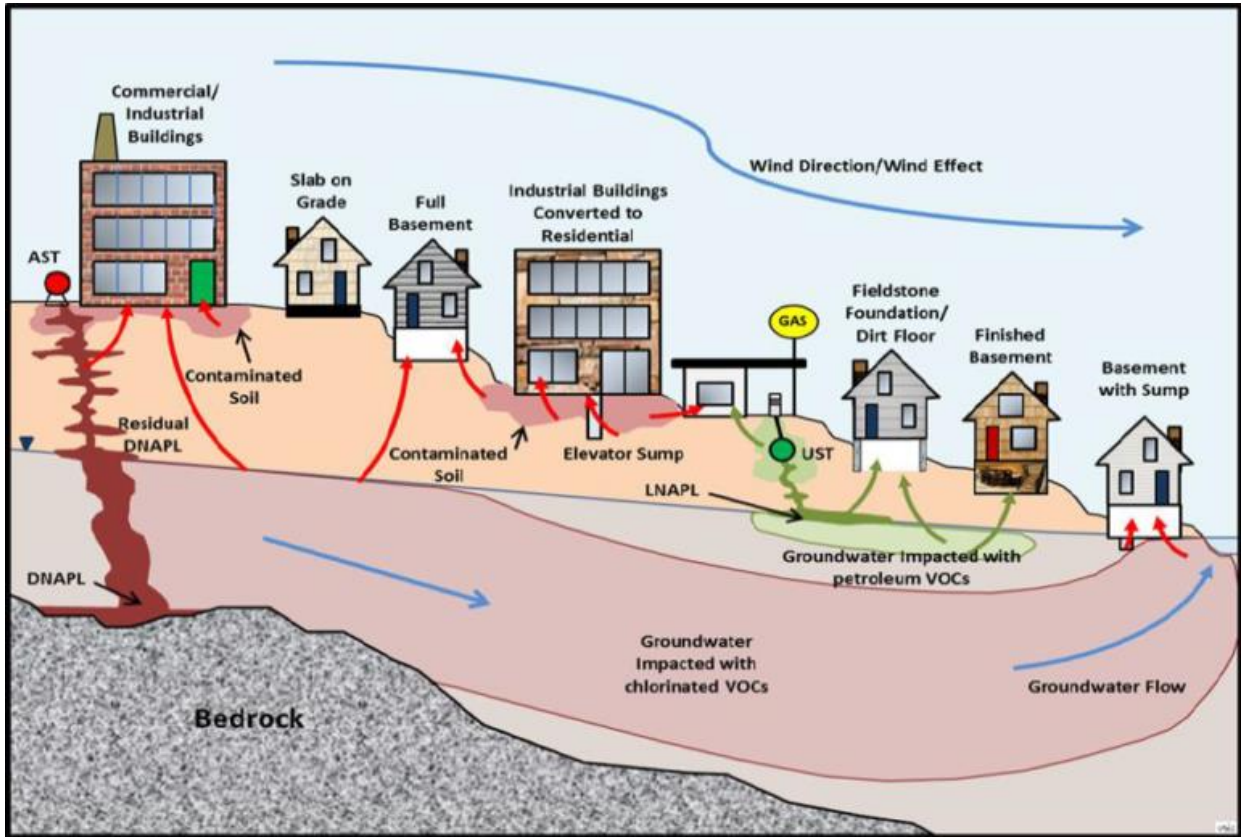
- Vapour intrusion (VI) is the migration of volatile chemicals from subsurface soil and/or groundwater into the indoor air of overlying buildings.
- Volatile organic compounds (VOCs) typically associated with VI are chlorinated solvents and petroleum hydrocarbons.



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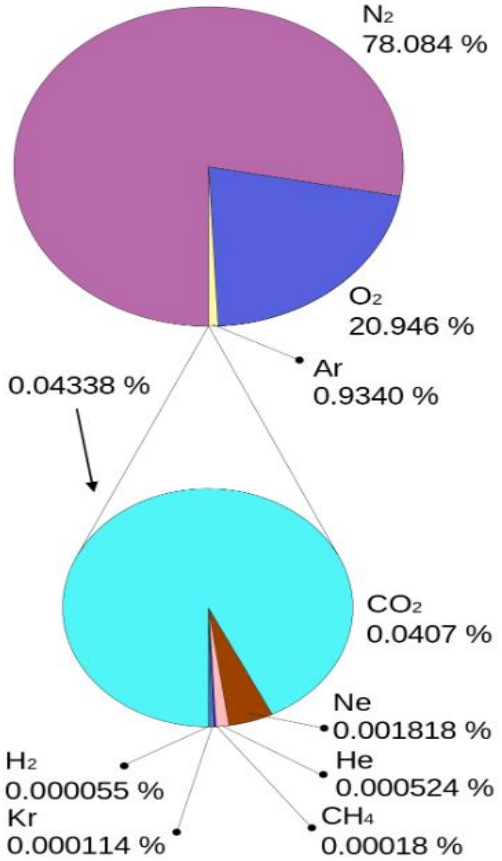

Air is mostly composed of 78% **nitrogen** and 21% **oxygen**:

One small but diverse group of gasses are **Volatile Organic Compounds (VOCs):**

- Group of carbon-based chemicals
- Evaporate at room temperature
- Emitted from various sources, both natural and human made

Why are we interested in monitoring VOCs?

- Source of CO_2
- Some VOCs can have **adverse effects** on **air quality** and human health even at low concentrations
- Exposure can lead to **respiratory problems, headaches, eye irritation, and other health issues**
- Monitoring and controlling VOC levels in the air are essential for maintaining **good indoor and outdoor air quality**

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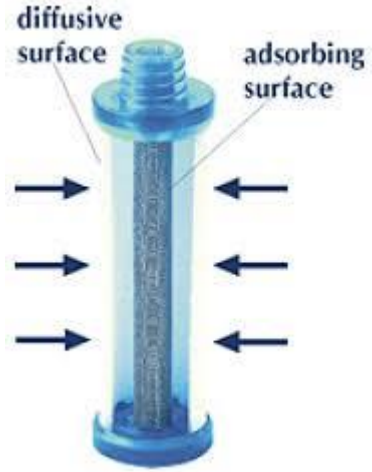
Passive Sampling

- Passive samplers are small, portable devices that absorb VOCs from the air over a defined period of time
- Passive samplers can be configured with a porous diffusive barrier or a nonporous membrane to control the rate of VOC collection by the adsorbent media.
- Common Sampler range: Adsorbent Badges,

  Radiello145, Waterloo Membrame Samplers (WMS)



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Active Sampling

- Active drawing of air through the sampler media via mechanical/hand pump
- Sorbent tubes contain adsorbent materials that capture VOCs as air passes through them
- Method allows for higher flow rates and shorter sampling durations
- Suitable for assessing VOC levels over shorter periods or in dynamic environments
- Common sampler range: Carbon, XAD-2, TO-17 TD, Radiello130 and other specialist tubes

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Passivated Canisters

- Passivated canisters are coated Ni/Cr Ox stainless steel containers utilised for collecting whole air samples.
- Certified in the laboratory and placed under vacuum
- Simplify field sampling, as samples are obtained by opening a valve without the need for pumps or additional equipment

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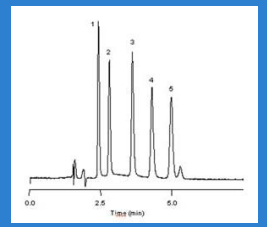
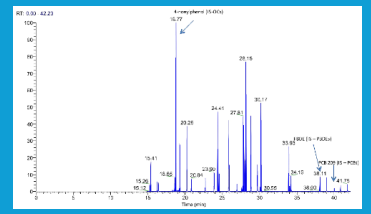
Desorption

GC - Separation



MS - Detection



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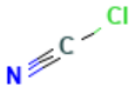
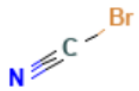
Eye irritation from an indoor animal enclosure

Canisters deployed to characterise standard VOC and atmospheric gas composition. No major detections

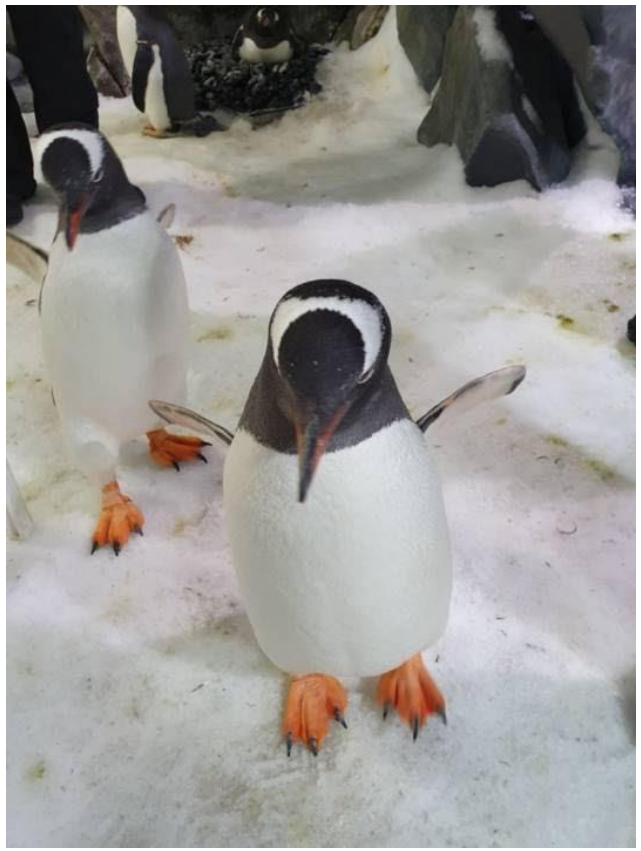
Non-Target Analysis performed to further characterise and identify presence of compounds of concern

Cyanogen Chloride and Cyanogen Bromide identified





Further site information then provided allowing identification of source and input for change to be actioned



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‘The analysis of analytes without known CAS numbers or analytical reference standards’

- Draft or Non-standard Methods
- User-Defined Methods
  - Program specific targets
  - Screening applications
  - Fingerprinting (e.g PFAS sourcing)
  - Source tracking

LC-QToF-MS/MS

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