Data Quality and Risk Assessment

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Introduction -Data Quality and Risk Assessment

- RA, CSM and data interconnection
- Confidence
- Data quality
- Good practice
- Investigation detail

RA Basics

- Contaminated land investigations – often ONLY soil based
- Other media such as groundwater, surface water, sediment, and vapour should be considered for CSM
- Groundwater is particularly relevant from a regional council perspective (e.g., discharge rules in regional plans)

7. Risk assessment

- conceptual site model
- evaluation of the probability that contamination exists on the site
- characterisation of the source through adequate delineation of contamination horizontally and vertically and assessment of contaminant concentrations
- identification and characterisation of potential pathways and receptors for each exposure area across the site (eg, assessment of geology, hydrogeology, building construction, site use)
- likelihood that contamination poses a risk to identified receptors including potential receptors
- evaluation of the level of any identified risk to human health pursuant to regulation 5(9)
  - *does a detailed site investigation exist that demonstrates that any contaminants in or on the piece of land are at, or below, background concentrations?*
- evaluation of the magnitude of any identified risk to other receptors (eg, ecological)
- limitations, assumptions and uncertainties in data and models used.

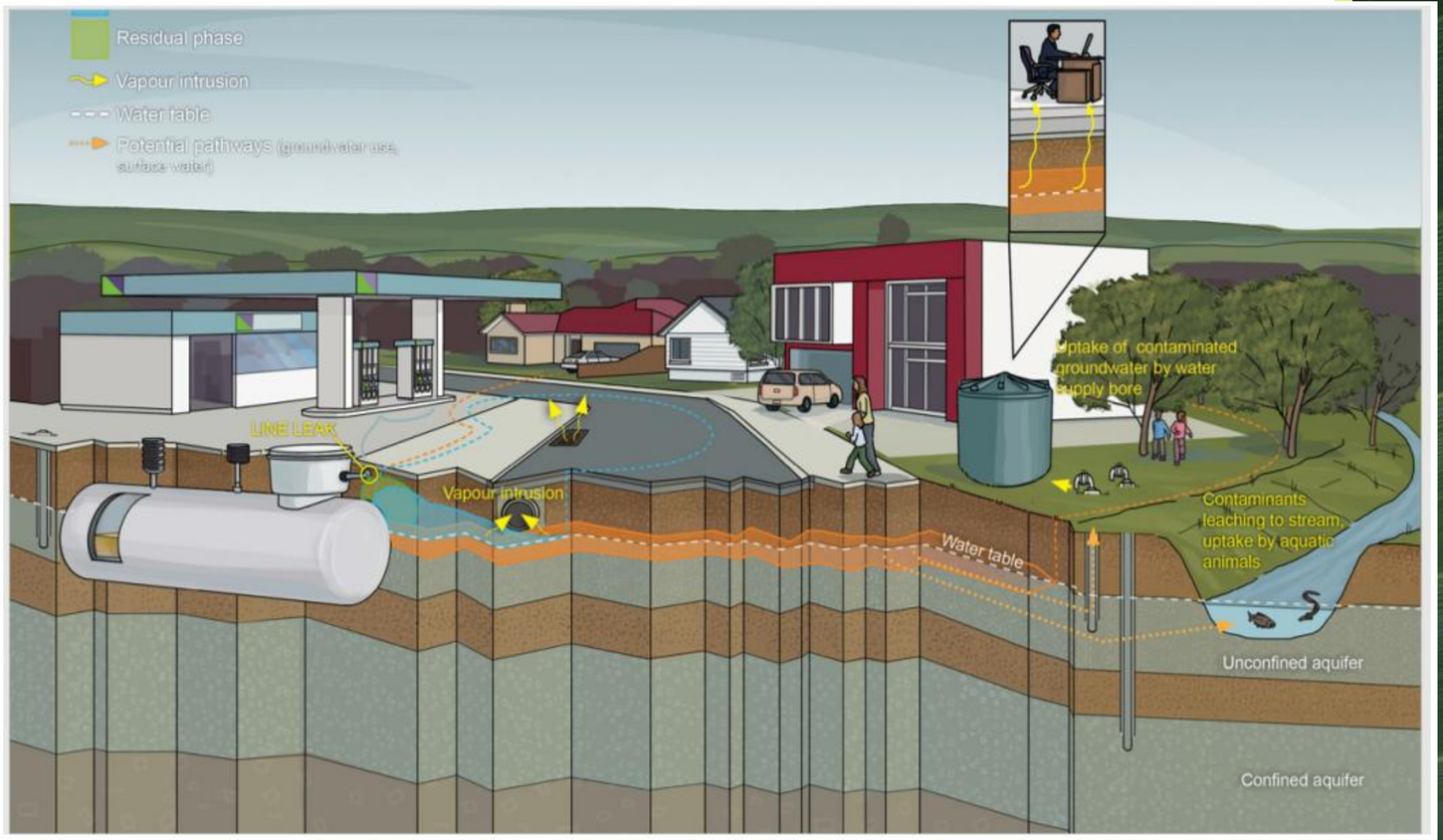
From CLMG #1

Data Collection Factors – Scoping

- Field sampling programmes are $$$
  - Be organised in advance
  - Understand objectives
  - Review rationale for each data point
- HAIL history
  - Contamination – Potential for cross-contamination/introduction of contaminants?
- Geology
  - Aquifers – Use, Potential for cross-connection?
- Receiving environment
  - Sensitive receptors
  - Potential for off-site discharges

Data Collection Factors – Site Works

- CSM understanding
  - Methodology decisions
  - Sampling locations/depth
  - Where/how many
  - What are we targeting
  - Tools required
  - Site limitations
  - Handling
- Scope changes



From CLMG #5

Data Confidence Factors - Samples

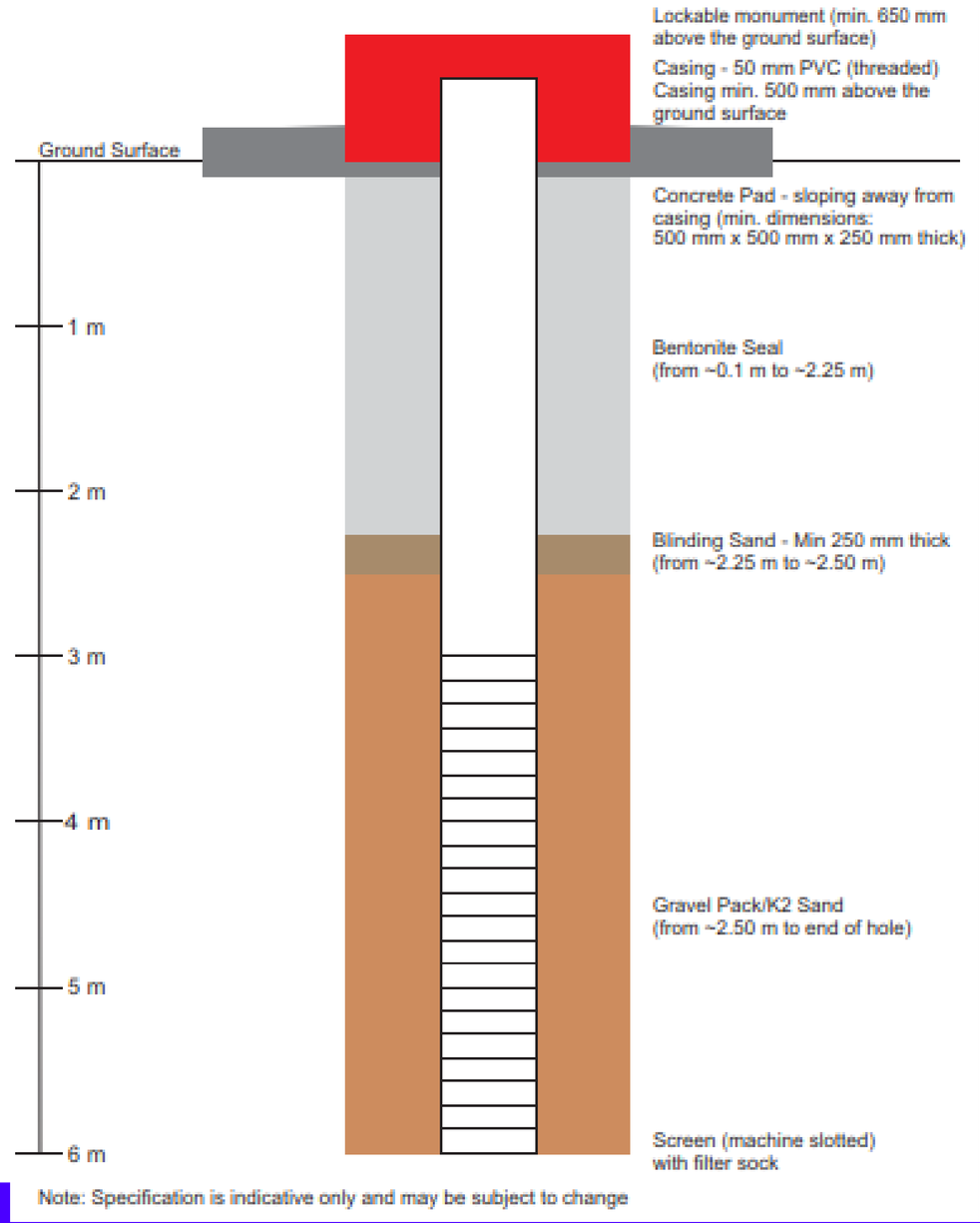
- Holding times
- Wrong sample container (for media/analyses)
- Temperature of samples
- Wrong analyses specified
- Wrong media sampled
- Wrong depth sampled
- CoC errors
- Cross contamination
- QA/QC omission

Example – Groundwater Sampling

- Example decisions to make and what could go right/wrong
- A lot of decisions
- All relate to confidence in data
- And subsequently RA

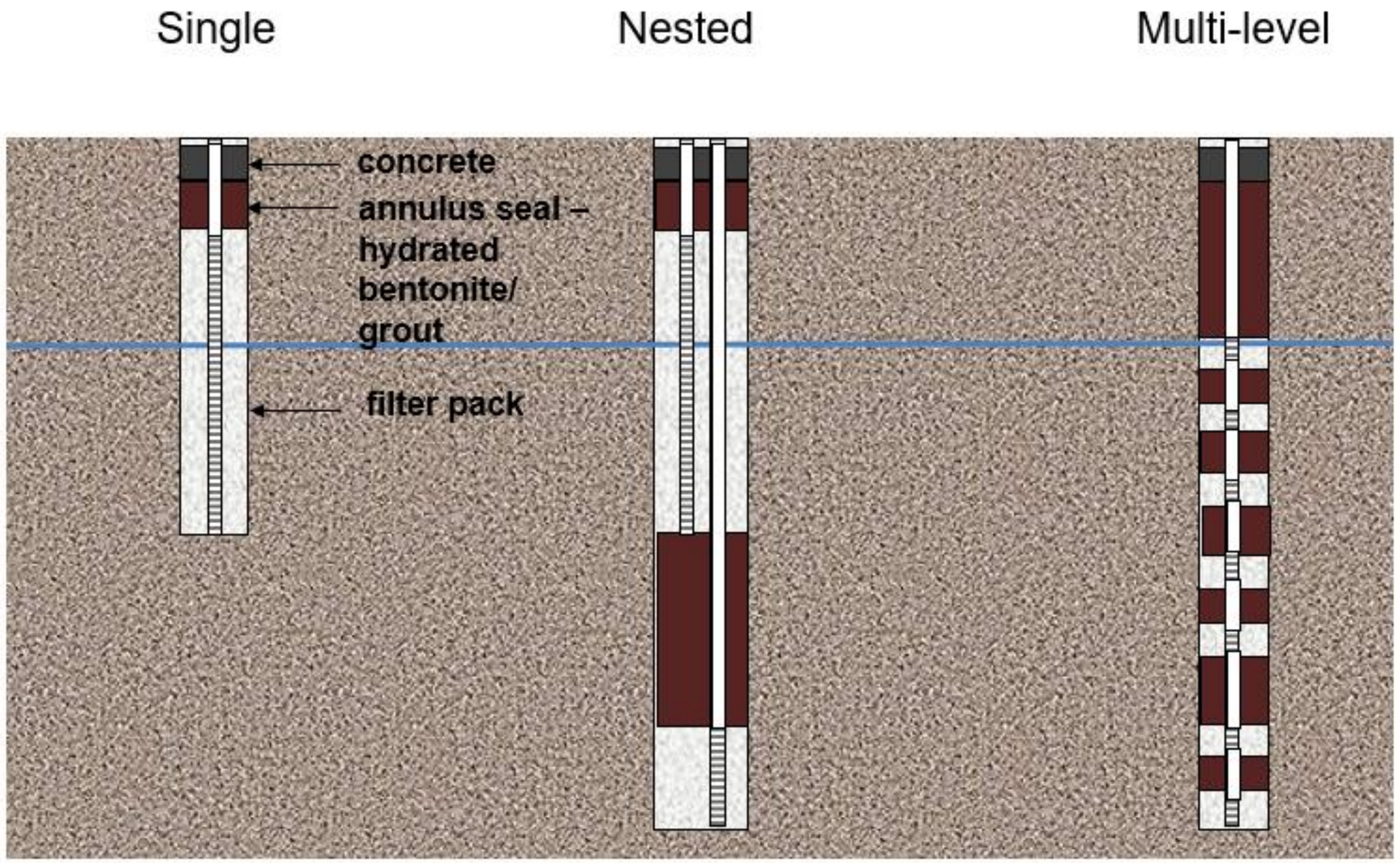
Good Data from Good Design

- Good design will mimic natural hydrogeology and not provide a pathway for contaminant migration/cross-connection between aquifers.
  - Target depth – contaminant specific
  - Screen position/slot size/slot spacing
  - Gravel/Filter pack design
  - Headworks
  - Sump at base (DNAPL)
  - Material – PVC/stainless steel
  - Purpose of well



Well Design

- Different types of monitoring wells:
  - Single/standard
  - Nested
  - Multi-level
- Observation well
- Well dia
  - 32 mm
  - 50mm
  - 100mm



Screen & Filter Pack

- Objective is to:
  - Hydraulically isolate the screen within the target aquifer/zone.
  - Minimise ingress of fine sediment into well.
  - Maximise well performance.
- Filter pack and screen slot size selected based on finest material encountered within screened section
- Keep track of volume of materials used.

Development

- Well development removes clays/silts/fines from within the well after drilling, and removes fine grained sediment from around the well screen to improve performance.
  - In production wells, this is a critical process and can take long time.
  - Environmental wells, focus is often on cleaning well and gravel pack.
  - Contaminated sites – special considerations

Groundwater Sampling Methods

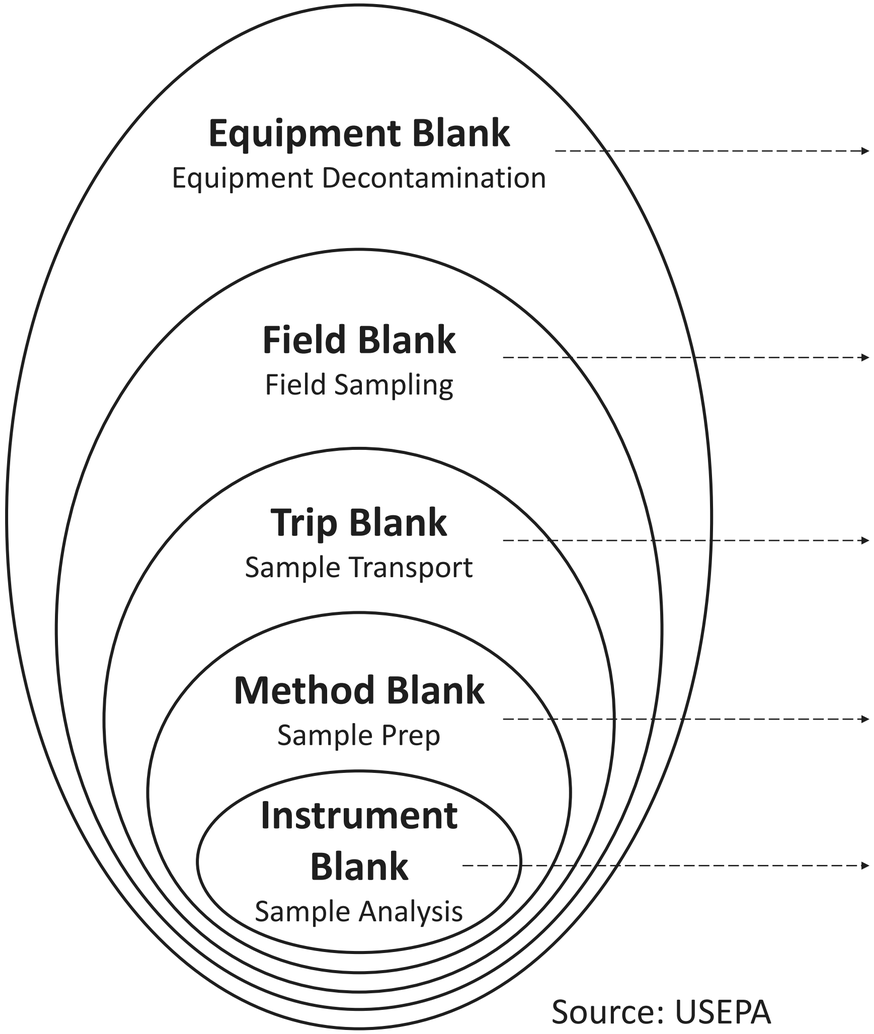
- The purpose of groundwater sampling is generally to collect a sample that is representative of the target aquifer.
- Variety of methods are available. General theory is:
  - Grab method – sample collected from target depth.
  - No purge methods – sampler deployed to target depth. Retrieved after a period of time that allows groundwater in the well to re-equilibrate.
  - Volumetric/stabilisation methods:
    - High-flow –abstracting 3x well volume. Sample representative of fresh groundwater from the target aquifer.
    - Low-flow – pumping at a low rates to minimise drawdown (i.e., pumping rate equal or similar to recharge rate) and maintaining laminar flow.

Grab Method	No Purge Methods	Volumetric/Stabilisation Methods
Bailer	Hydrasleeve	High-flow (e.g., in-situ irrigation pump, submersible pump etc.)
	Passive Diffusion	Low-flow (e.g., peristaltic pump, bladder pump, foot valve etc.)
	Snap Sampling	

Quality Assurance/Quality Control

- Quality assurance (QA) is the planned and systematic activities implemented within the sampling programme to provide adequate confidence that the data collected fulfills the project objectives.
- Quality control (QC) assesses the data collected within the QA framework.
- Things to consider in the field:
  - No. of QC samples:
    - Trip blanks.
    - Field Blanks.
    - Equipment/rinsate blanks.
    - Duplicates/triplicates.
  - Field filtering
  - Dedicated equipment
  - Decontamination procedures

Blank Types



Source: USEPA

Equipment Blank results include total field and laboratory sources of contamination.

Field Blank results include total ambient conditions during sampling and laboratory sources of contamination.

Trip Blank results include shipping and laboratory sources of contamination. Volatiles only.

Method Blank results show only laboratory sources of contamination.

Instrument Blank results show only laboratory sources of contamination.

Duplicates - Relative Percent Difference

- Precision measure
- Methodology for taking
- Nomenclature – QA/QC samples

Table B6a Groundwater Duplicate Pair

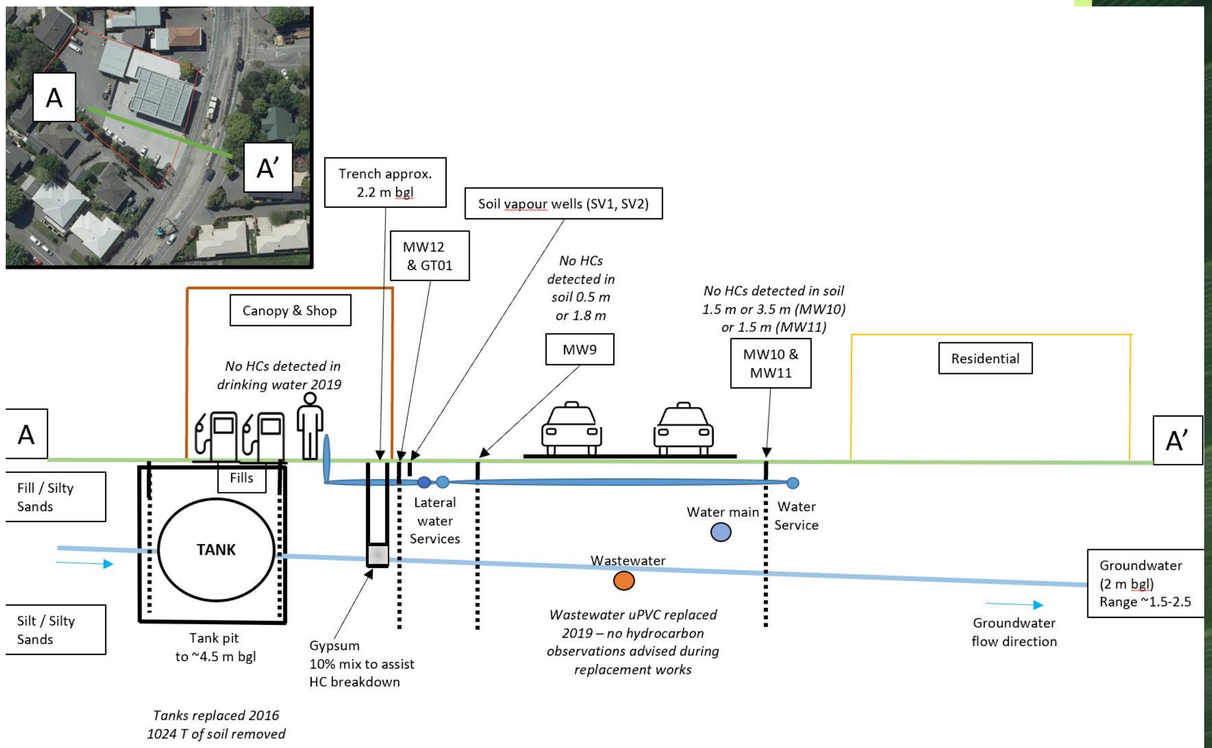
Sample Type	Primary	Duplicate	RPD %
Sample ID	MW7-B	QAQC01	
Sampled Date	19-Mar-25	19-Mar-25	
Lab ID	3821177.7	3821177.1	
TPH			
$C_7 - C_9$	1.09	1.17	7.1
$C_{10} - C_{14}$	0.9	1	11
$C_{15} - C_{36}$	< 0.4	< 0.4	NA
Total ($C_7 - C_{36}$)	2.0	2.2	10
BTEX			
Benzene	0.058	0.060	3.4
Toluene	0.192	0.195	1.6
Ethylbenzene	0.116	0.127	9.1
m&p-Xylene	0.41	0.48	16
o-Xylene	0.121	0.144	17

Data Interpretation Issues

- SQEP interpretation
- What is the purpose?
- Does data answer question?
- QA/QC interpretation
- Guideline criteria selection process
- Data gaps
- Is further analyses required?
- Is interpretation assistance required from SMEs?
- When to get more data?

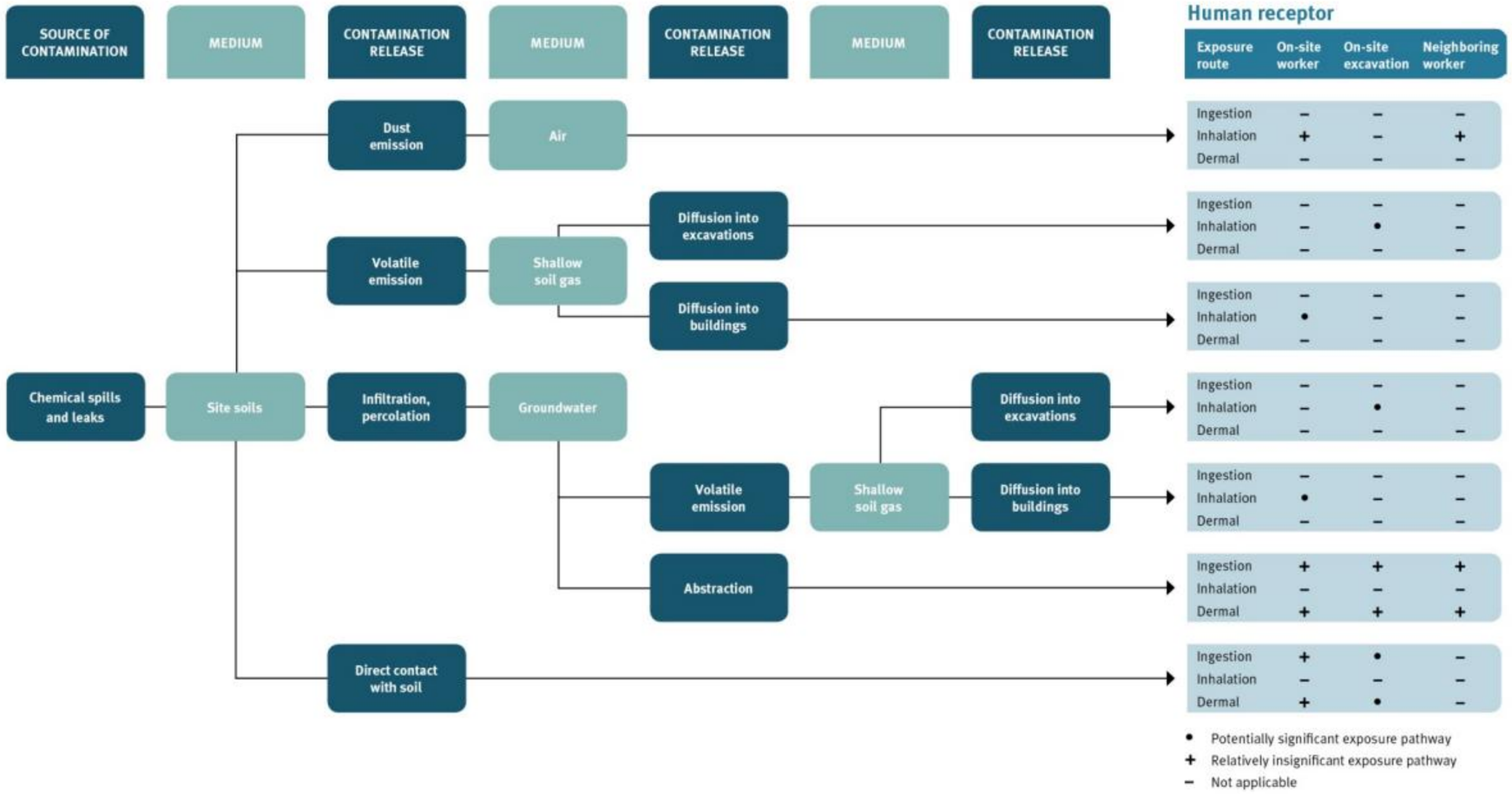
CSM thinking

- Consider each exposure pathway
- How confident are we
- Tiered approach to investigation
- Complete further sampling
- Activity decisions based on risk



Thank you

CSM flow diagram



From CLMG #5