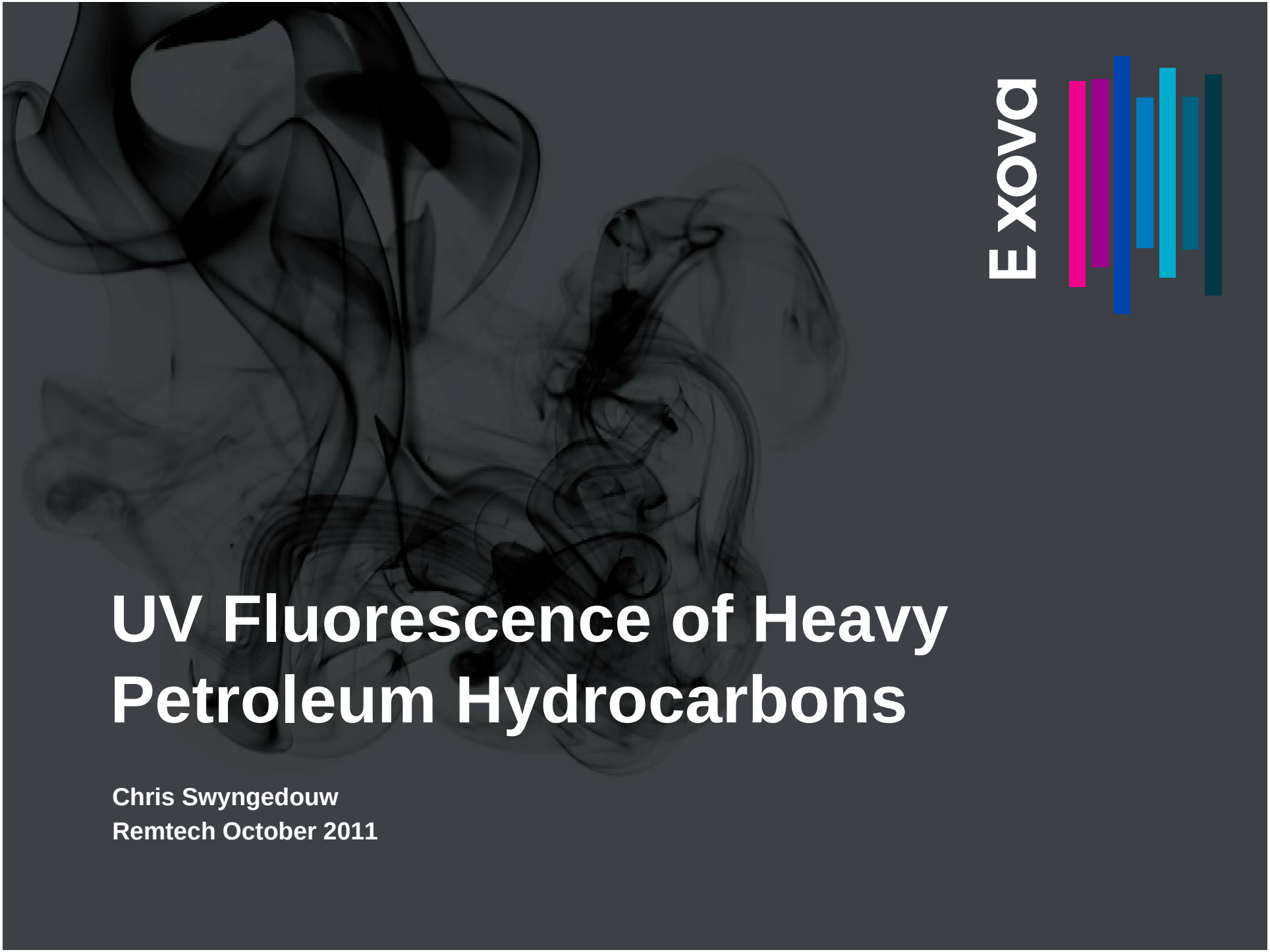


UV Fluorescence of Heavy Petroleum Hydrocarbons

Chris Swyngedouw

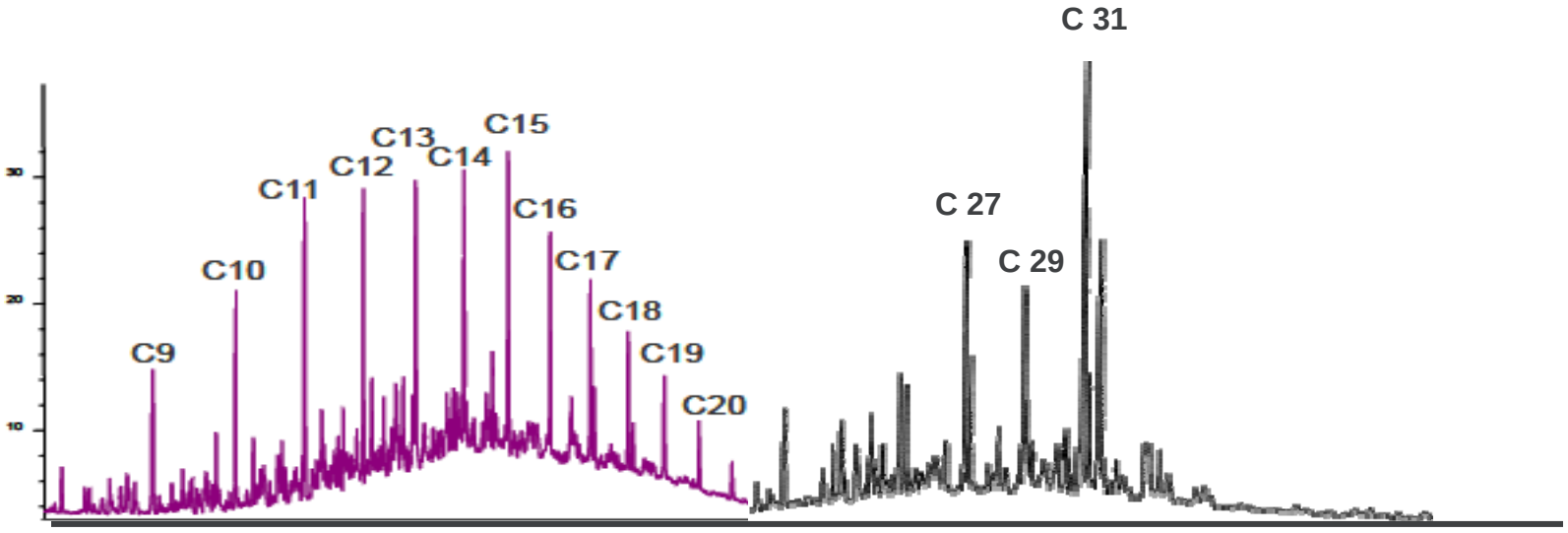
Remtech October 2011

Why UVF screen?

Decision making in the field for PHC excavation

- Visual observations
  - high concentrations evident - less obvious for old weathered PHCs
- Odour
  - can be evident while sampling
  - field personnel get desensitized, is discouraged from a H&S perspective
- Gas Tech
  - used as universal PHC field screening tool
  - but will only represent light end PHC (basically F1)
- F2 – F4 fraction
  - ?

Hydrocarbon analysis



Exova

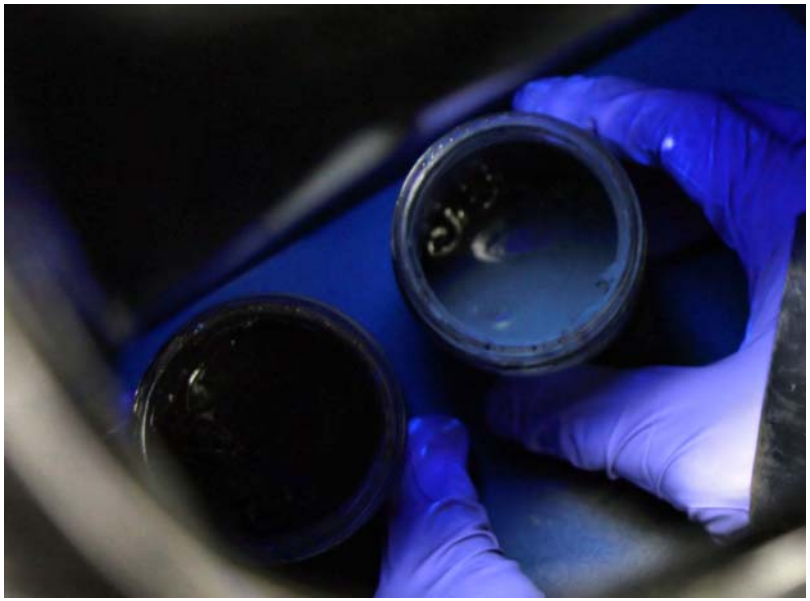
UVF field screening objectives

- Real time decisions
  - Used in unison with headspace vapour testing
- Detect petroleum hydrocarbons in soil for presence / absence
  - Relative concentrations (absent, low, high)
  - Handle interferences
- Augment site characterization
  - Complement gas chromatographic analysis for reporting
  - Supplement excavation/delineation field decision making
- Cost savings
  - Zones of residual contamination
  - Confirmatory laboratory analyses

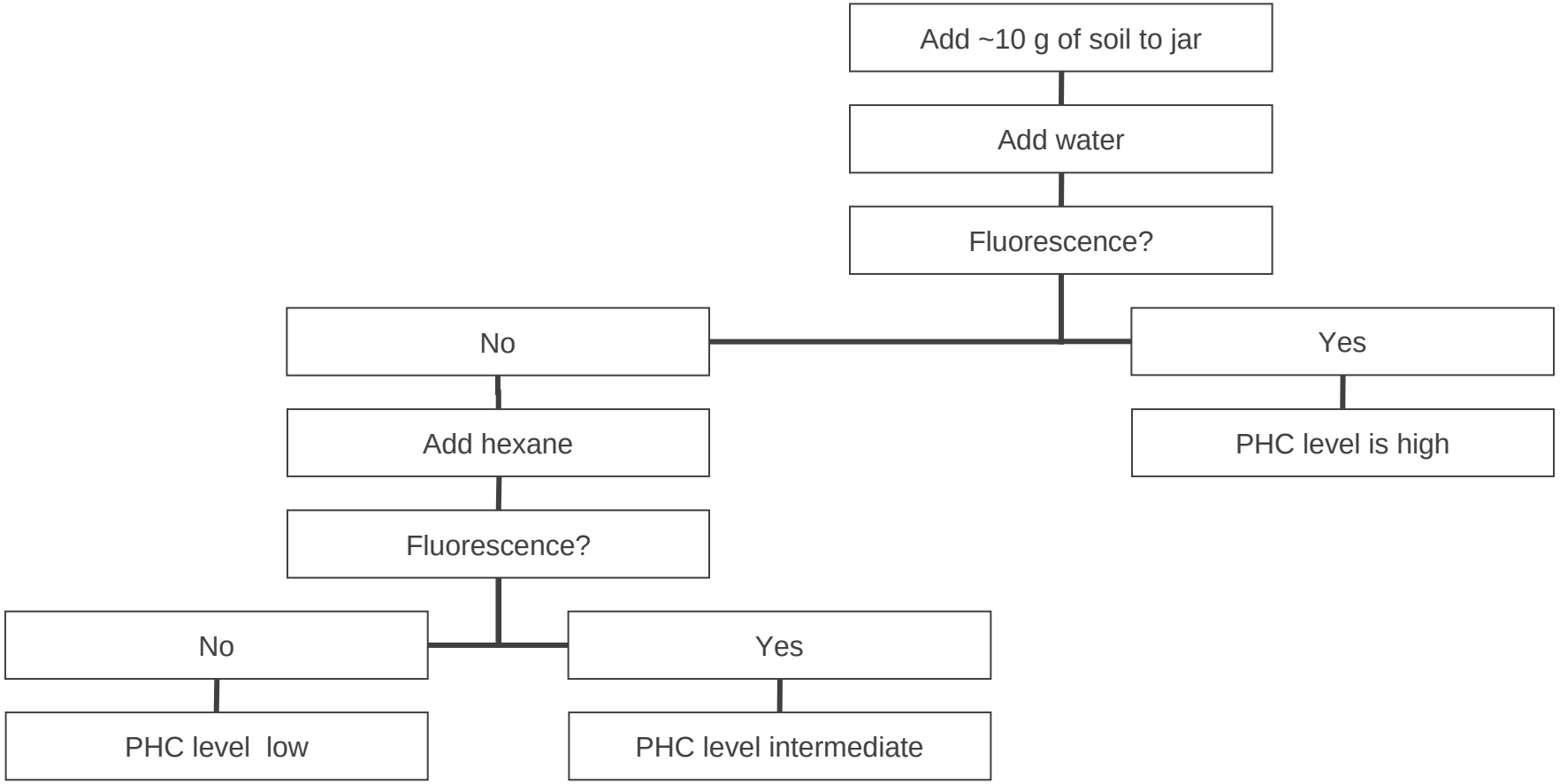
Fluorescence

- UVF response comes from PAHs
  - Response at ~400 mg/kg PHCs corresponding to 10-20 mg/kg PAHs (peat)

- Correspondence to lab results
  - Site soil heterogeneity: ~50% sub sampling variability
  - Lab homogenization 10-15%



Sample decision tree



Instrument issues

- Faulty on/off switch reported
- Some UV bulbs loosened after lengthy transport (reinsert into sockets)
- Near the end of the season, some UV bulbs needed replacing
- No issues with battery life reported.

Control samples

- In general, simple negative and positive observations worked well
- Some issues with attempting to acquire more detailed concentrations.
- No consistent results with specific controls (matrix and/or criteria)
- No peat interference with general procedure but some responses after prolonged hexane contact time.

Field measurements

- UV glasses, at times removed to reduce light entering sample box.
- Open outside sunlight is a problem with seeing a good positive hit.
- Better readings inside the cab.
- Quick reading using a large dark towel.
- Hexane exposure mitigation considerations.

Hexane exposure study

- Solstice Canada Corp. (Michelle Foster)
- Preliminary exposure study
- Outdoor setting – good ventilation
- Low worker exposure
- Further testing in different work settings on-going

Case studies