ALTALINK




Risk Based Approach to Powerline Reclamation

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Presenters

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Issue

- Power lines are very long, linear facilities
- Transmission line poles
  - 100 – 200 m apart
  - < 2 m dia. area impact
- Testing & excavation at every pole location is not considered practical
- No powerline specific reclamation criteria

Background

- Power poles treatment with wood preservatives:
  - Pentachlorophenol (Penta)
  - CCA
  - Creosote
- Treatment chemicals approved by Agriculture Canada
- Penta poles re-treated after 20 yrs

Questions

- What are typical Penta concentrations and distribution in soil?
- How much variability is there between poles?
- Is there a geographic or landform influence?

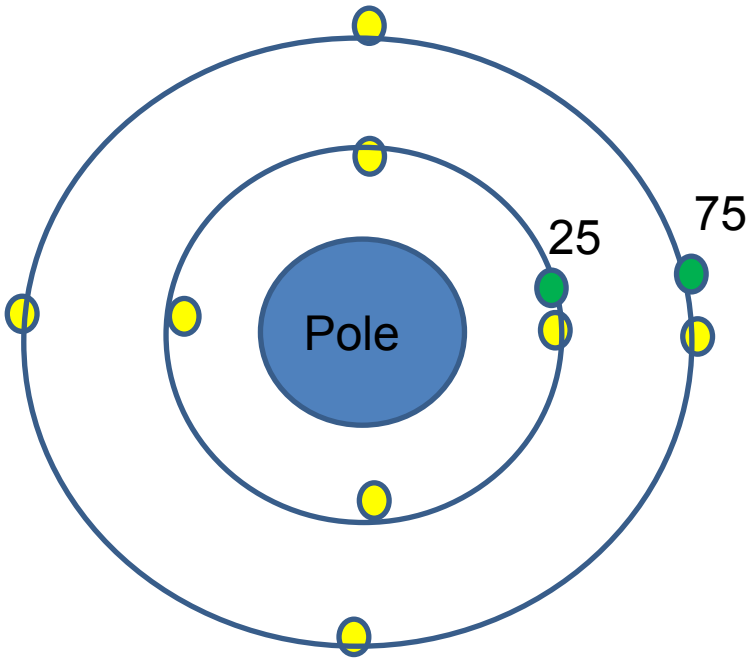
Investigation

Intensive soil sampling program

- Radiating out from pole
- To depths beyond pole setting depth
- Different
  - Geographic areas
  - Soil types
  - Landforms

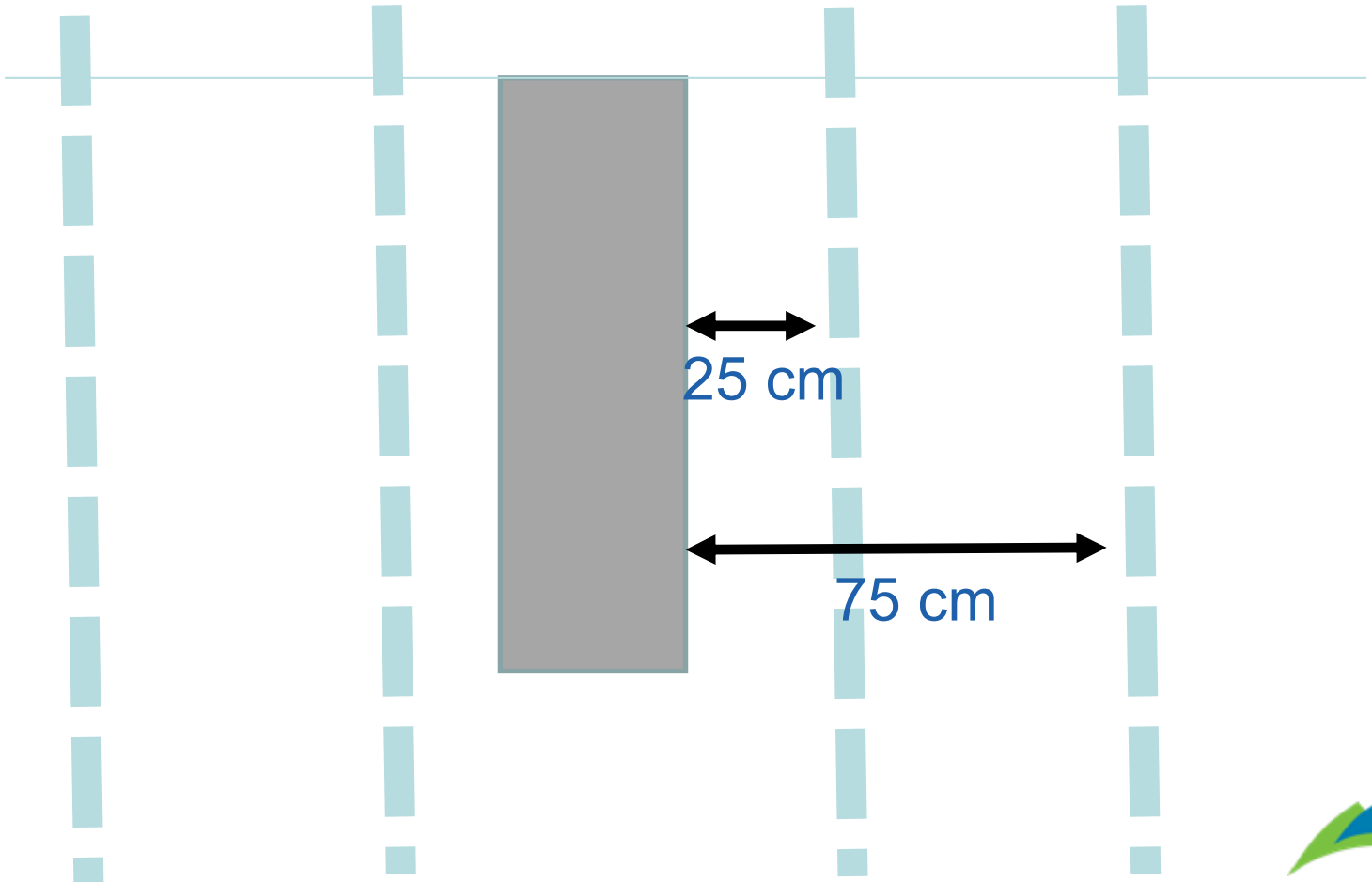
Sampling

for Assessment and Delineation



Sampling

for Assessment and Delineation



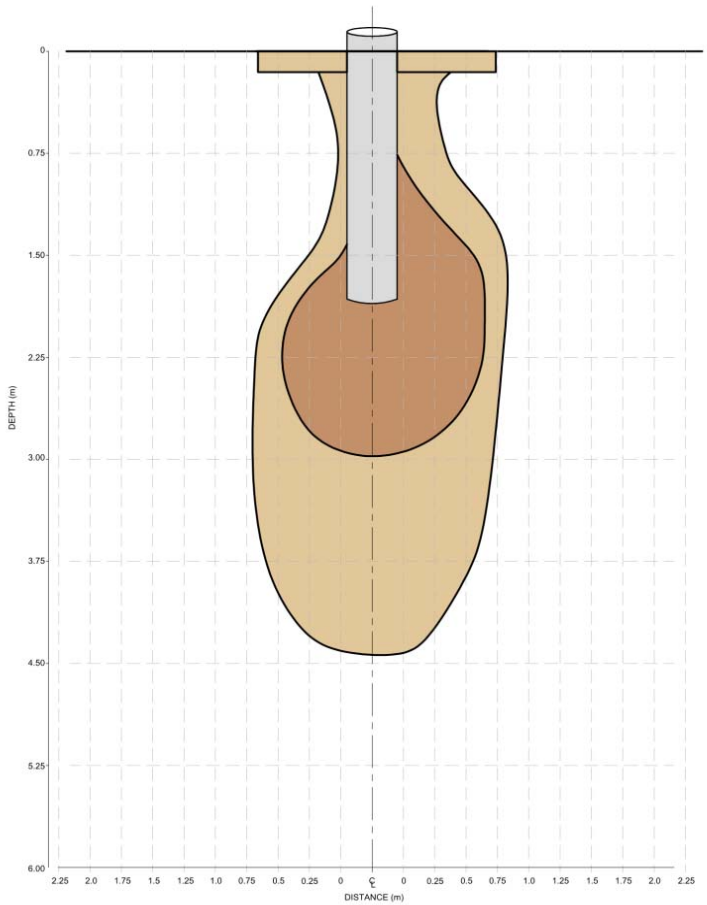
Results

- Contamination – may exceed Tier 1, but highly variable around a pole and between pole locations
- Limited lateral movement: < 0.5 m
- Depth: < 2.5 m beyond pole setting depth

Results con't

- Geographic – no apparent effect
- Soil types – no apparent effect
- Slope – no apparent effect
- Pole age – good correlation
  - to near zero after 55 yrs

Typical Contamination Profile



___1.5 m

___3.0 m

___4.5 m

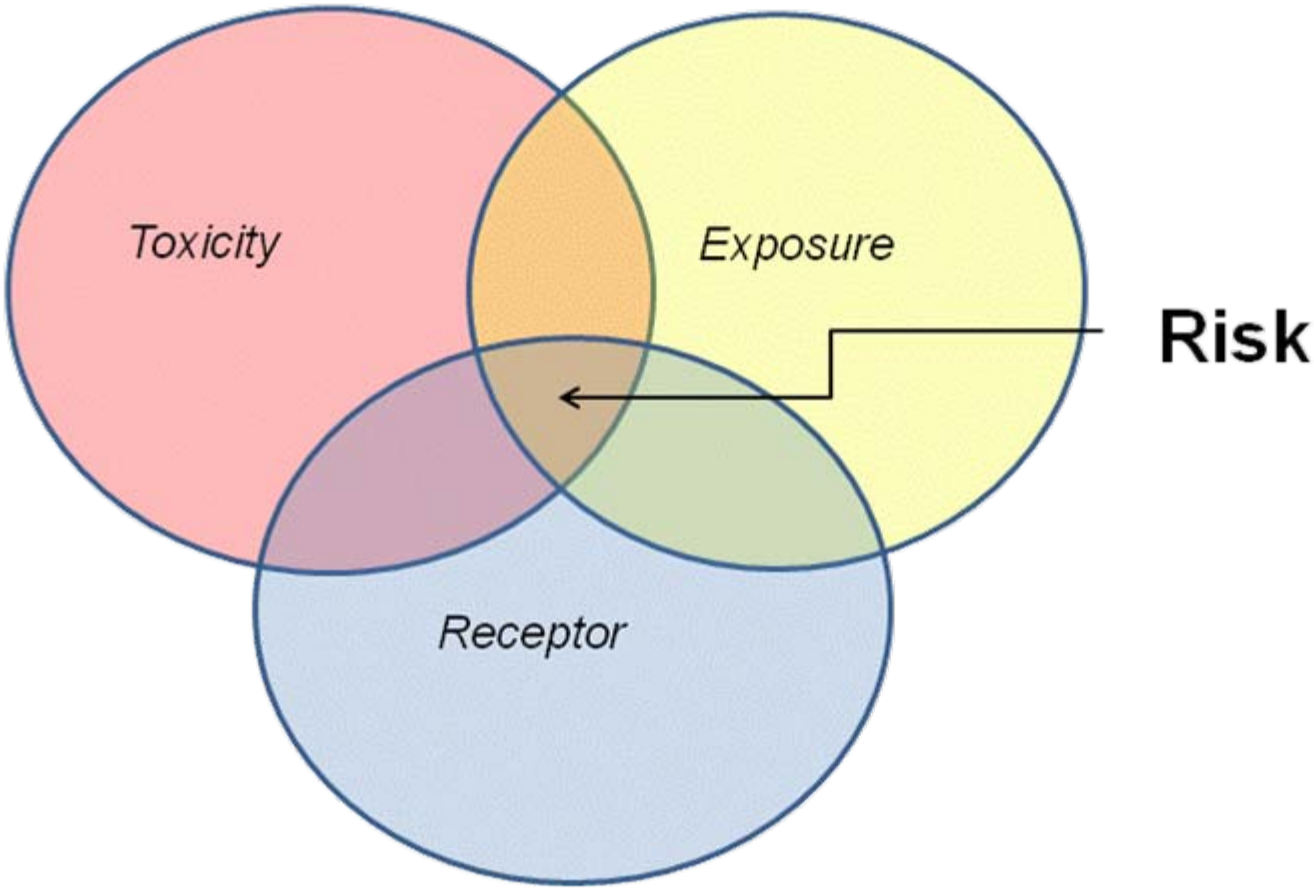
Conclusion

- Remediation would require significant excavation to remove a small amount of contaminated soil
- Standard reclamation procedures are not a practical approach to powerlines
- A risk based approach would be more suitable

Developing a Risk Based Approach

- Tier 1 vs. Tier 2
- Tier 2 – Site Specific Risk Assessment approach
  - Receptors
  - Toxicity
  - Exposure

Risk Assessment



Receptors

- Human
- Plants
- Animals
- Aquatic Organisms
- Soil Invertebrates

Toxicity of Penta

- Soil
  - Human 230 mg/kg
  - Soil eco-contact 11 mg/kg
- Water
  - Drinking water 0.03 mg/L
  - Aquatic Life 0.0005 mg/L

Potential Exposure Pathways

- Human direct soil contact
- Vapour inhalation
- Ecological soil contact
- Livestock and wildlife ingestion
- Transport with water
  - to DUA
  - to surface water

Fate and Transport

- Based on the AENV model:
  - for consistency with Alberta guidelines and
  - availability default values
- Tier 1 assumptions, except:
  - Plume size 2 m x 2 m
  - Estimated half-life
  - Proximity to groundwater and surface water – site specific

Half-life Calculation

$$t(1/2) = \frac{T \times \ln(2)}{\ln (S/E)}$$

where:

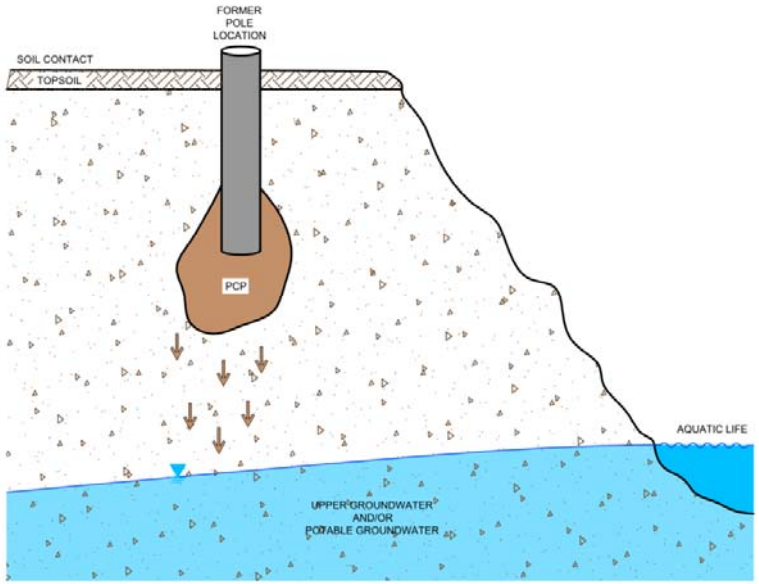
- t(1/2) = half life
- T = time in years
- S = starting concentration
- E = ending concentration

Result = 7 years

Proximity to Water

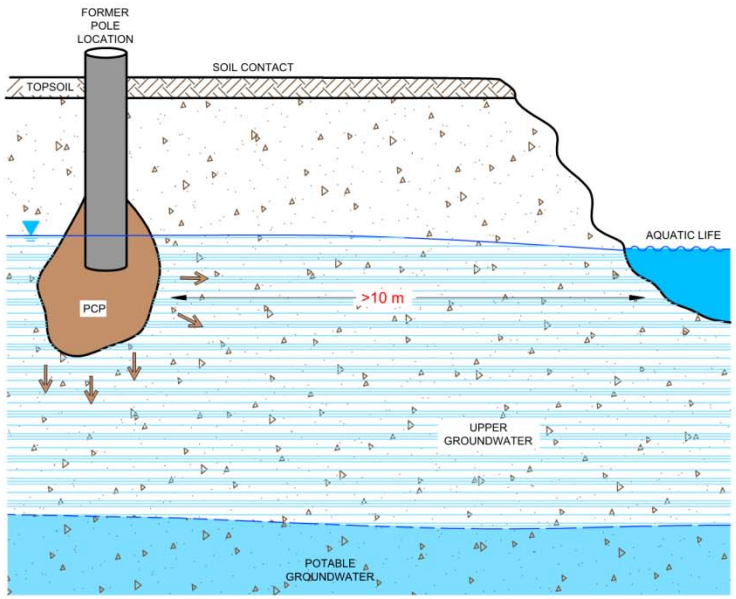
- Three likely scenarios considered
  - Separation from a potential DUA
  - Separation from surface water
  - No separation from surface water (<10 m)
- For each scenario
  - Fine-grained soil
  - Coarse-grained soil

Scenario 1
Separation from Groundwater/DUA

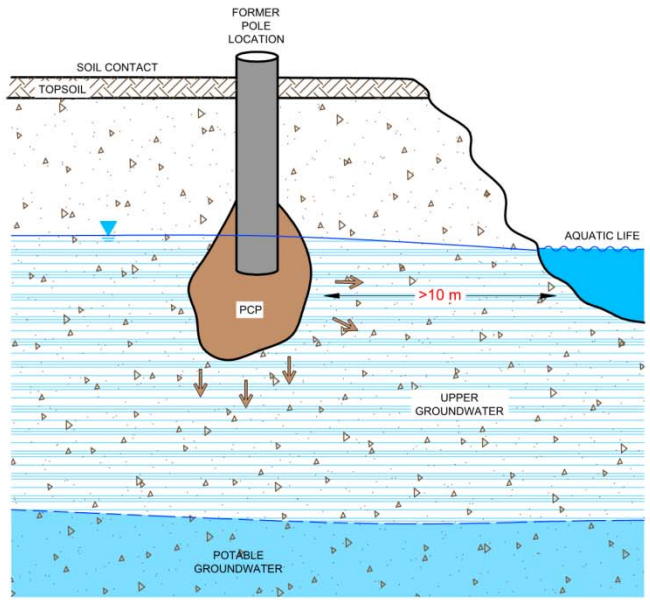


Scenario 2

>10 m from surface water



Scenario 3
<10 m from surface water



Calculated Tier 2 Criteria

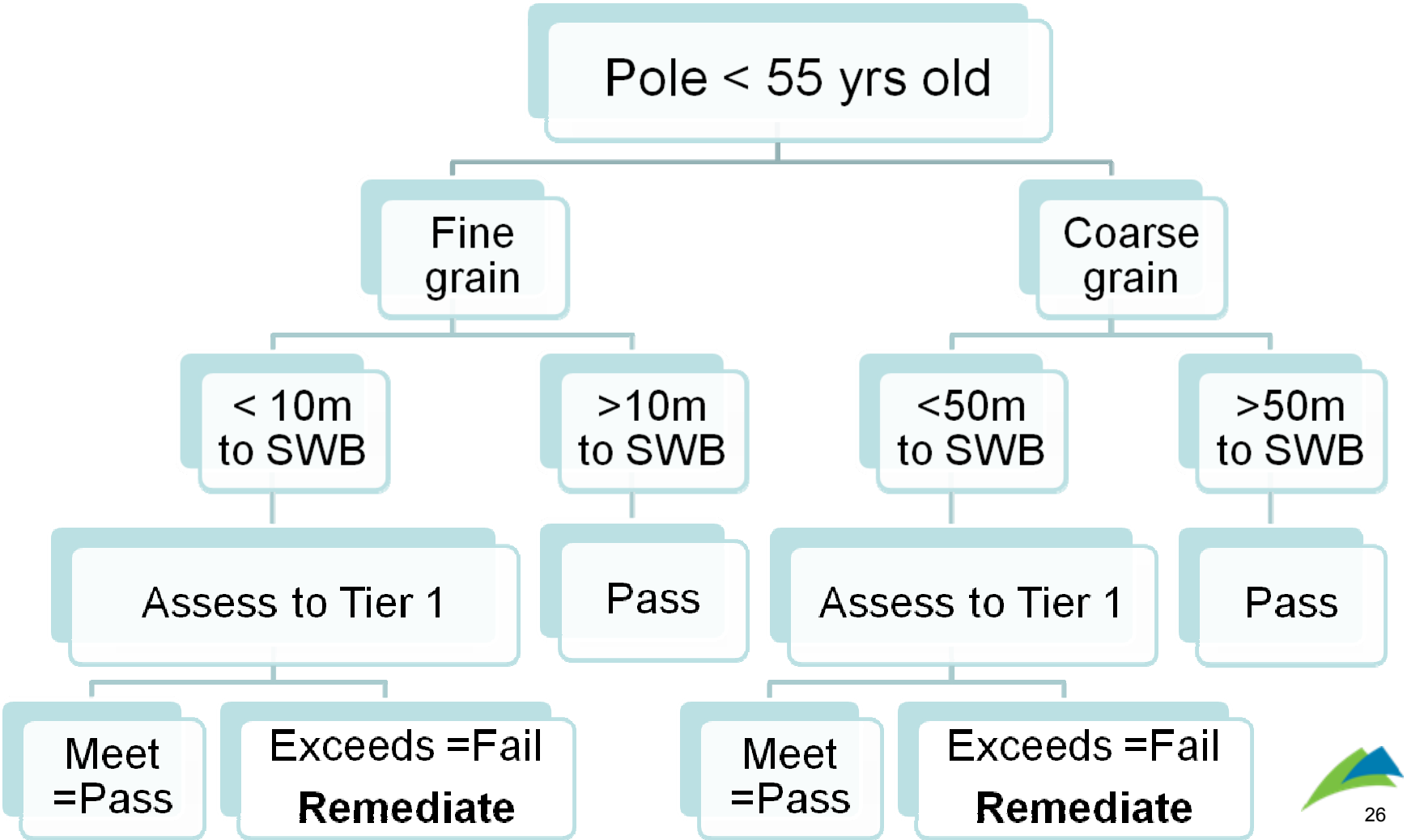
	DUA limit	Distance to Surface Water		
	1.5 m of Separation	<10 m (Tier 1)	10 m	50 m
	----------mg/kg ----------			
Fine	63	**0.024**	267	1000+
Coarse	80	**0.029**	**0.3**	109

- Most samples (67%) were less than Tier 1
- Probability of exceeding eco contact limit (**11 mg/kg**) in surface soil was 4%

Proposed Assessment Protocol

- Classify poles according to:
  - Age
  - Proximity to permanent surface water bodies
  - Proximity to DUA
  - Soil texture

Assessment Process



Example Application

- 237 transmission line poles
- 35 pole locations were visited
- 4 poles identified for sampling

Focus field investigation to areas of highest environmental risk

What did we learn?

- Do your homework
- Understand the REAL environmental risks
- Work with regulator agency
- Practical approach