ELT Materials: Got the Leachate Data – Now What?

Tire Recycling Conference

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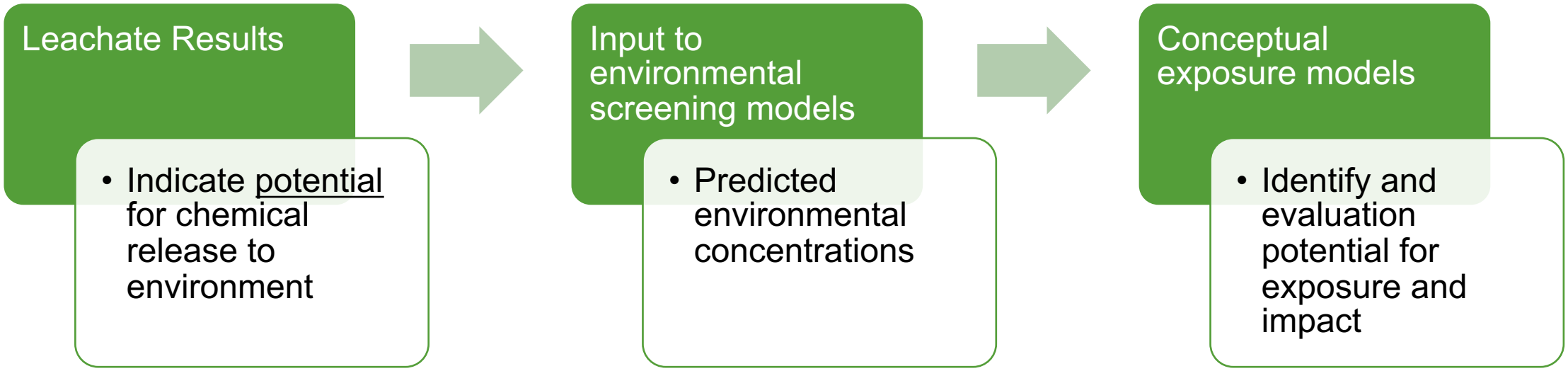
Tox Strategies

Use of Leaching Study Results

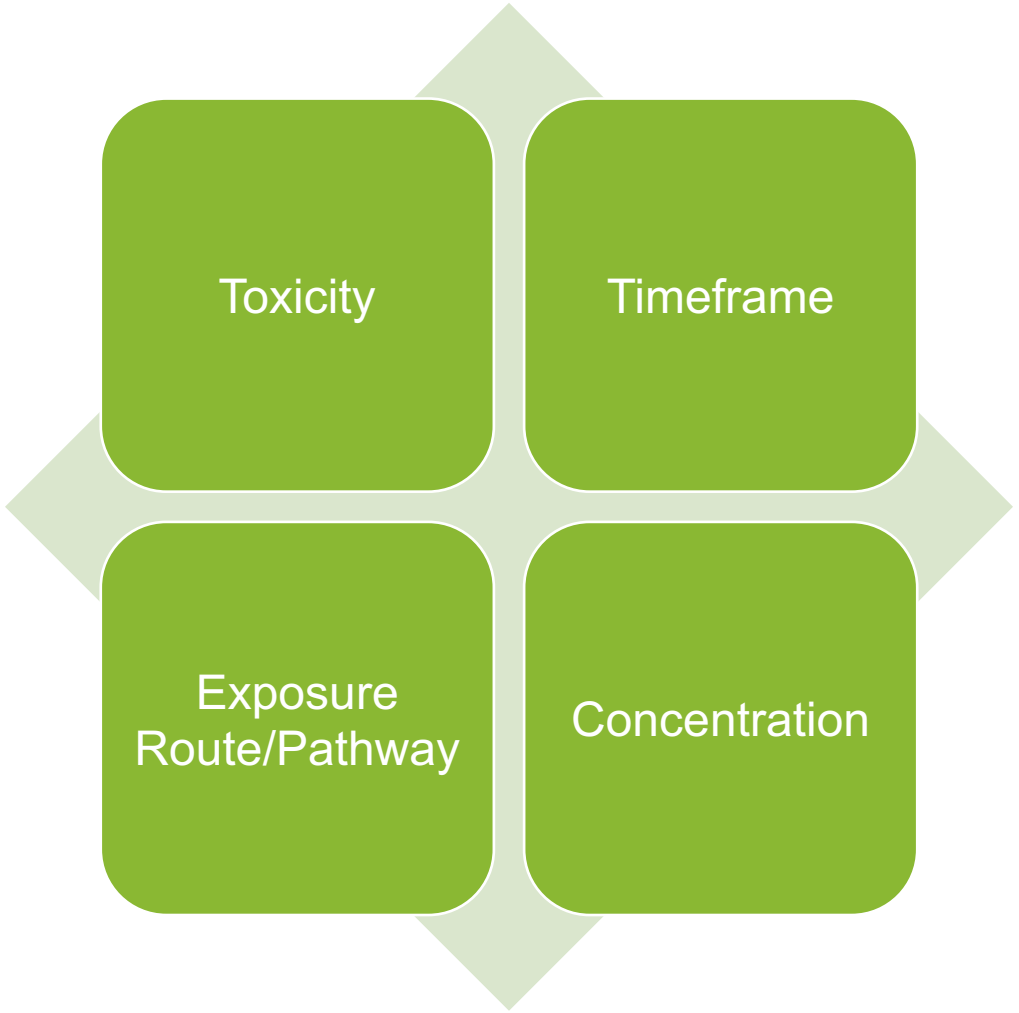


Evaluating Potential for Impacts – 6PPD and 6PPDQ

- High-level, preliminary impact assessment given limited toxicity data

$$\text{Risk Ratio} = \frac{\text{Estimated Concentration}}{\text{Ecological Toxicity Value}}$$

  - Acceptable: risk ratio ≤ 1
  - Unacceptable: risk ratio > 1



Ecotoxicity Values

6PPD

Environmental Compartment	Toxicity value	Reference(s)
Water[a]	3.7 µg/l	ECHA 2003[b]
Sediment	18 µg/g dry weight	Prosser et al. 2017
Soil	100 µg/g dry weight	Read across from 7PPD

6PPD-Quinone

Environmental Compartment	Toxicity value	Reference(s)
Water[a]	0.041 µg/l	Lo et al. 2023
Sediment	N/A[c]	
Soil	N/A[c]	

[a]Assumes equivalent sensitivity for marine and freshwater species in water and sediment
[b]ECHA REACH Dossier, 2003. *OECD 210 (Fish, Early-Life Stage Toxicity Test).* Retrieved May 2024.
[c]Insufficient data

Exemplar Exposure and Impact Estimates

TDA- Road Embankment

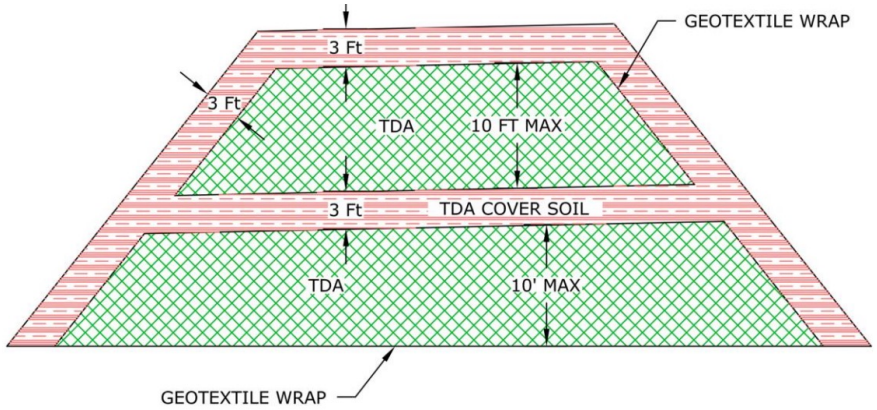
TDA- Stormwater Infiltration Gallery

Rubber Modified Aspalt

Example Approach for Evaluations of TDA Applications

TDA Use in Road Embankment

TDA being compacted at Dixon Landing, CA

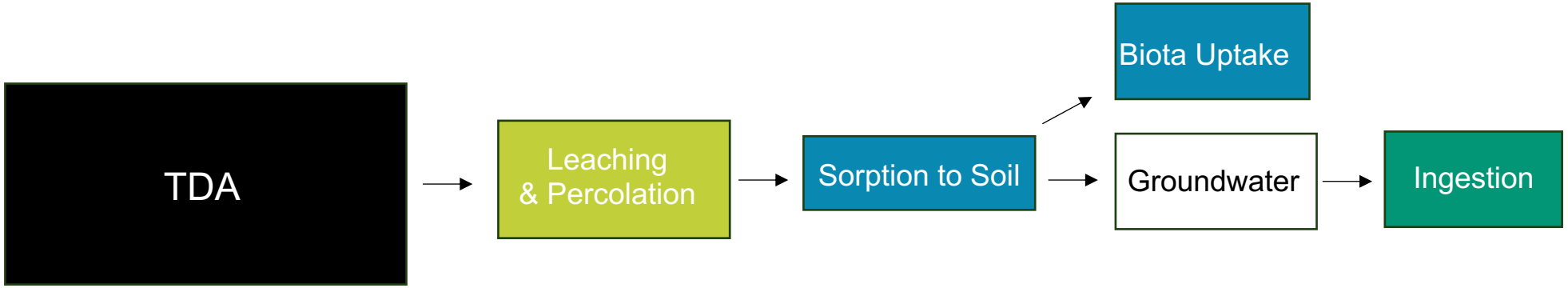


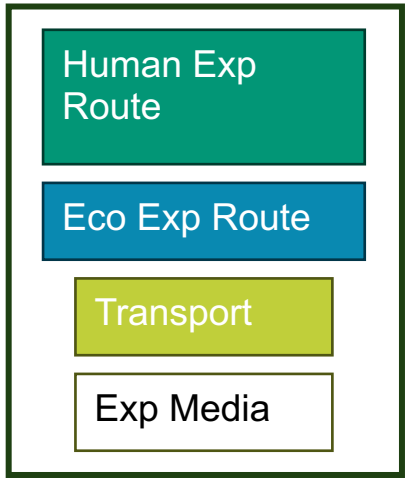
Cross section of Dixon Landing road embankment project using TDA

Final Dixon Landing TDA road embankment

Photo credit: CalRecycle

Conceptual Exposure Model For Leaching from TDA in Road Embankment





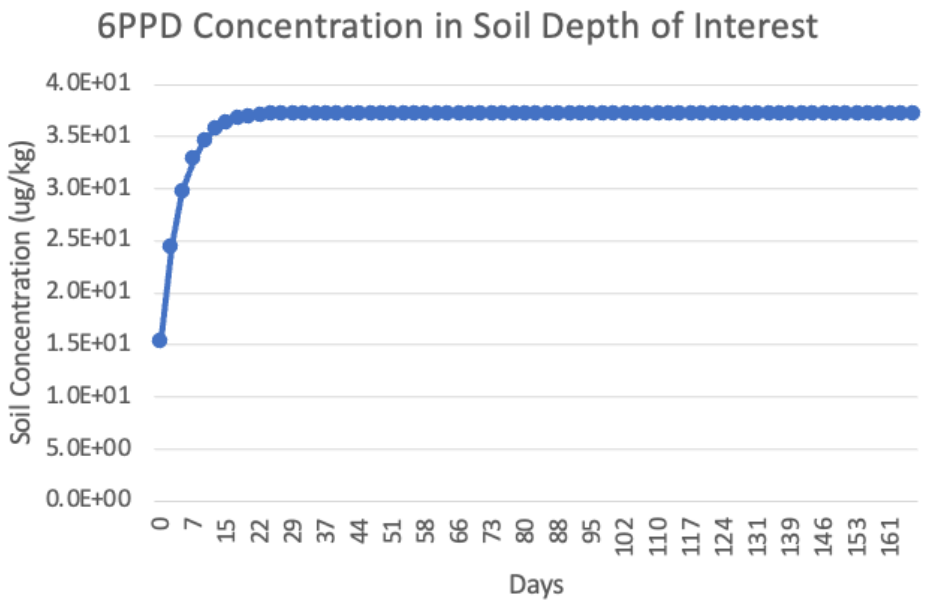
TDA Use in Road Embankment: Assumptions and Limitations

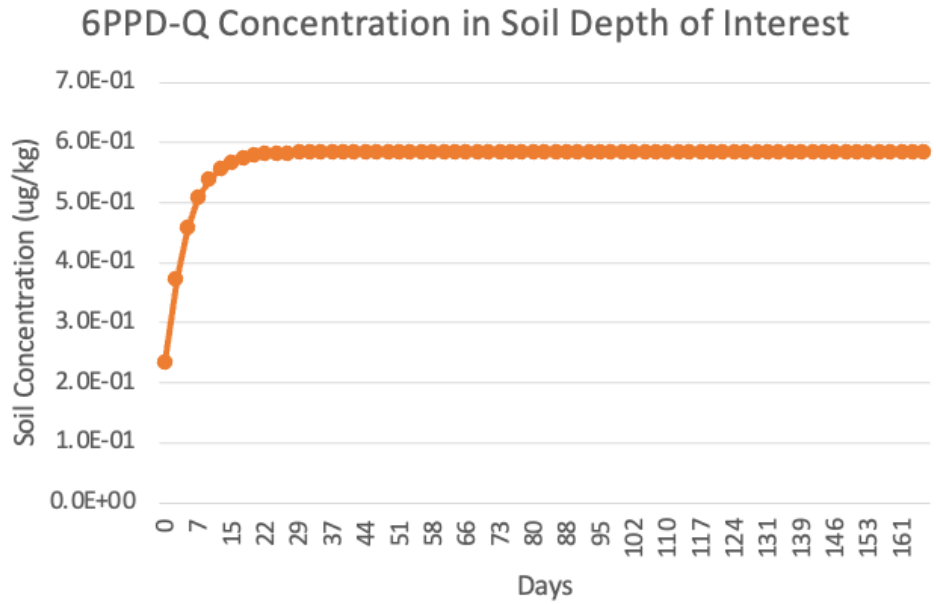
- Only modeled soil exposure
  - Human toxicity not yet evaluated
  - Leachate transport to surface water not likely
- 39 inches of rainfall in one year, 150 days of rain, 0.26 inches of rain per event
- Road embankment is 700 ft long and 50 ft wide, with width adjusted for part of embankment available for rainfall (not under road)
- TDA is 20 ft deep with geotextile and compacted soil layers

TDA Use in Road Embankment: Assumptions and Limitations

- All rainfall passes through TDA in embankment and infiltrates soil
- TDA leaching profile similar to L/S in laboratory conditions
- US EPA default soil parameters for retention in soil and sediment
- 6PPD and 6PPD-Q soil sorption is predicted by:
  - accumulation from repeated rain events,
  - partitioning coefficients, and
  - degradation according to its biological half-life (3.16 days for 6PPD, 3.31 days for 6PPD-Q)

TDA Use in Road Embankment





	6PPD
Soil Concentration (ug/kg)	37
Toxicity Value for Soil (ug/kg)	100,000
Risk Ratio for Soil Species	**0.00037**

	6PPDQ
Soil Concentration (ug/kg)	0.58
Toxicity Value for Soil (ug/kg)	Not available
Risk Ratio for Soil Species	**--**

Potential Model Refinements

- Better estimate of how much rainfall passes through embankment soil cover and geotextile wrap to contact TDA
  - Current model conservatively assumes all rainfall contacts TDA, although some may run off
- Better estimate of leaching profile with varying L/S values representative of expected real-world conditions
  - Current model uses leachate data from a single L/S value
- Use site-specific soil parameters
  - Current model uses default or average regional parameters
- Use site-specific embankment parameters