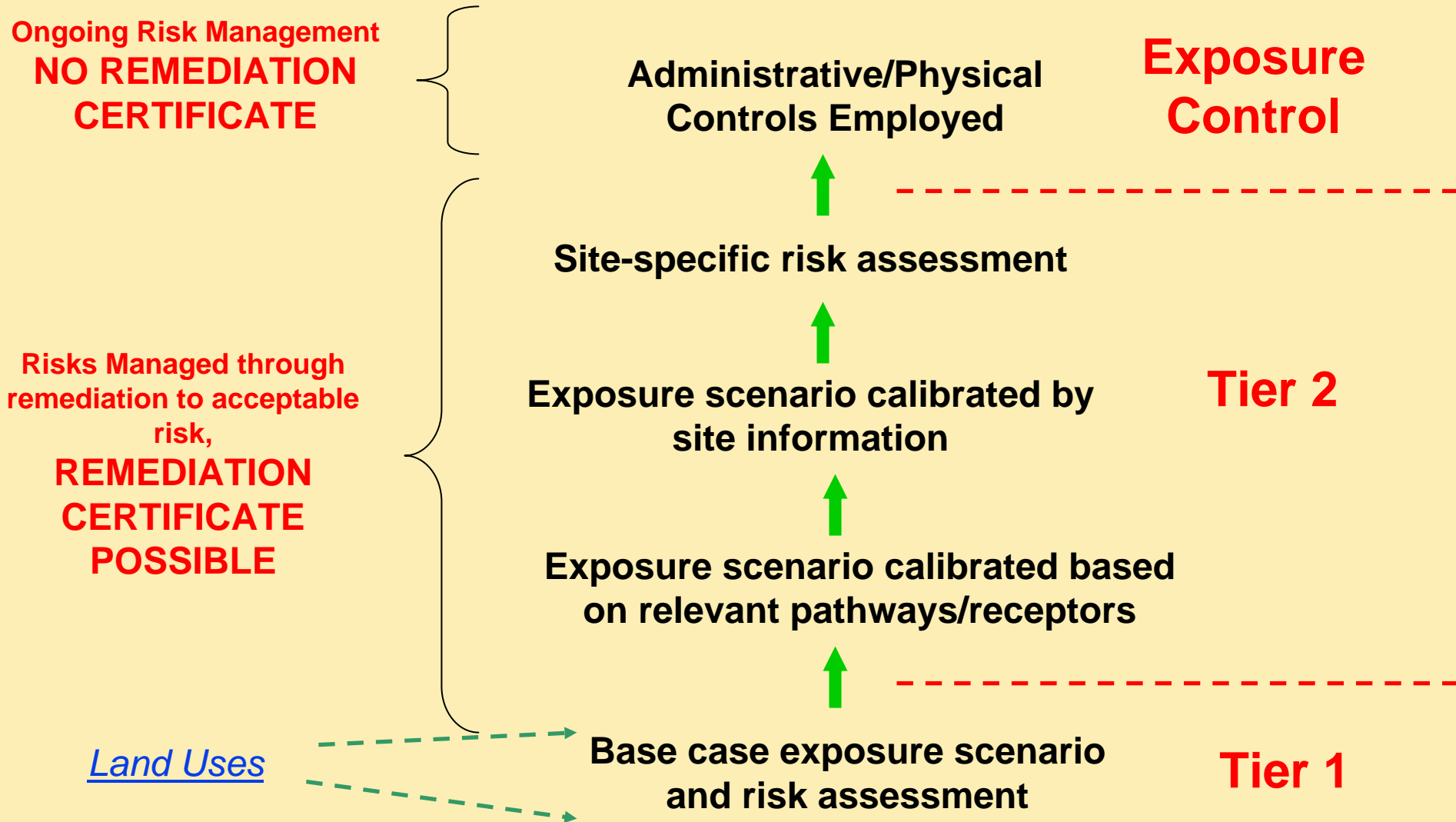


# Draft Tier 2 Soil and Groundwater Remediation Guidelines in Alberta

Norman Sawatsky

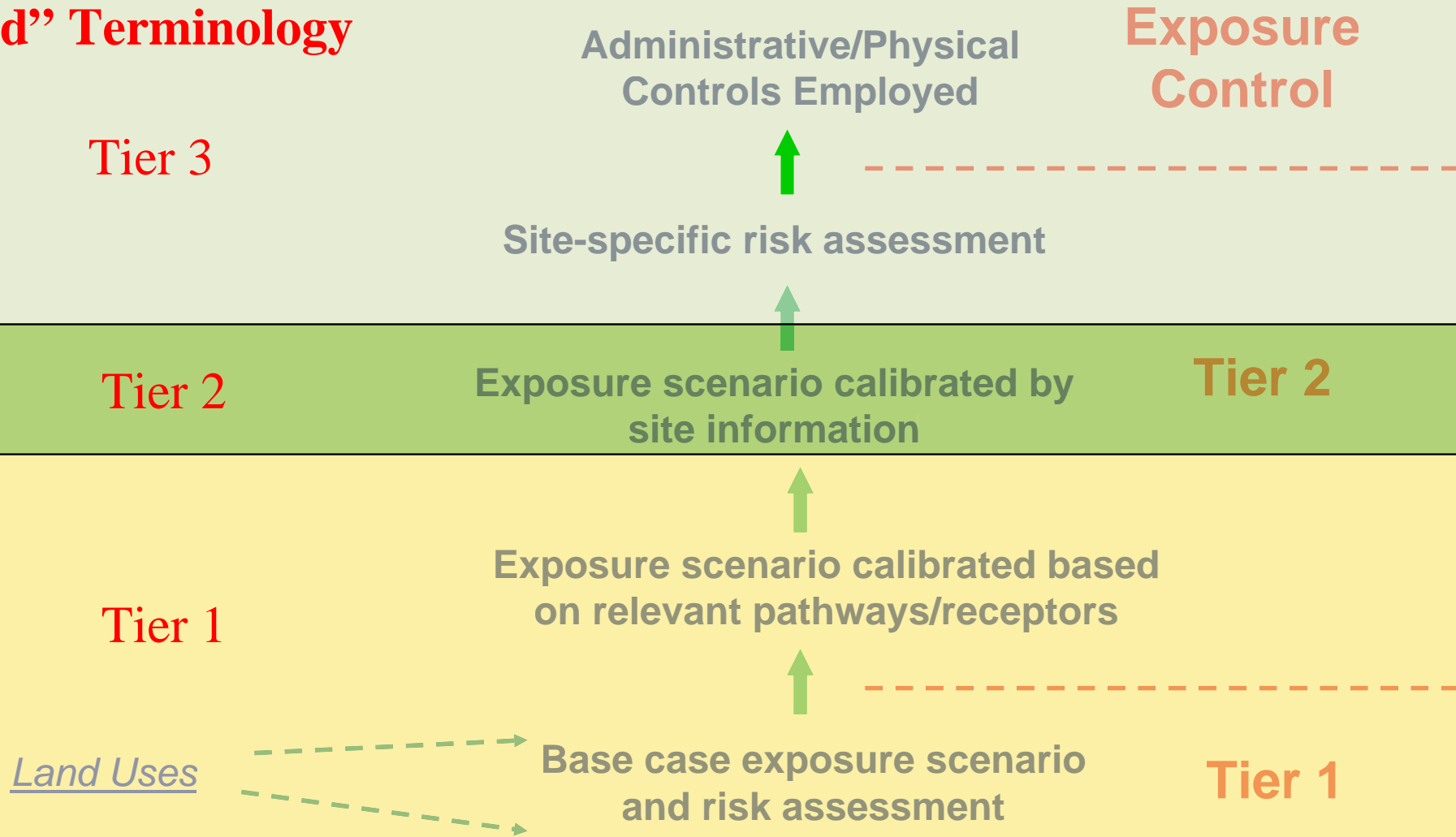
Kim Kirillo

# General Description of Tiered Framework



# General Description of Tiered Framework, 2

## “Old” Terminology



## Good Quality for Soil or Groundwater:

- no threat to humans, plants, animals
- carries out equivalent range of ecological functions and cycles
- doesn't pose a risk to other media (air, surface water, other groundwater)



Tier 2 options must apply and demonstrate same outcomes.

Only specified pathways/receptors and specified parameters within those pathways are open to Tier 2 interpretation.

Sediment

Groundwater



# Contaminated Sites Management *Policy*

- Pollution prevention
- Not “pollute-up-to” guidelines
- Source control
- Full delineation
- Protection for cross-media transfer
- Protection of Water Resources
- Full characterization of Tier 2 modifications



# Reasons to Proceed to Tier 2

- Site specific condition different than generic assumptions at Tier 1.
  - Exceptions that require Tier 2 evaluation due to specific site conditions that increase exposure risk or sensitivity of receptor.
  - Tier 2 evaluation where generic Tier 1 assumptions are shown to be more conservative than on-site condition
- Media Type may invalidate Tier 1 models




# Conditions Requiring Tier 2 Re-evaluation

- Land/water use scenarios not captured at generic level
- Atypical building construction
- Contaminant plume at or near a surface water body.
- Contaminated soil within 30 cm of building foundation or near-surface/near building foundation contaminated groundwater.
- Contamination in fractured bedrock
- Soils/geologic layers with high hydraulic conductivity/permeability/gradients
- Layered soil stratigraphy
- Bioaccumulators (commercial/industrial properties)




# Calibration for Relevant Pathways: Pathways/Receptors That May be Excluded At Tier 2

- Groundwater, Drinking Water
  - Based on definition of DUA and hydraulic connection
- Groundwater, Aquatic Life, Wildlife Watering
  - 300 meter separation
- Groundwater, Livestock Watering, Irrigation
  - lack of suitable water supply for purpose.



# Calibration for Model Parameters: Principles of Tier 2 Model Calibration

- Must only be applied where there is stable or decreasing contaminant zone
- Parameter must be able to be readily measured, quantified and verified.
  - Must be able to describe potential for both spatial and temporal variation
- Must be simply determined and applied
- Range of modifications allowed must be limited by applicable range given model limitations and assumptions
- Sampling must be congruent with the point of application in the model.
- Must consider implications and inter-relations with other parameters



# Calibration for Model Parameters: Soil/Groundwater Parameters That May Be Applied at Tier 2 Model Calibration

- Physical Soil Properties,
  - Texture, bulk density, porosity, permeability, *moisture content*,
- Hydrogeological Parameters,
  - Hydraulic gradient, conductivity,
- Physical Site Conditions
  - separation distance between contaminant layer and groundwater, separation distance between contaminant and building, distances to fixed receptors (e.g. aquatic life receptors), source dimensions.



# Site Specific Risk Assessment/Exposure Control

- Site Specific Risk Assessment assesses risk against a required set of outcomes based on generic land uses.
- Exposure Control requires administrative or engineered controls to ensure appropriate outcomes are achieved.



# Principles of Site Specific Risk Assessment

- Always requires a return to basic principles
- Always must consider all pathways and receptors, as described in the basic principles.
- Always must consider implications of Site-specific modification might have on pathways/receptors not accounted for in the Tier 1 description



**Thank You**

**Questions?**