

# EXAMINING RISK APPROACHES

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# EXAMINING RISK APPROACHES

## Purpose/Outcome:

- Explore differences that exist across states in the development and application of risk-based values.
- Highlight how these differences impact technical decision-making at remedial sites.
- Identify issues that may be considered for potential future ITRC collaborations on risk topics.

# EXAMINING RISK APPROACHES

## Discussion Group:

- **Steve Dizio – California Department Of Toxic Substances Control**
- **Mavis Kent – Oregon Department Of Environmental Quality**
- **Keith Collinsworth – South Carolina Department Of Health And Environmental Control**
- **Steve Roberts – University Of Florida**
- **Tom Harris – Louisiana Department Of Environmental Quality**

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## Two Major Issues:

- (1) Calculation of risk-based soil criteria**
- (2) Application of these soil criteria**

# TERMINOLOGY

- **Preliminary Remediation Goals**
- **Soil Screening Levels**
- **Action Levels**
- **Risk-Based Concentrations**
- **Cleanup Standards**
- **ALARA Goal Levels**
- **Soil Cleanup Criteria**
- **Derived Concentration Guideline Levels**
- **Final Remediation Levels**
- **Remedial Goal Options**
- **Allowable Residual Soil Concentrations**
- **Guideline Concentrations**
- **Release Criteria**

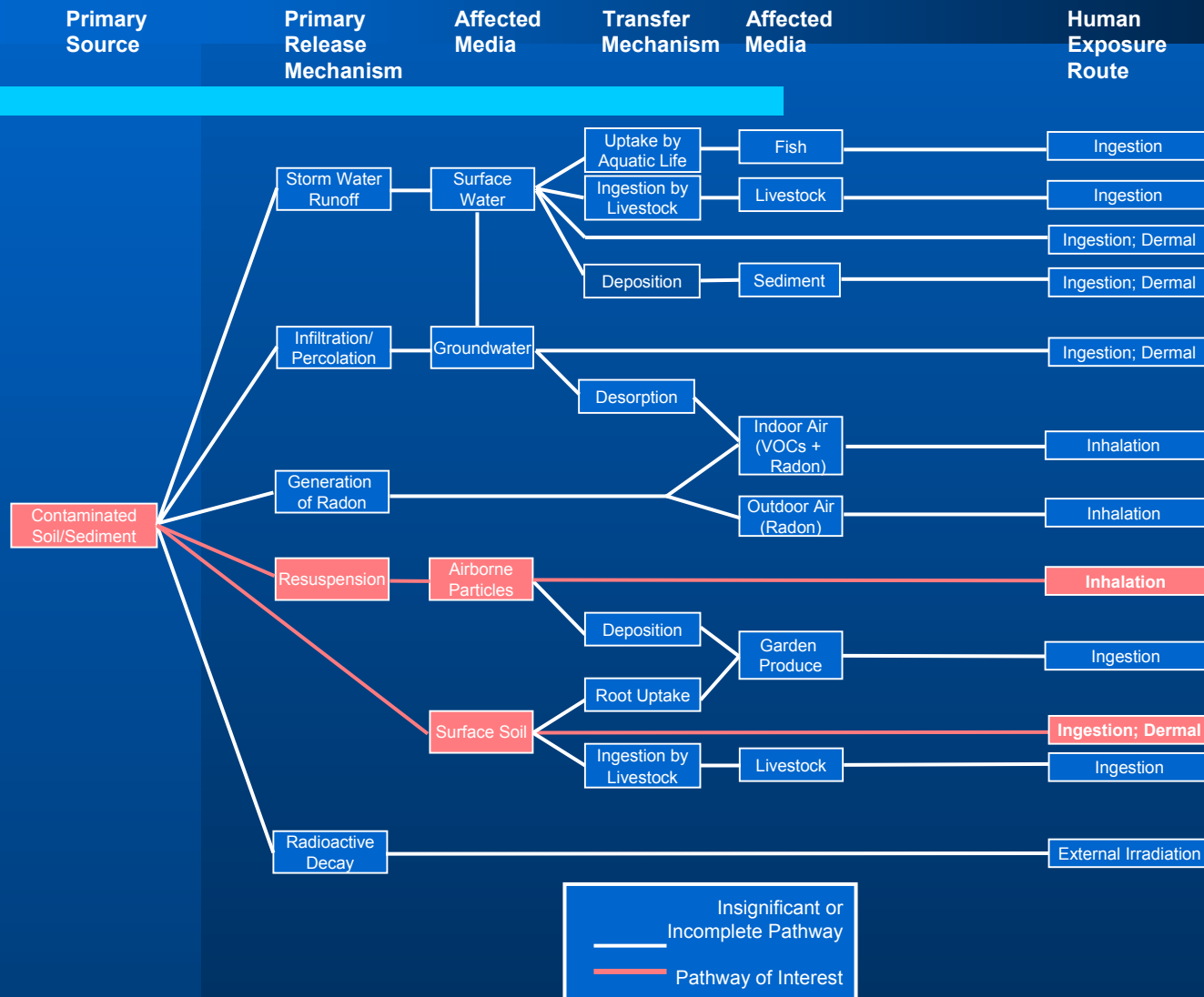
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## Residential PRGs (mg/kg)

CHEMICAL	Reg. 3	Reg. 6	Reg. 9
Acetone (nc)	7,800	1,600	1,600
Aluminum (nc)	78,000	76,000	76,000
Benzene (c)	12	0.66	0.65
Carbon tetrachloride (c)	4.9	0.24	0.25
Lead (nc)	--	400	400
PCE (c)	12	5.7	1.5

# RURAL RESIDENT EXPOSURE SCENARIO

## Conceptual Site Model



# Residential Exposure: Soil At Depth (Future Potential Exposure)



**How Do You  
Evaluate These  
“Units”**

**How Deep Before  
Unavailable For  
Exposure?**

**How Do You  
Evaluate “Stringers”?**



# Residential Exposure (Current Exposure)

Shallow Soil  
(Current or  
Imminent Exposure)

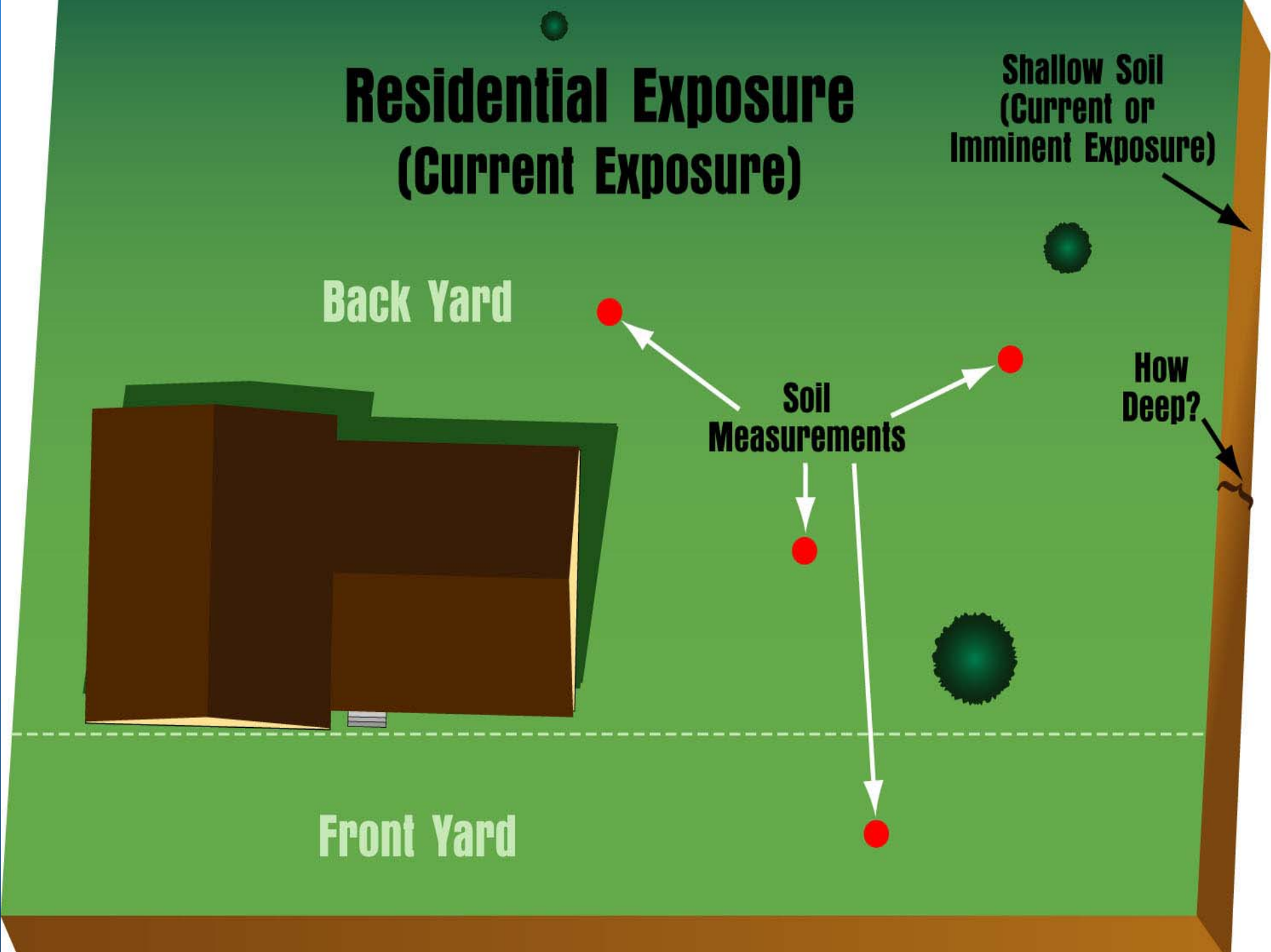
Back Yard



Soil  
Measurements

How  
Deep?

Front Yard



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## EXAMPLE VARIATIONS IN STATE PRACTICES

**1. How deep is “shallow” soil available for ingestion, dust inhalation and dermal exposure?**

**Arkansas: 6", 1 ft. To 1.5 ft on occasion is allowed**

**California: 10 - 12 ft.**

**Tennessee: 10 ft.**

**Texas: 15 ft.**

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## SUMMARY OF DISCUSSION TOPICS

# EXAMINING RISK APPROACHES

## PRG Comparison Between EPA Regions 3, 6 And 9

Type of Screening Value	General Trend	Possible Explanations
Residential Soil	Region 6 (with dermal) usually matches Region 9 while Region 6 (without dermal) usually matches Region 3 when inhalation component is missing. Regions 3 and 9 almost never match.	<ul style="list-style-type: none"> <li>Region 3 includes ingestion only in screening values while Regions 6 and 9 include ingestion, inhalation and dermal risk. Region 6 provides inclusive values both with and without dermal risk.</li> </ul>
	Occasionally, all values are the same (e.g., Antimony); different (e.g., Aroclors); or Region 6 (without dermal) matches Region 9.	<ul style="list-style-type: none"> <li>Some compounds may have negligible dermal risk;</li> <li>Region 6 default absorption values are 10% for organics while Region 9 uses 10% for SVOCs only;</li> <li>Regions 6 and 9 use route to route extrapolations and base PRGs on Csat for some VOCs;</li> <li>Regions 6 and 9 use a child inhalation rate of 10 m<sup>3</sup>/day while Region 3 uses 12 m<sup>3</sup>/day;</li> <li>Region 6 uses different child exposed surface area (2900 cm<sup>2</sup>/day) and dermal/skin contact (340 mg<sub>yr</sub>/kgd) factors than Region 9 ( 2800 cm<sup>2</sup>/day and 361 mg<sub>yr</sub>/kgd, respectively) – this data was not available for Region 3; or</li> <li>Region 3 no longer rounds screening values to 1E6 ppm.</li> </ul>

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## PRG Comparison Between EPA Regions 3, 6 And 9

Type of Screening Value	General Trend	Possible Explanations
Industrial Soil	Usually Region 6 (without dermal) matches Region 3, but sometimes it matches Region 9 and not Region 3.	<ul style="list-style-type: none"> <li>Region 3 includes ingestion only as screening values. Also, there is an ingestion fraction component of 50% included in the equation.</li> </ul>
	When both Region 6 values are the same, they usually match Region 9.	<ul style="list-style-type: none"> <li>There is probably negligible dermal risk in these cases.</li> </ul>
	There are more cases where the values are all different than for Residential Soil.	<ul style="list-style-type: none"> <li>See *</li> <li>Region 9 uses a different adult exposure surface area for workers (3300 cm<sup>2</sup>/day) than for a residential adult (5700 cm<sup>2</sup>/day). Regions 3 and 6 do not provide a value for workers in the exposure factors list.</li> </ul>
Ambient Air and Tap Water	Region 6 and Region 9 match while Region 3 is different for about 50% of the values. For the other 50%, they usually all match.	<ul style="list-style-type: none"> <li>Regions 6 and 9 use route to route extrapolations;</li> <li>Regions 6 and 9 base PRGs on C<sub>sat</sub> for some VOCs;</li> <li>For less toxic chemicals and SVOCs at Regions 6 and 9, a non-risk based "ceiling limit" concentration is given as 10+5 mg/kg.; or</li> <li>Regions 6 and 9 use a child inhalation rate of 10 m<sup>3</sup>/day while Region 3 uses 12 m<sup>3</sup>/day.</li> </ul>
	Occasionally, Regions 3 and 6 match and Region 9 is different.	<ul style="list-style-type: none"> <li>Region 9 may use more site-specific values than the other regions.</li> </ul>
	Region 6 almost always matches another region.	
	Aroclor values are different for all regions. Region 6 uses only noncancer endpoints while Regions 3 and 9 use cancer endpoints. Differences between Regions 3 and 9 are due to inhalation rate differences.	

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## PRG Comparison Between EPA Regions 3, 6 And 9

Type of Screening Value	General Trend	Possible Explanations
Soil Protective of Groundwater	For DAF=20, Region 3 and 9 values are <u>always</u> different. (Region 6 has no DAF=20 values.)	<ul style="list-style-type: none"><li>• The regions may use different soil conditions (e.g., pH) or other site-specific values;</li><li>• California PRGs are sometimes substituted when they are more restrictive than federal values;</li><li>• Region 3 uses a site-specific value for Cw (Region 3 tap water RBC) instead of an MCL; or</li><li>• Region 3 does not use Csat like the other regions.</li></ul>
	For DAF=1, Regions 6 and 9 are <u>always</u> the same while Region 3 is different.	<ul style="list-style-type: none"><li>• The regions may use different soil conditions (e.g., pH);</li><li>• Region 3 uses a site-specific value for Cw (Region 3 tap water RBC) instead of an ARAR; or</li><li>• Region 3 does not use Csat like the other regions.</li></ul>
Fish	Only Region 3 has fish values.	