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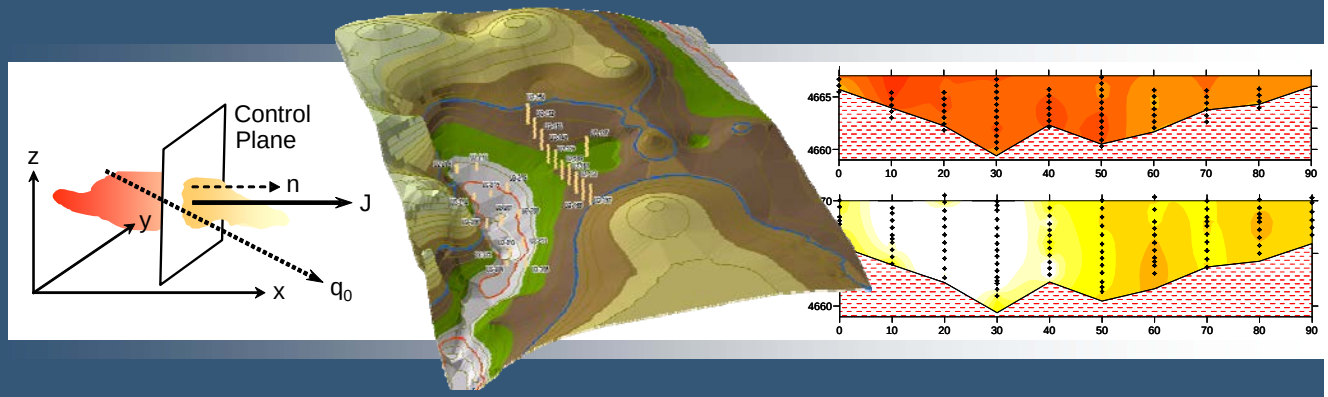
Triad Conference – June 10, 2008

Flux-Based Site Management

Lynn Wood



Office of Research and Development
National Risk Management Research Laboratory, Ground Water and Ecosystems Restoration Division, Ada, Oklahoma

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- SERDP

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Workshop Objectives

- Show by principle and practice the importance and utility of flux-based data for characterizing, managing, and remediating contaminated sites
- Present state-of-the-science information on measurement of reliable mass flux and mass discharge data
- Examine flux-based remedial design and assessment tools and demonstrate their application

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Workshop Agenda

I. Linkage between Triad and flux-based site management

II. Flux-based site management – what is it? why use it?

III. Numerical and management tools to facilitate data application and enhance data utility [REMChlor]

IV. Field measurement of mass flux and mass discharge

V. Application of flux-based site management – Case Studies

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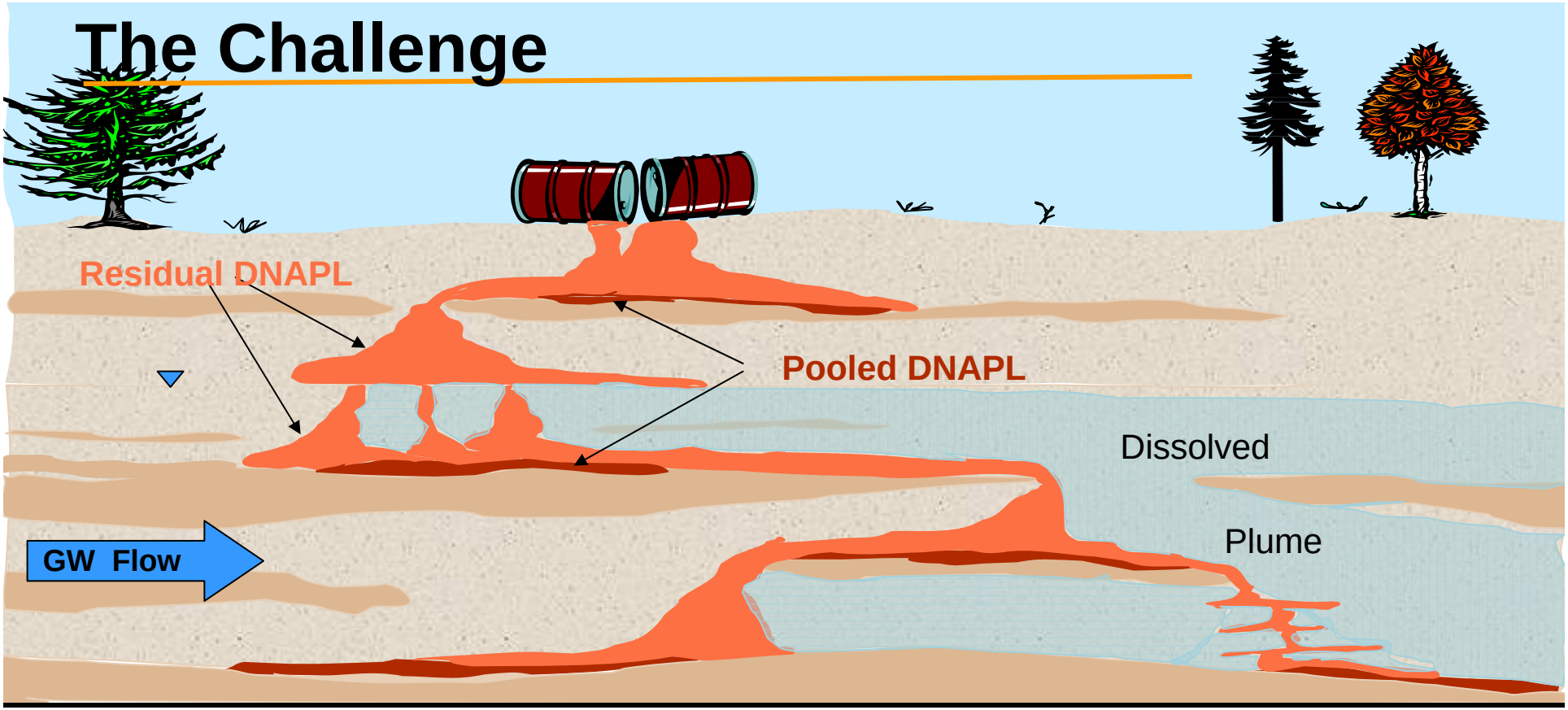
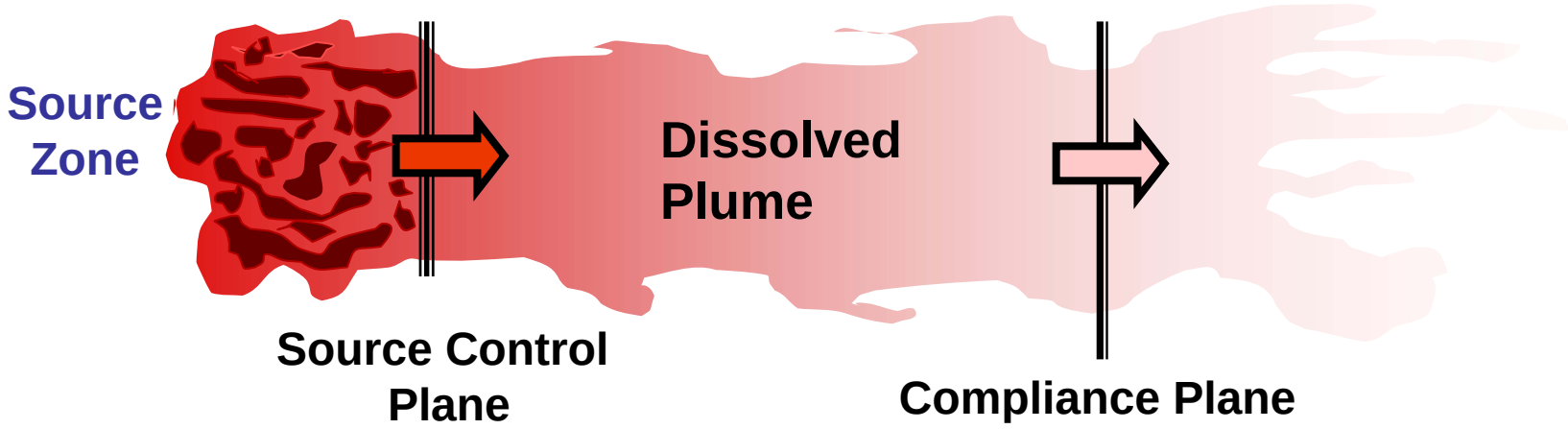
The Challenge





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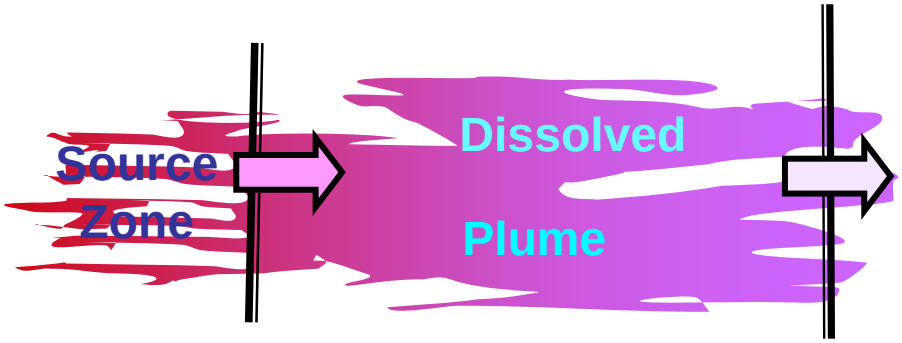
Why Flux-Based Approach

Pre-Remediation:

Source Treatment



Source Treatment

DNAPL Mass Reduction

Flux Response

Plume Treatment

Plume Response

Risk Response

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Flux-Based Concepts, cont'd

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Flux measurements provide quantitative information about:

- Source Strength
  - M_D at the source control plane
- Source-Plume Dynamics
  - Dynamics = f (Source strength + plume degradation)
- Contaminant Degradation
  - Based on one or more downgradient control planes
- Spatial Flux Distribution

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Flux-Based Concepts, cont'd

This information can be used to:

- Prioritize Sources by Strength
  - ✓ Between sites
  - ✓ Within sites
- Focus Source Treatment
  - ✓ Based on flux distribution at source control plane
- Optimize Resource Allocation
  - ✓ Between source and plume
  - ✓ Based on source strength/longevity & contaminant degradation
- Monitor Remedial Performance & Effectiveness
  - ✓ Shorter time scale
  - ✓ More reliable projections

Optimize Remedial Selection, Design, Implementation

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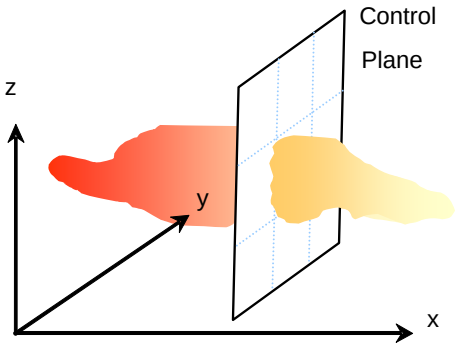
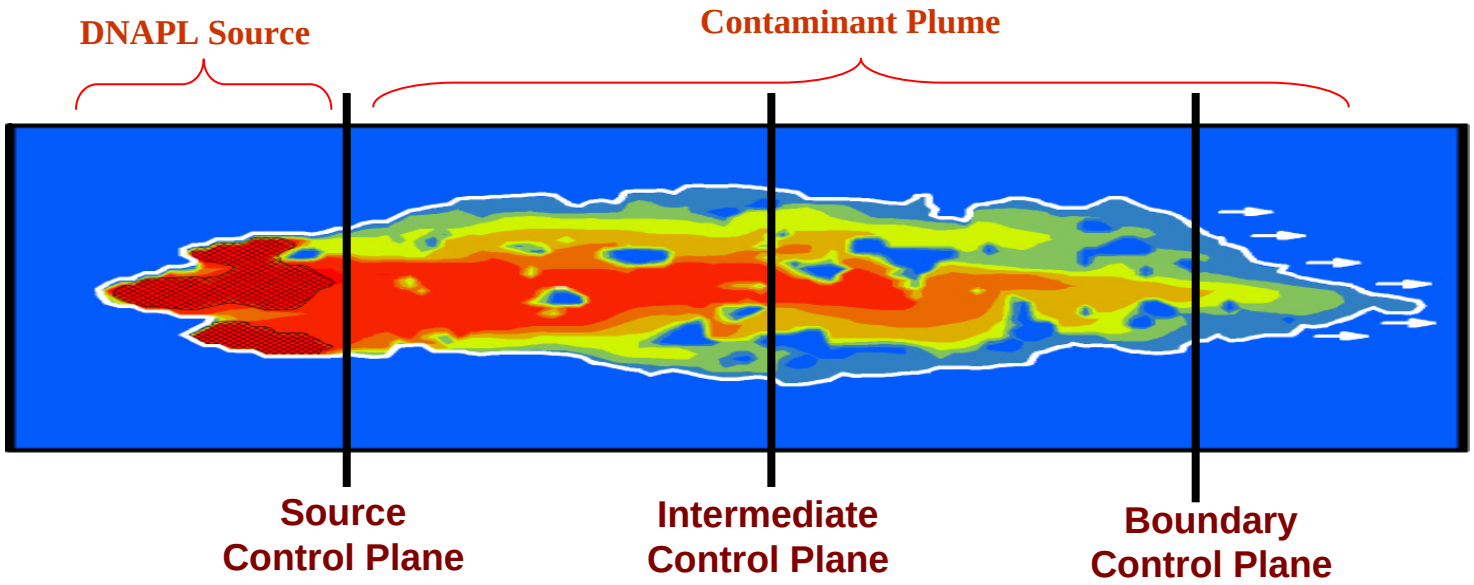
Flux-Based Concepts



- **Control Planes**
  - Transect of multiple wells (typically)
  - Perpendicular to mean groundwater flux direction
- **Mass Flux** (J, ML^2T^{-1}) - mass of contaminant per unit area per unit time
- **Mass Discharge** (M_D , MT^{-1}) - integration of mass flux across control plane area
- **Source Strength** - contaminant M_D at source control plane
- **Source Mass** – contaminant mass within the source zone (M)
- **Source Architecture** – contaminant distribution and morphology and its relationship to the flow field