

US EPA ARCHIVE DOCUMENT

SESSION 2

Addressing Data Gaps That Remain Before the Remedy Can Be Selected

IS THE RFI COMPLETE?



Agenda: Is the RFI Complete?

- ▶ Defining the three-dimensional nature/extent of contamination
- ▶ Streamlining site investigation methods
- ▶ Evaluate migration pathways
- ▶ Conceptual site model
- ▶ Evaluating human health risks
- ▶ Evaluating ecological risks

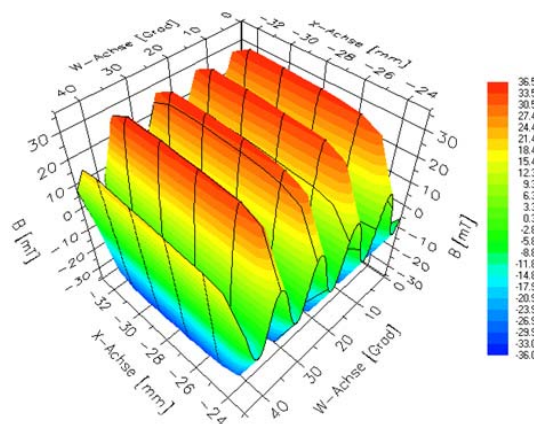


Is the RFI Complete?

Defining the three-dimensional nature/extent of contamination

▶ RFI Objectives Review

- Characterize the nature and extent of contamination
- Collect information to fill data gaps in the site conceptual model for characterization of:
 - Source Areas
 - Pathways
 - Potential receptors
 - Collect data for evaluating risk to human health and the environment



Is the RFI Complete?

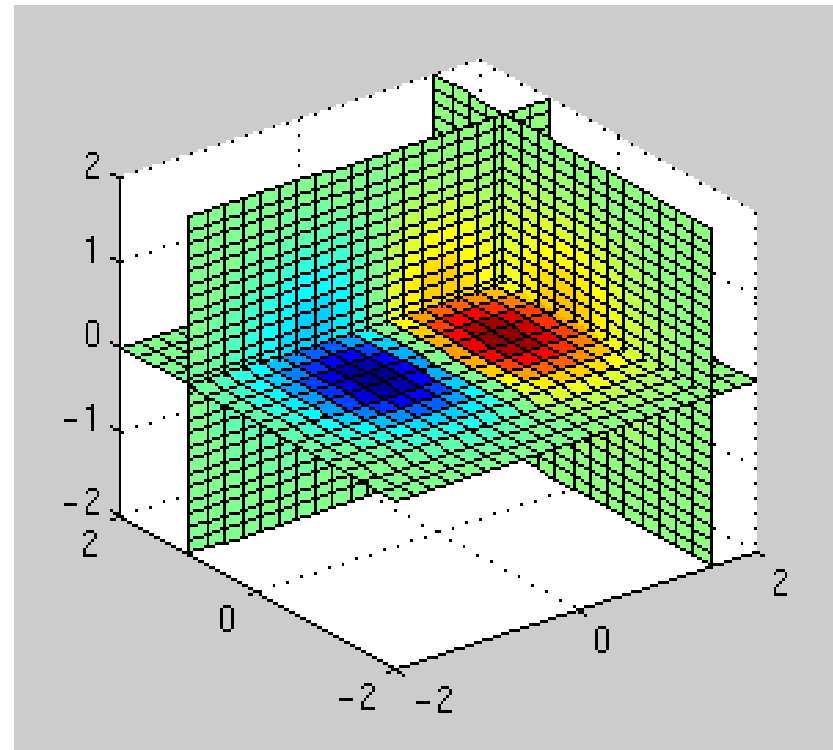
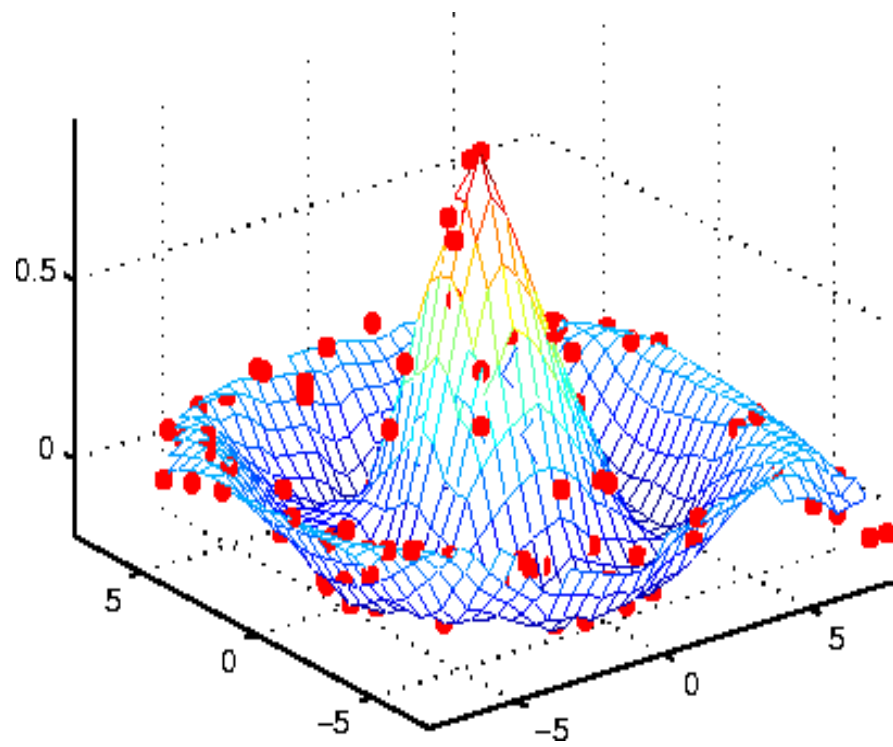
Defining the three-dimensional nature/extent of contamination

- ▶ What is three-dimensional nature/extent of contamination?
 - Lateral extent would be the length and width or x- and y-coordinates
 - Vertical would be the depth or z-coordinate
 - Horizontal would be the planar view if you were viewing from the air



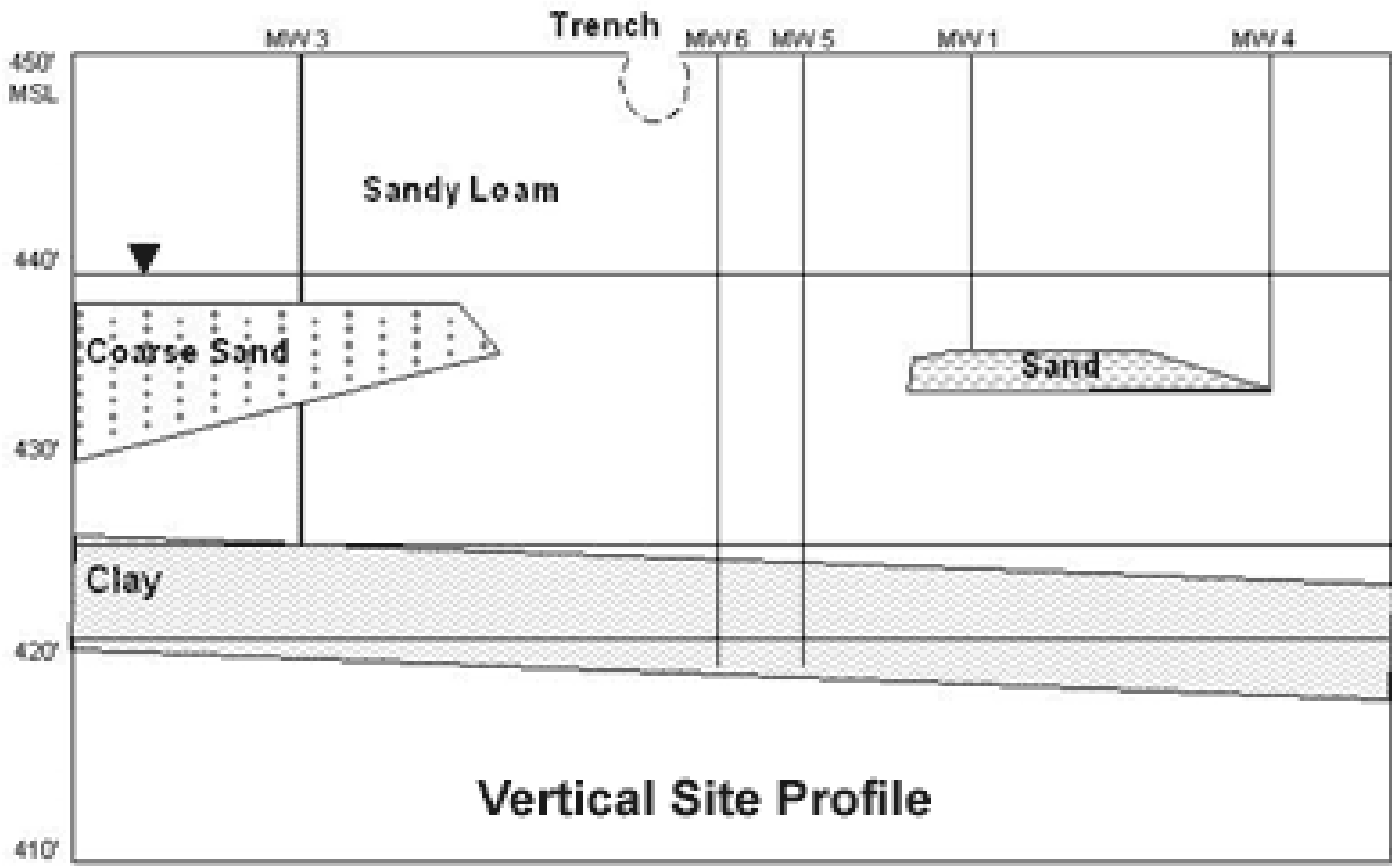
Is the RFI Complete?

Lateral and Vertical View



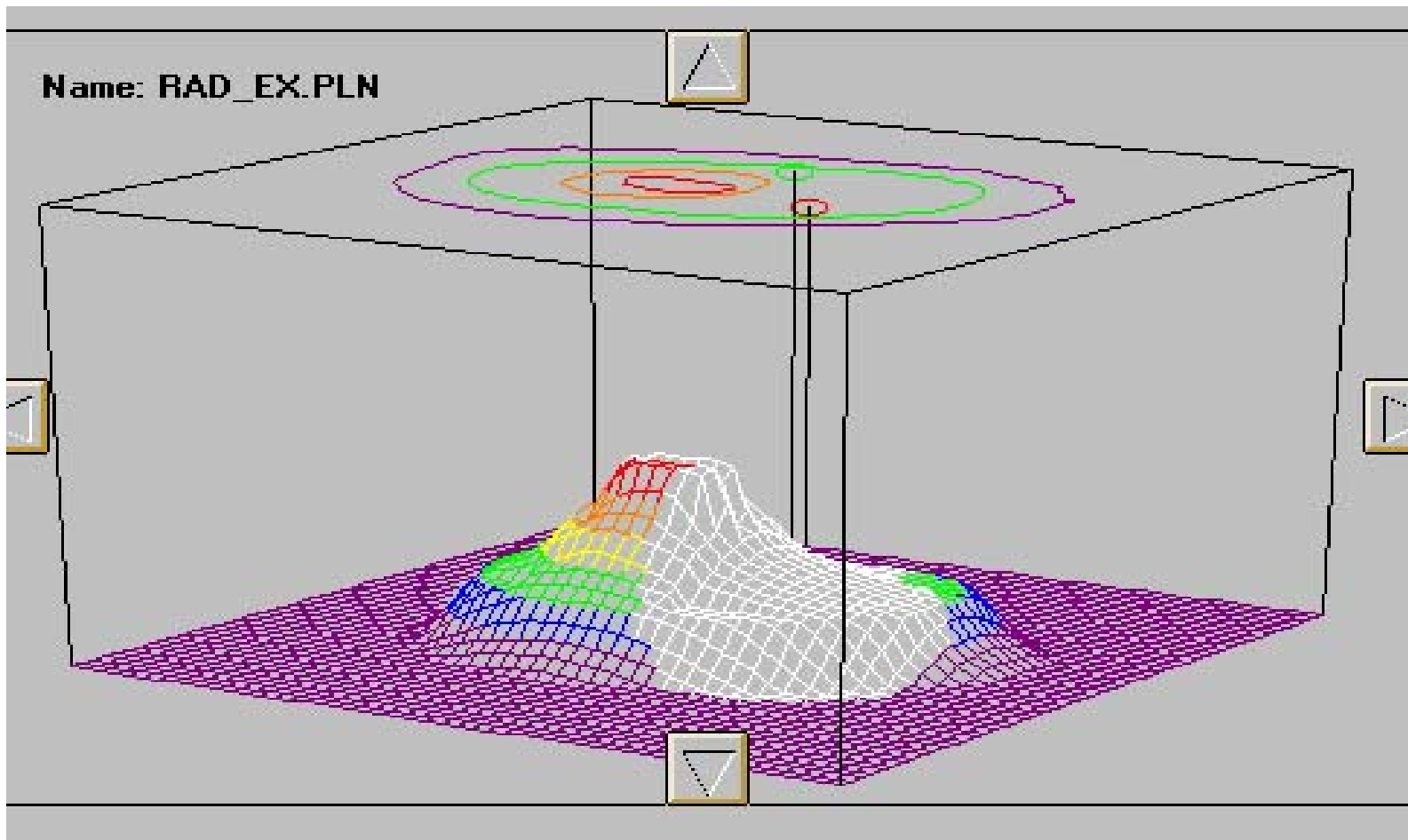
Is the RFI Complete?

Vertical View



Is the RFI Complete?

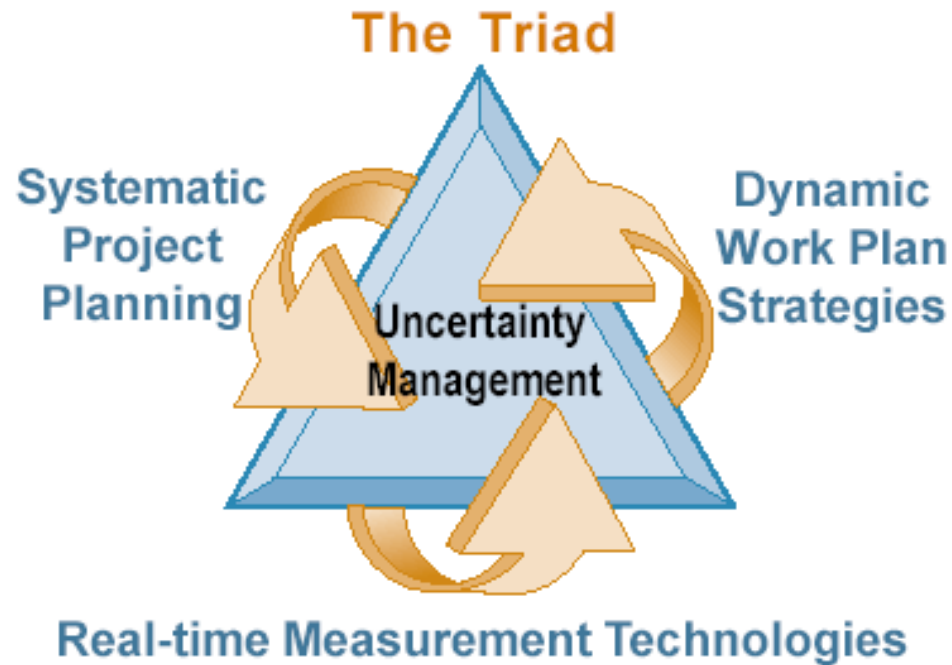
3D View



Is the RFI Complete?

Streamlining Site Investigation Methods

- ▶ Triad Sampling Approach



Is the RFI Complete?

Streamlining Site Investigation Methods (cont.)

- ▶ Confirmatory sampling
- ▶ Focused sampling to meet Environmental Indicators
- ▶ Physical parameters for remediation technology selection
- ▶ Others?



Is the RFI Complete?

Source Area Characterization

- ▶ Soil Contamination
 - Spill areas
 - Former underground structures
 - Tanks
 - Piping
 - Vaults

- ▶ Groundwater Contamination
 - Non-aqueous phase liquids (NAPLs)
 - Soil migration to groundwater
 - Groundwater discharge to surface water
 - Off-site sources



Is the RFI Complete?

Evaluate Migration Pathways

- ▶ What are the impacted media?
- ▶ Who is being exposed?
- ▶ What are the exposure pathways?



Is the RFI Complete?

Impacted Media

- ▶ Soil/soil gas
- ▶ Groundwater
- ▶ Surface water/sediment
- ▶ Indoor air
- ▶ Ambient air



Is the RFI Complete?

Risk Assessment Often Completed as a Part of the RFI

- ▶ Risk assessment is the basis of risk-based corrective action
- ▶ Screening-level human health risk evaluation is performed as part of the CA725
- ▶ If a more detailed evaluation is warranted, site-specific or baseline risk assessment can be performed using data from the RFI
- ▶ Risk assessment combines estimates of contaminant concentrations with receptor exposure assumptions to calculate carcinogenic risk and non-carcinogenic hazard
- ▶ Risk management decisions about how to address risks are made during corrective measures process

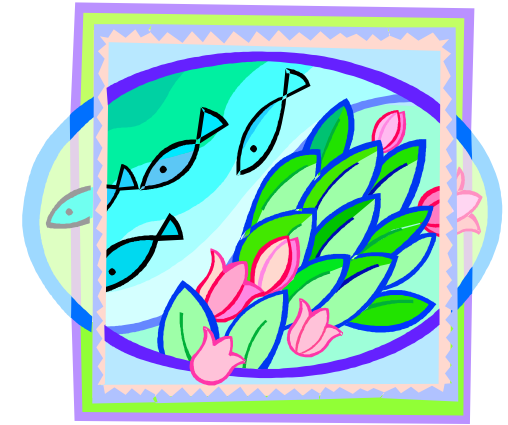
Is the RFI Complete?

Receptors

- ▶ Human receptors
 - Workers
 - Residents
 - Trespassers

- ▶ Ecological receptors
 - Wildlife at facility
 - Wildlife and plants at facility boundary
 - Threatened and endangered species

- ▶ Sensitive populations
 - Elderly
 - Breast-feeding mothers



Is the RFI Complete?

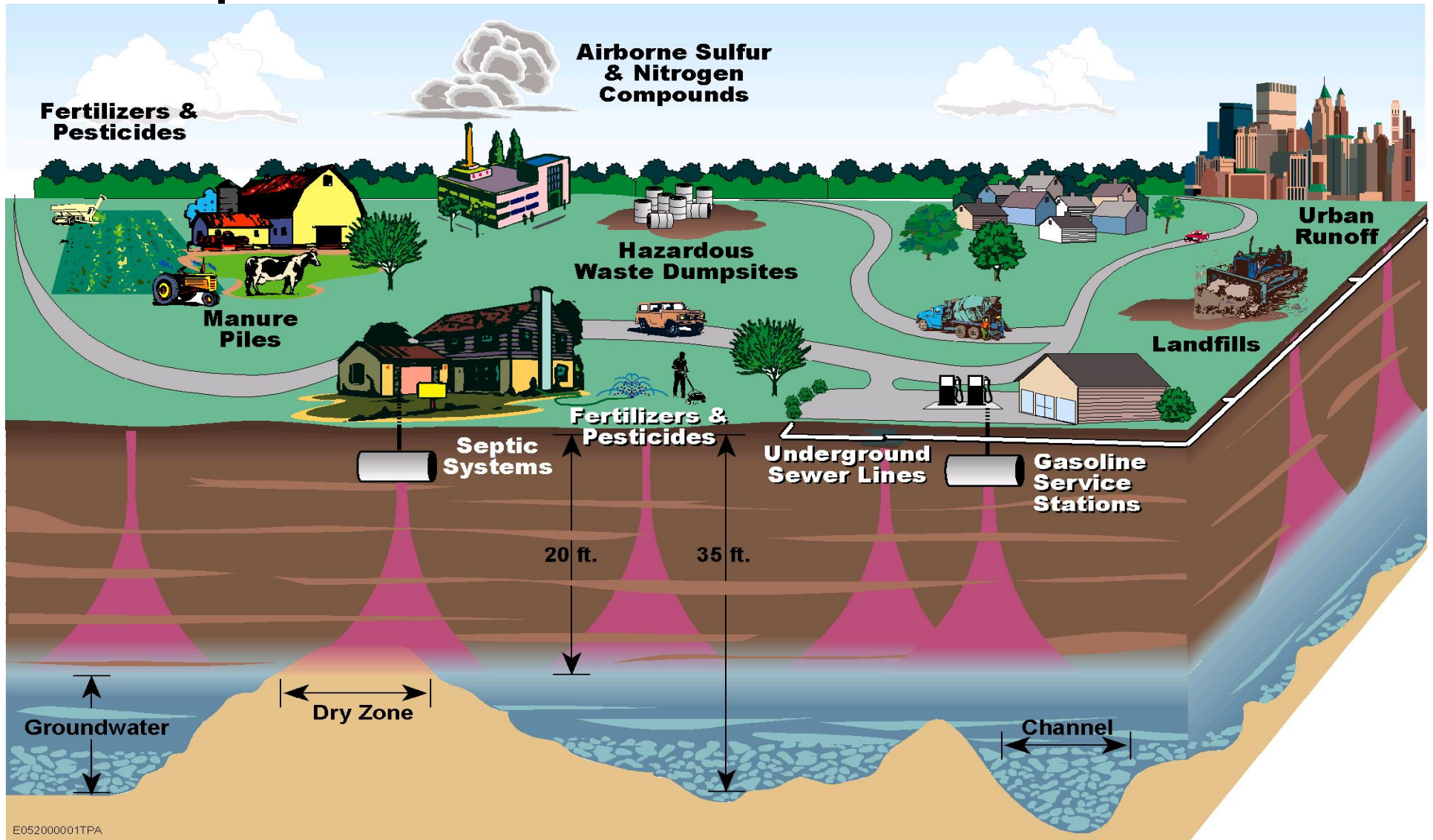
Exposure Pathways

- ▶ Soil contact/ingestion
- ▶ Sediment contact/ingestion
- ▶ Groundwater contact/ingestion
- ▶ Surface water contact/ingestion
- ▶ Ingestion of fish/wildlife/plants
- ▶ Inhalation
 - Air
 - Soil particulate



Is the RFI Complete?

Conceptual Site Model

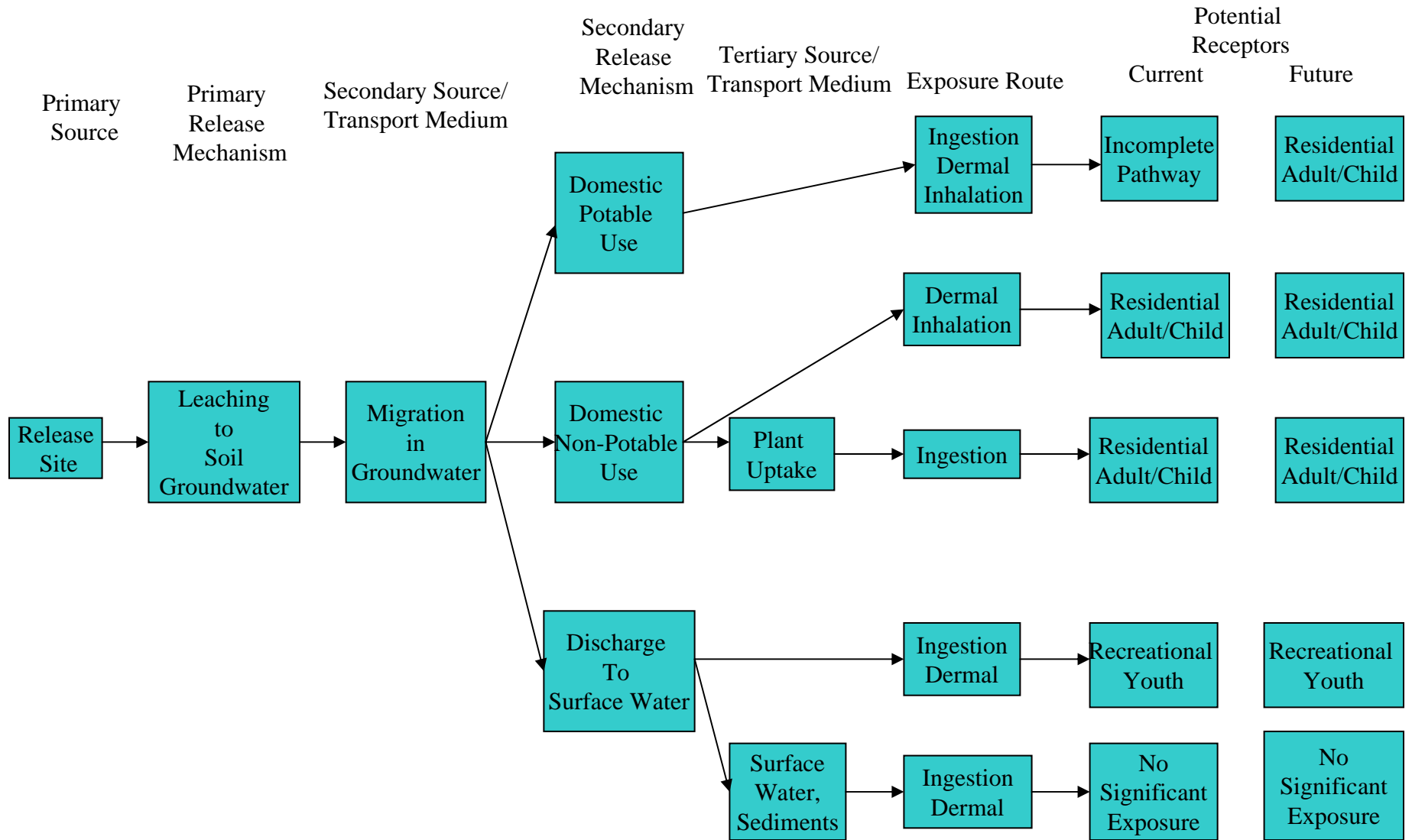


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Is the RFI Complete?

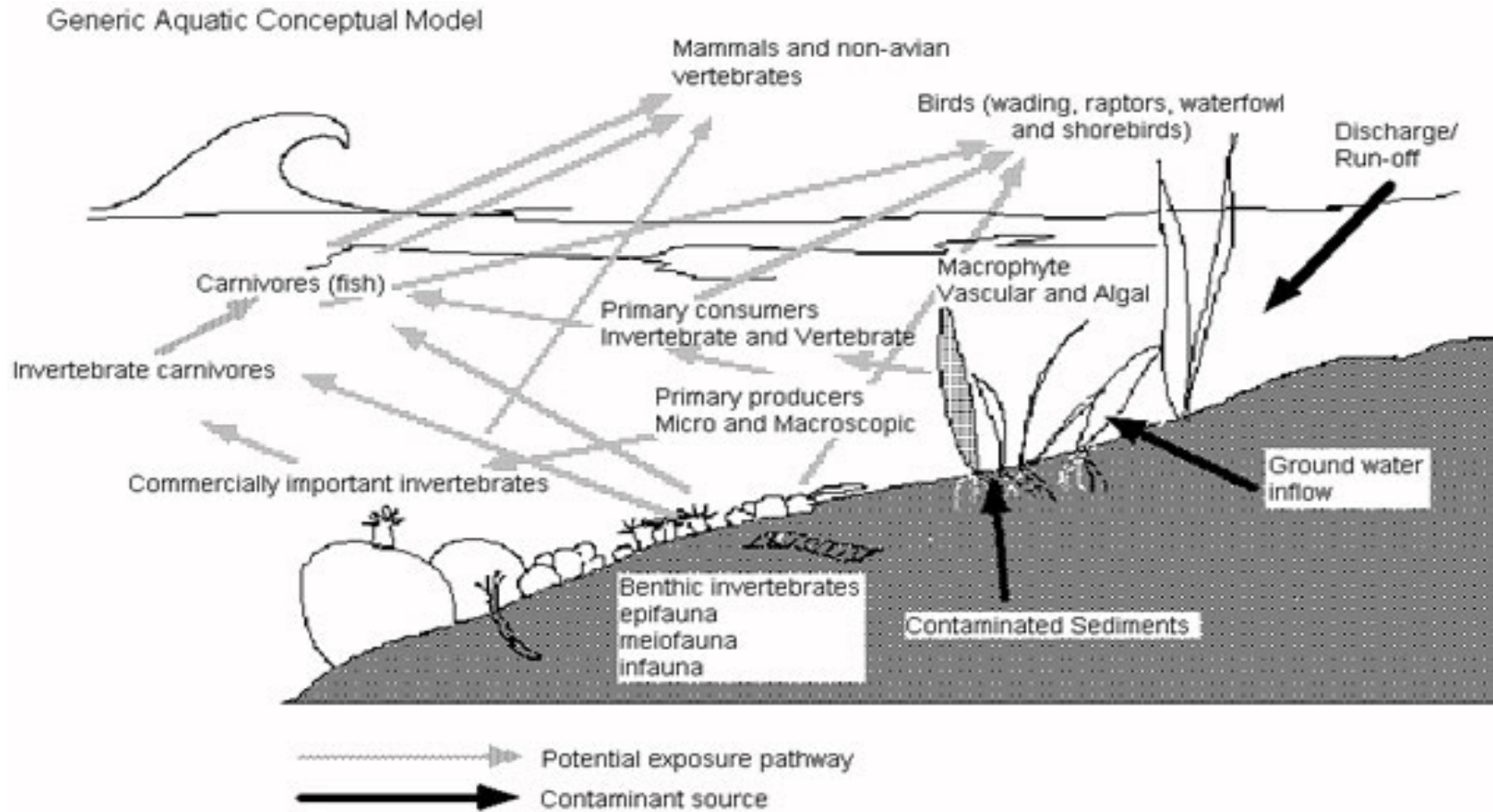
Conceptual Site Model



Is the RFI Complete?

Evaluating Ecological Risks

- ▶ What are ecological risks?



Is the RFI Complete?

Evaluating Ecological Risks (cont.)

- ▶ Formulate the problem
 - Who and what is impacted?
 - Integrate information on sources of stressors, stressor characteristics, exposure, ecosystems at risk, and ecological effects



Evaluating Ecological Risks (cont.)

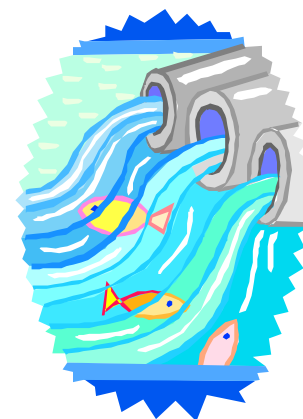
- ▶ Characterize exposure and ecological effects
 - Evaluate exposures to stressors
 - Evaluate the relationship between stressor levels and ecological effects
 - Identify the measures used to evaluate risk hypotheses, model characteristics, types and quality of data, planned analyses and presentation of results
 - Assessment endpoints
 - Measurement endpoints
 - Develop food-web models



Is the RFI Complete?

Evaluating Ecological Risks (cont.)

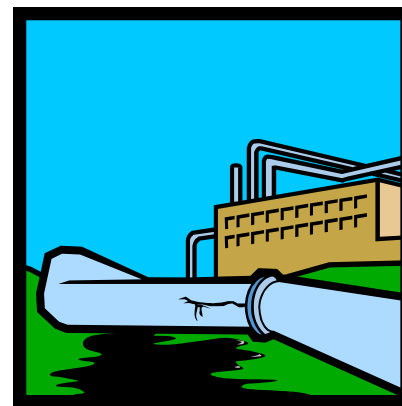
- ▶ Risk characterization
 - Estimate risks for single chemicals, single species, and endpoints
 - Perform multiple chemical risk predictions
 - Evaluate risks to communities and ecosystems
 - Determine the degree of confidence in the risk estimates
 - Evaluate the uncertainties associated with the risk estimates



Is the RFI Complete?

RFI Conclusions and Findings

- ▶ Determine whether extent of contamination is adequately defined
- ▶ Identify any existing data gaps and fine-tune site conceptual model
- ▶ Identify all potential receptors
- ▶ Determine the need for further action and make recommendation
 - No Further Action
 - Risk Assessment
 - Interim Measures
 - Presumptive Remedy
 - Corrective Measures Study



Is the RFI Complete?

Other Considerations for the RFI

- ▶ Combine the RFI and CMS for certain sites
 - Low risk
 - Where corrective measures are
 - Obvious
 - Easy to implement
 - Agreed to by Agency and owner/operator

- ▶ HSWA Permit/Consent Order requirements
 - RFI technical criteria
 - Identifies SWMUs/AOCs
 - RFI schedules
 - Data management/reporting requirements



Is the RFI Complete?

Guidance/References

- ▶ U.S. Environmental Protection Agency. RCRA Facility Investigation (RFI) Guidance. July 26, 1989. (OSWER Directive 9502.00-6D).
- ▶ U.S. Environmental Protection Agency. Handbook of Groundwater Protection and Cleanup Policies for RCRA Corrective. April 2004. (EPA 530-R-04-030).
- ▶ U.S. Environmental Protection Agency. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. June 1997. (EPA 540-R-97-006).
- ▶ U.S. Environmental Protection Agency. Using the Triad Approach to Improve Cost-Effectiveness of Hazardous Waste Cleanups. October 2001. (EPA 542-R-01-016).