

# Development of human health risk evaluation for defined sites of Egyptian interest, also using EEAA available data and other documental information: Conceptual Site Model Development

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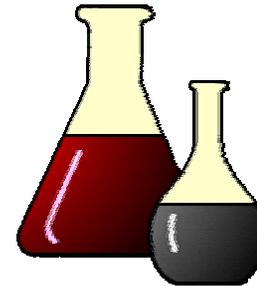
APAT

Agency for Environmental Protection and Technical Services

## Outline

- **Concept of risk**
- **Conceptual Site Model development**
- **Examples**

Concentration at Point of  
Exposure (POE)



X

Exposure Factors



X

Toxicity



=

Risk to Human Health



Concentration at Point of  
Exposure (POE)

X

~~Exposure Factors~~

X

Toxicity

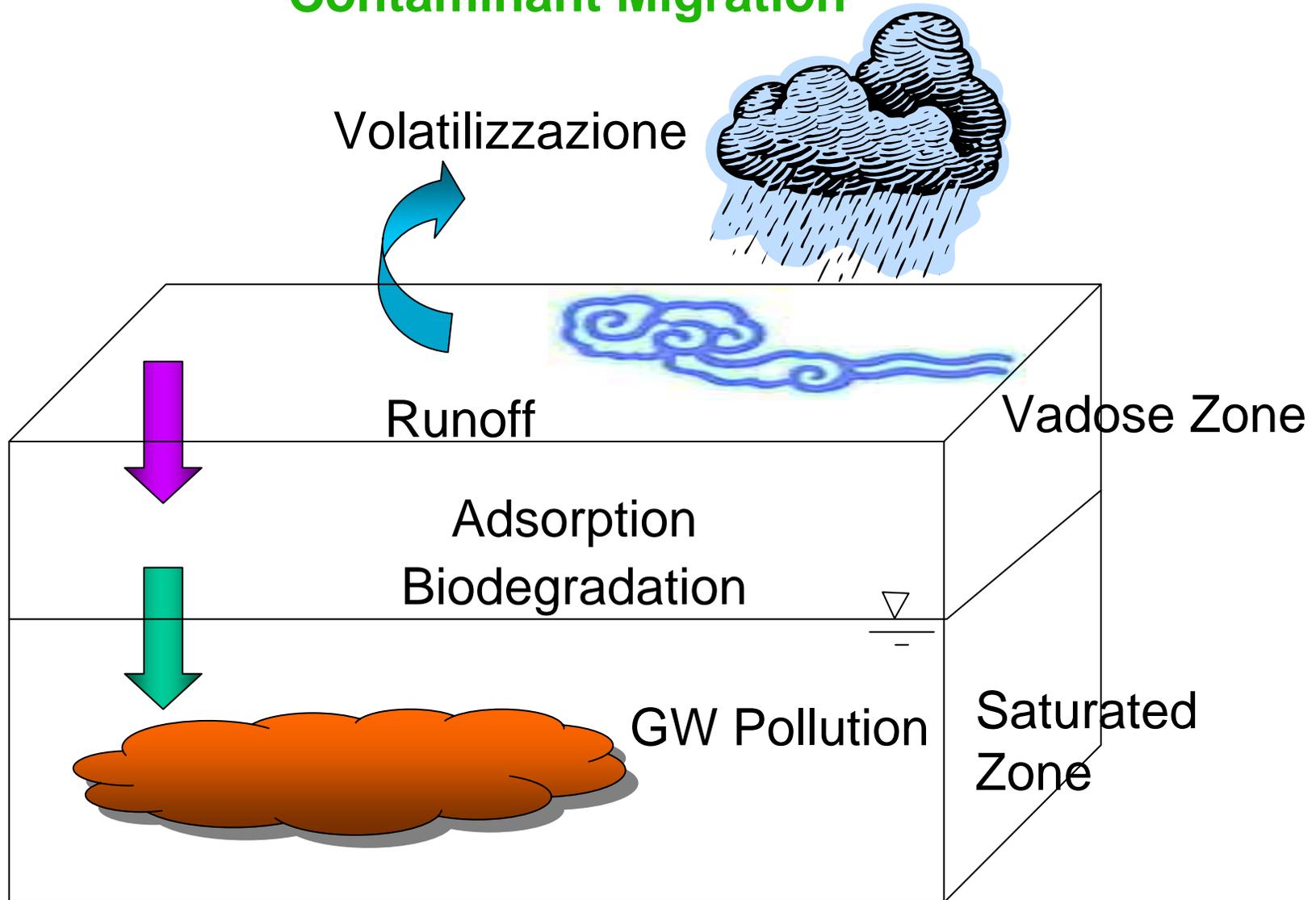
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~~Risk to Human Health~~

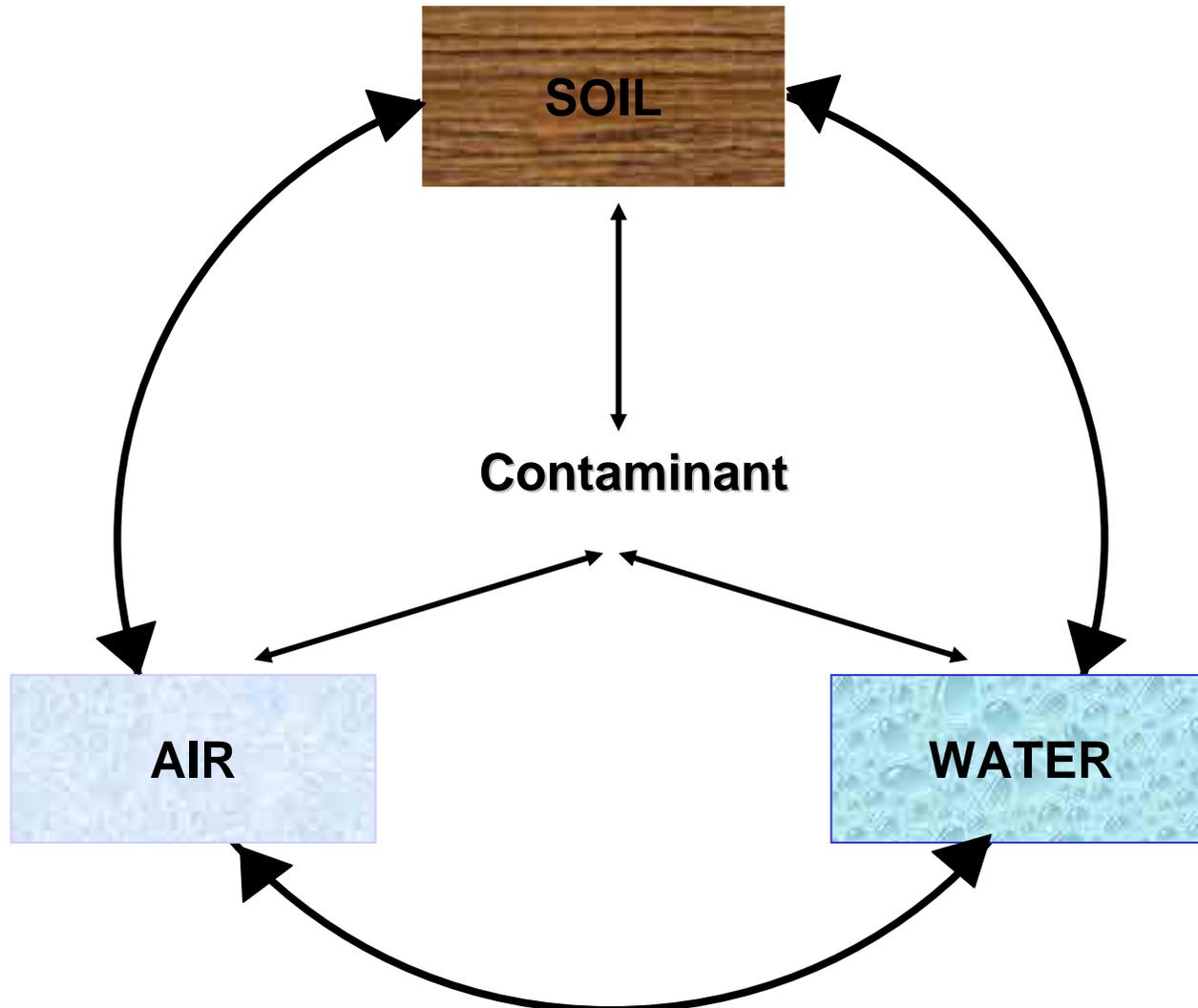


No exposure = No risk

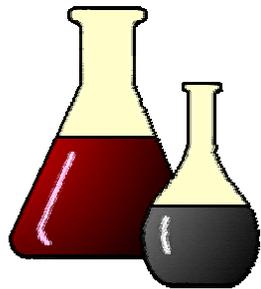
## Contaminant Migration



## Contaminant Migration



## Human Health Risk Assessment



X



X



=

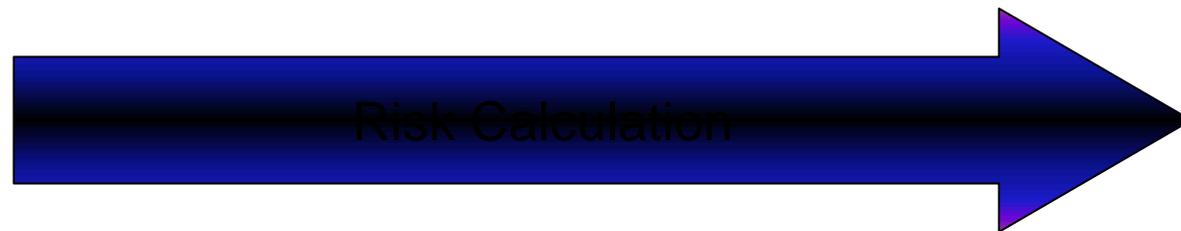


Concentration at POE Exposure Factor

Toxicity

Human-Health Risk

Contaminant  
Concentration



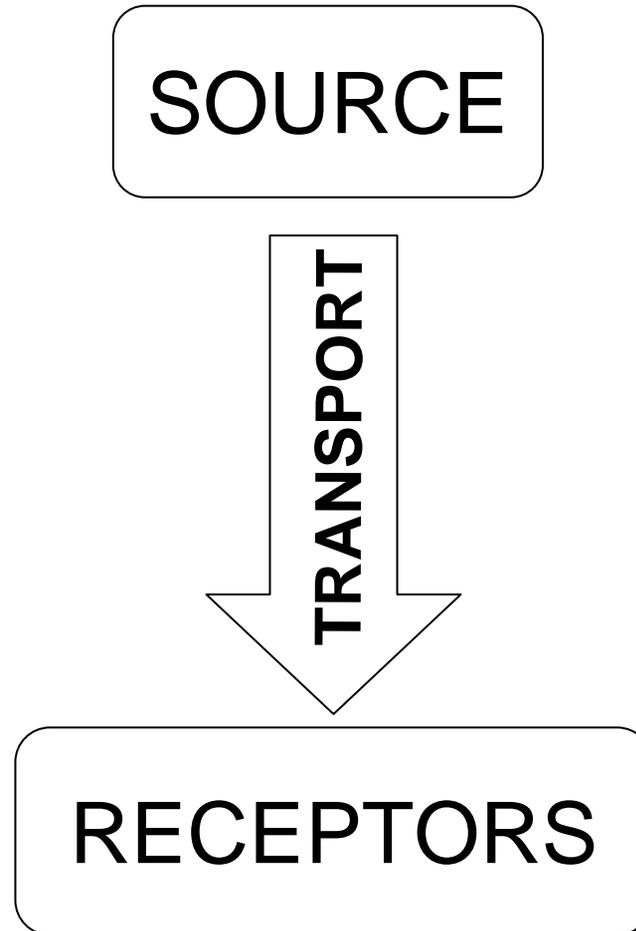
Risk  
?

Site Specific Target  
Levels

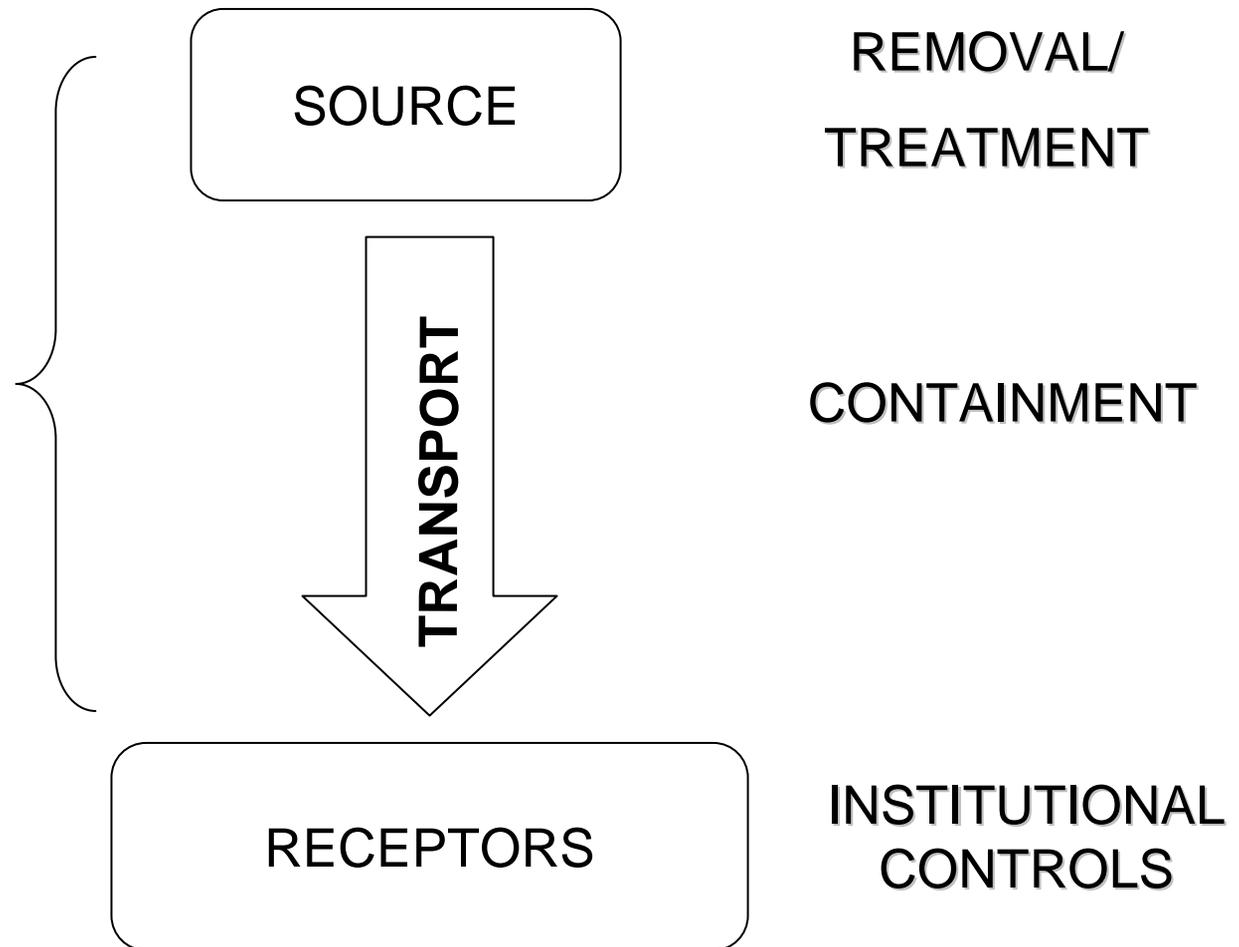


Risk levels

## Conceptual Site Model



## Conceptual Site Model: risk management



## Conceptual Site Model (CSM)

- Outlines the Exposure Assessment and Basis for the Risk Assessment
  - Improves understanding of contamination phenomena
  - Sources, fate and transport and exposure pathways and receptors/resources are identified

## Conceptual Site Model (CSM): Source

The sources of contamination considered in the HH application of RA are:

- Surface Soil (SS) : 0-1 m
- Sub-soil: -1 m to water table
- Groundwater (GW): saturated zone

All the above mentioned are secondary sources of contamination.

## Conceptual Site Model (CSM): Pathways

- Indoor Volatilisation
- Outdoor Volatilisation
- Outdoor Dust Resuspension
- Leaching in the vadose zone
- Dispersion in groundwater
- Aerial dispersion

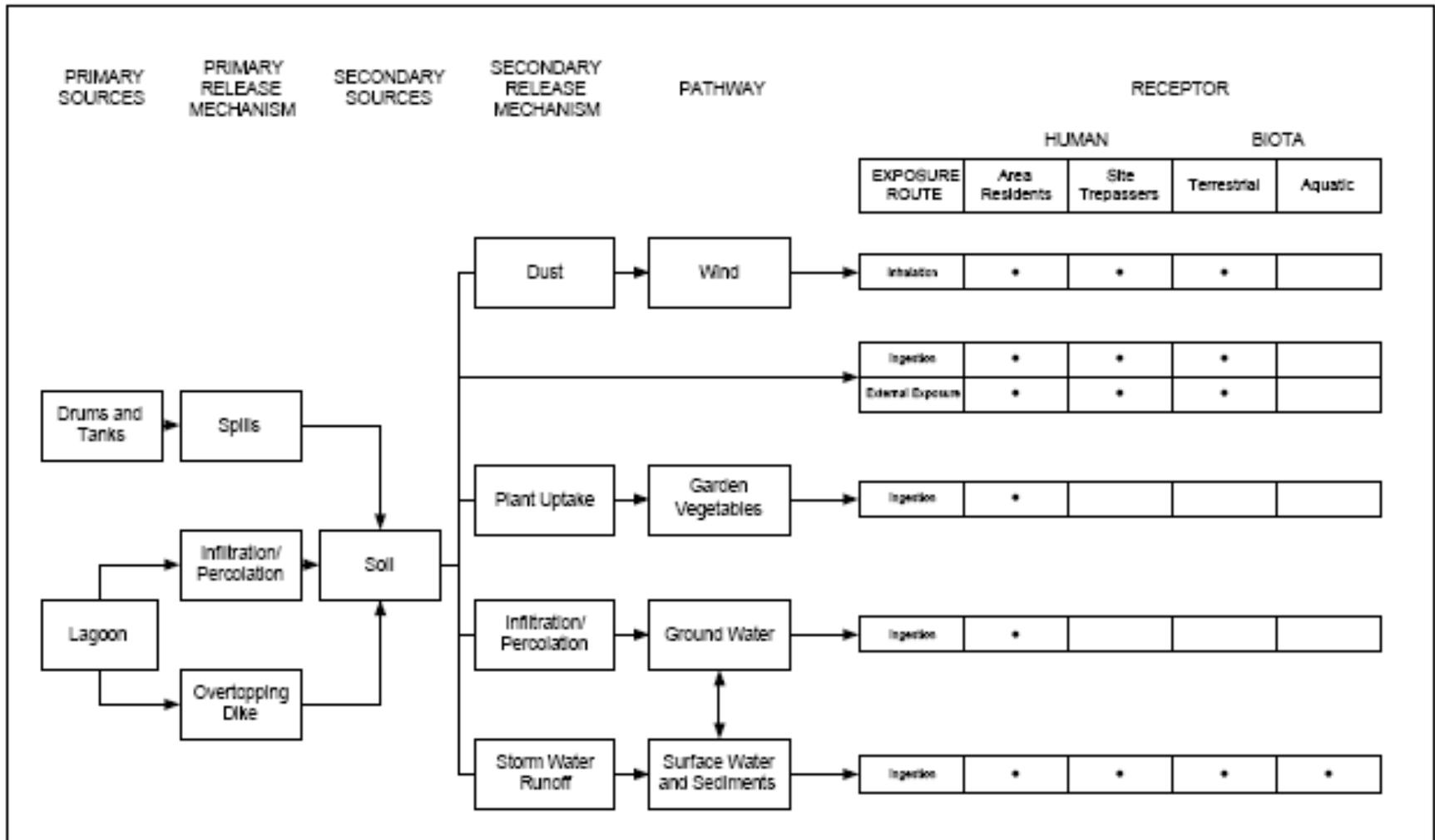
## Conceptual Site Model (CSM): Exposure Pathways

- Dermal Contact with SS
- Ingestion of SS
- Outdoor Inhalation of vapour and dusts
- Indoor inhalation of vapour

## Conceptual Site Model (CSM): Receptors

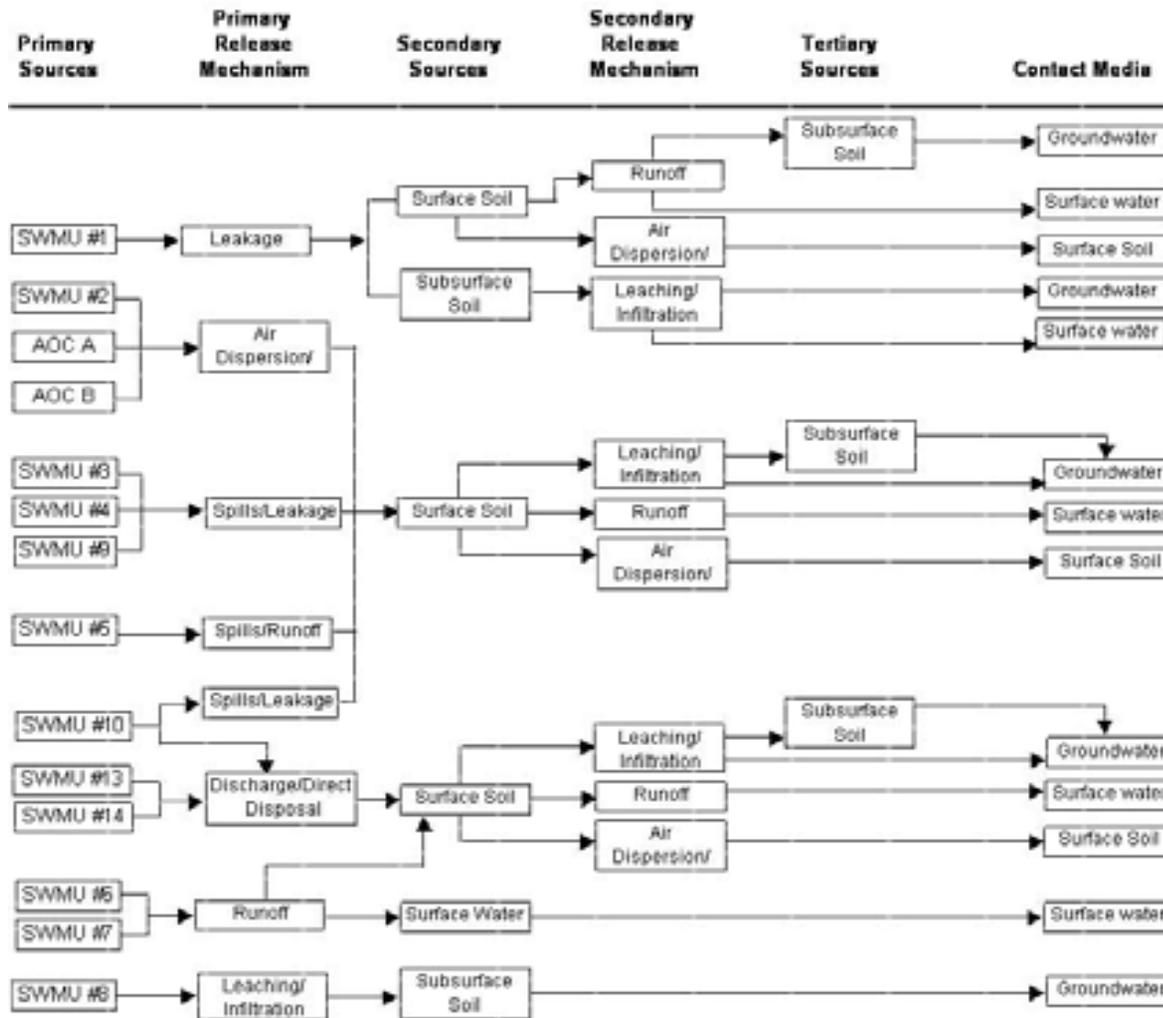
- Residential (adults and children) on-site, off-site
- Recreational (adults and children): on-site, off-site
- Industrial/ Commercial (adult): on-site, off-site

# Example n. 1

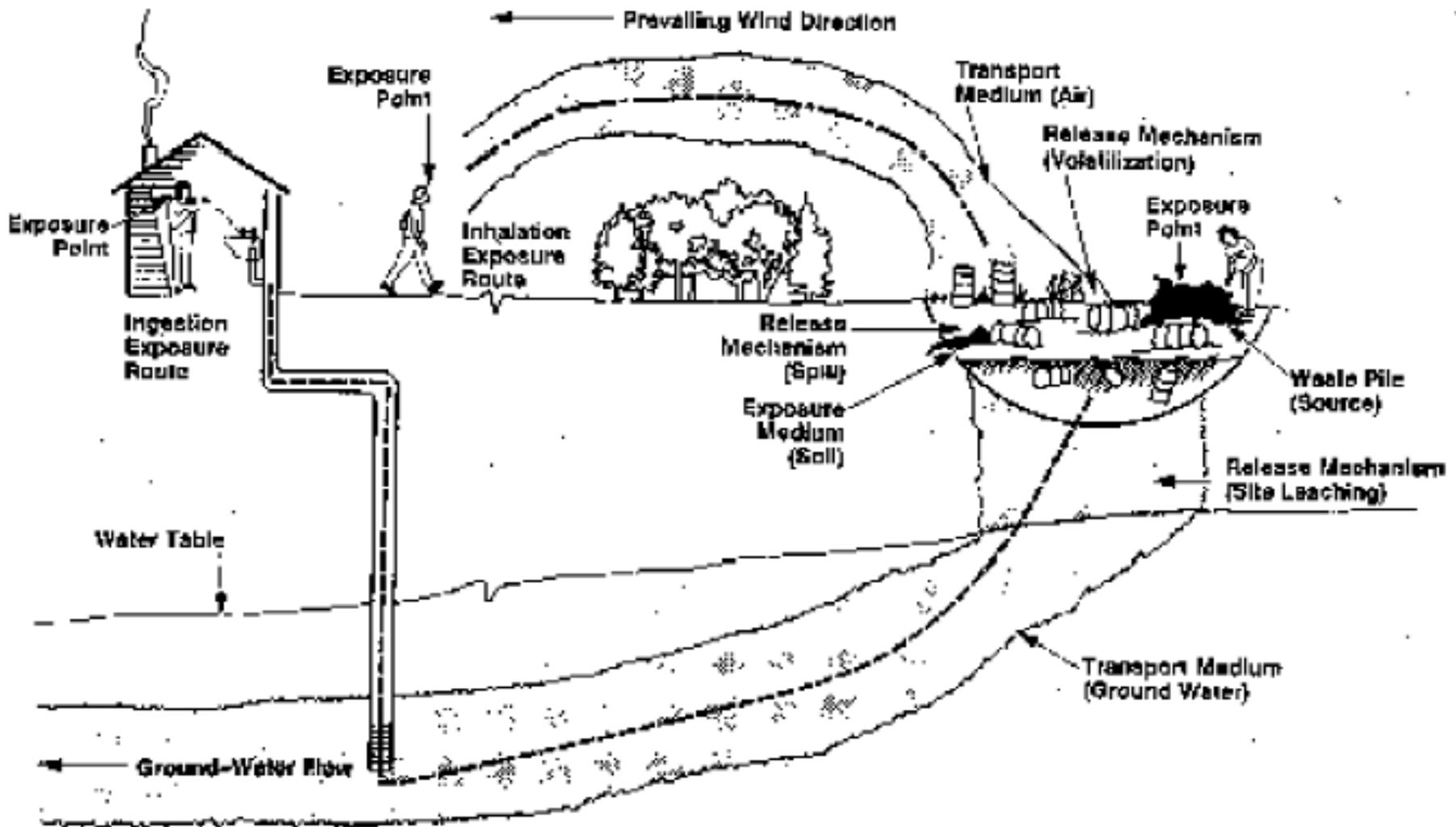


# Example n. 2

Figure 16. Wall Colmonoy Corporation Conceptual Site Model



## Example n. 3



## Benefits of Using a CSM

- Defines the Study Early in the Process
- Helps Focus Data Needs
  - Nature and Extent
  - Understanding Fate and Transport Properties
- Clarifies the Risk Management Goals
  - Defines the Receptor Populations and Resources You Will Protect Based on Preeminent Threats and Pathways of Exposure

## Powerful Risk Communication Tool

- Everyone can follow a flow chart
- Reduces concepts of exposure to transparently clear pathways which are immediately obvious to the layman (public)
- It is the most helpful piece of presentation material for use in public meetings
- Discuss the CSM before AND after public health effects discussion
  - Attach levels of real world risk and pragmatism to results of the risk evaluation.

## Quick Overview: Exposure Parameter Values and Sources

- Exposure Factors Handbook (USEPA, 1997, 2004-Dermal EFH)
- Child-Specific Exposure Factors Handbook (USEPA, 2002)
- Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (HHRAP) (USEPA 1998 and 1999 errata)
- Soil Screening Levels Guidances (USEPA, 1996, 2000, 2002)
- Risk Assessment Guidance for Superfund, Part E (USEPA, 2004)
- Subsurface Vapor Intrusion Guidance (USEPA, 2002, ITRC, 2007)
- Adult Lead Model (2003)