



# **Agenda Item #12**

## **Monitored Natural Attenuation Workshop**

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# Introduction

- Monitored Natural Attenuation (MNA) = reliance on natural-occurring processes to achieve remedial objectives in a reasonable time frame.
- MNA has been implemented in our Region and continues to be proposed at cleanup sites in our Region.

# Purpose

- Components of MNA.
- How MNA is being used in our Region and other Regions.
- Regulatory guidance and policies.
- Recommendations for acceptable site conditions.
- Obtain Water Board input on MNA considerations, e.g., timeframes and projected future uses.

# Issues

- Some MNA proposals do not adequately demonstrate that our criteria are satisfied.
- Some MNA proposals include long cleanup timeframes.
- Need to consider restoration of groundwater for future expected use.

# MNA Remediation of Groundwater Sites

- Demonstration that MNA will achieve cleanup objectives in a reasonable timeframe.
- A monitoring program to determine the continued effectiveness of MNA.

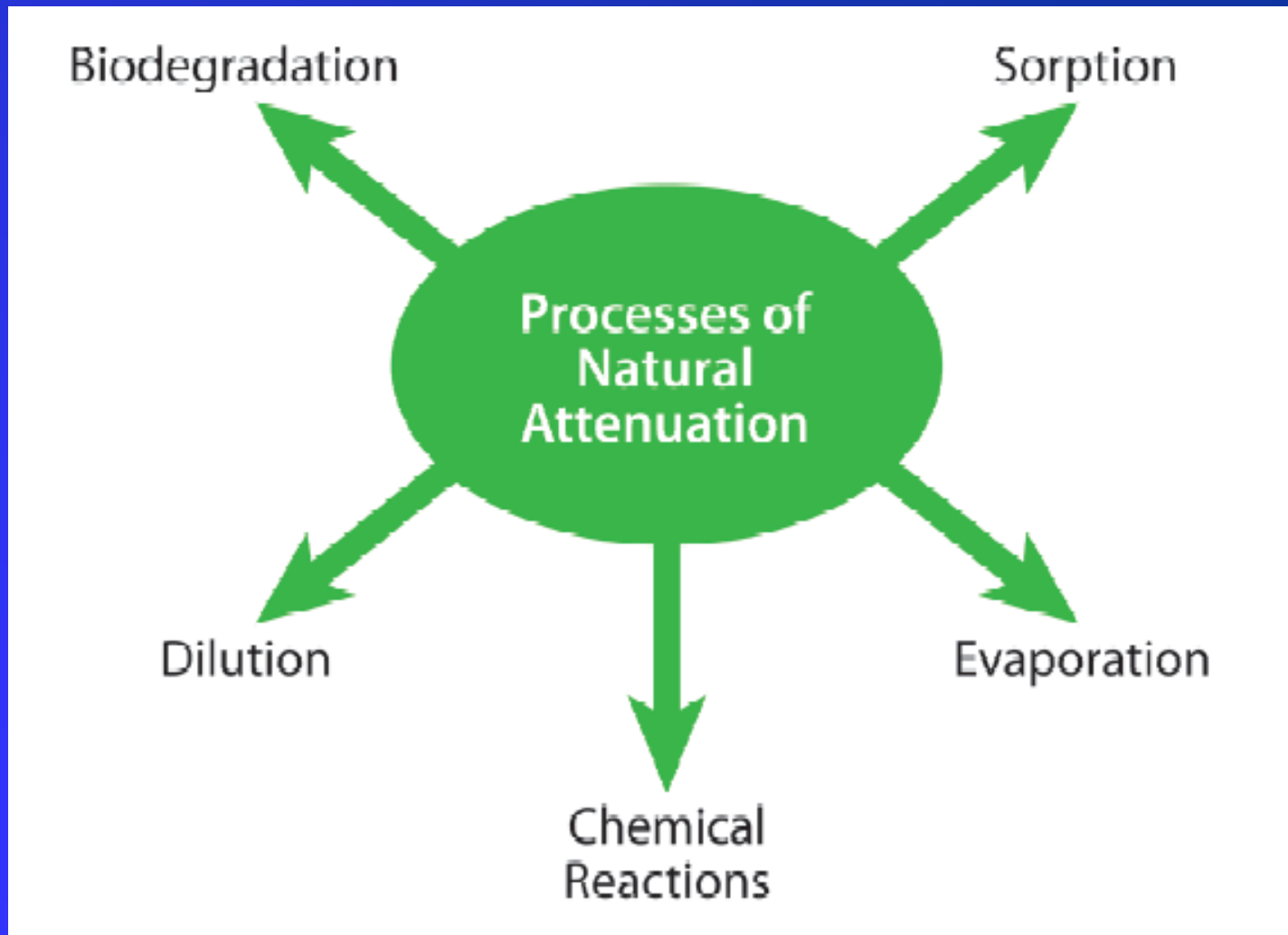
# Regulatory-acceptable MNA is not a “do-nothing” approach

- Monitor plume behavior until remedial objectives have been achieved.
- Contingencies in place if the plume does not behave as expected.

# MNA is Not

- Containment Zone. Based on findings that water quality objectives are not technically or economically achievable.
- Petroleum Underground Storage Tank Low-Threat Closure Policy (LTCP).
  - Incorporates some of the principles of MNA.
  - No monitoring after LTCP criteria met.

# Natural Attenuation Processes





# Natural Attenuation Processes Fuel and Chlorinated Solvents

- Biodegradation
- Chemical reactions
- Volatilization
- Sorption onto soil particles
- Dilution

# Natural Attenuation Processes Inorganic Compounds

- **Chemical reactions  
(oxidation-reduction)**
- **Sorption onto soil particles**
- **Dilution**

# Major Potential Advantages

- Potentially lower remediation costs than active remediation.
- Smaller environmental footprint: less waste, less surface disturbance, etc.

# Major Potential Disadvantages

- **MNA usually takes longer to achieve cleanup goals.**
- **Uncertainties associated with long-cleanup time:**
  - Changes in site conditions that could effect plume behavior.
  - Future needs for groundwater.

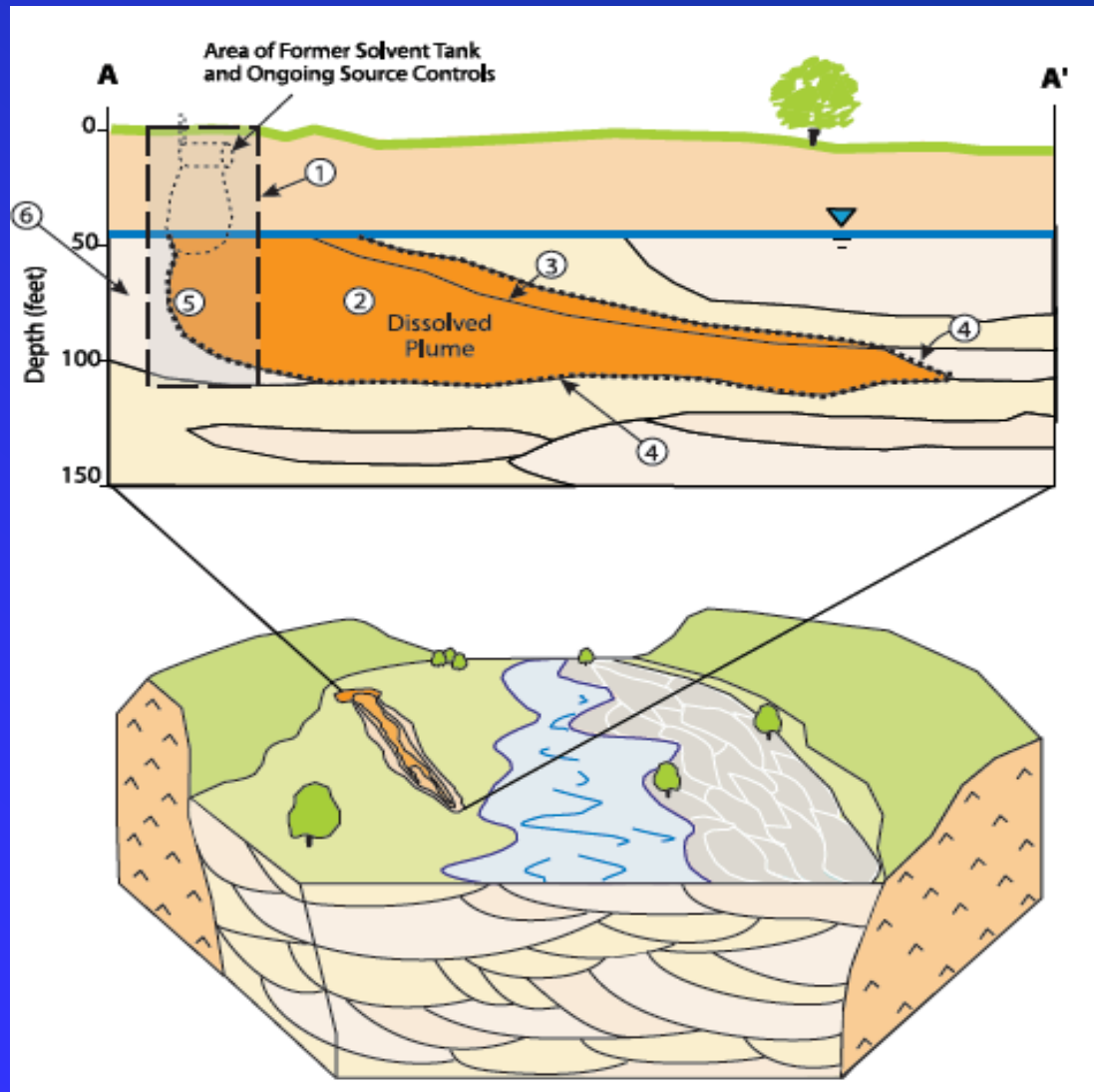
# MNA Guidance

- 1999 **USEPA Directive on the Use of MNA** at Superfund Sites, RCRA Corrective Action, and UST Sites. Establishes USEPA Policy for MNA.
- Various USEPA technical guidance documents:
  - Based on type of contaminant.
  - Analyses to demonstrate MNA effectiveness.
  - Requirements for long-term monitoring.

# Minimum Requirements

- The site has been adequately characterized.
- Source has been remediated.
- Plume boundary is stable or decreasing.
- The contamination does not pose immediate threat to human health or environment.
- Remedial goals will be achieved in a “reasonable time.”

# Conceptual Site Model

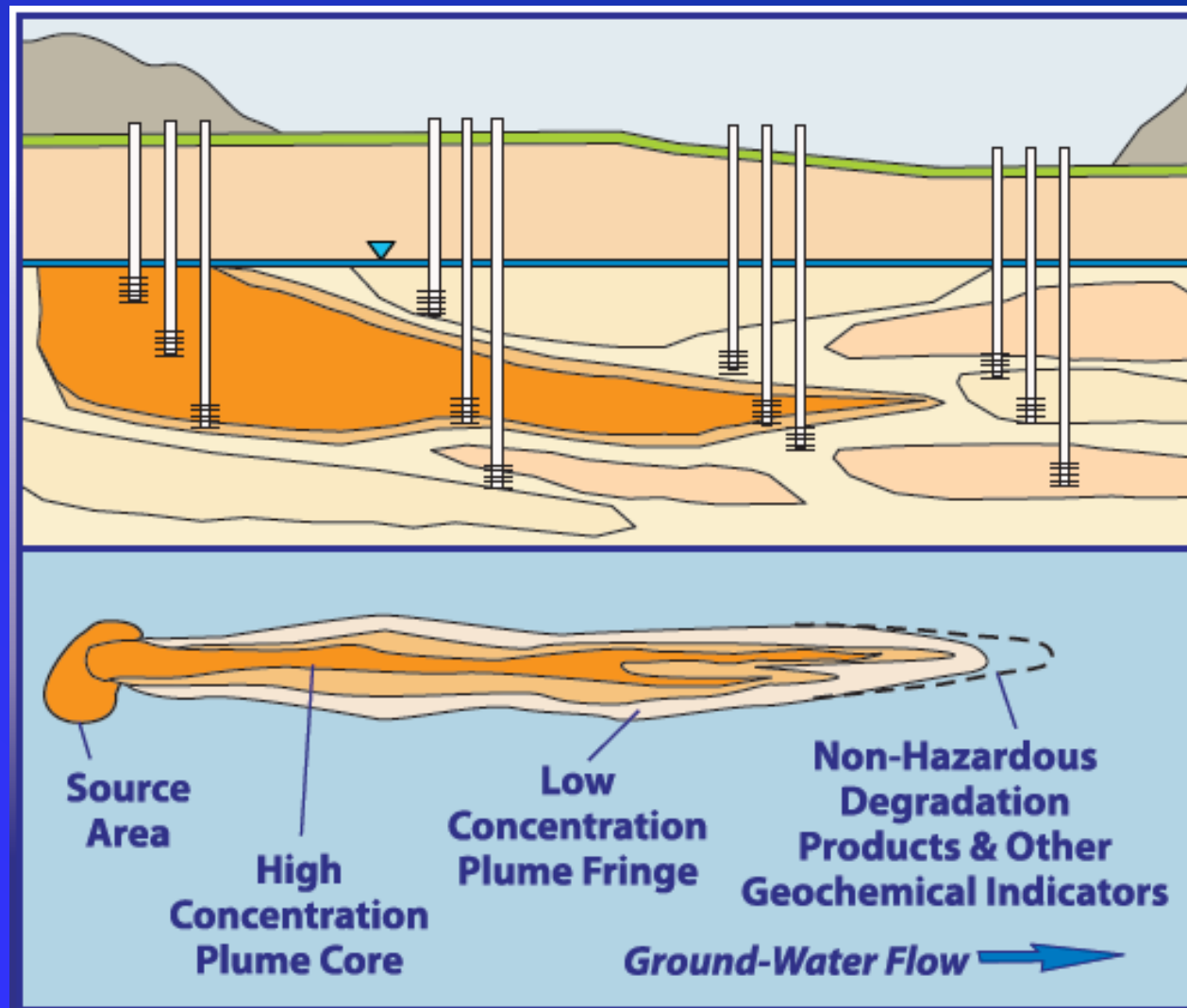


# Where is MNA Used

- With an active remediation system (e.g., pump in the hot spots and MNA in low concentration areas).
- When active remediation is no longer effective.
- As sole remedy at small, low concentration sites.



# Groundwater Plume



# Regulatory Framework

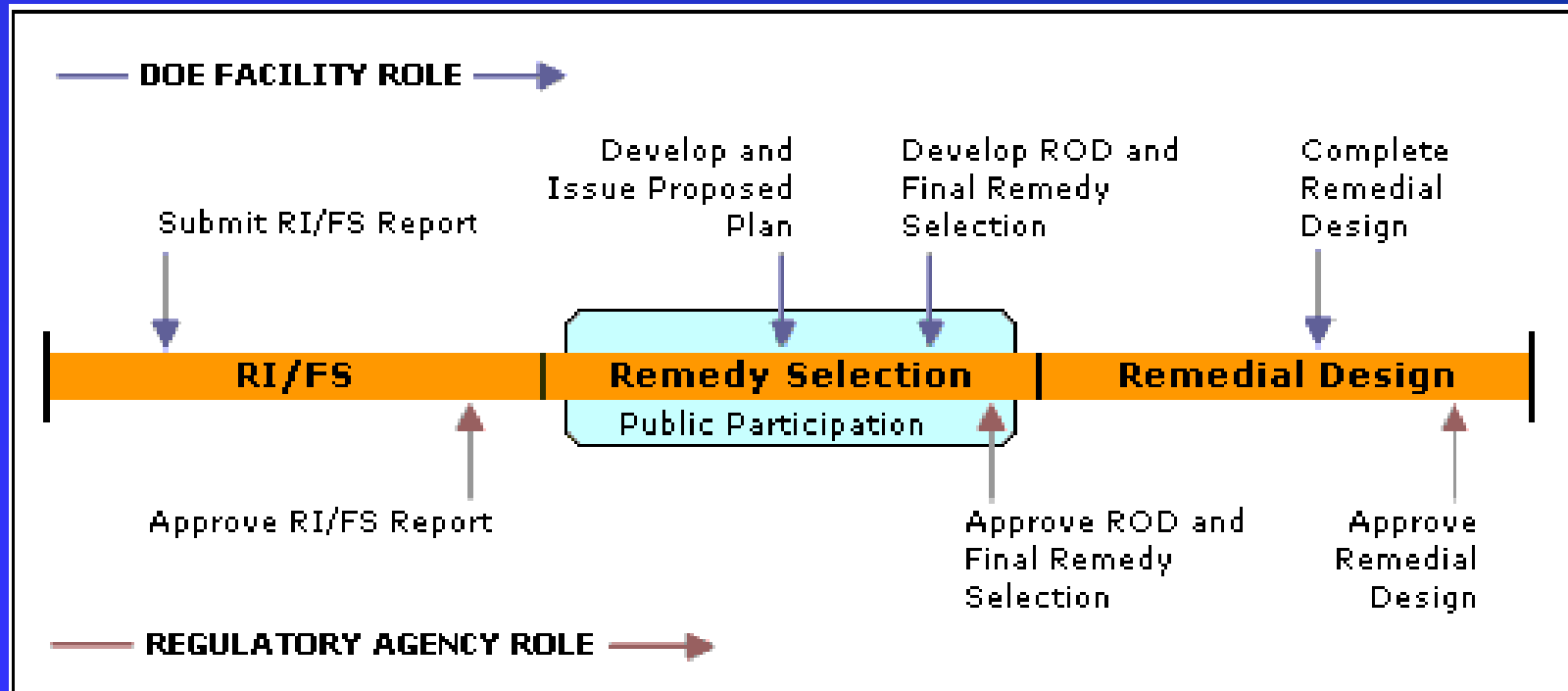
SWRCB Resolution No. 92-49 specifies Regional Water Board shall concur with proposals that:

*have a substantial likelihood to achieve compliance, **within a reasonable time frame**, with cleanup goals and objectives that implement the applicable Water Quality Control Plans and Policies...*

# Process for Accepting MNA

- Evaluation of MNA begins with studies that evaluate various remedial alternatives (feasibility studies).
  - Studies must be acceptable by Staff as adequate demonstrations.
- Acceptance of MNA remedy is decision document, i.e., Record of Decision (ROD) or Corrective Action Plan (CAP).

# Remedial Selection Process Federal Facilities



# Criteria for Acceptance of MNA

1. MNA Demonstration (Feasibility Study):
  - Adequate site characterization.
  - Source control.
  - Stable or decreasing plume boundary.
  - Plume does not pose a threat to human health or the environment.
  - Achieve cleanup goals in a reasonable timeframe.

# Criteria for Acceptance of MNA

## 2. Decision Document

- Long-term Monitoring
- Triggers and Contingencies
- May require Institutional Controls, e.g., land use covenants that restrict land use.

# Regional Water Boards

- MNA as sole remedy: 0 to 10 % of sites.
- MNA in conjunction with another remedy: 5 to 80% of sites.
- Two Regions had no approved MNA remedies longer 20 years.
- Two Regions had approved cleanup timeframes for greater than 100 years for a few sites.
- Follow USEPA guidance and Resolution 92-49.

# Lahontan Region Sites

Military Sites with Accepted MNA in Decision Documents:

- 6 sites with MNA as primary remedy.
- 1 site with MNA as a component.

Sites being considered for MNA:

- Over 50% of open sites.
- Most are fuels and solvents.
- Only a few inorganic sites.



# Summary

- MNA can be an effective cleanup tool at some sites.
- Applicable guidance should be followed for MNA selection and implementation.
- Responsible Party must demonstrate site is adequately characterized and MNA will achieve cleanup goals in a reasonable timeframe.
- Not all sites proposed for MNA will meet technical and regulatory requirements.

# Discussion Topics/ Water Board Input

- At what initial stage should staff request policy direction on remedy selection?
- How to encourage collaboration to avoid delays and conflicts.

# Discussion Topics/ Water Board Input

- What factors should staff consider when determining future aquifer use?
  - Distance from population centers.
  - Projected growth and demands on aquifer.
  - Increased demands based on drought or climate change.
- What is a reasonable timeframe to achieve cleanup goals?

# Discussion Topics/ Water Board Input

- Are there other Board expectations staff should share with Responsible Party? For example:
  - Establishing technical basis of MNA prior to decision document.
  - Clear triggers and contingencies that will be maintained until remedial goals achieved.