
Module 6: Alternatives

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- Module 6 contains three sections:**
 - 6.1 Development and Screening of Alternatives**
 - 6.2 Detailed Analysis of Alternatives**
 - 6.3 Remedy Selection, Preparing Projects Plans and the Records of Decision**

**Module 6.1:
Development and Screening of
Alternatives**

Module Objectives

- ❑ **Explain the relationship between alternatives selection and EPA Superfund program expectations**
- ❑ **Identify the options for source control**
- ❑ **Identify the steps in the alternative development process**
- ❑ **List the two reasons for communicating early with the regulators during alternative development**

Objectives for Choosing Alternatives

- **Develop an appropriate range of distinct hazardous waste management alternatives that:**
 - **Protect human health and the environment**
 - **Attain ARARs**
 - **Are cost-effective**
 - **Utilize permanent solutions and treatment technologies to maximum extent practicable**

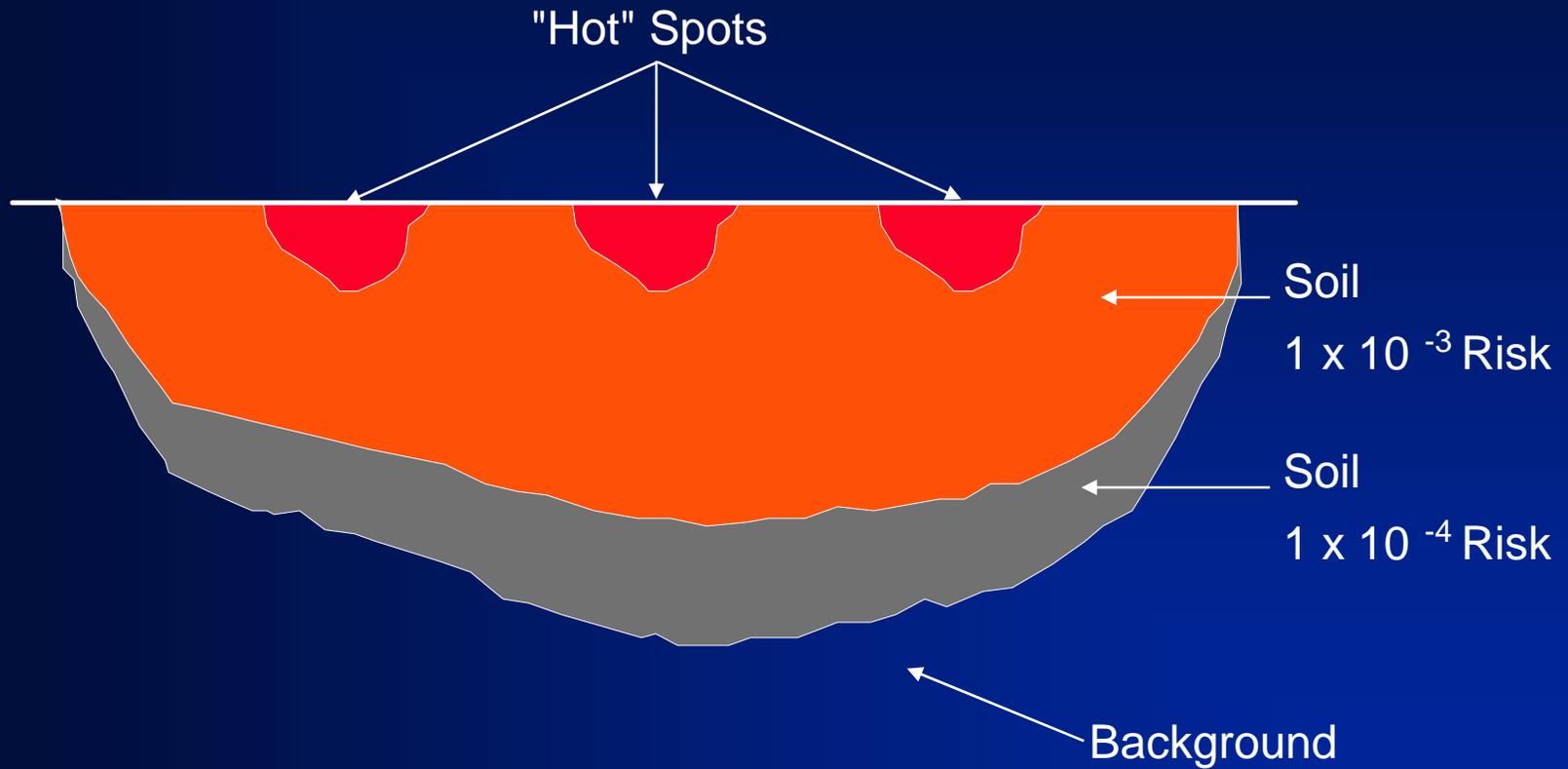
Development of Alternatives

- **Range of practicable alternatives should reflect program expectations**
 - **Address principal threats through treatment**
 - **Use engineering controls for waste that poses low long-term threat or where treatment is impracticable**
 - **Use institutional controls primarily as supplements to engineering controls**
 - **Combine approaches, as appropriate**
 - **Consider innovative technologies, as appropriate**
 - **Return ground water to its beneficial uses within a reasonable timeframe**
- **Response actions selected for sites with similar characteristics should be considered and evaluated**

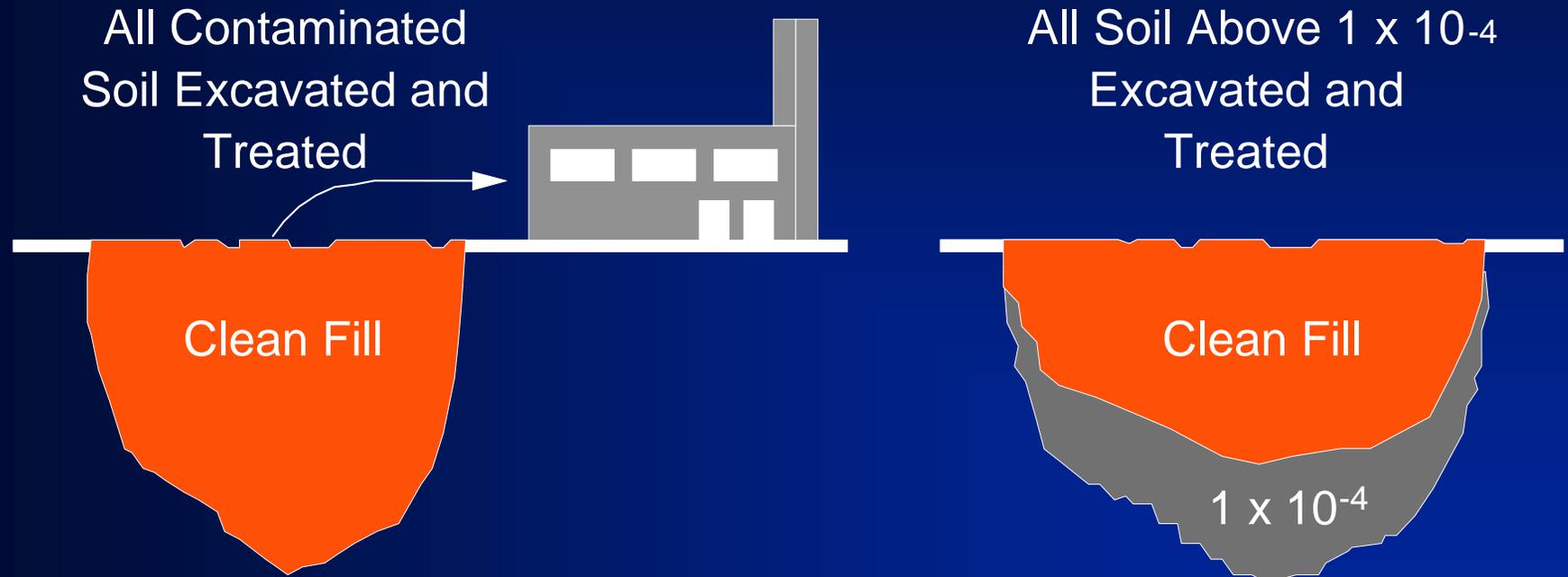
Range of Source Control Options

- ❑ **Treatment option to eliminate, or minimize to extent feasible, need for long-term management**
- ❑ **Treatment options that address principal threats**
- ❑ **Innovative treatment technologies, as appropriate**
- ❑ **One or more containment options utilizing little or no treatment**
- ❑ **No action alternative**

Source Control

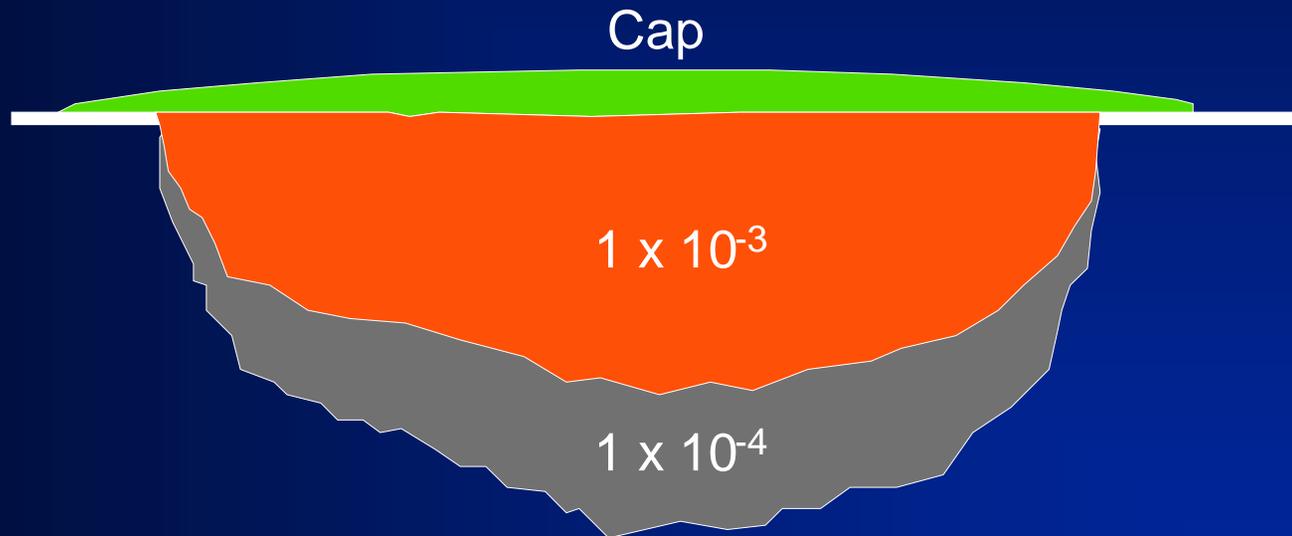


Eliminate/Minimize Need for Long-Term Management

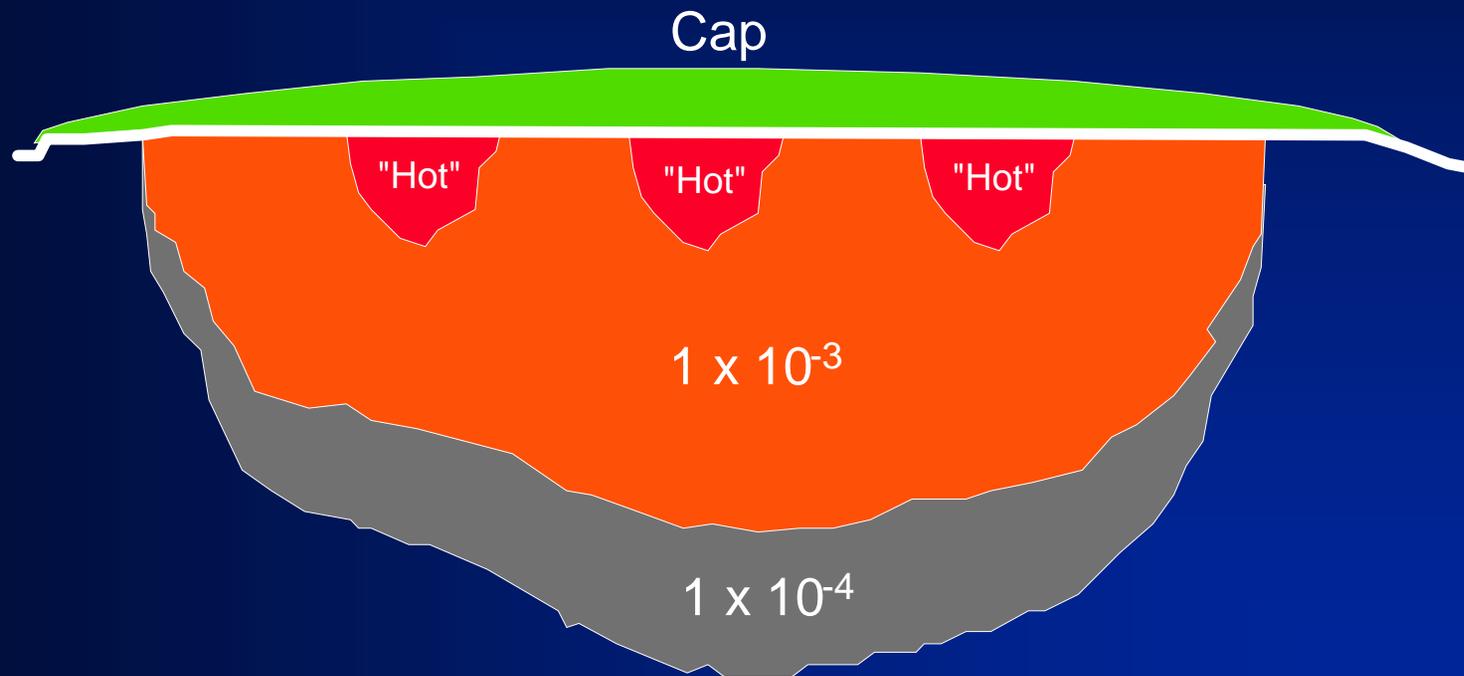


Treatment To Address Principal Threats

"Hot" Spots
Excavated and Treated



Containment With Little or No Treatment

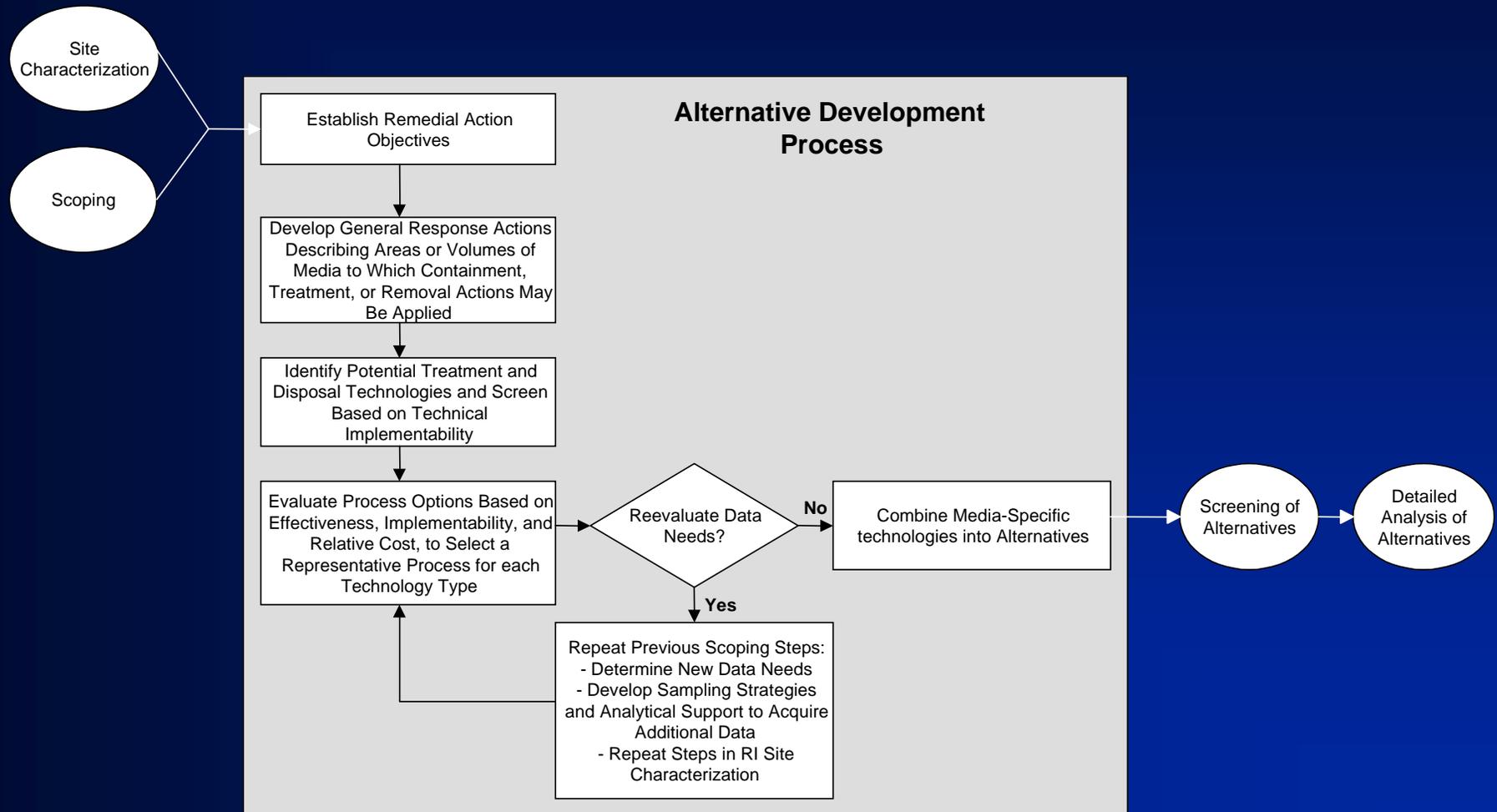


Alternative Development Process

- ❑ **Develop remedial action objectives (RAOs)**
- ❑ **Develop general response actions**
- ❑ **Identify volumes or areas of media to which general response actions may be applied**
- ❑ **Identify and screen technologies and process options**
- ❑ **Evaluate process options**
- ❑ **Assemble alternatives**

Development and Screening of Alternatives

Alternative Development Process



Communication During Development/ Screening Alternatives

- ❑ **Meet with lead/support agency to obtain early agreement on:**
 - **Technologies/alternatives to be considered**
 - **ARARs**

- ❑ **Lead agency continues communication with community, as appropriate**

Module Summary

- **Hazardous waste management alternatives must:**
 - **Protect human health and the environment**
 - **Attain ARARs**
 - **Be cost effective**
 - **Utilize permanent solutions and treatment technologies to maximum extent practicable**

- **Source control options include:**
 - **Eliminating/ minimizing need for long term management**
 - **Treatment to address principal threat**
 - **Innovative treatment technology**
 - **Containment with little or no treatment**
 - **No action**

Module Summary

- ❑ **Range of practicable alternatives should reflect program expectations.**
- ❑ **Communication among the lead and support agencies and their contractor is very important in order to obtain input and agreement on the technologies, processes, and alternatives considered for implementation at the site.**

Module 6.2
Detailed Analysis of Alternatives

Module Objectives

- ❑ **Identify the three purposes of the detailed analysis of alternatives**
- ❑ **Identify and define the nine criteria for alternatives analysis**

Detailed Analysis

Purpose is to provide sufficient information to:

- ❑ **Compare alternatives**
- ❑ **Construct remedy selection rationale**
- ❑ **Demonstrate satisfaction of statutory requirements**
 - **Documentation**
 - **Public notice and comment**

Nine Criteria

- ❑ Overall protection of human health and the environment
- ❑ Compliance with applicable or relevant and appropriate requirements
- ❑ Long-term effectiveness and permanence
- ❑ Reduction of toxicity, mobility or volume through treatment
- ❑ Short-term effectiveness
- ❑ Implementability
- ❑ Cost
- ❑ State acceptance
- ❑ Community acceptance

Module Summary

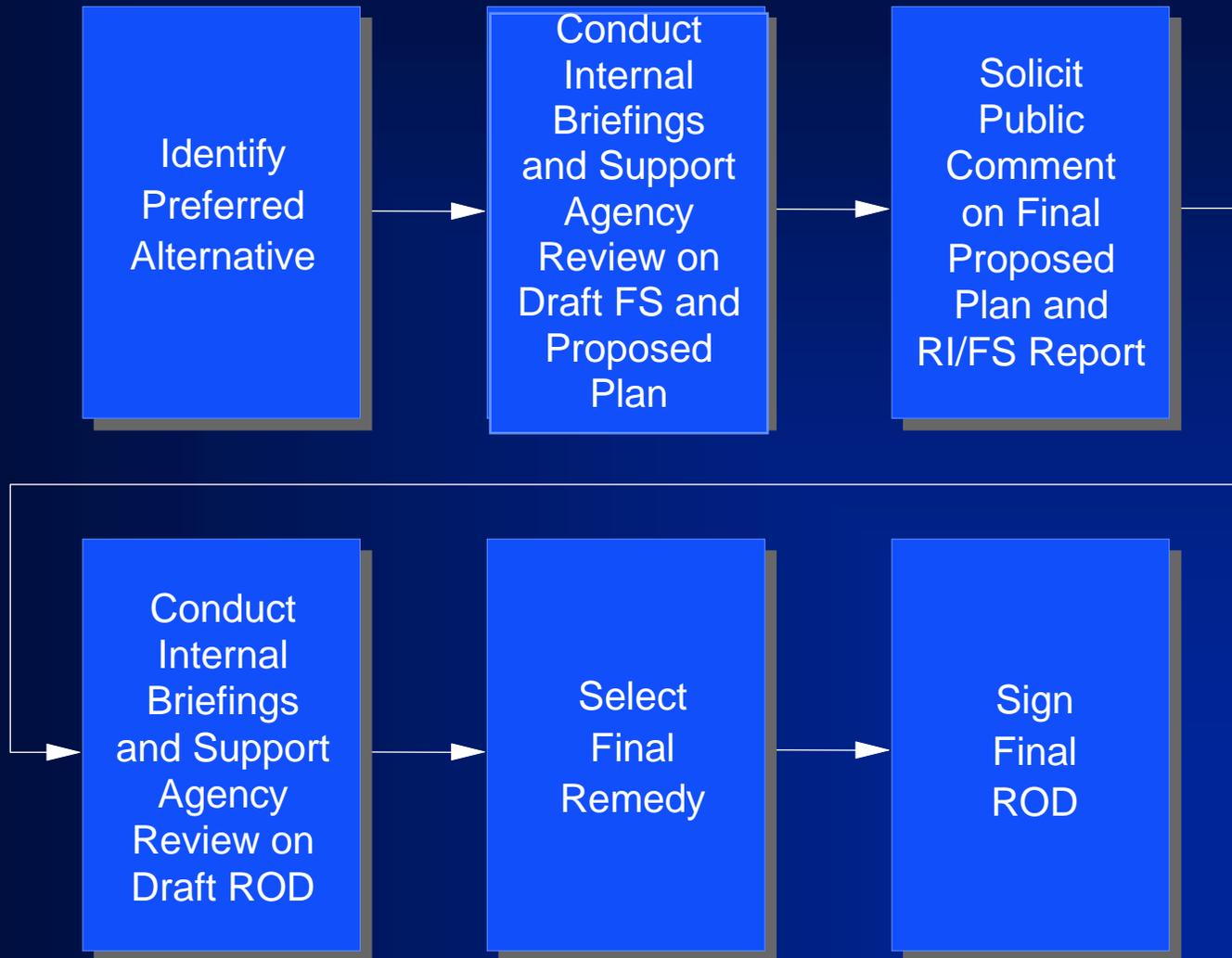
- The purpose of the detailed analysis is to compare the alternatives that survived the initial screening, describe the differences among them, and demonstrate whether the alternatives satisfy mandatory requirements.
- Comparison of the alternatives will be based on nine criteria. The criteria are divided into three groups:
 - The first two criteria are the threshold criteria. They relate to statutory requirements each alternative *must* satisfy to be eligible for selection.
 - The next five are the primary balancing criteria upon which detailed analysis is primarily based.
 - The last two are modifying criteria. After formal public comment is considered, the lead agency may modify aspects of alternative or choose another based on these criteria.

**Module 6.3:
Remedy Selection, Preparing
Proposed Plans
and the Records of Decision**

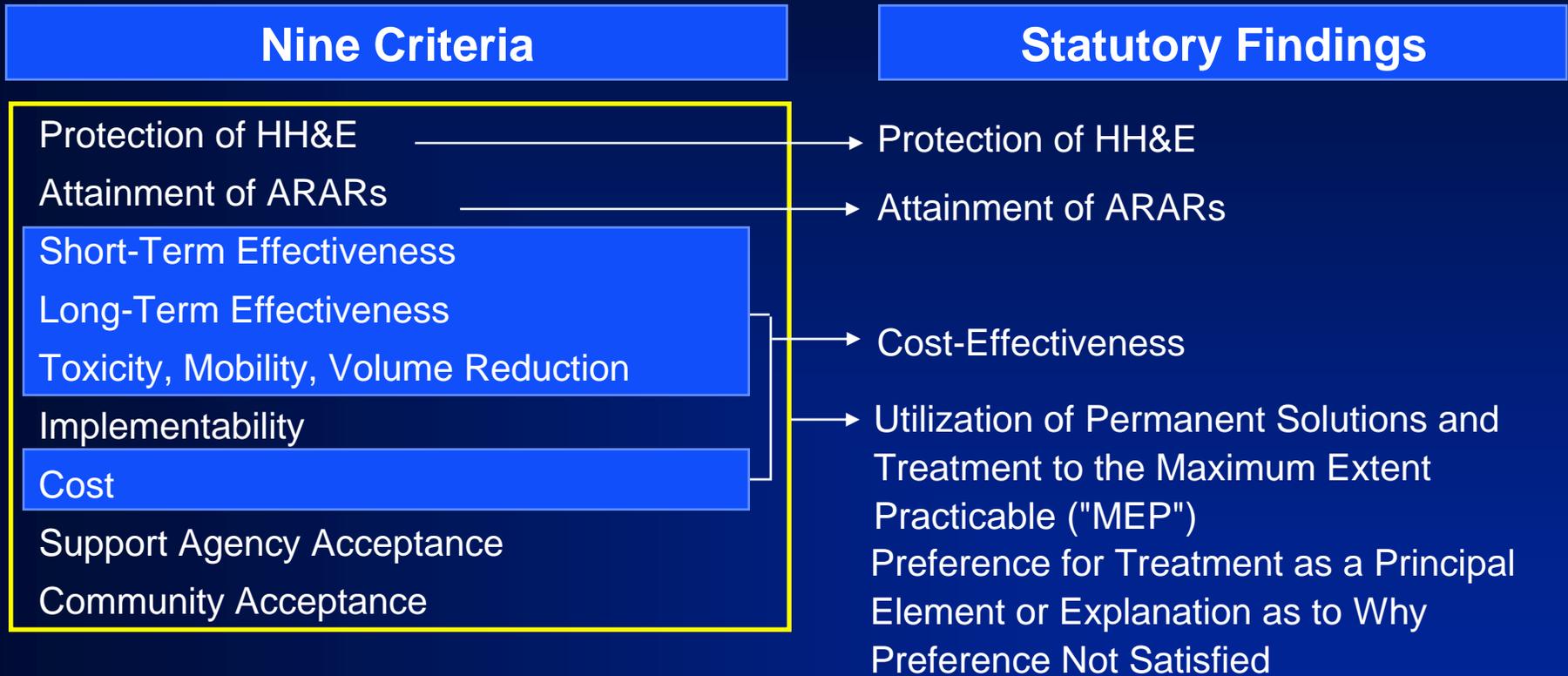
Module Objectives

- ❑ **Identify the steps in the remedy selection process**
- ❑ **Define Proposed Plan and identify its purpose**
- ❑ **Explain how the two screening thresholds, the five balancing criteria, and the two modifying criteria are used during the alternatives selection process**

1. Overview of Remedy Selection Process



2. From Nine Criteria to Statutory Findings

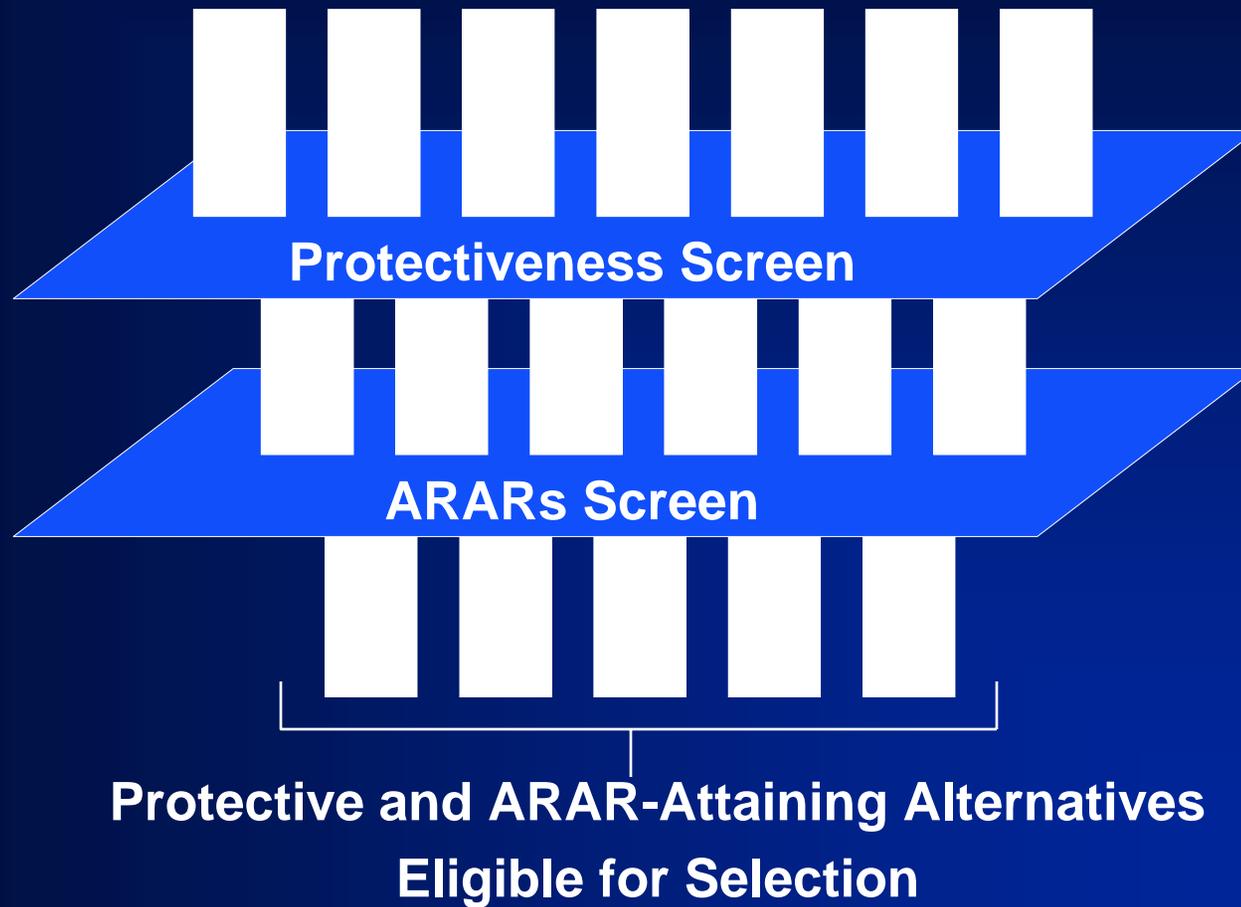


- ❑ **Select the most appropriate solution for the site problems that are being addressed:**
 - That alternative representing the maximum extent to which permanent solutions and treatment technologies can be practicably utilized in a cost-effective manner

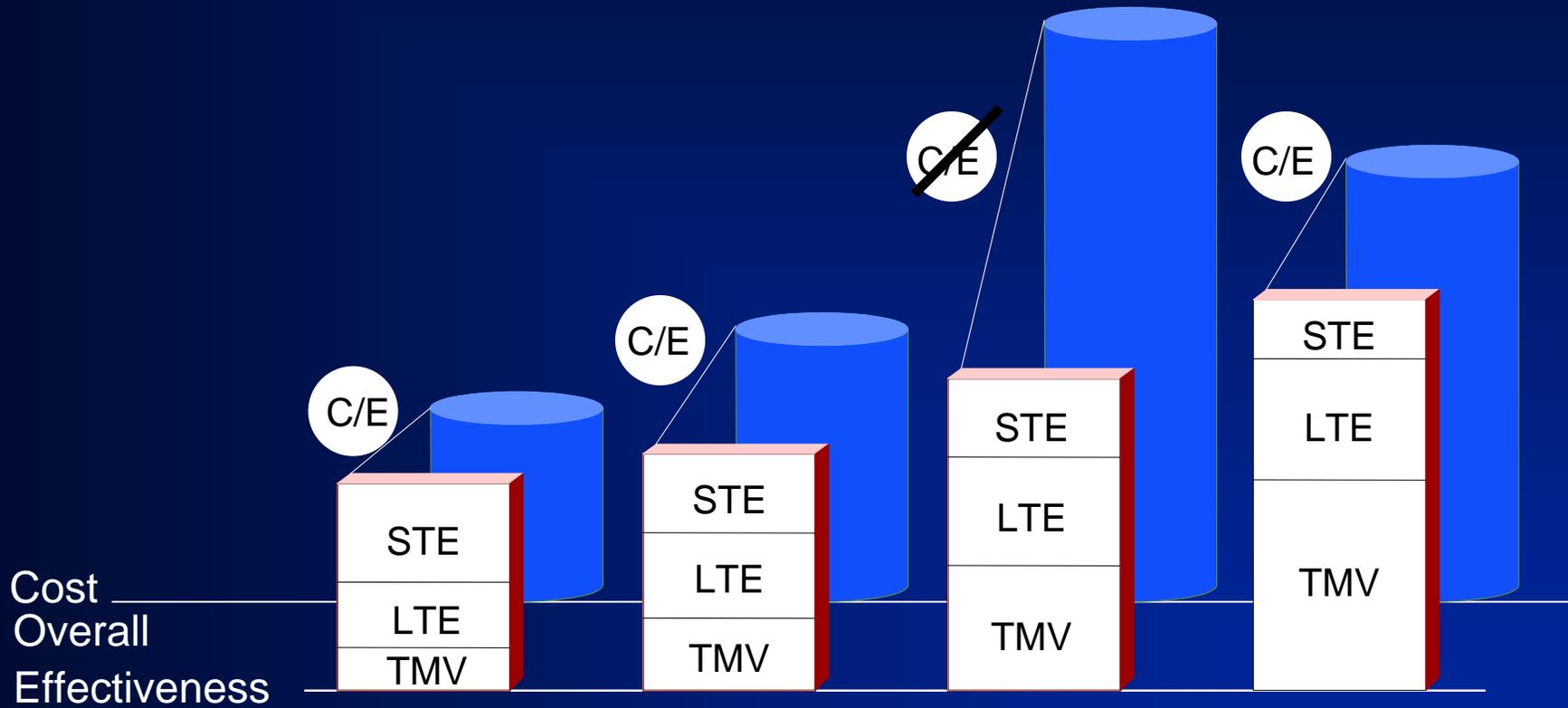
Proposed Plan: Review Results of Detailed Analysis

- ❑ **Individual assessment of alternatives against nine criteria**
- ❑ **Comparative analysis to assess relative performance of alternatives in terms of nine criteria**

Proposed Plan: Identify Threshold Alternatives

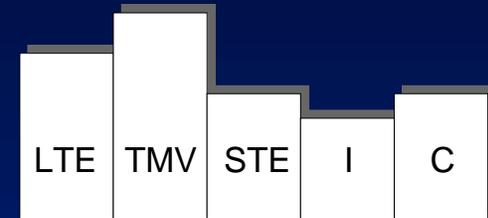


Cost-Effectiveness Analysis



Preliminary "MEP" Balancing

Alternative #4



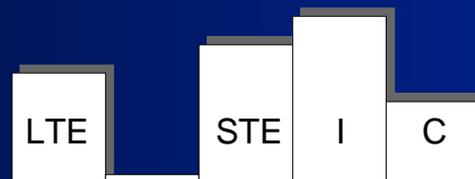
Alternative #3



Alternative #2

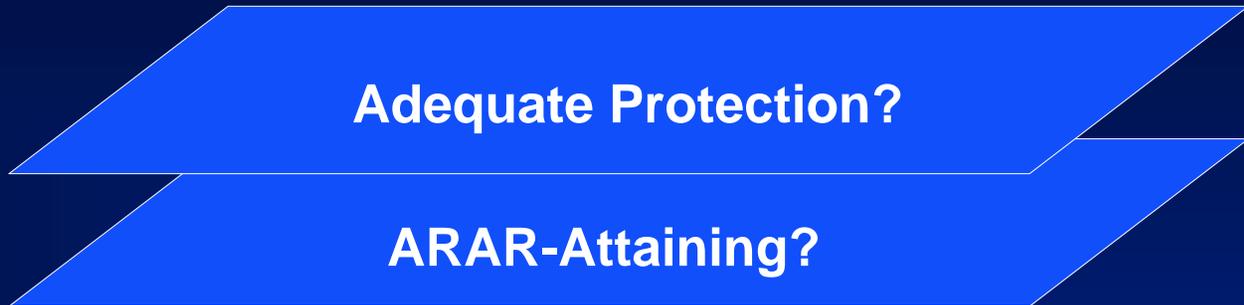


Alternative #1



ROD: Final Remedy Selection

Screens:



Primary
Balancing
Factors:



Modifying
Considerations:

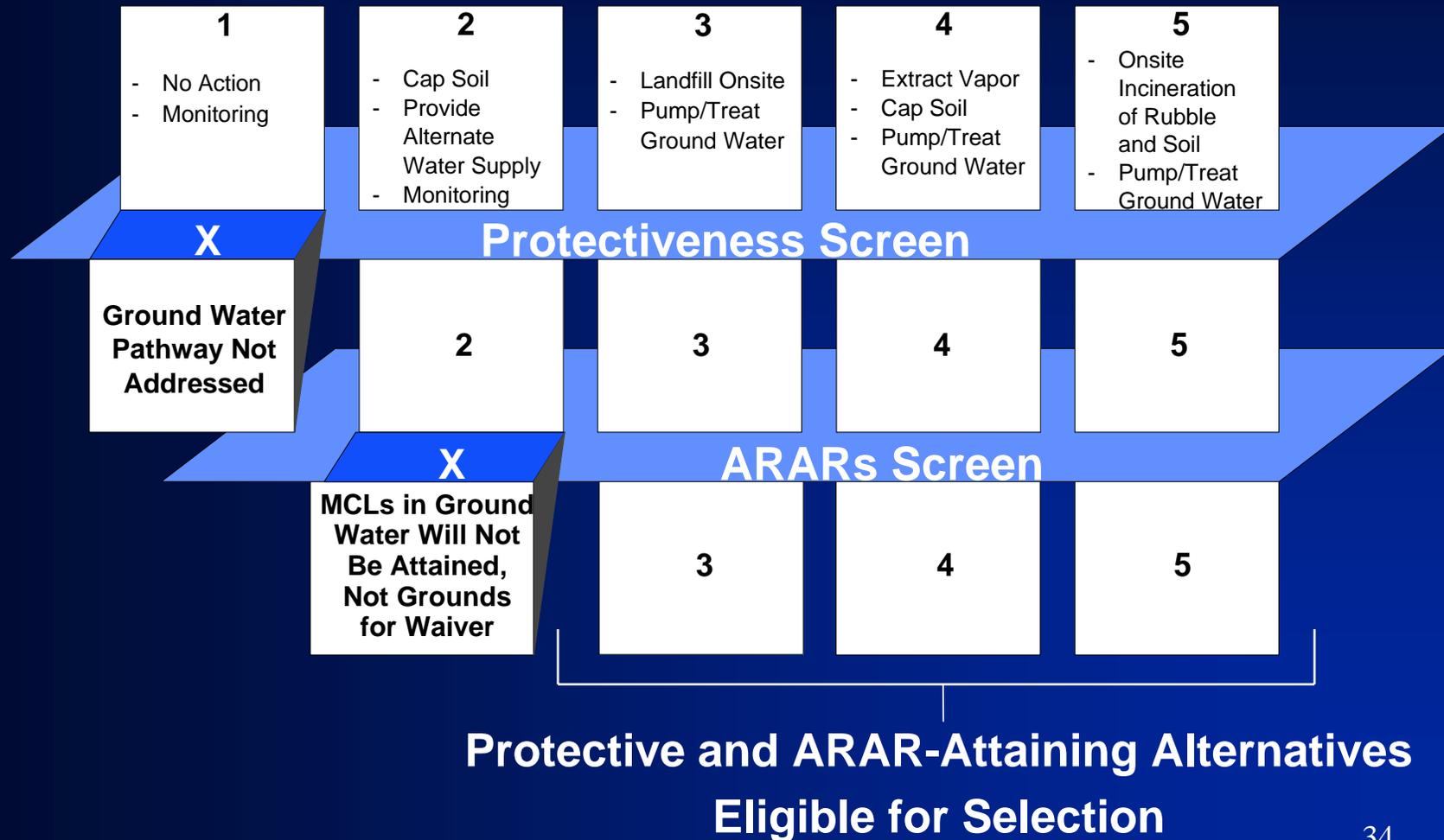


3. Examples

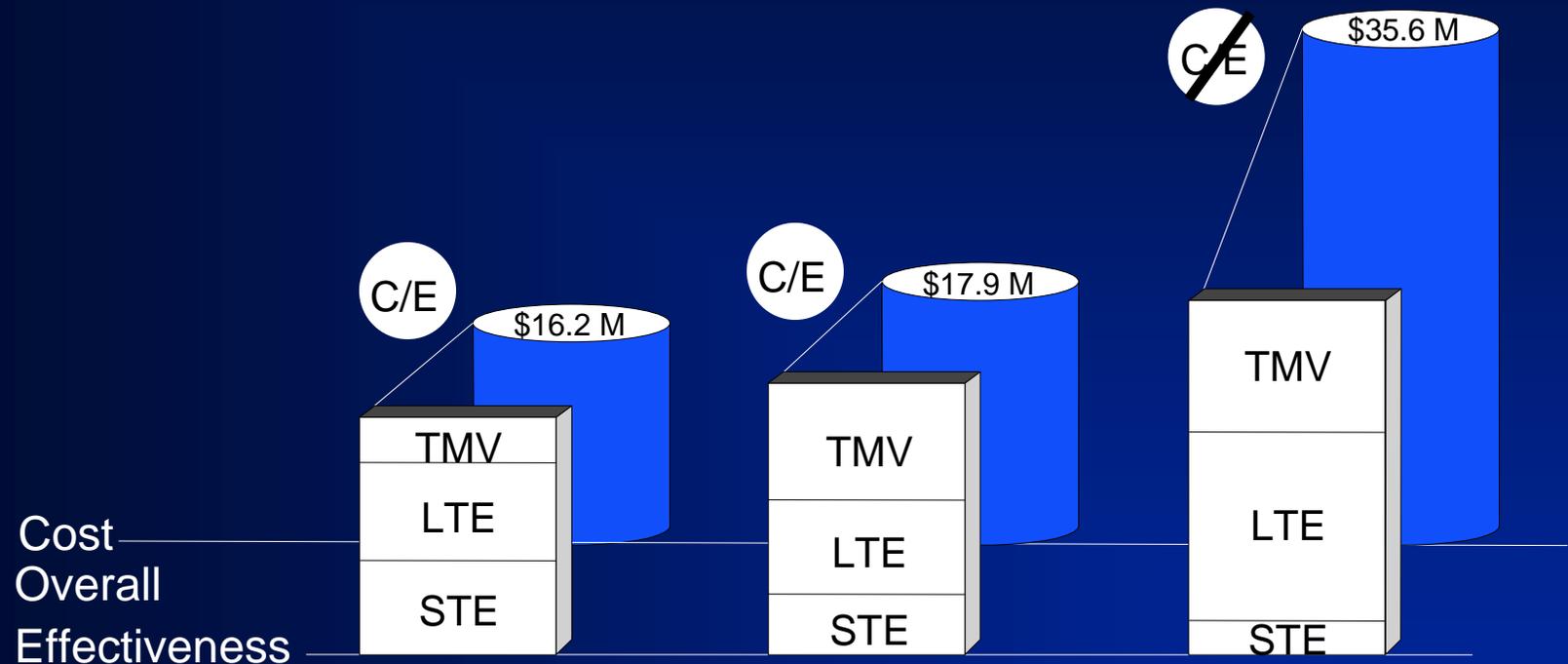
- ❑ **Example 1: Preferred alternative selected as remedy**
- ❑ **Example 2: Preferred alternative no longer cost-effective**
- ❑ **Example 3: Preferred alternative no longer “MEP”**
- ❑ **Example 4: Community opposition requires re-evaluation of “MEP” balancing**

Remedy Selection

Example 1: Preliminary Protectiveness and ARAR Findings



Example 1: Preliminary Cost-Effectiveness Determination



- Alternative #3**
- Onsite Landfill
 - GW Pump/Treat

- Alternative #4**
- Extract Vapor then Cap Soils
 - GW Pump/Treat

- Alternative #5**
- Onsite Incineration of Rubble and Soil
 - GW Pump/Treat

Example 1: Preliminary "MEP" Balancing

Protective, ARAR-Attaining, and C/E Alternatives Eligible for Selection

Alternative #3

- Onsite Landfill
- GW Pump/Treat

Alternative #4

- Soil Vapor Extraction
Followed by Cap
- GW Pump/Treat

Identify Alternative that Appears to Provide Best Balance (Preliminary "MEP" Balancing)

~~MEP~~

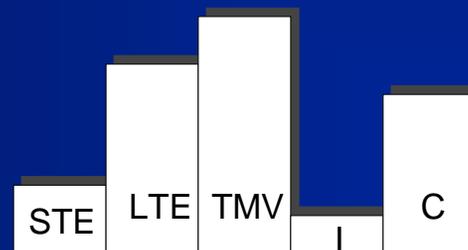
Does Not Satisfy Preference for Treatment



Alternative #3

MEP

Satisfies Preference for Treatment



Alternative #4

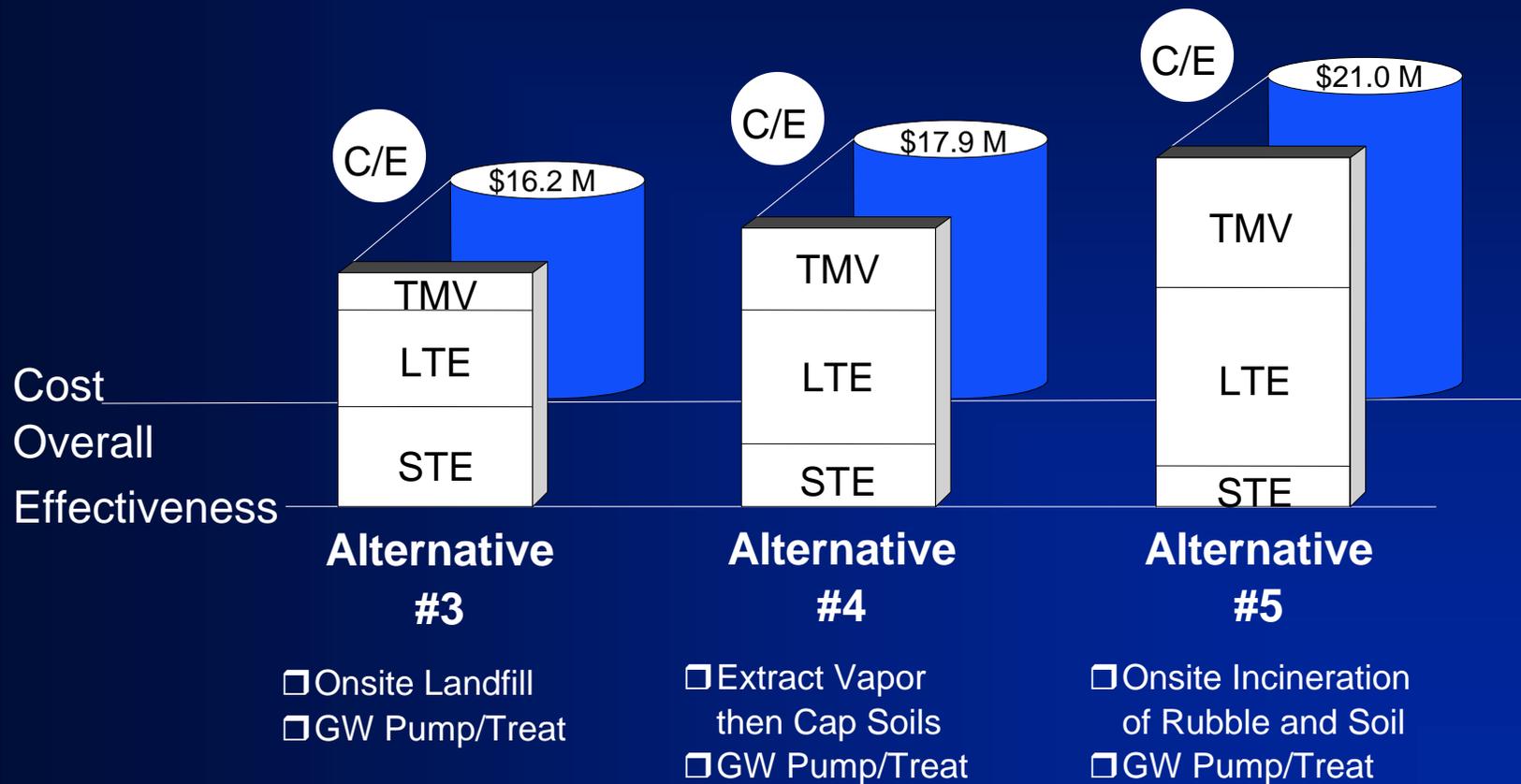
Example 1: Preferred Alternative Selected as Final Remedy

- ❑ **No new information provided in public comment that changes preliminary statutory determinations**
- ❑ **State and community find preferred alternative acceptable**

Example 2: Preferred Alternative No Longer Cost-Effective

- ❑ **Alternative 4 proposed**
- ❑ **New information reveals incineration costs were overestimated**
- ❑ **Reevaluate cost-effectiveness analysis and “MEP” determination as part of balancing**

Example 2: Final C/E Analysis



Remedy Selection

Example 2: Final "MEP" Balancing

Protective, ARAR-Attaining, and C/E Alternative Eligible for Selection

Alternative #3

- Onsite Landfill
- GW Pump/Treat

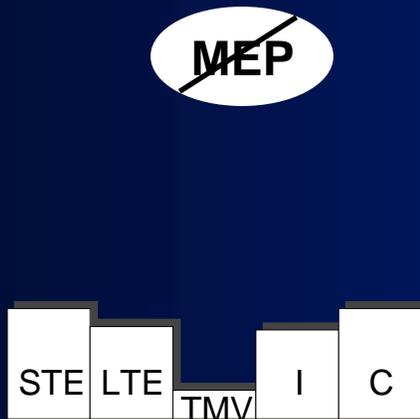
Alternative #4

- Soil Vapor Extraction Followed by Cap
- GW Pump/Treat

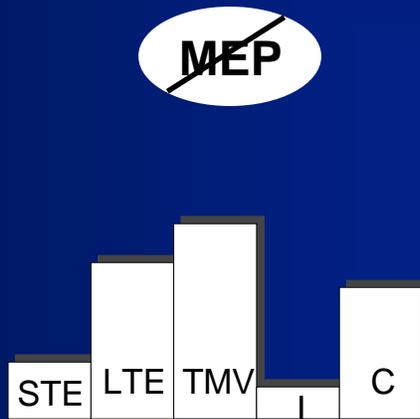
Alternative #5

- Onsite Incineration (Clean Closure)
- GW

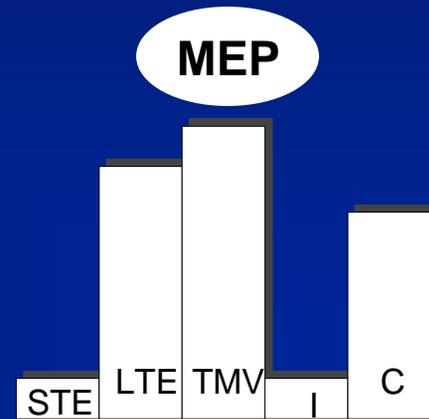
Select Alternative Affording Best Balance



Alternative #3



Alternative #4

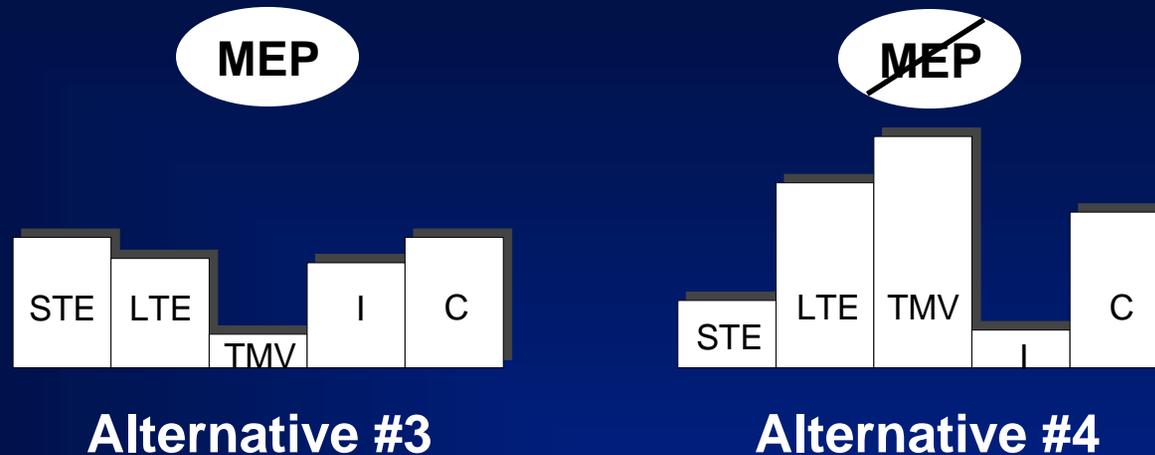


Alternative #5

Example 3: Preferred Alternative No Longer Provides Best Balance

- ❑ **Alternative 4 proposed**
- ❑ **New information reveals soil vapor extraction more difficult to implement than previously believed**
- ❑ **“MEP” determination reconsidered**

Example 3: Final MEP Decision



- ❑ Rebalancing reveals Alternative 3 is most appropriate solution for the site....providing the best balance
- ❑ No discernable difference between Alternatives in terms of support agency or community acceptance

Example 4: Community Opposition Leads to Selection of Remedy Other Than Preferred Alternative

- ❑ **Alternative 4 proposed**
- ❑ **Community objects to long implementation time of soil vapor extraction and incineration**
- ❑ **Objection causes lead agency to reconsider “MEP” determination**

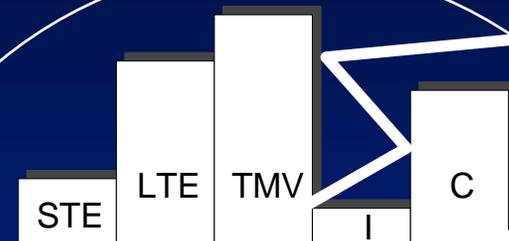
Example 4: Final MEP Balancing

"MEP"?



Alternative #3

- ❑ Onsite Landfill
- ❑ GW Pump/Treat
- ❑ 2 Year Implementation Time



Alternative #4

- ❑ Soil Vapor Extraction Followed by Cap
- ❑ GW Pump/Treat
- ❑ 5-8 Year Implementation Time

**Strong
Community
Objection**

Module Summary

- ❑ **The remedy selection process includes the following steps:**
 - **Identify preferred alternative**
 - **Conduct internal briefings and support agency review on draft FS and proposed plan**
 - **Solicit public comment on final proposed plan and RI/FS report**
 - **Conduct internal briefings and support agency review on draft ROD**
 - **Select final remedy**
 - **Sign final ROD**

Module Summary (con't)

- ❑ **The purpose of the proposed plan is to facilitate public participation in the remedy selection process**
- ❑ **The proposed plan summarizes all the alternatives that were considered, highlighting the key factors which led to the identification of the preferred alternative**

Exercise 5: Remedial Alternatives Selection Exercise

□ Exercise Objectives:

- Introduces students to the process of remedial alternative selection**
- Students are also able to look at the selection process from various roles**