Moving Petroleum Release Sites to Closure

ASTSWMO Webinar

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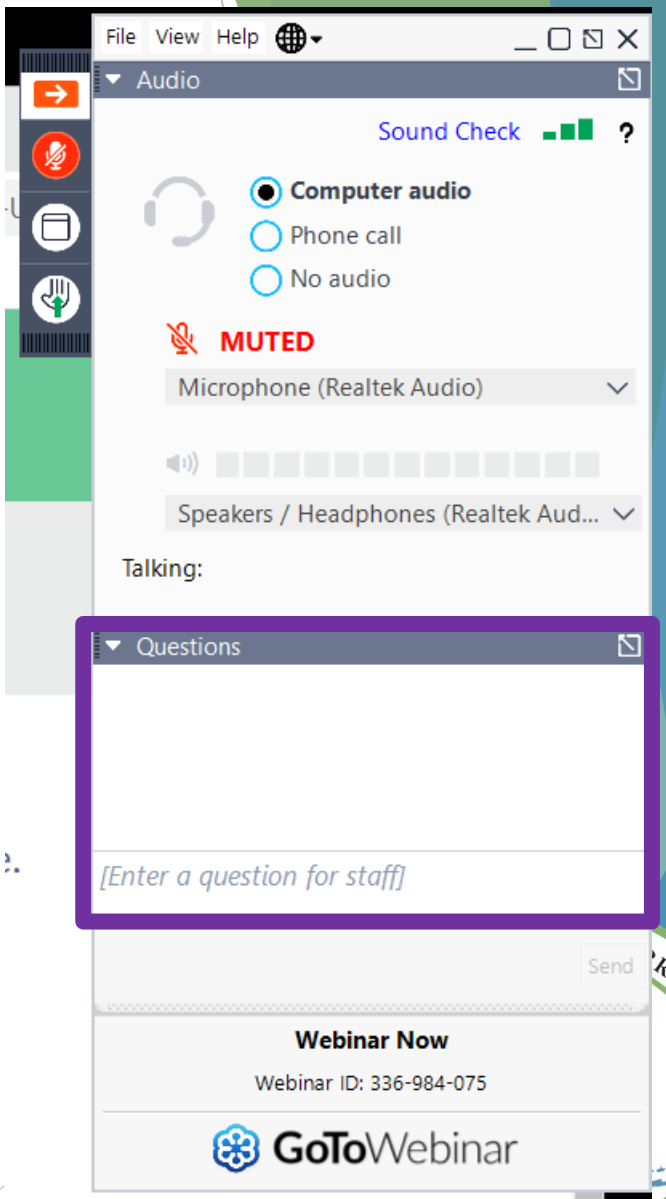
Before we start

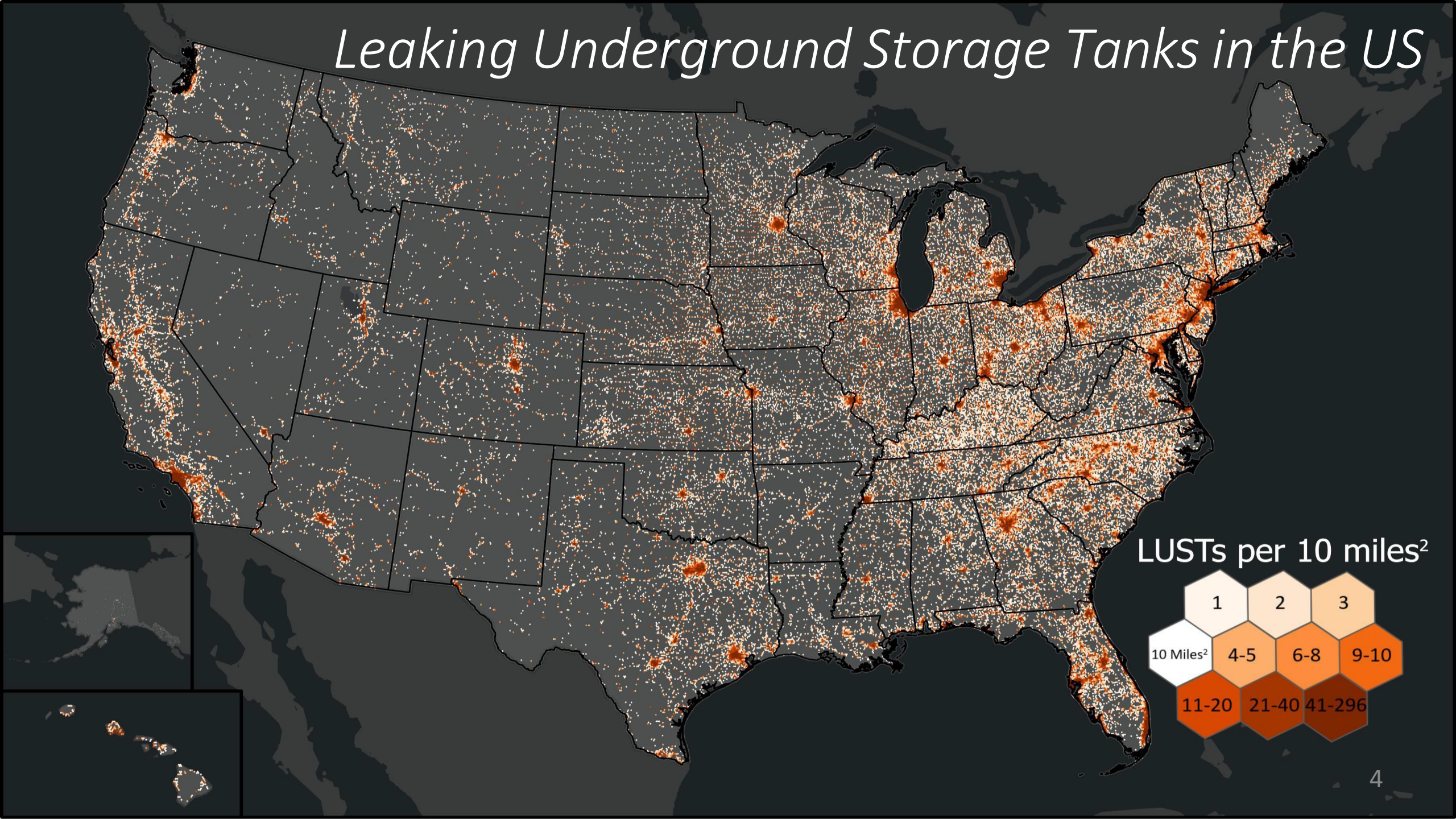
- All attendees will be muted throughout the webinar.
- **Questions:** Use the **Questions Panel** in the dashboard to send questions to the speakers during the webinar.
- **Note who the question is directed to in your submittal.**
- Questions will be answered at the end of the webinar.
- The webinar is being recorded and will be made available on the ASTSWMO website.



Goals for this Webinar

- Alternative criteria for closing LUST remediation projects
  - 58,000 open LUST sites
  - Energy transition will increase releases and decrease revenues
- Outline the proposed changes
- Invite you to participate

Leaking Underground Storage Tanks in the US

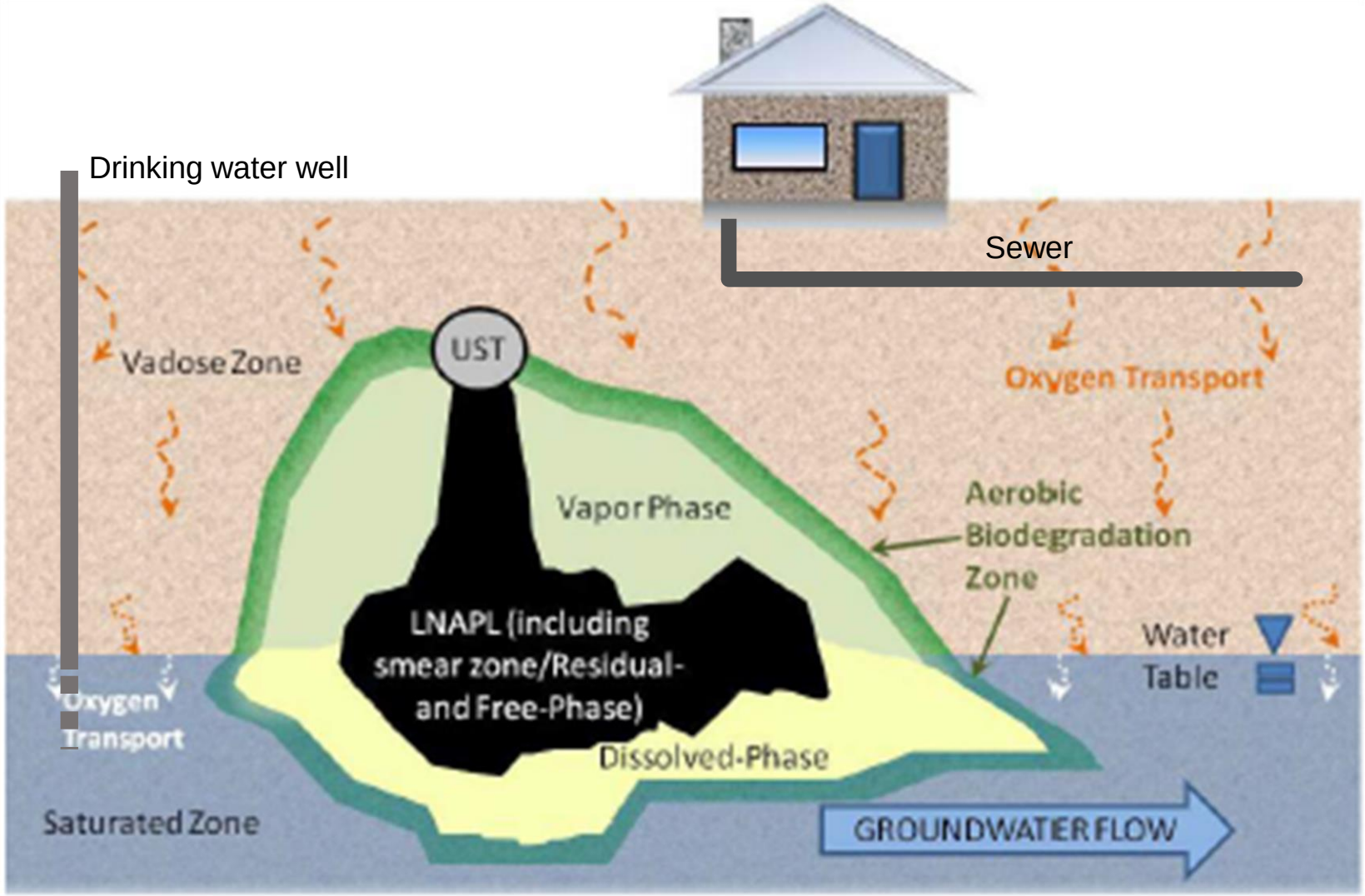


Evolution of Petroleum UST Corrective Action

	1980s	1990s	Current
Cleanup goals	Universal Worst case exposure	Source, pathway, receptor Site specific target concentrations	Screening distances Stability Alternative end points
Assessment	Homogenous subsurface	More complete	HRSC for complex sites Measure surrogates
Remedial Methods	Physical extraction	*in-situ* methods	Recoverability NSZD Enhanced biodegradation
Natural Degradation	A mystery	Some understanding	Rely on Calculate rate

What Have We Learned?

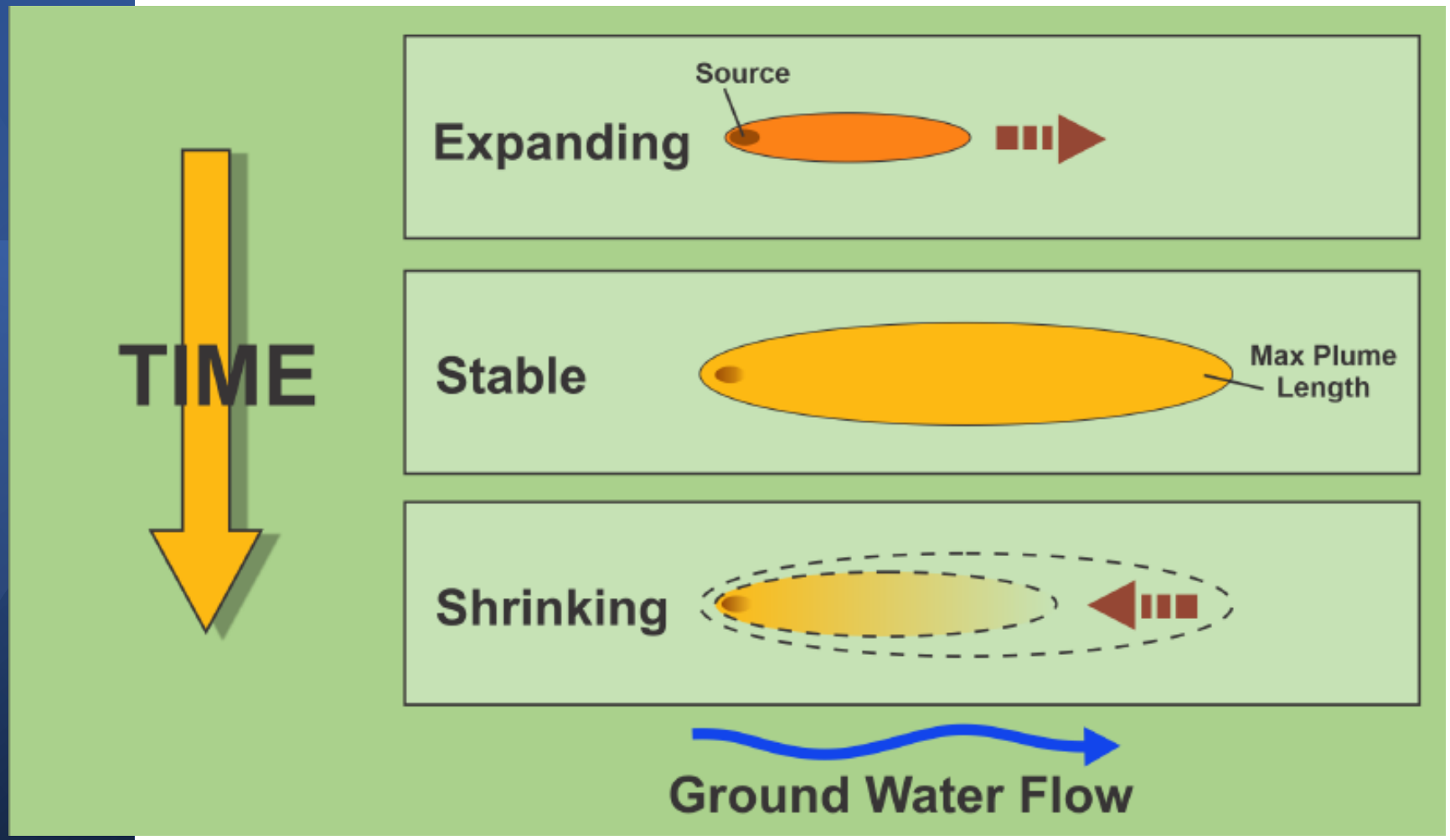
Source
Pathway
Receptor



Based on Figure 2 from “Technical Guide For Addressing Petroleum Vapor Intrusion At Leaking Underground Storage Tank Sites” EPA 510-R-15-001 (2015)

What Have We Learned?

Stability



From: New Jersey "Monitored Natural Attenuation Technical Guidance", (2022)

What Have We Learned?

LNAPL Behavior

ITRC LNAPL3 describes how:

- LNAPL flows in more permeable paths
- LNAPL attaches to fine-grained soil
- Once the release has stopped, motor fuel plumes typically become stable within a year
- Biodegradation plays a bigger role than was initially thought

Moving Sites to Closure (MStC) Task Group

ASTM Committee - E50.04

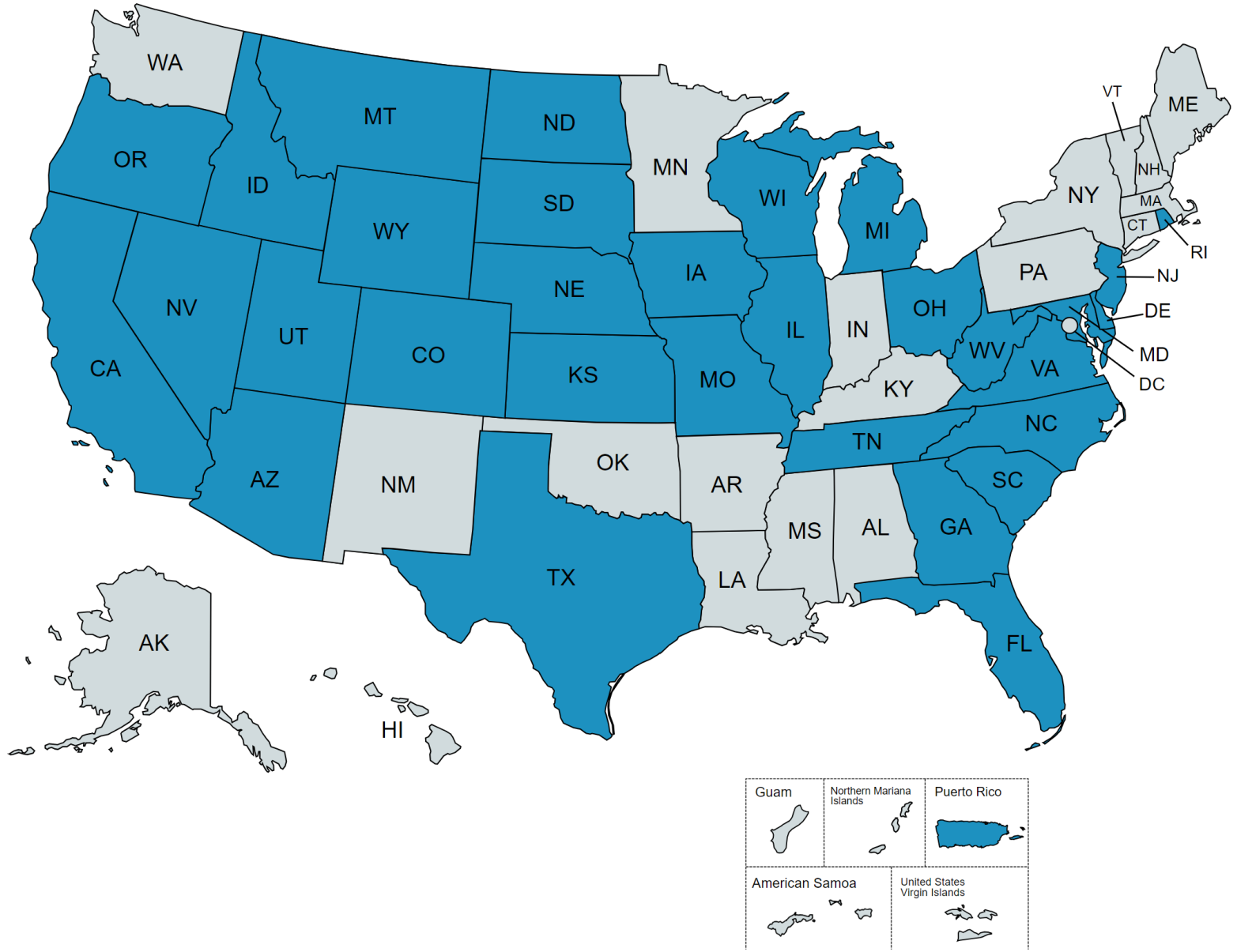
73 members incorporating the latest science to develop sustainable solutions for stalled remediations

Regulator	30%
Owner	14%
Insurer/Fund	5%
Consultant	47%
Academic	4%

ASTSWMO State Survey

- 75 questions prepared by workgroup
- ASTSWMO LUST Task Force sent out survey
- 34 States and Territories responded
- If your state has not responded, you still have time

ASTSWMO LUST Story Map



Categories of Questions

- Vapor Intrusion
- Groundwater/Surface Water
- Vadose Zone Soils
- LNAPL/Free Product
- Barriers to Closure
- Helpful guidance?

Results
Vapor Intrusion

- 72% allow engineering controls
- 62% allow technically defensible criteria
- 59% use one or more of EPA PVI Screening Criteria
- **44% allow no additional net environmental benefit**

Results Groundwater

- 94% allow closure if on-site GW below clean-up criteria
- 78% allow closure if off-site GW below clean-up criteria
- **72% allow the use of institutional controls**
- 50% allow closure based on mass flux analysis
- 44% allow no additional net environmental benefit

Results
Vadose Soil

- **88% allow closure if COCs below cleanup criteria**
- 75% allow the use of engineered barriers
- 62% have TPH, GRO or DRO closure criteria
- 50% allow no additional net environmental benefit

Results LNAPL

- 56% allow closure if LNAPL is stable
- 53% allow LNAPL recovery until below a predetermined rate
- 41% allow no additional net environmental benefit
- **34% allow individual regulators to determine maximum extent practicable**

Results Barriers to Closure

- 84% - unresponsive responsible party
- 69% - rebound of COCs after remediation ends
- 66% - off-site property access issues
- 66% - no viable responsible party
- **56% - staffing shortages**

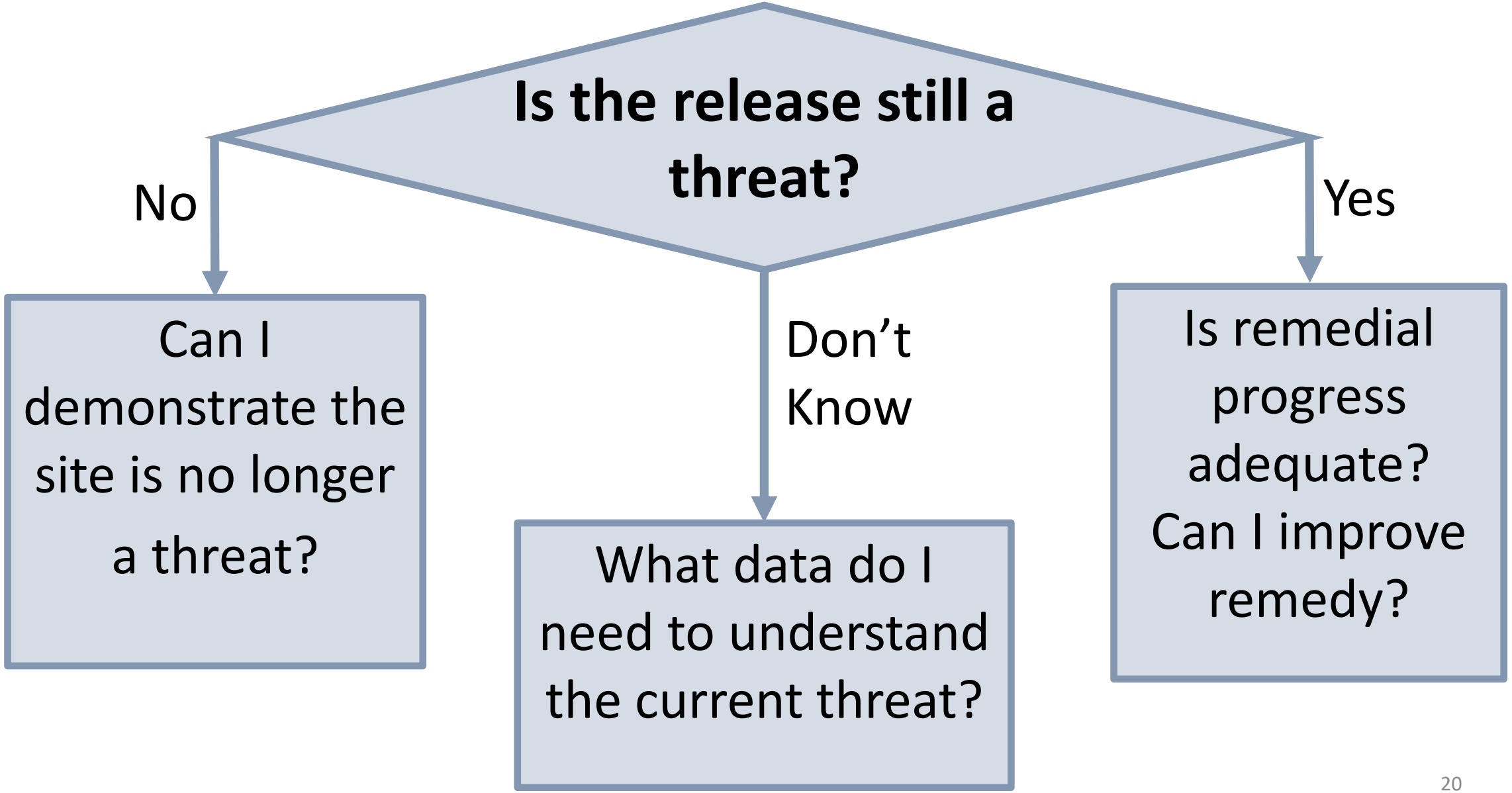
The Task Group's Take Aways from the Survey

- >40% of the States have flexibility to close sites that do not meet remedial goals
- Many states have limitations on free product in monitoring wells
- Regulatory pathways focus on numeric standards in soil and groundwater
- Institutional and engineering controls are widely accepted
- Non-technical issues are rampant

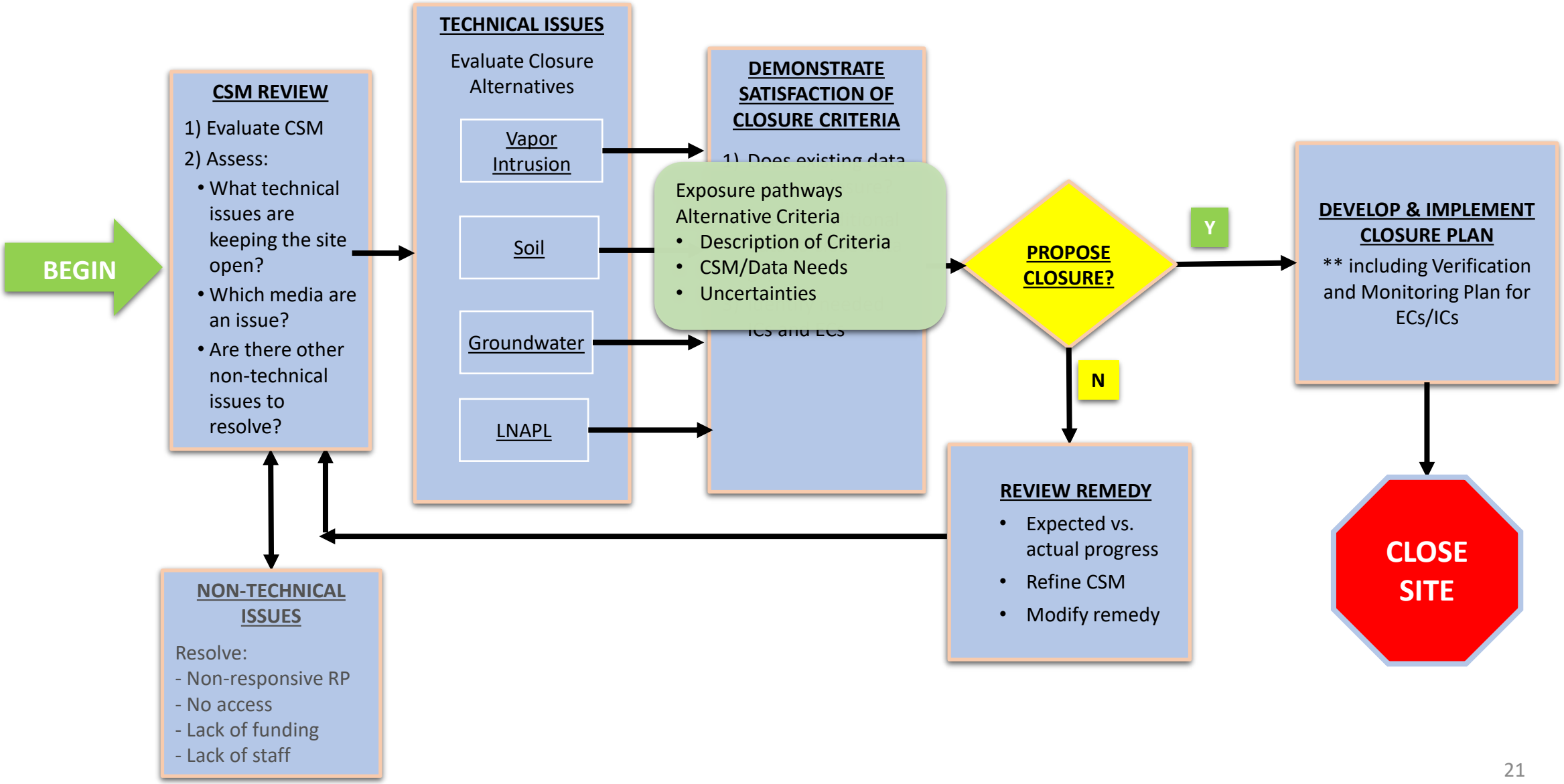
Results
What elements to include in an ASTM Standard?

- 75% wanted criteria for closure decisions
- 72% asked for best practices for managing orphaned sites
- 72% wanted examples or success stories
- 69% asked for outreach and training on best practices
- 69% wanted more on periodic review of remedial effectiveness

Questions to Ask



MStC Flow Chart



Alternative Criteria for Closure

Minimums conditions to consider alternative closure criteria:

- The release has stopped
- No current impacts to receptors
- If present, the LNAPL is stable

Alternative Criteria for Closure

Demonstrate low threat based on:

- Distance
- Stability
- Modeling – future movement or mass limited

Alternative Criteria for Closure: LNAPL Stability

Demonstrate the LNAPL is stable:

- Decreasing LNAPL
- Stable groundwater plume
- Residual footprint > mobile LNAPL footprint
- LNAPL transmissivity
- Residual LNAPL in the soil vs gauged LNAPL thickness

Engineering and Institutional Controls

- Critical for many sites
- Periodic evaluation to ensure continued effectiveness

Major Changes

- Free product in monitoring wells may be acceptable
- Rationale for closure more descriptive than numeric
- Many states allow alternatives, but have not defined them
- Some states will need revisions to their law or regulation
- Education

Want to participate? Join the ASTM Task Group!

Questions?

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