Strategies To Increase LUST Cleanups: Lessons From States

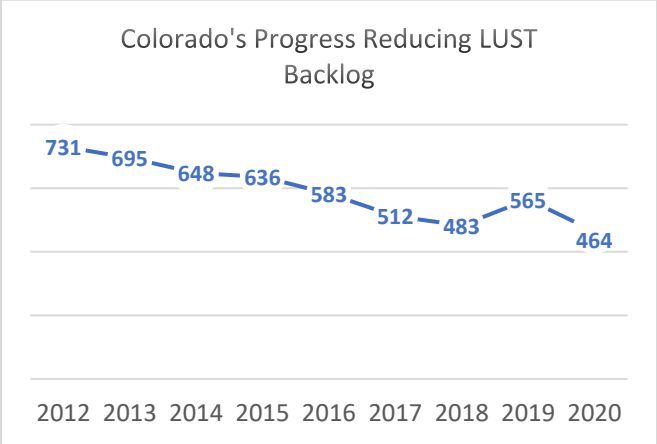
Colorado's RBCA and "SMART" Approach To LUST Cleanups

Summary

- Closing sites with offsite contamination can be a challenge for state leaking underground storage tank (LUST) programs. To address this issue, Colorado enhanced its Tier I and Tier II risk based corrective action (RBCA) criteria by establishing Tier III and Tier IV options that allow for site closure in situations where contamination extends beyond the property boundary as long as certain conditions are met. Doing so helped them close older sites that were difficult to close under their Tier I and Tier II criteria, even after years of active remediation efforts.
- Colorado's SMART approach (see "Define Remedial Goals and Objectives") to cleaning up LUST releases encompasses:
  - Specific—targeting the treatment area and clearly stating technology-specific end points
  - Measurable—using performance metrics that demonstrate progress toward the end point
  - Agreed upon—ensuring responsible party, cleanup consultant, and state regulator understand, accept, and agree on concerns, goals, objectives, treatment areas, metrics, and end points
  - Realistic—demonstrating the ability to achieve objectives
  - Time based—targeting a date to achieve the remedial end point
- To reach closure, Colorado uses the treatment train concept of sequencing remedial technologies and continuous re-evaluation during site remediation.

Results

- Closing 365 releases during FY 2020 means Colorado has closed 95 percent of their reported confirmed releases since the start of the federal underground storage tank program in 1988.
- Since October 2014, Tier III and Tier IV closures have made up over 10 percent of Colorado's total closures in that time. These sites would have been extremely difficult to close or otherwise not closed.
- Colorado has been able to allocate limited resources to higher-risk sites.



Colorado's LUST backlog since 2012, illustrating the impact of Tier III and Tier IV closures on reducing the backlog at a quicker pace since 2015. The spike after 2018 is due to spill bucket test failures, most of which are quickly closed out.

Lessons Learned

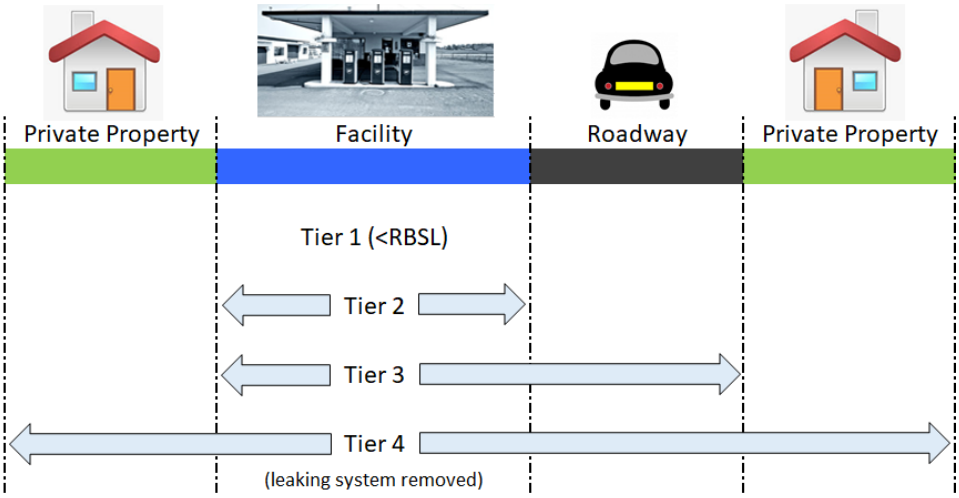
- Make an extensive effort to inform and educate affected parties and the general public about the RBCA process. Colorado's Oil and Public Safety Division (OPS) website highlights impacted areas on a map.
- Most people are more concerned with property devaluation; they generally accept that health risks are adequately addressed. If exposure pathways change, OPS reserves the right to reopen an investigation, which comforts landowners. Colorado notifies offsite property owners at least 30 days prior to anticipated site closure. The state shares current and anticipated exposure and risk information and provides an opportunity for offsite owners to notify OPS about additional exposure pathways that would change the risk evaluation. If the state does not receive additional information, they close the site. This reduces transaction costs and expedites closures.
- Sequencing multiple remedial technologies based on remedial objectives can improve efficiency and lead to quicker closure.
- Manual bailing, absorbent socks, and other techniques to recover minor amounts of light non-aqueous phase liquid (LNAPL) accumulating in wells is ineffective in reducing overall risk because those

techniques typically only address the small amount of LNAPL that is easily collected. Instead, Colorado focuses on reducing the toxicity of LNAPL by remediating the source where most of the hydrocarbon mass is and degrading chemicals of concern, mainly BTEX and other aromatics, via mechanical, chemical, or biological means.

- Monitored natural attenuation sites do not always progress as expected. Colorado uses a spreadsheet to model expected reductions over time. A site may require active remediation if it does not meet calculated milestones.

Background

- Colorado uses fate and transport modeling, empirical data, and other lines of evidence to support Tier III and Tier IV closure criteria, which apply to public roadways and to private property, respectively.
- For sites that cannot achieve Tier I or Tier II closure criteria, Colorado can apply Tier III or Tier IV closure criteria if:
  - Free product was removed to the maximum extent practicable
  - Past efforts were properly implemented
  - Feasible technologies were already tried
  - Access and cost were considered, and the anticipated costs outweigh the benefits of further cleanup efforts
  - Future risk reduction was determined unlikely
- Colorado adopted Interstate Technology & Regulatory Council's (ITRC) LNAPL principles and recommendations in 2015, leading to closures with measurable LNAPL present if recovery is negligible and there are minimal or manageable health risks receptors. Colorado also adopted ITRC and EPA petroleum vapor intrusion screening criteria in 2014 to assess vapor exposure pathways quickly.
- Treatment trains set forth a plan at the beginning of the cleanup to use multiple treatment technologies in succession or in multiple contaminant areas to reach closure.



Closure tiers adopted in Colorado.

For More Information

- Colorado Department of Labor & Employment, Division of Oil & Public Safety, 303-318-8500
- Association of State and Territorial Solid Waste Management Officials (ASTSWMO) LUST Workshop 2019 Resources: Closure Pathways and LNAPL Policy in Colorado; Planning Treatment Trains and Concurrent Remedies