



THE NATIONAL LUST CLEANUP BACKLOG: A STUDY OF OPPORTUNITIES

STATE SUMMARY CHAPTER: TEXAS

LIST OF ACRONYMS

EPA	United States Environmental Protection Agency
ESA	Expedited Site Assessment
FY	Fiscal Year
LPST	Leaking Petroleum Storage Tank
LUST	Leaking Underground Storage Tank
MNA	Monitored Natural Attenuation
MSA	Multi-Site Agreement
PRP	Potentially Responsible Party
PSTR	Petroleum Storage Tank Remediation
RBCA	Risk-Based Corrective Action
RP	Responsible Party
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
UST	Underground Storage Tank

EXECUTIVE SUMMARY

Leaks from underground storage tanks (USTs) threaten America's groundwater and land resources. Even a small amount of petroleum released from a leaking underground storage tank (LUST) can contaminate groundwater, the drinking water source for nearly half of all Americans. In surveys of state water programs, 39 states and territories identified USTs as a major source of groundwater contamination.² As the reliance on our resources increases due to the rise in population and use, there is a correspondingly greater need to protect our finite natural resources.

From the beginning of the UST program to September 2009, more than 488,000 releases were confirmed from federally regulated USTs nationwide. Of these confirmed releases, over 100,000 needing cleanup remained in the national LUST backlog. These releases are in every state, and many are old and affect groundwater. To help address this backlog of releases, the United States Environmental Protection Agency (EPA) invited 14 states to participate in a national backlog characterization study.

ANALYSIS OF TEXAS DATA

The Texas Commission on Environmental Quality (TCEQ) has made significant progress toward reducing its LUST cleanup backlog. As of February 2009, TCEQ had completed 22,642 LUST cleanups, which is 88 percent of all known releases in the state. At the time of data collection, there were 2,968 releases remaining in its backlog.³ To most effectively reduce the national cleanup backlog, EPA believes that states and EPA must develop backlog reduction strategies that can be effective in states with the largest backlogs. EPA invited Texas to participate in its national backlog study because Texas has one of the ten largest backlogs in the United States.

In this chapter, EPA characterized releases in Texas that have not been cleaned up, analyzed these releases based on categories of interest, and identified potential opportunities for TCEQ and EPA to explore that might improve the state's cleanup progress and reduce its backlog. Building on the potential cleanup opportunities identified in the study, EPA will continue to work with TCEQ to develop backlog reduction strategies.

In Texas, as in every state, many factors affect the pace of cleaning up releases, such as the availability and mechanisms of funding, statutory requirements, and program structure. The recent economic downturn has also had an impact on the ability of many states to make progress on cleanups.

EPA included potential cleanup opportunities in this report even though current circumstances in Texas might make pursuing certain opportunities challenging or unlikely. Also, in some cases, TCEQ is already using similar strategies as part of its ongoing program. The findings from the analysis of TCEQ's data and the potential cleanup opportunities are summarized below in eight study areas: stage of cleanup, media contaminated, cleanup financing, potentially responsible party (PRP)

- 1 Data were provided in May 2009 by TCEQ staff and are not identical to UST performance measures on EPA's website, available online at www.epa.gov/oust/cat/camarchv.htm.
- 2 EPA, *National Water Quality Inventory: 2000 Report*, pp. 50-52. www.epa.gov/305b/2000report/chp6.pdf.
- 3 EPA tracks individual releases rather than sites in its performance measures. Therefore, the analyses in this report account for numbers of releases, not sites.
- 4 Unknown media releases include those releases where the media is unknown as well as those releases where, based on available data, it was not possible to identify the media contaminated.

Texas LUST Data By the Numbers¹

National Backlog Contribution	2.9%
Cumulative Historical Releases	25,610
Closed Releases	22,642/88%
Open Releases	2,968/12%
Stage of Cleanup	
Confirmed Release	1,235/40%
Site Assessment	533/18%
Remediation	1,200/42%
Media Contaminated	
Groundwater	1,967/66%
Soil	259/9%
Other	98/3%
Unknown ⁴	644/22%
Median Age of Open Releases	10.0 years

recalcitrance, release priority, number of releases per PRP, geographic clusters, and passive remediation.

Stage of Cleanup *(see page TX-10 for more details)*

Texas Finding	Potential Opportunity	Releases
19 percent of releases are either: <ul style="list-style-type: none"> • 5 years old or older and site assessment has not started; or • 10 years old or older and still in site assessment. 	<ul style="list-style-type: none"> • Expedite site assessments at old releases to identify releases that can be closed with minimal effort or moved toward remediation. • Implement enforcement actions at stalled releases. 	559
35 percent of releases are: <ul style="list-style-type: none"> • 10 years old or older; and • in remediation. 	Use a systematic process to explore opportunities to accelerate cleanups and reach closure such as: <ul style="list-style-type: none"> • periodic review of release-specific treatment technologies; • review of site-specific cleanup standards; • consider use of institutional or engineering controls; and • implement enforcement actions if cleanup has stalled. 	1,043

The remaining open releases in Texas are taking a long time to move through the cleanup process and the progress of many old cleanups is stalled. There are several reasons why many releases in the backlog are old including: past deferral of cleanups due to lack of resources, many releases are complex and therefore take a long time to address, and many releases are being addressed through passive remediation. EPA believes it is important for TCEQ to explore opportunities to accelerate cleanups at older releases and work toward bringing all releases to closure.

Media Contaminated *(see page TX-12 for more details)*

Texas Finding	Potential Opportunity	Releases
32 percent of releases: <ul style="list-style-type: none"> • contaminate groundwater; • are in remediation; and • are 10 years old or older. 	Systematically evaluate cleanup progress at old releases with groundwater impacts and consider alternative cleanup technologies or other strategies to reduce time to closure.	948
9 percent of releases: <ul style="list-style-type: none"> • impact soil only; and • have a higher median age than releases with groundwater contamination in all LUST cleanup stages. 	<ul style="list-style-type: none"> • Continue to use targeted backlog reduction efforts to close old releases with soil contamination; • Encourage responsible parties (RPs) to use expedited site assessment to move releases more quickly into remediation. 	259
22 percent of releases do not have the type of media contaminated tracked electronically.	Target releases with unknown media contamination for expedited site assessments (ESAs) and use this information to update the release priority as needed and to customize the remedial activity.	644

Releases contaminating groundwater have always been the largest part of the national backlog and 66 percent of releases in Texas are documented as contaminating groundwater. In general, groundwater contamination is more technically complex to remediate and also takes longer to clean up than soil contamination. For old, complex cleanups where long-term remediation is underway, EPA believes it is important for TCEQ to periodically reevaluate cleanup progress and reconsider whether the cleanup technology being used is still optimal.

Even though soil contamination is typically easier to remediate than groundwater contamination, many releases in Texas that impact soil only are still unaddressed or are in the early stages of cleanup. These cleanups have likely been deferred for higher risk posed by releases with groundwater contamination. Nevertheless, EPA believes TCEQ should continue to make progress toward closure for all its LUST releases. Better information about the type of media contaminated at each release could also help TCEQ to choose optimal cleanup technologies and to evaluate cleanup progress.

Cleanup Financing *(see page TX-14 for more details)*

Texas Finding	Potential Opportunity	Releases
7 percent of state fund eligible releases have not finished site assessment.	Explore ways to move more state-funded cleanups toward closure, such as: <ul style="list-style-type: none"> • redirecting funds saved at cleanups with improved cost-effectiveness to state fund eligible cleanups where assessment has not been completed; or • encouraging the use of other sources of public and private funding. 	193
84 percent of privately-financed cleanups have not finished site assessment.	<ul style="list-style-type: none"> • Use enforcement actions to initiate the cleanup of privately-financed cleanups. • Provide information and technical assistance to RPs at old releases. • Encourage RPs and stakeholders to examine all available public and private funding options. 	1,575

EPA and state programs are interested in exploring successful financing strategies for completing cleanups quickly. EPA acknowledges that the recent economic downturn has impacted cleanup financing. EPA also believes the availability of funding for cleanup is essential to reducing the backlog, so in addition to this study, EPA is increasing its focus on oversight of state funds as well as conducting a study of private insurance. Most remaining backlogged LUST cleanups in Texas are privately financed, typically by private insurance, and the majority of these have not finished site assessment. Given that RPs are responsible for financing these cleanups guided by state-certified, privately-paid project managers, these releases should be able to proceed with remediation. The state professional staff overseeing cleanups is augmented by state contracted staff for state-funded and privately-funded cleanups.

TCEQ's current efforts to streamline its enforcement process could improve the effective use of enforcement actions to initiate privately-financed cleanups. Where financing is an issue for either state-funded or privately-funded cleanups, TCEQ should consider encouraging the use of other public or private funding sources such as petroleum brownfields grants for low priority releases without a viable RP.

PRP Recalcitrance *(see page TX-16 for more details)*

Texas Finding	Potential Opportunity	Releases
Releases with recalcitrant PRPs are significantly older within all media types.	Use enforcement actions to accelerate the cleanup of releases with recalcitrant RPs.	476

TCEQ regularly reviews its database for releases with recalcitrant PRPs; these releases are significantly older than those with active PRPs.⁵ However, only 42 open releases (1 percent of the backlog) have ever been subject to enforcement actions. Increased use of enforcement actions by TCEQ to prevent RP recalcitrance, especially at soil cleanups, could yield more closures and influence other recalcitrant RPs to resume cleanup activities.

Release Priority *(see page TX-17 for more details)*

Texas Finding	Potential Opportunity	Releases
6 percent of releases: <ul style="list-style-type: none"> • are high priority; and • have not finished site assessment. 	Explore options for moving releases toward closure including: <ul style="list-style-type: none"> • expediting site assessments of all releases to ensure that all releases are appropriately ranked; • ensuring releases with immediate risks are actively being worked on; and • having all releases make progress toward closure. 	180

An appreciable number of releases considered high priority by the state still remained in the early stages of cleanup after a considerable length of time. Some of these cleanups are relatively complex and pose higher risks but others may be artifacts of data management practices. Releases were prioritized until 2003, when Texas Risk Reduction Program rules were implemented and prioritization of releases ceased. Releases are again being prioritized as of March 2009. EPA will work with TCEQ to develop strategies to move all releases toward closure and to confirm that there are no immediate risks to human health and the environment posed by unaddressed high priority releases.

⁵ TCEQ considers a PRP recalcitrant if a release is at least 1.5 years old and the program has not received correspondence from the PRP for 15 months.

Number of Releases per PRP *(see page TX-18 for more details)*

Texas Finding	Potential Opportunity	Releases
PRPs with few releases are slower to complete site assessments and begin remediation than PRPs with more than three releases.	<ul style="list-style-type: none"> Provide information and technical assistance to RPs; or implement enforcement actions at old releases. 	1,242
20 percent of releases are associated with 27 PRPs each with 10 or more releases.	Explore possibilities for multi-site agreements (MSAs) or enforcement actions with parties associated with multiple releases.	584

EPA analyzed the number of releases per PRP to identify the PRPs that might be the largest potential contributors to Texas' cleanup backlog. EPA was able to identify groups of 10 or more releases that are associated with the same PRP based on the "potentially responsible parties" data maintained by TCEQ. In Texas, 27 PRPs are potentially responsible for 10 or more releases each and account for 20 percent of the backlog. TCEQ and EPA can use this information to identify possible participants for multi-site strategies to clean up groups of releases. In addition, RPs responsible for more than three releases are quicker to complete site assessments and move their releases into remediation than are RPs with fewer than three releases.

Geographic Clusters *(see page TX-20 for more details)*

Texas Finding	Potential Opportunity	Releases
9 percent of releases are clustered within a one-mile radius of five or more releases.	Target releases within close proximity for resource consolidation opportunities.	Targeted number of releases ⁶

Another multi-site approach TCEQ could use is targeting cleanup actions at geographically clustered releases. The geographic cluster approach may offer opportunities for new community-based reuse efforts, using economies of scale and addressing commingled contamination. EPA believes that highlighting geographic clusters of releases and working with state and local governments and communities in an area-wide planning context can facilitate the remediation of additional releases. EPA intends to work with the states to conduct further geospatial analyses on clusters of releases in relation to PRPs, highway corridors, local geologic and hydrogeologic

⁶ Opportunities marked as "targeted number of releases" relate to geographic opportunities that will address a limited number of releases within select designated geographic areas.

settings, groundwater resources, and/or communities with environmental justice concerns. These analyses might reveal additional opportunities for backlog reduction.

Use of Passive Remediation *(see page TX-21 for more details)*

Texas Finding	Potential Opportunity	Releases
71 percent of releases in the Remediation stage use passive remediation.	Evaluate effectiveness of cleanup using passive remediation and optimize the cleanup methodology at the less effective cleanups.	712

TCEQ's risk-based decision-making practices identify releases that may use passive remediation, which entails a less active approach than EPA outlines for monitored natural attenuation (MNA). Passive remediation is used for many ongoing cleanups and for a significant number of privately-financed cleanups, most of which are relatively old. Cleanups financed by private financial responsibility mechanisms are not affected by the financial limits placed on cleanups financed by the state fund. If passive remediation at privately-financed cleanups does not address contamination in a reasonable timeframe, EPA encourages the use of active remediation technology.

CONCLUSION

This chapter contains EPA's data analysis of the LUST cleanup backlog in Texas and identifies potential opportunities to reduce the backlog in Texas. EPA discusses the findings and opportunities for Texas, along with those of 13 additional states, in the national chapter of this report. EPA will work with states to develop potential approaches and detailed strategies for reducing the backlog. Development of strategies could involve targeted data collection, reviewing particular case files, analyzing problem areas, and sharing best practices. Final strategies could involve EPA actions such as using additional program metrics to show cleanup progress, targeting resources for specific cleanup actions, clarifying and developing guidance, and revising policies. EPA, in partnership with states, is committed to reducing the backlog of confirmed UST releases and to protecting the nation's groundwater, land, and communities affected by these releases.

PROGRAM SUMMARY

State LUST Program Organization and Administration

The Texas Commission on Environmental Quality's (TCEQ's) Leaking Petroleum Storage Tank (LPST) Program staff oversee all leaking underground storage tank (LUST) cleanups. All cleanups in Texas are RP-lead regardless of whether the release is eligible for the state fund unless the RP is unwilling, unable, or unknown. Cleanups at RP-lead releases must be conducted by a LPST-certified Corrective Action Specialist contracted by the RP and overseen by a LPST-certified Corrective Action Project Manager. RPs must work with a Corrective Action Specialist for cleanups funded both by private insurance and those financed by the state fund. TCEQ professional staff are augmented by a private regulatory contractor.

Cleanup Financing

Most of the backlogged LUST cleanups in Texas are privately financed, typically by private insurance. The Petroleum Storage Tank Remediation (PSTR) fund finances LUST cleanups of releases that were reported before December 22, 1998, from tanks that were in compliance with UST regulations. Texas' fund has a deductible that varies based on the number of tanks that an RP owns and operates at the time of application. State fund-financed cleanups currently represent approximately one-third of Texas' backlog. All corrective action activities and costs for state-funded cleanups must be approved in writing by TCEQ. In addition, a licensed or registered professional engineer must approve the remediation equipment design and supervise construction. The PSTR fund derives revenue from a fee on petroleum fuels at bulk distribution facilities and is currently set to expire on August 31, 2011. The sunsetted state fund will make no more reimbursements after September 1, 2012.

Cleanup Standards

Until spring 2009, two sets of risk-based cleanup standards were applied, depending on release date. As of March 19, 2009, all releases are required to follow Texas Administrative Code (TAC) 334 Risk-Based Corrective Action (RBCA) rules, regardless of release date. These rules are driven by receptors and were reinstated in an effort to reduce time and resources spent on cleanups.

Release Prioritization

Under Texas Risk Reduction Program rules applied between 2003 and 2009, there was no prioritization system in place. TAC 334, which was effective for releases before September 2003 and is retroactively effective as of March 2009, uses risk to prioritize open releases. Prioritization serves as the basis for allocating the state's financial resources for state-funded cleanups and oversight resources in general. Privately-financed cleanups are prioritized to allocate staff oversight resources, if they become limited. Staff focus on higher priority releases, regardless of state fund eligibility. Some lower priority releases may close faster because receptors are not exposed.

State Backlog Reduction Efforts

To reduce a historically large backlog, TCEQ has undertaken efforts to ensure that all releases are progressing through cleanup. For the past five years, TCEQ used the Inactive Initiative to target releases for which there has been no communication from PRPs for 15 months or more. Efforts are also underway to streamline the enforcement process to pursue unresponsive or unwilling RPs.

⁷ Based on FY 2009 *UST Performance Measures End of Year Activity Report*.

⁸ Estimates provided by TCEQ staff.

⁹ This amount includes approximately \$1.0 million for Texas' privatization contract.

Texas LUST Program At a Glance

Cleanup Rate

In fiscal year (FY) 2009, TCEQ confirmed 289 releases and completed 639 cleanups.⁷

Cleanup Financing

Of open releases, 36 percent (1,086 releases) are eligible for state funding.

Cleanup Standards

The program applies risk-based standards.

Priority System

Prior to September 2003, releases were prioritized based on risk to receptors. This system was reinstated on March 19, 2009.

Average Cleanup Cost

\$83,000⁸

Releases Per Project Manager

Each project manager is responsible for 30 open releases. Additional management is performed by private contractors.

Administrative Funding (FY 2008)

\$3.5 million.⁹

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ANALYSIS AND OPPORTUNITIES

In this study, EPA analyzed Texas' federally-regulated releases that have not been cleaned up (open releases). EPA conducted a multivariate analysis on all of TCEQ's data.¹⁰ This technique provided an objective analysis of multiple release characteristics and allowed EPA to highlight the traits most commonly associated with older releases. Next, EPA divided the open releases into groups that might warrant further attention. EPA used descriptive statistics to examine the distribution of releases by age of release and stage of cleanup and highlighted findings based on TCEQ's data.¹² EPA then identified potential opportunities for addressing particular groups of releases in the backlog. Many releases are included in more than one opportunity. These opportunities describe actions that EPA and TCEQ might use as a starting point for collaborative efforts to address the backlog. Although EPA's analysis covered all releases in Texas, there are 14 releases that are not included in any of the subsets identified in the findings or opportunities due to the way EPA structured the analysis. These releases might also benefit from some of the suggested opportunities and strategies.

EPA's analyses revealed eight areas of the Texas backlog with potential opportunities for its further reduction:

- Stage of cleanup
- Media contaminated
- Cleanup financing
- PRP recalcitrance
- Release priority
- Number of releases per PRP
- Geographic clusters
- Passive remediation

LUST Data Source

Electronic data for UST releases occurring between September 1972 and January 2009 were compiled with TCEQ staff in 2008 and 2009.¹¹ Data were obtained from TCEQ's LPST database and selected based on quality and the ability to address areas of interest in this analysis.

¹⁰ For a detailed description of the analytic tree method, see Appendix A.

¹¹ For a detailed description of the Texas data used in this analysis, see the Chapter Notes section.

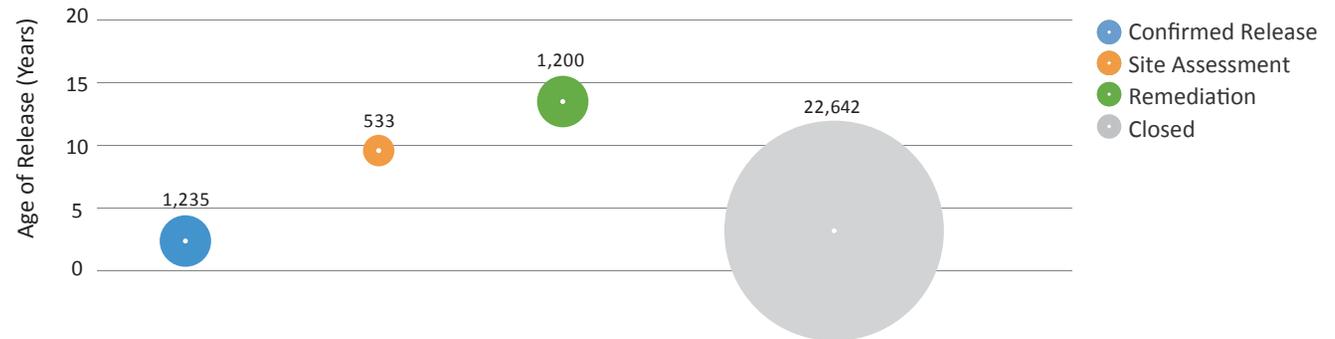
¹² For a detailed description of release stages, see the Chapter Notes section (Stage of Cleanup Reference Table).

STAGE OF CLEANUP

As of February 20, 2009, the Texas backlog consisted of 2,968 open releases. EPA analyzed the age of these LUST releases and their distribution among the stages of cleanup. To facilitate analysis, EPA classified Texas' open releases into three stages of cleanup: the Confirmed Release stage (releases where assessments have not begun), the Site Assessment stage (releases where assessments have begun), and the Remediation stage (releases that have started remedial activities).¹³ While EPA grouped the releases into linear stages for this analysis, EPA recognizes that cleanups might not proceed in a linear fashion. Cleanup can be an iterative process where releases go through successive rounds of site assessment and remediation. However, in the long run, this approach might be both longer and more costly. Acquiring good site characterization up front can accelerate the pace of cleanup and avoid the extra cost of repeated site assessment.

Since Texas' LUST program began, TCEQ has closed 22,642 releases, half of which were closed in less than 4.5 years (Figure 1 below). The young median age of closed LUST releases might be attributable to the rapid closure of relatively easy to remediate releases. Also, national program policy allows states to report confirmed releases that require no further action at the time of confirmation as "cleanup completed." Therefore, some releases are reported as confirmed and cleaned up simultaneously.

Figure 1. Age of Releases among Stages of Cleanup



The white dot at the center of each circle represents the median age of releases. Each circle is labeled with, and scaled to, the number of releases within each stage. Included in the release counts and size of circles are 227 closed releases for which release age is unknown. These releases are not part of the median age calculation.

TCEQ has undertaken efforts to reduce its backlog through its Inactive Initiative and streamlining of its enforcement process.¹⁴ States might find opportunities for closure with minimal effort at lower-risk releases where little or no remedial work is required to reach closure standards or at releases that have met closure standards but have not finished closure review.

Texas has many old LUST releases not in remediation. Figure 2 shows the backlog of open releases by age and stage of cleanup and allows for the identification of older releases by stage. Figure 2 breaks out the 301 older releases in the Confirmed Release stage (10 percent of the backlog) that have not been assessed, five years or more after the releases were confirmed. It also

Texas Finding

19 percent of releases are either:

- 5 years old or older and site assessment has not started; or
- 10 years old or older and still in site assessment.

Potential Opportunity

Releases

- Expedite site assessments at old releases to identify releases that can be closed with minimal effort or moved toward remediation.
- Implement enforcement actions at stalled releases.

Releases 5 years old and older in the Confirmed Release stage 301

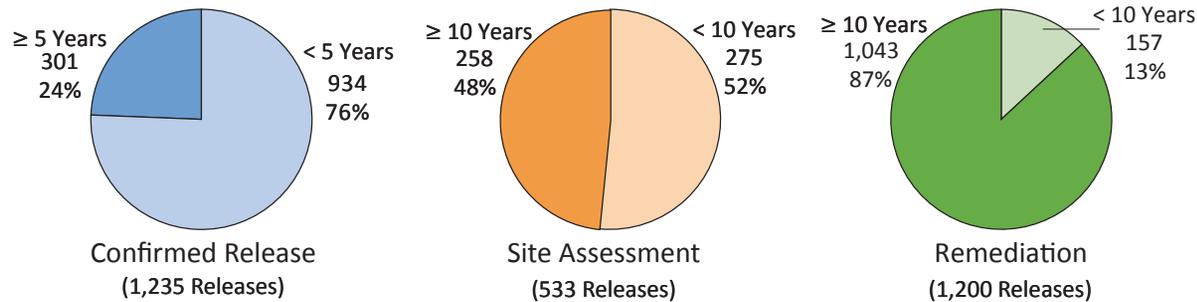
Releases 10 years old and older in the Site Assessment stage 258

¹³ Releases were classified into stages based on available data and discussion with TCEQ staff. For more information, see the Chapter Notes section.

¹⁴ See State Backlog Reduction Efforts in the Program Summary.

shows the 258 older releases in the Site Assessment stage (9 percent of the backlog) that have not entered the Remediation stage, 10 years or more after the releases were confirmed. This subset of older releases in the early stages of cleanup accounts for 19 percent of Texas' total backlog. Texas' data indicate that these releases could be moved into remediation and to closure more quickly.

Figure 2. Release Age Distribution among Stages of Cleanup



EPA encourages states to streamline the corrective action process, improve data collection, reduce the overall cost of remediation, and move releases more rapidly toward remediation and closure. To assist states and regulators in implementing these objectives, EPA developed its *Expedited Site Assessment (ESA) guide*.¹⁵ The guide explains the overall ESA process as well as specific site assessment tools and methods. The ESA process rapidly characterizes site conditions to help support cost-effective corrective action decisions. ESAs will help identify releases that can be closed with minimal effort or provide all the information needed to move a release into remediation. Conducting site assessments efficiently and quickly might help reduce the backlog by accelerating the pace of cleanup and ultimately decrease overall project costs.

Texas also has many old releases in the Remediation stage. Thirty-five percent (1,043 releases) of all of Texas' releases are in remediation and are 10 years old or older (Figure 2 above). This older group of releases represents 87 percent of the releases in remediation. Because EPA only has the date that a release was confirmed but not when it moved from one stage to the next (e.g., from assessment to remediation), EPA can calculate the overall age of the release but not the actual time spent in the Remediation stage. It is possible that some of these releases might have only recently entered remediation. TCEQ should consider establishing a systematic process to evaluate existing releases in remediation and optimize cleanup approaches, including choice of technology and site-specific risk-based decision making. This process might save TCEQ resources and bring releases to closure more quickly. This would allow TCEQ to move on to other releases needing attention and remove releases from the backlog. The use of institutional or engineering controls can also reduce the time to closure by eliminating exposure pathways and allowing for less stringent cleanup standards where protective and appropriate.

Texas Finding

- 35 percent of releases are:
- 10 years old or older; and
 - in remediation.

Potential Opportunity	Releases
Use a systematic process to explore opportunities to accelerate cleanups and reach closure such as:	1,043
<ul style="list-style-type: none"> • periodic review of release-specific treatment technologies; • review of site-specific cleanup standards; • consider use of institutional or engineering controls; and • implement enforcement actions if cleanup has stalled. 	

¹⁵ EPA's 1997 guidance document, *Expedited Site Assessment Tools for Underground Storage Tank Sites: A Guide for Regulators* (EPA 510 B-97-001), is available online at www.epa.gov/OUST/pubs/sam.htm.

Texas Finding

- 32 percent of releases:
- contaminate groundwater;
 - are in remediation; and
 - are 10 years old or older.

Potential Opportunity **Releases**

Systematically evaluate cleanup progress at old releases with groundwater impacts and consider alternative cleanup technologies or other strategies to reduce time to closure. 948

Texas Finding

- 9 percent of releases:
- impact soil only; and
 - have a higher median age than releases with groundwater contamination in all LUST cleanup stages.

Potential Opportunity **Releases**

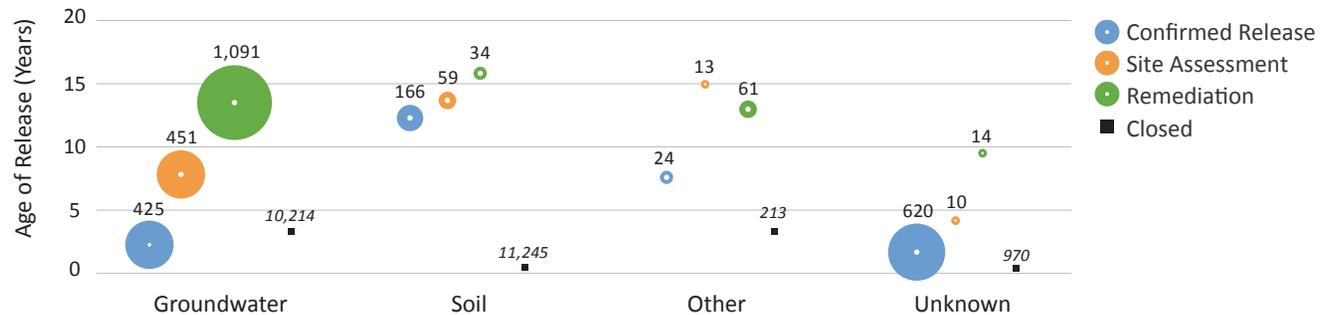
- Continue to use targeted backlog reduction efforts to close old releases with soil contamination;
 - Encourage responsible parties (RPs) to use expedited site assessment to move releases more quickly into remediation.
- 259

MEDIA CONTAMINATED

Groundwater is an important natural resource at risk from petroleum contamination. Old releases impacting groundwater make up a majority of Texas’ backlog. Groundwater contamination generally takes longer and is typically more expensive to clean up than soil contamination. In this study, EPA examined media as a factor contributing to the backlog. The following analysis classified media contamination into four categories: groundwater (1,967 open releases); soil (259 open releases); other media, which includes vapor and surface water (98 open releases); and “unknown” media, which includes releases with no media specified (644 releases).¹⁶

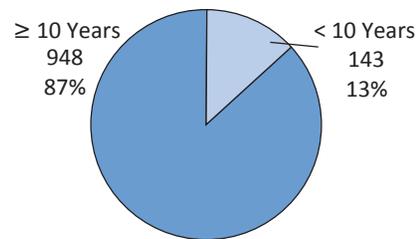
In Texas, 66 percent of releases (1,967 releases) involve groundwater contamination and have a median age of 10.0 years (Figure 3 below). In contrast, only 45 percent of closed releases (10,214 releases) impacted groundwater and these releases have a significantly younger median age of 2.9 years (Figure 3 below). Of the 1,091 Remediation stage releases that impact groundwater, 87 percent (948 releases) are 10 years old or older (Figure 4 below). This subset of older releases that contaminate groundwater and are in remediation accounts for 32 percent of Texas’ total backlog. Groundwater contamination is typically more complex and difficult to remediate than soil contamination. However, if TCEQ could identify opportunities to improve cleanup efficiency, it might be able to accelerate the pace of cleanups. For example, encouraging RPs to re-evaluate the cleanup progress, current contaminant levels, and treatment technologies might move releases through remediation and to closure more quickly.

Figure 3. Age of Releases, by Media Contaminated and Stage of Cleanup



Squares indicating closed releases are not scaled to the number of releases in that stage.

Figure 4. Age of Remediation Stage Releases with Groundwater Impacts



16 For a detailed description of media contamination classifications, see the Chapter Notes section.

Releases that contaminate soil only are of concern because they represent a potential threat to groundwater resources and contaminate properties in neighborhoods and communities. Although contaminated soil can typically be cleaned up faster than contaminated groundwater, soil cleanups in the Texas backlog have a higher median age than groundwater cleanups in all LUST cleanup stages (Figure 3). TCEQ might defer the cleanup of soil contamination for higher priority groundwater contamination. However, the 9 percent of the backlog (259 releases) contaminating soil only in Texas offer potential opportunities for reducing the backlog. Of releases with soil contamination, 64 percent (166 releases) remain within the Confirmed Release stage, 122 of which are 5 years old or older and 57 of which are greater than 13.5 years old (Figure 5, Nodes 2.4-2.6, below). Expediting site assessments and getting these releases into remediation could help Texas move all releases toward closure, thereby reducing the backlog.

There are also 22 percent of releases (644 releases) for which the type of media contaminated is either unknown or is not tracked in the LPST database (Figure 3). Of these releases, 66 percent (428 releases) are recent and in the Confirmed Release stage (Figure 5, Nodes 2.1-2.2, below). However, 192 releases with unknown media are older than 3.5 years (Figure 5, Nodes 2.3-2.6). An additional 24 releases within the Site Assessment and Remediation stages do not list a specified media, although it should be known and tracked by these stages of cleanup (Figure 3 and Figure 5, Nodes 1.2-1.3). Reliable, regular data entry and proactive data management and review practices could identify releases that might be closed or expeditiously moved on to remediation and closure.

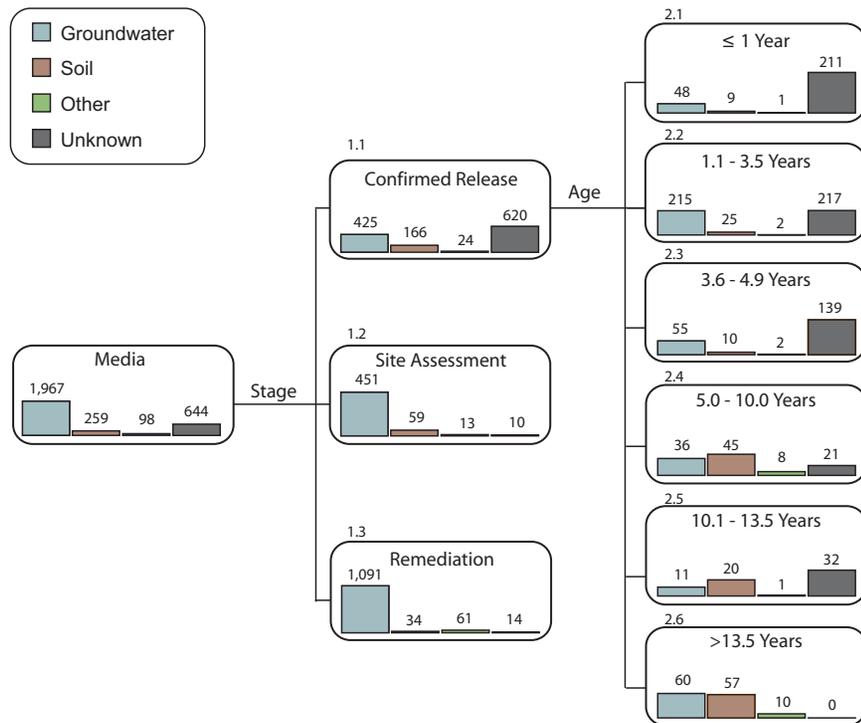
Texas Finding

22 percent of releases do not have the type of media contaminated tracked electronically.

Potential Opportunity Releases

Target releases with unknown media contamination for expedited site assessments (ESAs) and use this information to update the release priority as needed and to customize the remedial activity.

Figure 5. Backlog Distribution, by Type of Media Contaminated



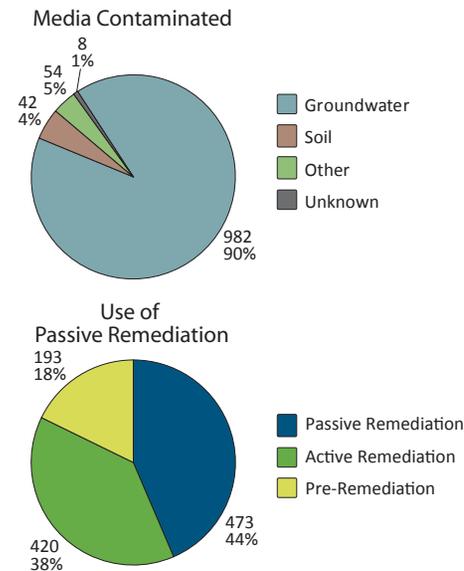
Texas Finding

7 percent of state fund eligible releases have not finished site assessment.

Potential Opportunity Releases

- Explore ways to move more state-funded cleanups toward closure, such as:
- redirecting funds saved at cleanups with improved cost-effectiveness to state fund eligible cleanups where assessment has not been completed; or
 - encouraging the use of other sources of public and private funding.

Figure 7. Characteristics of State Fund Eligible Releases

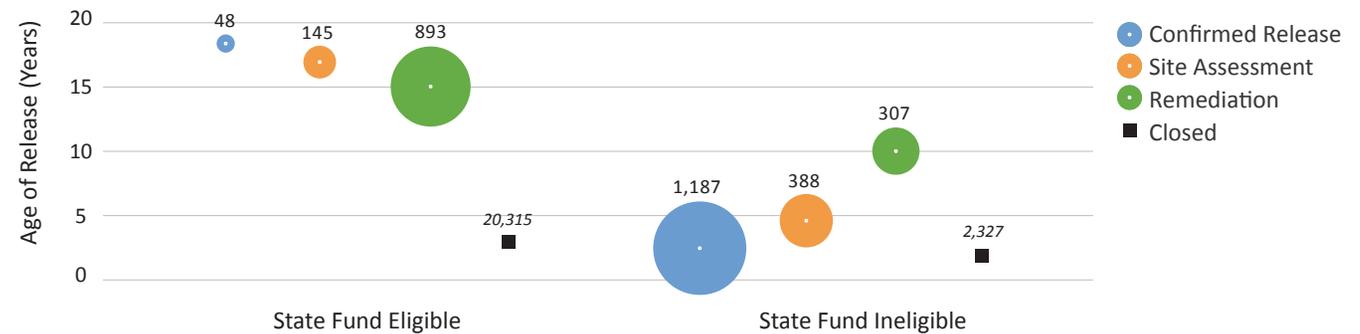


CLEANUP FINANCING

EPA and state programs are interested in exploring successful financing strategies for completing cleanups quickly. EPA acknowledges that the recent economic downturn has impacted cleanup financing. EPA also believes the availability of funding for cleanup is essential to reducing the backlog, so in addition to this study, EPA is increasing its focus on oversight of state funds as well as conducting a study of private insurance. To analyze the effect of financing issues on closure rates, EPA evaluated cleanup progress of Texas’ releases for both state-funded cleanups and those addressed by private funding.

Thirty-six percent of releases (1,086 releases) in Texas are state fund eligible.¹⁷ Of these releases, 82 percent (893 releases) are in the Remediation stage. However, 7 percent (193 releases) of Texas’ backlog consists of a number of older releases awaiting site assessment (48 releases) or in site assessment (145 releases) (Figure 6 below). Although these 193 releases are a small percentage of the Texas backlog (7 percent), they are also the oldest group of releases.

Figure 6. Age of Releases, by State Fund Eligibility and Stage of Cleanup



State fund eligible releases have a median age approximately 12 years older than state fund ineligible releases (Figure 6), at least partially because of the 1998 eligibility deadline of the Texas PSTR fund. Of the releases being addressed by the state fund, 90 percent (982 releases) of these releases impact groundwater and 44 percent (473 releases) of these groundwater cleanups use passive remediation (Figure 7 to the left and Figure 8, page 15). Groundwater cleanups are typically long-term efforts and passive remediation is also typically a slow process. While state fund budget reductions in recent years may limit funding availability, TCEQ should consider whether a systematic evaluation of contaminant levels and optimization of treatment technologies could potentially lead to a reduction in the state fund eligible portion of Texas’ backlog. Expediting site assessments might also be a tool for moving the oldest remaining releases in Texas’ backlog into remediation and to closure. TCEQ should consider exploring the availability of additional funding sources through public/private partnerships such as petroleum brownfields grants for low priority releases without a viable RP. In addition, some states have been able to address more releases by financing claims through public/private partnerships.

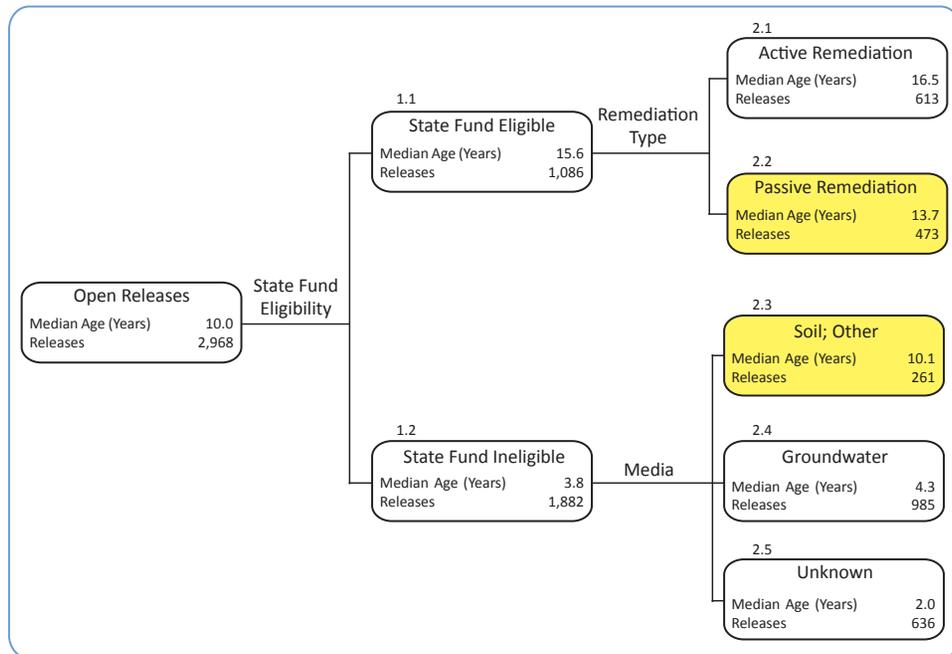
Privately-financed cleanups (i.e., state fund ineligible cleanups) in Texas offer opportunities to expedite reduction of the state’s backlog as well. Sixty-three percent of releases (1,882 releases) are privately financed, most by private insurance (Figure 6). Given that RPs are responsible for financing these cleanups guided by state-certified, privately-paid project managers, these

¹⁷ Eligibility is determined by TCEQ and documented in the LPST database and is not based solely on the release date.

releases should be able to proceed with remediation as these costs are covered by private financial responsibility mechanisms, typically private insurance. The state professional staff overseeing cleanups is augmented by state contracted staff for state funded and privately-funded cleanups. Federal regulations require that UST insurers provide “first dollar coverage” so that site assessment and cleanup should not be delayed for lack of ready cash. However, of the privately-financed cleanups in Texas, 84 percent (1,575 releases) have not started remediation. In addition, 63 percent of those releases (1,187 releases) have not begun assessment and remain in the Confirmed Release stage (Figure 6). Over half of these releases have been awaiting assessment for over 2.6 years. Of the privately-financed cleanups in remediation, half are over 10 years old (Figure 6).

Within the 1,882 open privately-financed cleanups, releases contaminating soil and other media are significantly older than those releases with groundwater or unknown media impacts (Figure 8 and Figure 9, Node 2.3, below). As stated earlier in the Contaminated Media discussion, most releases impacting soil remain unassessed and most of these are privately-financed cleanups (Figure 6).

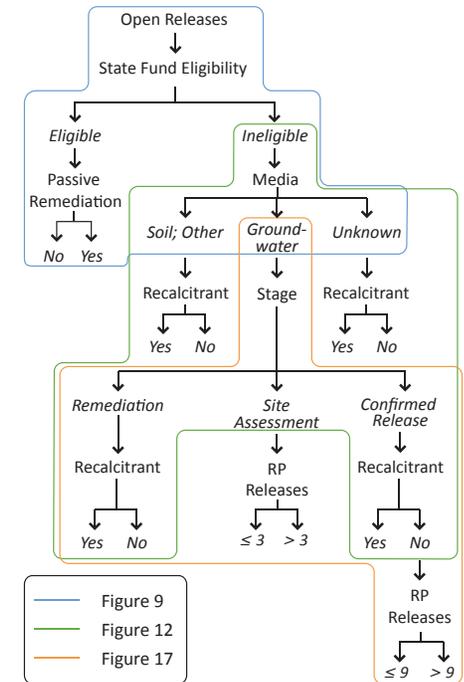
Figure 9. Tree Analysis of Open Release Age - First Level



privately-financed cleanups and moving them into remediation and to closure could further help to reduce the backlog. If releases are stalled, in addition to enforcement, TCEQ could encourage RPs and/or stakeholders to pursue alternative public and private funding sources, including petroleum brownfields grants in the case of low priority releases with no viable RP.

There are likely significant opportunities to expedite the reduction of Texas’ backlog among these 1,882 privately-financed cleanups; they are not limited by state financing or staffing levels. The soil cleanups are typically faster than groundwater cleanups. Assessment of confirmed privately-financed cleanups (1,187 releases, 40 percent of the backlog) could yield closures under Texas’ risk-based policies, as could completion of assessments for privately-financed cleanups in the Site Assessment stage (13 percent of the backlog, 388 releases) (Figure 6). Conducting outreach to RPs or pursuing enforcement actions where necessary to initiate cleanup activities at

Figure 8. Complete Tree Analysis of Open Release Age – Outline



A simplified outline of the analytic tree structure is shown above. Specific branches are shown in greater detail in Figures 9, 12, and 17. For additional information on the analytic tree method, see the Chapter Notes section.

Texas Finding

84 percent of privately-financed cleanups have not finished site assessment.

Potential Opportunity Releases

- Use enforcement actions to initiate the cleanup of privately-financed cleanups. 1,575
- Provide information and technical assistance to RPs at old releases.
- Encourage RPs and stakeholders to examine all available public and private funding options.

PRP RECALCITRANCE

Texas Finding

Releases with recalcitrant PRPs are significantly older within all media types.

Potential Opportunity	Releases
Use enforcement actions to accelerate the cleanup of releases with recalcitrant RPs.	476
<i>State fund eligible releases with recalcitrant PRPs</i>	116
<i>State fund ineligible releases with recalcitrant PRPs</i>	360

Releases with recalcitrant PRPs account for 16 percent of the current backlog (476 releases), 76 percent of which (360 releases) are ineligible for state funding (Figures 10 and 11 below).¹⁸ These releases with recalcitrant PRPs persist despite Texas' Inactive Initiative. Releases with recalcitrant PRPs are significantly older than releases with responsive PRPs for all media types, particularly within state fund ineligible releases (Figure 12, Nodes 1.1, 1.3, 2.1, and 2.3, below). Releases with recalcitrant PRPs tend to be 3 to 5 years older than those releases with responsive PRPs, based on median age. According to the Texas data, only 1 percent of the backlog (42 open releases) has ever been under enforcement actions, and only 195 closed releases had been under enforcement actions. More frequent and conspicuous enforcement, especially applied to releases contaminating soil, could yield more closures as well as spur other recalcitrant RPs to resume cleanup activities.

Figure 10. Recalcitrance of PRPs at Open Releases

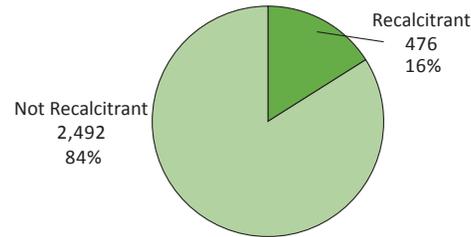


Figure 11. State Fund Eligibility of Releases with Recalcitrant PRPs

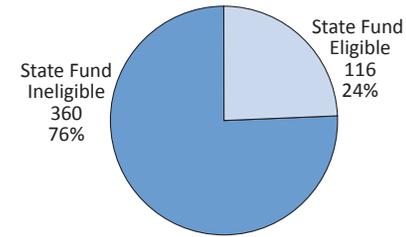
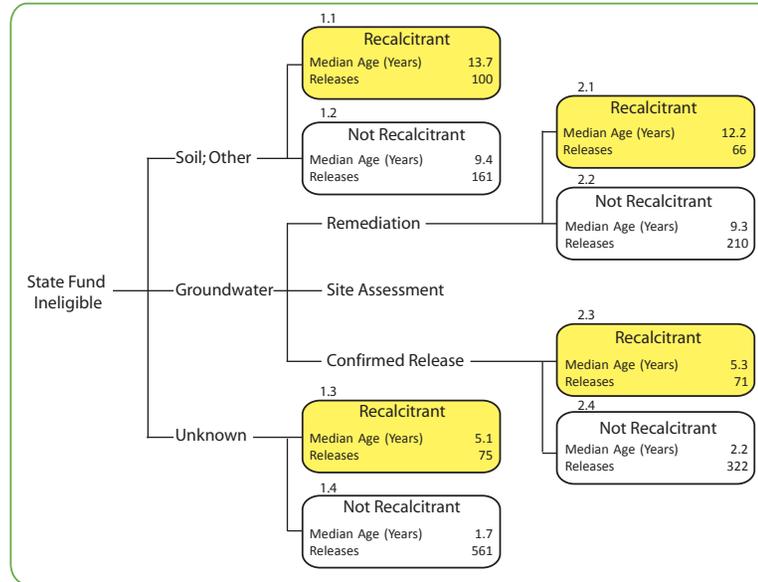


Figure 12. Tree Analysis of Open Release Age - Second Level



18 TCEQ considers a PRP recalcitrant if a release is at least 1.5 years old and the program has not received correspondence from the PRP for 15 months.

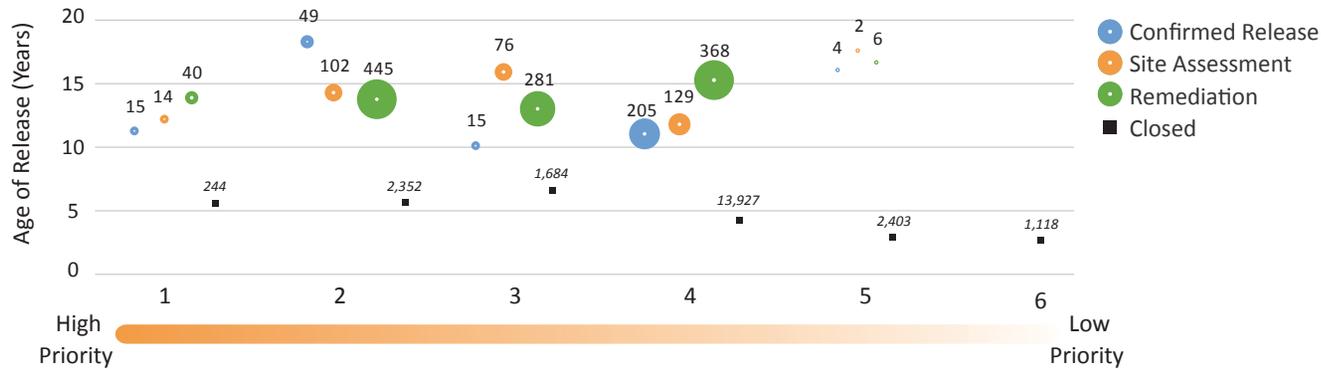
RELEASE PRIORITY

Many state programs employ prioritization systems to decide how to best allocate state resources for state-funded assessments and cleanups and oversight of privately-financed cleanups. States approach cleanup priority differently, and there might be opportunities within TCEQ’s prioritization system to increase the number of closures. TCEQ follows its priority rankings as a matter of policy but can make exceptions to address lower priority releases on a case-by-case basis.

Prior to September 1, 2003, all LUST releases were prioritized for allocation of state resources and oversight based on release characteristics. TCEQ did not prioritize the 41 percent of the backlog (1,217 releases) that occurred after this date. At the time TCEQ submitted the data to EPA for this analysis, TCEQ had only prioritized releases occurring prior to 2003. Therefore, all releases in this study with a priority score are at least 5.5 years old. TCEQ recently resumed prioritization of all releases, including those releases occurring between September 1, 2003 and the present, all of which are privately financed.

Texas has 180 high priority releases that have not finished site assessment. EPA, working with TCEQ, defined Priority 1 and Priority 2 releases in the Texas database as high priority releases for the purposes of this analysis. Of the releases that occurred before August 31, 2003, 64 are Priority 1 or Priority 2 (2 percent of the backlog) where site assessments have not begun (Figure 13 below). In addition, 116 are Priority 1 or 2 releases where site assessments have not been completed. Recalcitrance is common among older, prioritized releases, suggesting that release prioritization did not spur recalcitrant PRPs to action or ensure that high priority cleanups were expedited in all cases (Figure 14 to the right). Future prioritization programs could help prevent inactive cleanups at high priority releases if coupled with a focus on preventing RP recalcitrance.

Figure 13. Age of Open Releases, by Priority Score and Stage of Cleanup¹⁹



Priority 1 and Priority 4 releases have a significantly higher proportion of releases within the Confirmed Release stage (22 and 29 percent, respectively) compared to Priority 2 (8 percent) and Priority 3 releases (4 percent) (Figure 12 above). Although this pattern would be expected for the low priority releases, the reason why Priority 1 cleanups have not progressed as quickly as Priority 2 and 3 releases could not be determined.

Texas Finding

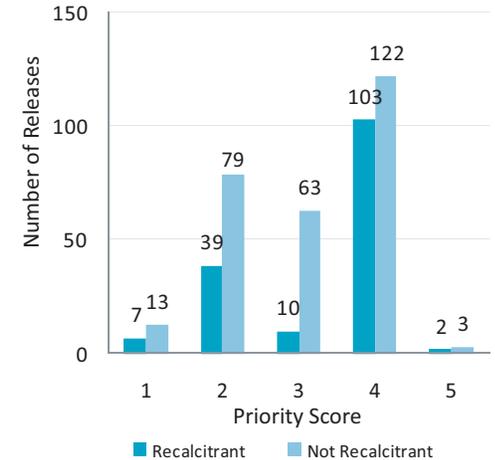
- 6 percent of releases:
- are high priority; and
 - have not finished site assessment.

Potential Opportunity

Releases

- | | |
|--|-----|
| Explore options for moving releases toward closure including: | 180 |
| <ul style="list-style-type: none"> • expediting site assessments of all releases to ensure that all releases are appropriately ranked; • ensuring releases with immediate risks are actively being worked on; and • having all releases make progress toward closure. | |

Figure 14. Recalcitrance of RPs with Pre-remediation Releases 10 Years Old or Older

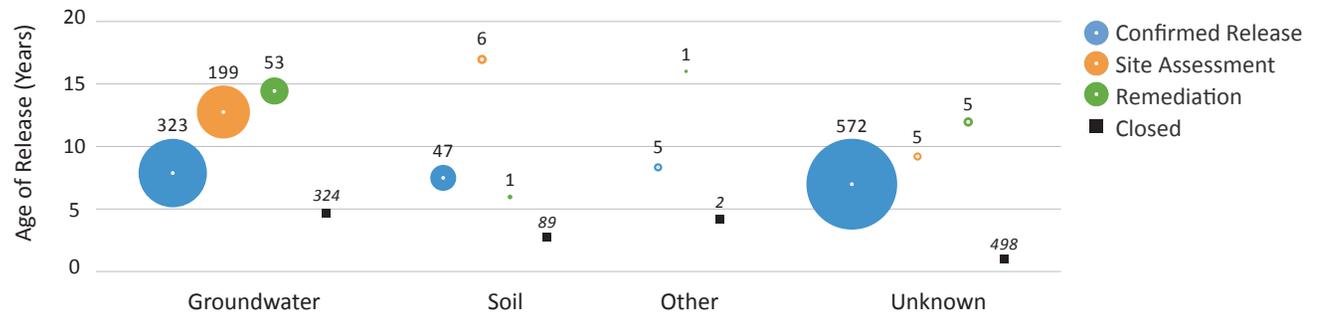


¹⁹ Eligibility is determined by TCEQ and documented in the LPST database and is not based solely on the release date.

In addition, 12 releases are listed with a Priority 5 score which, according to TAC 334 RBCA rules, do not require a remedial action plan and, therefore, might be close to closure (Figure 13, page 17). However, six of these releases are within the Remediation stage, suggesting that the accuracy of the data might need to be verified.

With the re-implementation of the priority ranking system in spring 2009, TCEQ will assign a priority to the 1,217 unprioritized releases that occurred after August 31, 2003. The type of media contamination for these releases is largely groundwater or unknown media (Figure 15 below). TCEQ will need to characterize the releases with unknown media contamination prior to risk-based prioritization and this should help prevent old releases with unknown media impacts from persisting in the backlog.

Figure 15. Age of Unprioritized Releases, by Media Contaminated and Stage of Cleanup²⁰



NUMBER OF RELEASES PER PRP

Texas Finding

PRPs with few releases are slower to complete site assessments and begin remediation than PRPs with more than three releases.

Potential Opportunity

Releases

- Provide information and technical assistance to RPs; or
- implement enforcement actions at old releases.

1,242

EPA analyzed the number of releases per PRP to identify PRPs that are the largest potential contributors to the state’s cleanup backlog.²¹ This analysis revealed that the number of releases for which a PRP is potentially responsible is related to release age and stage of cleanup.

Releases associated with PRPs that are potentially responsible for fewer releases tend to be older and in the early stages of cleanup, in contrast with releases where the PRP is responsible for multiple releases (Figure 16, page 19). Most PRPs in Texas have a single open release, the majority of which are within the Confirmed Release stage. Fifty percent of the backlog (1,242 releases) has not begun remediation and is from PRPs with fewer than four releases (Figure 16).

For Confirmed Release stage releases with groundwater impacts, PRPs with fewer than 10 releases take longer to perform site assessments (Figure 17, Node 2.1). Within the Site Assessment stage, PRPs with fewer than four releases take longer to begin remediation (Figure 17, Node 1.1). TCEQ might expedite cleanup by providing technical assistance to RPs with fewer releases or, in some cases, might need to pursue enforcement actions.

²⁰ This graphic provides information on releases after August 31, 2003.

²¹ TCEQ provided data on “potentially responsible parties,” entities that are recorded in the state’s database as responsible for release cleanup.

Figure 16. Age of Open Releases, by Number of Other Open Releases for which a PRP is Potentially Responsible and by Stage of Cleanup

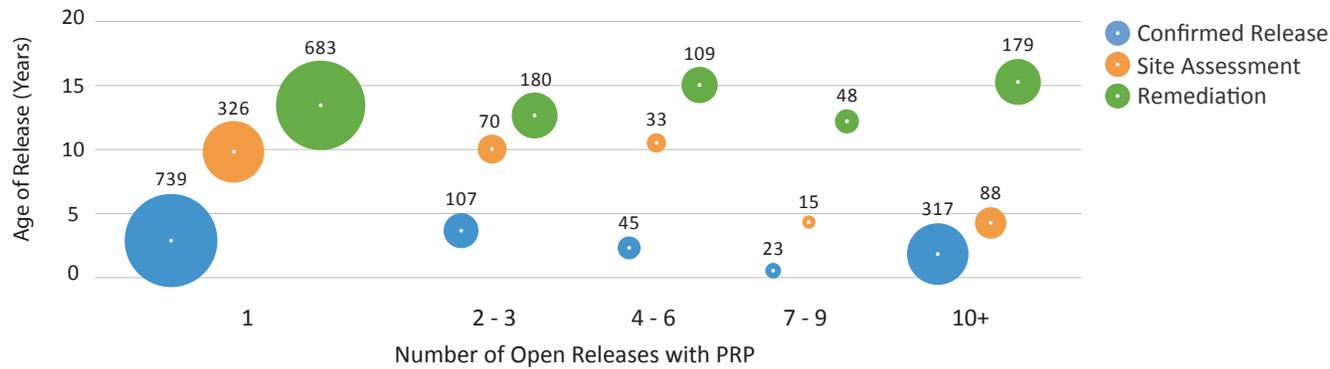
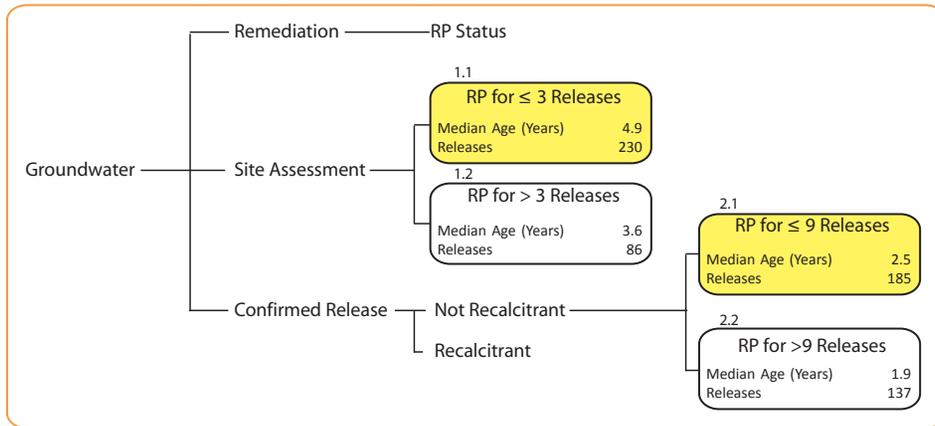


Figure 17. Tree Analysis of Open Release Age - Third Level



A total of 27 PRPs are each potentially responsible for 10 or more releases and account for 20 percent of the Texas backlog (584 releases) (Table 1 to the right). Of these, 13 gasoline retail, distribution, or refining businesses are the PRPs for 315 releases (11 percent of the backlog), and another eight PRPs are potentially responsible for 135 releases at convenience stores (5 percent of the backlog). Focused efforts engaging these 27 PRPs through collaboration or enforcement might expedite closure of many of these releases.

Texas Finding

20 percent of releases are associated with 27 PRPs each with 10 or more releases.

Potential Opportunity

Explore possibilities for multi-site agreements (MSAs) or enforcement actions with parties associated with multiple releases.

Table 1. PRPs with 10 or More Open Releases

Type of PRP	Number of Releases	Number of PRPs
Convenience Store Chain	135	8
Gasoline Retail/Distribution/Refining	315	13
Government - State	43	1
Supermarket Chain	43	1
Unknown Type ²²	23	2
Utility	15	1
Government - Federal	10	1
Total	584	27

22 The PRPs for these releases are known, but the type of business could not be determined based on available information.

Texas Finding

9 percent of releases are clustered within a one-mile radius of five or more releases.

Potential Opportunity

Target releases within close proximity for resource consolidation opportunities.

Releases

Targeted number of releases²³

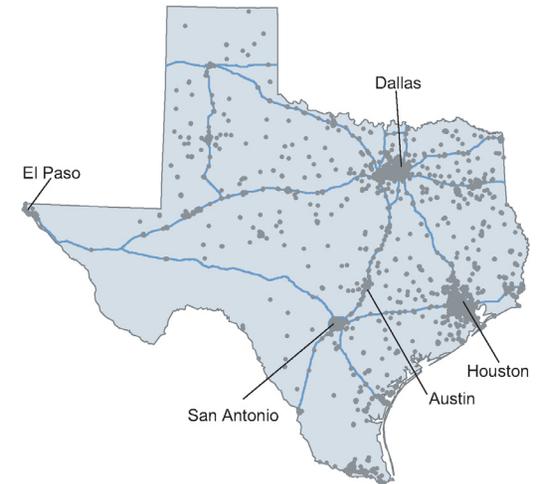
GEOGRAPHIC CLUSTERS

EPA performed a geospatial analysis to look for alternative ways to address the backlog. While releases in geographic clusters might not have the same RP, they tend to be located in densely populated areas and might present opportunities to consolidate resources and coordinate efforts. Geographic proximity can call attention to releases in areas of interest such as redevelopment, environmental justice, and ecological sensitivity.

State and local governments can utilize geographic clusters for area-wide planning efforts. EPA's analysis identified 265 releases (9 percent of releases) located within a one-mile radius of five or more releases (Figure 18 to the right). Of these releases, 37 (1 percent of releases) are located within a one-mile radius of 10 or more releases. Approaching the assessment and cleanup needs of an area impacted by LUSTs can be more effective than focusing on individual releases in isolation from the adjacent or surrounding area. Considering geographically-clustered releases might pave the way for new community-based revitalization efforts, utilize economies of scale to yield benefits such as reduced equipment costs, and present opportunities to develop multi-site cleanup strategies, especially at locations with commingled contamination.

The EPA Region 6 Brownfields program is undertaking an effort to address multiple releases through an initiative that supports the redevelopment of automobile dealerships. This initiative could present an opportunity to reduce the backlog in Texas. EPA encourages states to look for opportunities for resource consolidation and area-wide planning but also recognizes that this approach is best geared to address targeted groups of releases as opposed to a state-wide opportunity for every cluster of releases. EPA intends to conduct further geospatial analyses on clusters of releases in relation to RPs, highway corridors, local geologic and hydrogeologic settings, groundwater resources, and/or communities with environmental justice concerns. These analyses might reveal additional opportunities for backlog reduction.

Figure 18. Map of All Open Releases



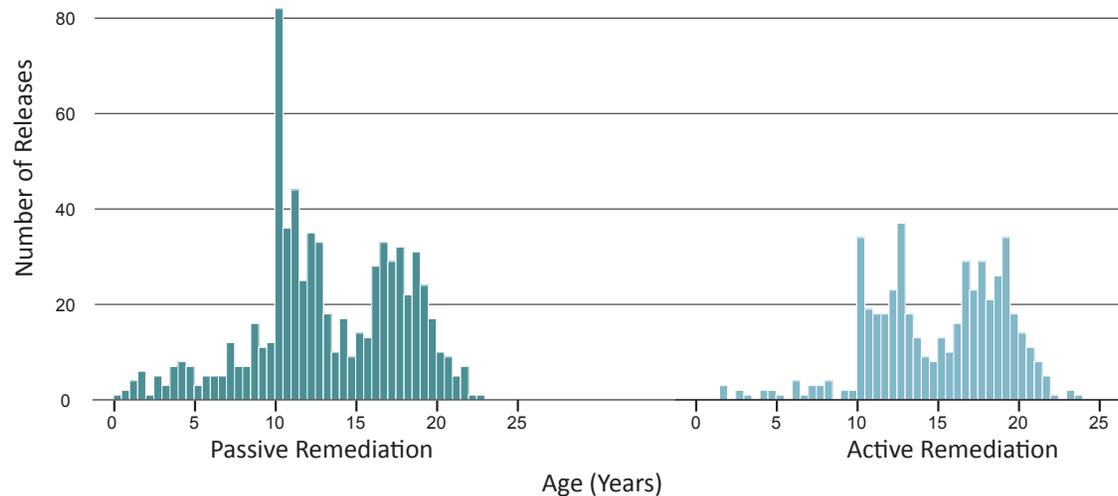
²³ Opportunities marked as “targeted number of releases” relate to geographic opportunities that will address a limited number of releases within select designated geographic areas.

USE OF PASSIVE REMEDIATION

Frequent use of passive remediation as the remedial technology for cleanups might be contributing to the Texas backlog. Passive remediation is currently being used at 71 percent (712 releases) of Remediation stage releases at both state fund and privately-financed cleanups. Most of these releases are 10 to 13 years old or 16 to 19 years old (Figure 19 below). Available data do not provide the date when a release entered into passive remediation. Therefore, some of the releases might have only started passive remediation recently.

EPA guidance states that monitored natural attenuation (MNA) is an appropriate remediation method only where its use will be protective of human health and the environment and it will be capable of achieving site-specific remediation objectives within a timeframe that is reasonable compared to other alternatives.²⁴ Neither MNA nor passive remediation should be considered a default or presumptive remedy at any contaminated site. When implemented according to EPA guidance, MNA might be a strategy for efficient use of state resources in comparison to a more active cleanup technology by providing more technically defensible predictions for cleanup timeframes and effective performance monitoring. TCEQ does not use MNA as a formal remedy, but if a release can be remediated without active remediation activities, TCEQ monitors the site until it reaches the cleanup goal. If a thorough evaluation determines that passive remediation is ineffective in reducing contamination within a reasonable timeframe, TCEQ should consider the use of active remediation technologies as resources permit. Evaluation of cleanup progress and the effectiveness of passive remediation might alert TCEQ to those releases where an alternative cleanup approach is more appropriate. In addition, TCEQ should consider whether privately-financed cleanups using passive remediation (239 releases) should be moved into active remediation (Figure 20 right).

Figure 19. Age Distribution of Open Releases in Remediation, by Remediation Type



Texas Finding

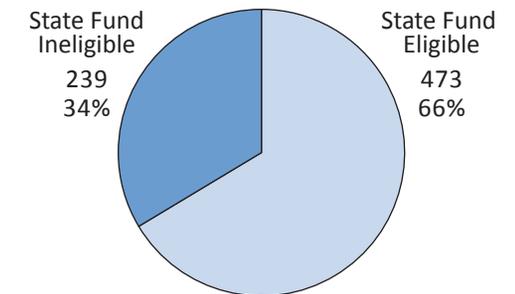
71 percent of releases in the Remediation stage use passive remediation.

Potential Opportunity

Releases

Evaluate effectiveness of cleanup using passive remediation and optimize the cleanup methodology at the less effective cleanups.	712
--	-----

Figure 20. State Fund Eligibility of Cleanups Using Passive Remediation



²⁴ For more information regarding appropriate use of MNA, see www.epa.gov/swrust1/pubs/tums.htm and EPA Directive Number 9200.4-17P, *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*, available online at www.epa.gov/oust/directiv/d9200417.htm.

CONCLUSION

Texas LUST Program Contact Information

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Office of Compliance and
Enforcement Remediation Division

MC 137
P.O. Box 13087
Austin, TX 78711-3087

Phone: 512-239-2200
Fax: 512-239-3399

www.tceq.state.tx.us/nav/cleanups/pst.html

In this state chapter, EPA presented the analysis of LUST data submitted by TCEQ and highlighted information on Texas' LUST program. Based on the analytic results, EPA identified potential opportunities that could be used to address specific backlog issues in Texas. Over the course of the entire study, EPA also analyzed data from 13 other states. Findings and opportunities that apply to all 14 states are discussed in the national chapter of the report. Each opportunity represents one potential approach among many to address the backlog. Discussion of the opportunities as a whole is intended as a starting point for further conversations among EPA, Texas, and the other states on strategies to reduce the backlog. EPA will work with our partners to develop the backlog reduction strategies. Development of the strategies might include targeted data collection, reviewing particular case files, analyzing problem areas, and sharing best practices. The strategies could also involve actions from EPA, such as using additional program metrics, targeting resources for specific cleanup actions, clarifying and developing guidance, and revising policies. EPA, in partnership with states, is committed to reducing the backlog of confirmed UST releases and to protecting the nation's groundwater and land and the communities affected by these releases.

CHAPTER NOTES

TEXAS DATA BY ATTRIBUTE

The following table provides details on the data elements of interest in this analysis. Data were provided by TCEQ staff in 2008 and 2009 for use in this analysis. Several data elements of interest could not be addressed with the information available. All available data elements were analyzed and only those data elements that revealed informative patterns of interest are included in the report.

Data Element	Texas Data	Use in Analysis
Administrative Cost	Estimates were provided by TCEQ staff.	Included in the "Program Summary" section and in the national chapter.
Age	Age was calculated for closed releases by subtracting the confirmed release date from the closure date and dividing by 365. Age was calculated for open releases by subtracting the confirmed release date from the data date and dividing by 365. Any values less than -.1 were left blank. Values between -.1 and 0 were counted as 0. All dates were rounded to one decimal point. Ages of releases with insufficient or invalid data were left blank.	Variable in all analyses.
Cleanup Standards	No site-specific data available.	State-wide standards examined in the national chapter.
Closure Date	Data were obtained from the "COMP-P6" in the "Texas LPST Sites_01-15-09.txt" file.	Included in the calculation of release age.
Confirmed Release Date	Data were obtained from the "Entered" field in the "Texas LPST Sites_01-15-09.txt" file.	Included in the calculation of release age.
Data Date	February 20, 2009 is used for all records. This is the date the data were sent.	Included in the calculation of release age.
Federally-Regulated LUST Releases	The correct universe of releases was identified by TCEQ staff and included in the "Texas LPST Sites_01-15-09.txt" file.	Identifies the appropriate universe of releases for analysis.
Free Product	Priority code data from the "PRIO-CD" field provides some information on releases that have had free product at some point in their history. This method cannot determine whether free product continues to exist at releases, so this attribute was not examined in this analysis.	Data not suitable for analysis.
Institutional and Engineering Controls	No data available.	Not applicable
Latitude and Longitude	Data for most releases were obtained from TCEQ's Petroleum Storage Tank shape file. Where possible, coordinates for releases without existing latitude and longitude values were obtained by EPA staff by geocoding address and street locations.	Used in geospatial analysis calculating the number of open releases within a one-mile radius of other open releases.
Media	Media contaminated values were assigned to releases based on the priority code assigned to each release using the "PRIO-CD" field from the "Texas LPST Sites_01-15-09.txt" file (see Priority Code Reference Table). Where media contaminated could not be determined using this method, "GW-IMP," "SW-IMP," "SOIL-IMP," and "DW-IMP" fields were used to determine the media contaminated. Releases with groundwater contamination marked (in addition to any other media) were counted as "groundwater." Releases with only soil contamination marked were counted as "soil." Releases with any other combination of media were counted as "other." "Unknown" releases might include those releases for which there are no data available in the database, but for which information is available in other files, and releases for which the type of media contaminated is truly unknown.	Examined in the "Media Contaminated" section.

Data Element	Texas Data	Use in Analysis
Methyl Tertiary Butyl Ether (MTBE)	Data were obtained by selecting all releases where the "MTBEMax" field from "Texas LPST Sites_01-15-09.txt" is greater than 0.	No informative patterns were identified.
Number of Releases per RP	Calculated as the total number of open releases associated with a unique RP name.	Examined in the "Number of Releases per RP" section.
Orphan	No data available.	Not applicable
Passive Remediation	Status codes from the "STATCD" field in the "Texas LPST Sites_01-15-09.txt" file were used to identify releases with passive remediation (code 3 – "Monitoring").	Examined in the "Use of Passive Remediation" section.
Proximity	Geospatial analysis performed by EPA revealed the number of other open releases located within a one-mile radius of each open release.	Examined in the "Geographic Clusters" section.
Public Spending	Data were obtained from the "Texas LPST Sites_Costs for Reimbursable Sites.txt" file. This file contains information related to requests for reimbursement for corrective action activities performed at LPST releases and the amounts include labor expenses paid to certified contractors for their work. Data for releases that are not covered by the state fund are not included. These amounts could not be adjusted for inflation and so this attribute was not examined in this analysis.	Data not suitable for analysis.
Release Priority	Data were obtained from the "PRIO-CD" field in the "Texas LPST Sites_01-15-09.txt" file. Priority codes were grouped into the six major categories, one through six (see Release Priority Reference Table). As use of the prioritization system was discontinued in September 2003, priority scores were not examined for releases after that date.	Examined in the "Release Priority" section.
RP	Data were obtained from the "PRP-NAME" field in the "Texas LPST Sites_01-15-09.txt" file.	Used to calculate the number of releases associated with each unique RP.
RP Recalcitrance	Recalcitrance was determined by identifying releases at least 1.5 years old with no incoming correspondence since 2005 that have had outgoing correspondence. Incoming and outgoing correspondence records obtained from the "PRPREC'D" and "TWCLETTR" fields in the "Texas LPST Sites_Correspondence.txt" file. This file contains correspondence information for all LPST releases. This rule captures only releases where RPs are currently recalcitrant.	Examined in the "RP Recalcitrance" section.
Staff Workload	Estimate provided by TCEQ staff.	Examined in the "Program Summary" section and in the national chapter.
Stage of Cleanup	Releases were assigned a standardized stage based on values in the "STATCD" field from "Texas LPST Sites_01-15-09.txt" and the presence or absence of a closure date (see Stage of Cleanup Reference Table).	Variable in all analyses.
State Fund Eligibility	Data were obtained from the "1588Elig" data field in the "Texas LPST Sites_01-15-09.txt" file.	Examined in the "Cleanup Financing" section.
Status	Releases were assigned a standardized stage based on values in the "STATCD" field from "Texas LPST Sites_01-15-09.txt" and the presence or absence of a closure date.	Identifies the appropriate universe of releases for tree analysis.
Voluntary Cleanup Program	The "LPST_sites.xls" file includes voluntary cleanup releases with a known leaking underground petroleum storage tank.	No informative patterns were identified.

Release Priority Reference Table

Each release is assigned one priority score in the LPST database. Releases on or after September 1, 2003 are not prioritized. These data were used to analyze patterns in priority and to identify the media contaminated for each release.

Priority Code	Priority Description	Media
1.1	1.1 CURRENT VAPOR IMPACT TO BUILDING OR RESIDENCE	Vapor
1.2	1.2 ACTIVE PUBLIC WATER SUPPLY WELL/LINE/SW INTAKE IMPACT	Other
1.3	1.3 SOLE-SOURCE DOMESTIC WATER SUPPLY WELL/LINE/SW INTAKE IMPACT	Groundwater
1.4	1.4 EXPLOSIVE VAPORS IN SUBSURFACE UTILITY - NO BLDG/RES IMPACT	Other
1.5	1.5 FP ON/IN: GROUND SURFACE/SW/UTILITY (NOT WATER SUPPLY LINE)	Not assigned
1.6	1.6 EDWARDS AQUIFER, RECHARGE ZONE OR TRANSITION ZONE IMPACT	Groundwater
1.7	1.7 VAPORS OF A SAFETY CONCERN PRESENT OUTDOORS	Other
1A	1A IMPACT/THREAT TO HUMAN HEALTH AND/OR SAFETY	Not assigned
1B	1B DRINKING WATER AQUIFER OR WATER WELL IMPACTED/THREATENED	Groundwater
1C	1C MAJOR IMPACT TO SURFACE WATER SUPPLY	Other
1D	1D GROUP 1 GROUNDWATER, PLUME HAS/LIKELY TO MIGRATE OFF-SITE	Groundwater
1E	1E GROUP 2 GROUNDWATER, PLUME OFF-SITE, WELL W/IN 0.5mi RADIUS	Groundwater
1F	1F GROUP 3 GROUNDWATER, PLUME OFF-SITE, WELL W/IN 0.5mi RADIUS	Groundwater
2.1	2.1 CONTAMINATED SOIL EXPOSED & UNSECURED, RECEPTOR W/IN 500ft	Soil
2.2	2.2 FORMER VAPOR IMPACT/NAPL NEAR UTILITY, POTENT'L VAPOR PTHWY	Other
2.3	2.3 DOM H2O SUPPLY WELL/LINE/SW INTAKE IMPACT ADDL H2O AVAILABLE	Groundwater

Priority Code	Priority Description	Media
2.4	2.4 NON-PUBLIC/NON-DOMESTIC WATER SUPPLY WELL IMPACT	Groundwater
2.5	2.5 GW IMPACT, PUBLIC/DOMESTIC WATER SUPPLY WELL W/IN 0.25mi	Groundwater
2.6	2.6 IMPACTED GW DISCHARGES TO SW USED BY HUMAN,ENDGR SPEC <500ft	Groundwater
2.7	2.7 PUB/DOM WELL W/IN IMPACTED AREA, SOURCE GW NOT IMPACTED	Not assigned
2A	2A GROUNDWATER OTHER THAN 1B, SITE CHARACTERIZATION INCOMPLETE	Groundwater
2B	2B SURFACE WATER IMPACT THREATENS PUBLIC HEALTH, WILDLIFE, ETC.	Other
2C	2C GROUP 1 GROUNDWATER, OFF-SITE MIGRATION UNLIKELY	Groundwater
2D	2D GROUP 2 GROUNDWATER, PLUME OFF-SITE, NO WELLS W/IN .5mi RAD.	Groundwater
2E	2E GROUP 3 GROUNDWATER, OFF-SITE MIGRATION LIKELY	Groundwater
2F	2F GROUP 3 GROUNDWATER, OFF-SITE MIGRATION UNLIKELY	Groundwater
2G	2G GROUP 2 GROUNDWATER, OFF-SITE MIGRATION UNLIKELY	Groundwater
3	3 GROUP 3 GROUNDWATER, NO WELLS W/IN .5mi RADIUS	Groundwater
3.1	3.1 GW IMPACT, PUB/DOM WATER SUPPLY WELL W/IN .25 - .5mi	Groundwater
3.2	3.2 IMPACTED GW W/IN 500ft-0.25mi TO SW USED BY HUMAN,ENDGR SPEC	Groundwater
3.3	3.3 GW IMPACT, NON-PUBLIC/NON-DOMESTIC H2O SUPPLY WELL W/IN.25mi	Groundwater
3.4	3.4 NON-PUB/DOM WELL W/IN IMPACTED AREA, SOURCE GW NOT IMPACTED	Not assigned
3.5	3.5 A DESIGNATED MAJOR OR MINOR AQUIFER IS IMPACTED	Groundwater
4.0	4.0 ASSESSMENT INCOMPLETE, NO APPARENT RECEPTORS IMPACTED	Not assigned

Priority Code	Priority Description	Media
4.1	4.1 GW IMPACTED, NO APPARENT THREATS OR IMPACTS TO RECEPTORS	Groundwater
4.2	4.2 NO GW IMPACT, NO APPARENT THREATS OR IMPACTS TO RECEPTORS	
4A	4A SOIL CONTAMINATION ONLY, REQUIRES FULL SITE ASSESSMENT & RAP	Soil
4B	4B MINOR SURFACE WATER IMPACT	Other
4C	4C MINOR RELEASE TO GROUND SURFACE	Soil
5	5 MINOR SOIL CONTAMINATION - DOES NOT REQUIRE A RAP	Soil
6	6 MINOR SOIL CONTAMINATION - NO REMEDIAL ACTION REQUIRED	Soil

Stage of Cleanup Reference Table

Each release is assigned one status in the LPST database. These data were used to analyze the stage of cleanup.

Status Description	Has Closure Date	Stage
1 - PREASSESSMENT/ RELEASE DETERMINATION		Confirmed Release
2 - SITE ASSESSMENT		Site Assessment
4 - PLAN B/RISK ASSESSMENT		Site Assessment
3 - MONITORING		Remediation
5 - CORRECTIVE ACTION PLAN		Remediation
6E - FINAL CONCURRENCE APPROPRIATE, UNABLE TO LOCATE RP		Remediation
6G - IN-ACTIVE, CANNOT CLOSE, CANNOT LOCATE RP		Remediation
6G - IN-ACTIVE, CANNOT CLOSE, CANNOT LOCATE RP	Yes	Remediation
6X - CROSS REFERENCE TO ANOTHER LPST NUMBER		Remediation
6A - FINAL CONCURRENCE ISSUED, CASE CLOSED		Closed
6A - FINAL CONCURRENCE ISSUED, CASE CLOSED	Yes	Closed
6D - FINAL CONCURRENCE PENDING PAYMENT OF DELINQUENT FEES	Yes	Closed

6D - FINAL CONCURRENCE PENDING PAYMENT OF DELINQUENT FEES		Closed
6E - FINAL CONCURRENCE APPROPRIATE, UNABLE TO LOCATE RP	Yes	Closed
6P - FINAL CONCURRENCE PENDING DOCUMENTATION OF WELL PLUGGING	Yes	Closed
6P - FINAL CONCURRENCE PENDING DOCUMENTATION OF WELL PLUGGING		Closed
6X - CROSS REFERENCE TO ANOTHER LPST NUMBER	Yes	Closed