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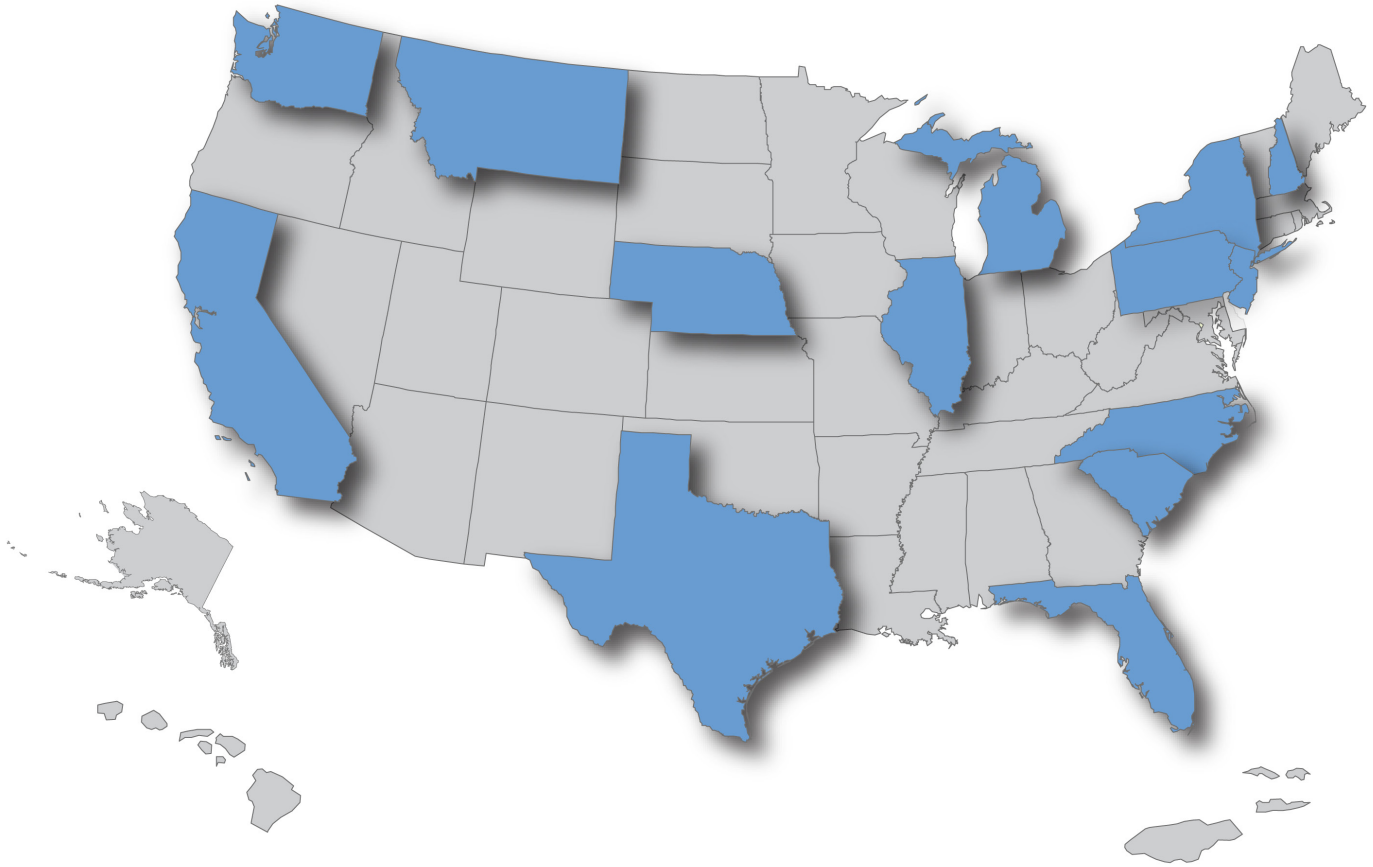
The National LUST Cleanup Backlog:
A Study of Opportunities



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THE NATIONAL LUST CLEANUP BACKLOG: A STUDY OF OPPORTUNITIES

STATE SUMMARY CHAPTER: CALIFORNIA

Office of Solid Waste and Emergency Response
Office of Underground Storage Tanks
September 2011

LIST OF ACRONYMS

EPA	United States Environmental Protection Agency
ESA	Expedited Site Assessment
FR	Financial Responsibility
FY	Fiscal Year
LIA	Local Implementing Agency
LOP	Local Oversight Program
LUST	Leaking Underground Storage Tank
MNA	Monitored Natural Attenuation
MSA	Multi-Site Agreement
MTBE	Methyl Tertiary Butyl Ether
NA	Not Applicable
RP	Responsible Party
RWQCB	Regional Water Quality Control Board
SWRCB	California State Water Resources Control Board
DOD	United States Department of Defense
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.[1] 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 needing cleanup, over 100,000 confirmed releases 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 CALIFORNIA DATA

California's State Water Resources Control Board (SWRCB) has made significant progress toward reducing its LUST cleanup backlog. As of February 2009, SWRCB had completed 27,992 LUST cleanups, which is 73 percent of all known releases in the state. At the time of data collection, there were 10,274 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 California to participate in its national backlog study because California has one of the ten largest backlogs in the United States.

In this chapter, EPA characterizes California's releases that have not been cleaned up, analyzes these releases based on categories of interest, and identifies potential opportunities for SWRCB 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 SWRCB to develop backlog reduction strategies.

In California, 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. In some cases, state workers face furloughs as well as other budget cuts that impact their ability to address the backlog.

California LUST Data
By the Numbers[2]

National Backlog Contribution	10.0%
Cumulative Historical Releases	38,266
Closed Releases	27,992/73%
Open Releases	10,274/27%
Stage of Cleanup	
Confirmed Release	84/1%
Site Assessment	5,656/55%
Remediation	4,534/44%
Media Contaminated	
Groundwater	6,711/65%
Soil	1,610/16%
Other	1,076/10%
Unknown[4]	877/9%
Median Age of Open Releases	14.1 years

1 EPA, *National Water Quality Inventory: 2000 Report*, pp. 50-52. www.epa.gov/305b/2000report/chp6.pdf.

2 Data were provided in February 2009 by SWRCB staff and are not identical to the UST performance measures reported on EPA's website, available online at: www.epa.gov/oust/cat/camarchv.htm. In addition, the GeoTracker database used by all LUST oversight agencies is not up to date for all LUST releases. For more detailed information, see the Data Limitations section.

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.

EPA included potential cleanup opportunities in this report even though current circumstances in California might make pursuing certain opportunities challenging or unlikely. Also, in some cases, SWRCB is already using similar strategies as part of its ongoing program. The findings from the analysis of SWRCB's data and the potential cleanup opportunities are summarized below in seven study areas: stage of cleanup, media contaminated, cleanup financing, presence of free product, oversight agency backlogs, number of releases per responsible party (RP), and geographic clusters.

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

California Finding	Potential Opportunity	Releases
31 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.	• 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.	3,215
33 percent of releases are: • 10 years old or older; and • in remediation.	Use a systematic process to explore opportunities to accelerate cleanups and reach closure, such as: • periodic review of release-specific treatment technologies; • review of site-specific cleanup standards, where applicable; • consider use of institutional or engineering controls; and • implement enforcement actions if cleanup has stalled.	3,426

California's releases are taking a long time to move through the cleanup process, and while most of California's releases have started site assessment, the majority of open releases have not moved on to remediation. There are several reasons why many releases in the backlog are old including: releases that are complex and therefore take a long time to address; low risk releases whose cleanup is delayed for higher risk releases; and the limited number of releases addressed to date through state funds. EPA recognizes SWRCB's interest in addressing high risk releases. Nevertheless, EPA believes it is important for SWRCB to explore opportunities to accelerate cleanups at older releases and to make progress toward bringing all releases to closure.

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

California Finding	Potential Opportunity	Releases
27 percent of releases: • 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.	2,733
7 percent of releases: • impact soil only; • have not finished site assessment; and • are 10 years old or older.	• Continue to use targeted backlog reduction efforts to close old releases with soil contamination with minimal effort. • Encourage RPs to use expedited site assessment to move releases more quickly into remediation.	669
9 percent of releases do not have the type of media contaminated electronically tracked in the GeoTracker database.	Target releases with unknown media contamination for expedited site assessments and use this information to customize the remedial activity and update the GeoTracker database as necessary.	819

Releases contaminating groundwater have always been the largest part of the national backlog and 65 percent of releases in California 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 California's oversight agencies to periodically reevaluate cleanup progress and consider whether the cleanup technology being used is still optimal.

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

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

California Finding	Potential Opportunity	Releases
65 percent of releases have not received state funds.	Explore opportunities to address more releases with the state fund such as: • examine cost-saving measures; and • examine other funding sources, including public/private funding options such as petroleum brownfields grants for low priority releases or financing claim payments.	6,661
21 percent of the backlog is: • state-funded; and • in remediation.	Explore opportunities to move releases toward closure such as: • reevaluate the current remedial plans at state fund eligible releases in long-term remediation to identify releases where more cost-effective plans could be implemented, such as using monitored natural attenuation (MNA) or using site-specific risk-based decision-making; and • consider closing releases using institutional or engineering controls.	2,151

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.

All state programs are experiencing resource limitations, and progress toward backlog reduction is dependent on their ability to apply existing resources to their backlogs. If more cost-effective remedial plans could be implemented at state-funded cleanups in long-term remediation, or other funding sources found for those not in remediation, this would free up funding to address more releases. EPA was able to collect data on releases where the RP had submitted claims and for those releases that had received state funds. Based on the 2009 data, 35 percent of open releases had received state funds, leaving 65 percent without having received state funds. Of the releases that had not received state funds, 27 percent had submitted claims but not had received payment. SWCRB should examine funding opportunities to address additional releases such as cost saving measures or other potential funding sources such as public/private partnerships.

Presence of Free Product *(see page CA-15 for more details)*

California Finding	Potential Opportunity	Releases
5 percent of releases have free product present.	• Address the presence of free product at releases. • Implement enforcement actions at stalled releases.	537

Although federal regulations require the removal of free product to the extent practicable, there are over 350 releases with free product that are 10 years old or older in the backlog.[5] The persistence of free product at old releases indicates that owner/operators might not be complying with cleanup requirements and are not effectively removing free product. Use of enforcement actions at old releases with persistent free product could help ensure the recovery of free product contamination and move cleanups toward closure.

Oversight Agency Backlogs *(see page CA-16 for more details)*

California Finding	Potential Opportunity	Releases
The number of releases and the distribution of releases among stages of cleanup vary among the oversight agencies.	Develop agency-specific strategies for moving releases toward remediation and closure and updating the GeoTracker database.	Variable number of releases[6]

Regional Water Quality Control Boards (RWQCBs), Local Oversight Program (LOP) agencies, and Local Implementing Agencies (LIAs) such as county health agencies and fire departments direct the investigation and cleanup of releases in California. The state provides funding to RWQCBs and LOPs, but it does not fund or have statutory authority over the LIAs. According to GeoTracker, California's mandated electronic data collection system, the majority of the state's backlog is within the jurisdiction of the RWQCBs and LOPs. Differences in the management and administration of remedial actions might be causing differences in cleanup outcomes. Expediting site assessment of pre-remediation releases and reviewing the treatment technologies in place at releases in remediation might identify opportunities to move releases toward remediation and accelerate cleanups. In addition, SWRCB can facilitate

5 Free product removal is addressed under Title 40 § 280.64, available online at: www.epa.gov/oust/fedlaws/techrule.htm#280.64.

6 Opportunities marked as "variable number of releases" relate to programmatic opportunities and affect an unknown number of releases, potentially including all open releases.

sharing of information and best practices among the various oversight agencies to improve overall program management.

Number of Releases per RP *(see page CA-17 for more details)*

California Finding	Potential Opportunity	Releases
19 percent of releases are associated with 88 RPs each with 10 or more releases.	Explore possibilities for multi-site agreements (MSAs) or enforcement actions with parties responsible for multiple open releases.	1,967

EPA analyzed the number of releases per RP to identify the RPs that are the largest potential contributors to the state's cleanup backlog. EPA was able to identify groups of 10 or more releases that have a common RP identified in SWRCB's GeoTracker database.[7] In California, 88 parties are each associated with 10 or more releases and account for 19 percent of the backlog. California's oversight agencies and EPA can use this information to identify possible participants for multi-site strategies to clean up groups of releases.

Geographic Clusters *(see page CA-18 for more details)*

California Finding	Potential Opportunity	Releases
64 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[8]

Another multi-site approach California uses is targeting cleanup actions at geographically-clustered releases. SWRCB has begun a corridor initiative with EPA along Interstate 710 in Los Angeles and Long Beach to clean up and promote the reuse of old LUST sites. This type of approach could 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 in area-wide initiatives will improve California's pace of cleaning up releases. EPA intends to work with the states to conduct further geospatial analyses on clusters of open 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.

7 Approximately 700 releases from United States Department of Defense (DOD) facilities were not included in the GeoTracker database at the time of this analysis, so federal government RPs were under-represented in the data set. DOD releases have since been updated in the database.

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

CONCLUSION

This chapter contains EPA's data analysis of California's LUST cleanup backlog and identifies potential opportunities to reduce the backlog in California. EPA discusses the findings and opportunities for California, 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

California's leaking underground storage tank (LUST) program and underground storage tank (UST) Cleanup Trust Fund are managed by the California State Water Resources Control Board (SWRCB).[9] The investigation and cleanup of releases is performed under the direction of nine Regional Water Quality Control Boards (RWQCBs), 22 Local Oversight Program (LOP) agencies, and numerous Local Implementing Agencies (LIAs) such as county health agencies and fire departments.[10] The state provides funding to the RWQCBs and LOPs, but it does not fund or have statutory authority over the LIAs. LIAs collect fees from operating USTs and use those funds for oversight. LOPs and LIAs operate under California's Health and Safety Code while RWQCBs operate under the state's Water Code.

Cleanup Financing

California's UST Cleanup Trust Fund was established in 1989 by the state legislature to assist eligible UST owners and operators to meet federal and state requirements for demonstration of financial responsibility (FR) for any damages incurred as a result of tank operations. Subaccounts of the UST Cleanup Trust Fund include the Emergency, Abandoned, and Recalcitrant Account Program, the Orphan Site Cleanup Account Program, which sunset in January 2008, and the new Orphan Site Cleanup Fund. The Emergency, Abandoned, and Recalcitrant Account Program primarily funds emergency corrective action while the two orphan site programs provide financial assistance for the cleanup of brownfield sites contaminated by LUSTs.

The state fund's revenues are generated by a storage fee for every gallon of petroleum product placed into USTs. Revenues have declined in recent years, and the latest projections indicate that the 2009 revenues will be $20 million less than the revenues received two years ago.

To be eligible for state funds, a tank owner must be in compliance with UST permitting requirements, regulatory agency cleanup orders, and payment of fees. Eligibility is not evaluated until a claim is filed by a responsible party (RP). In order to first reimburse RPs who are least able to pay the costs of cleanup, the UST Cleanup Trust Fund prioritizes payment of approved claims based on the type of RP. Highest priority is given to residential claimants (Class A), then to small businesses (Class B), larger businesses (Class C), and finally major oil companies (Class D). Major oil companies have also received state funding directly from the state legislature to address cleanups. There is a $5,000 deductible on claims from the UST Cleanup Trust Fund and a $1.5 million ceiling on all claims.

Cleanup Standards

In 1992, SWRCB adopted an overarching policy requiring cleanup to background levels when possible. However, SWRCB does allow oversight agencies to use less-stringent, site-specific cleanup goals when background levels cannot be achieved. Initial guidelines used by regulators state-wide at LUST sites are the Maximum Contaminant Levels for groundwater as set by EPA and Preliminary Remediation Goals for soil as set by EPA Region 9. SWRCB requires that any alternative level of water

California LUST Program At a Glance

Cleanup Rate
In fiscal year (FY) 2009, SWRCB confirmed 148 releases and completed 1,066 cleanups.[11]

Cleanup Financing
California's UST Cleanup Trust Fund is financed by a storage tank fee of 1.4 cents for every gallon of petroleum stored in an UST. The fund covers cleanup costs for eligible releases and reimburses claims based on the type of claimant and the size of the business.

Cleanup Standards
Cleanup to background levels is SWRCB's goal. Regional authorities may set their own cleanup standards when background levels cannot be achieved.

Priority System
There is no state-wide method of prioritizing LUST cleanups. Implementing agencies may use specific cleanup priority systems.

9 For more information on California state program management, see: www.waterboards.ca.gov/water_issues/programs.
10 There are many LIAs in California, but at the time of this analysis, the GeoTracker database listed open releases from only 59 LIAs.
11 Based on FY 2009 *UST Performance Measures End of Year Activity Report*.

quality less stringent than background must be consistent with the maximum benefit to the people of the state, not unreasonably affect current and anticipated beneficial use of affected water, and not result in water quality less than that prescribed in the water quality control plan for the basin within which the site is located.[12] When less stringent cleanup standards are used, institutional or engineering controls may be implemented. Since 1998, fewer than five releases per year, on average, have been closed with institutional controls in place.

Release Prioritization

SWRCB does not employ a state-wide prioritization system for addressing LUST cleanups, as the state delegates responsibility for cleanups to the local level. Each oversight agency may prioritize cleanups at its discretion.

State Backlog Reduction Efforts

In 2006, SWRCB implemented a five-year review program of UST Cleanup Trust Fund-reimbursed releases that have been open for at least five years to evaluate the annual progress toward closure. SWRCB has eight to 10 staff assigned to this work with assistance also provided by EPA Region 9. Based on site-specific data collected during the review, the Trust Fund proceeds with one of the following options: (1) agrees that the LUST cleanup continue on the current course; (2) works with the RWQCB, LOP, or LIA to modify the course of work to move the release toward closure; (3) makes a recommendation for closure of the release to the regulatory oversight agency; or (4) if necessary, elevates the release to SWCRB's upper management, and eventually to the Board itself, for closure. An effort to review cleanups not funded by the UST Cleanup Trust Fund was launched in November 2009.

SWRCB passed a resolution in May 2009 that all cleanups, both state-funded and privately-financed, must be reviewed by June 2010 to identify releases for closure and additionally, the state must reduce monitoring schedules from quarterly to semi-annually in an effort to conserve resources.[13] The resolution also allows for closure with residual contamination as long as: (1) no current adverse impacts on water uses are present; and (2) contamination will naturally attenuate within a reasonable timeframe. Another ongoing process for backlog reduction is the state's petition process, whereby RPs that have completed corrective action at a release can petition SWRCB for closure. Finally, in an effort to improve state-wide data management, SWRCB and EPA Region 9 are encouraging LIAs and the United States Department of Defense (DOD) to track LUST data in the GeoTracker database and to meet with RWQCBs and LOPs to discuss backlog reduction efforts. The City of Los Angeles and Ventura County have been especially aggressive in reviewing case files, updating database records, and closing releases.

12 For more information, see Resolution 1992-049: www.swrcb.ca.gov/water_issues/programs/land_disposal/resolution_92_49.shtml.

13 For more information, see Resolution 2009-042: www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2009/rs2009_0042.pdf.

ANALYSIS AND OPPORTUNITIES

In this study, EPA analyzed California's federally-regulated releases that have not been cleaned up (open releases). EPA conducted a multivariate analysis on all of California's data. However, this technique did not identify strong underlying patterns in the data.[14] 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 SWRCB's data.[15] 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 SWRCB might use as a starting point for collaborative efforts to address the backlog. Although EPA's analysis covered all releases in California, there are 390 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 seven areas of California's backlog with potential opportunities for its further reduction:

- Stage of cleanup
- Media contaminated
- Cleanup financing
- Presence of free product
- Oversight agency backlogs
- Number of releases per RP
- Geographic clusters

LUST Data Source

Electronic data for LUST releases occurring between January 1970 and February 2009 were compiled with SWRCB staff in 2008 and 2009.[16] Data were obtained from SWRCB's GeoTracker database and selected based on quality and the ability to address areas of interest in this analysis.[17]

Data Limitations

Although efforts are underway to improve data management, data limitations in the GeoTracker database prevented precise analysis of the number and age of open releases in California. The total number of releases identified in the database for this analysis has 4,717 fewer releases (3,510 closed and 1,207 open releases) than were reported in EPA's 2008 UST Performance Measures report. There are likely two primary reasons for this significant difference. First, LIAs that do not receive funding from the state have historically not consistently used the GeoTracker database. Instead, these LIAs have tracked LUST data in local databases. At the time of this analysis, 59 LIAs were listed in the GeoTracker database. EPA Region 9 has been working with LIAs to update the database, although SWCRB has no statutory authority requiring the LIAs' compliance. In addition, approximately 700 releases from DOD facilities were not included in the GeoTracker database at the time of this analysis. DOD releases have since been updated in the database.

Of the releases that are included in the GeoTracker database, the release dates are missing for 22 percent of closed releases (6,098 releases) and 9 percent of open releases (971 releases). The age of release therefore could not be calculated for these 7,069 releases. In addition, EPA Region 9 has found that many release dates in the database are inaccurate and that approximately 10 percent of releases reported to EPA as closed in 2009 were not from federally-regulated tanks. EPA Region 9 suspects that this type of inaccuracy has been a common occurrence in SWRCB's reporting to EPA and is looking for ways to address these reporting errors. Continued efforts by SWRCB and EPA Region 9 to generate a comprehensive database of LUST releases in California and address concerns over the quality of existing data records will improve SWRCB's ability to optimize management of LUST releases.

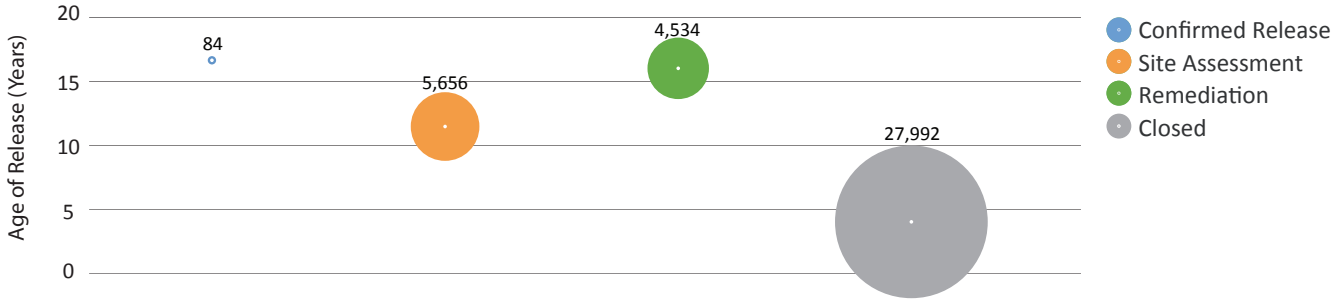
14 The analytic tree method, a multivariate technique used to identify underlying patterns among large data sets, did not reveal strong patterns within the data. For more information on analytic trees, see Appendix A.
15 For a detailed description of release stages, see the Chapter Notes section (Stage of Cleanup Reference Table).
16 For a detailed description of the California data used in this analysis, see the Chapter Notes section.
17 This database can be queried online at: geotracker.swrcb.ca.gov.

STAGE OF CLEANUP

As of February 19, 2009, the California backlog consisted of 10,274 open releases. EPA analyzed the age of these LUST releases and their distribution among the stages of cleanup. To facilitate analysis, EPA classified California's 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 where remedial activities have started).[18] 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 California's LUST program began, 27,992 releases have been closed in California; half of these releases were closed in fewer than 3.9 years (Figure 1 below).[19] 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



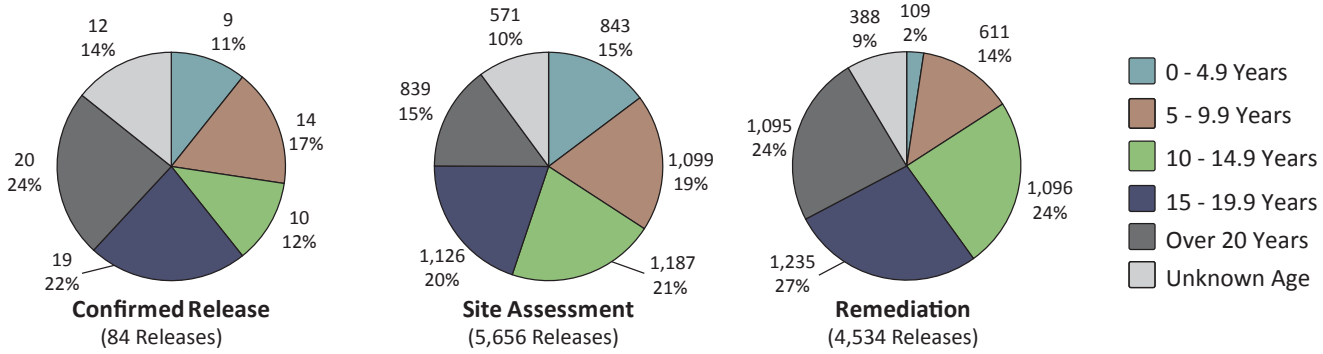
The white dot at the center of each circle represents the median age of releases. Each circle is labeled with, and scaled to, the number of releases within each stage. Included in the release counts and size of circles are 6,098 closed releases and 971 open releases for which release age is unknown. These releases are not part of the median age calculation.

California has undertaken three initiatives to look for releases that could be closed with minimal effort including: a five-year review of state fund reimbursed releases, a resolution that all releases must be reviewed by June 2010 to identify releases for closure, and a petition process through which RPs that have completed corrective action can petition the program for closure status.[20] 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.

18 Releases were classified into stages based on available data and discussions with SWRCB staff. For more information, see the Chapter Notes section.
19 Median ages of open and closed releases were calculated using available data. See data limitations discussion for more information.
20 See State Backlog Reduction Efforts in the Program Summary.

California has many old LUST releases not in remediation. Figure 2 below 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 3,152 older releases in the Site Assessment stage (31 percent of the backlog) that have not entered the Remediation stage, 10 years or more after the releases were confirmed. Figure 2 also shows the 63 older releases in the Confirmed Release stage (1 percent of the backlog) that have not been assessed, five years or more after the releases were confirmed. California's data indicate that these releases have not moved into remediation 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.[21] The guide explains the overall ESA process as well as specific site assessment tools and methods. The ESA process rapidly characterizes site conditions to make 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.

California also has many old releases in the Remediation stage. Thirty-three percent of California's releases (3,426 releases) are in the Remediation stage and are 10 years old or older (Figure 2). Because only 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 begun remediation. Increasing efficiency and getting releases through the cleanup process as quickly as possible will expedite the reduction of the backlog. SWRCB should establish 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 SWRCB resources and bring releases to closure more quickly.

21 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.

California Finding

31 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.	3,215
Releases 5 years old or older in the Confirmed Release stage	*63*
Releases 10 years old or older in the Site Assessment stage	*3,152*

California Finding

33 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: • periodic review of release-specific treatment technologies; • review of site-specific cleanup standards, where applicable; • consider use of institutional or engineering controls; and • implement enforcement actions if cleanup has stalled.	3,426

MEDIA CONTAMINATED

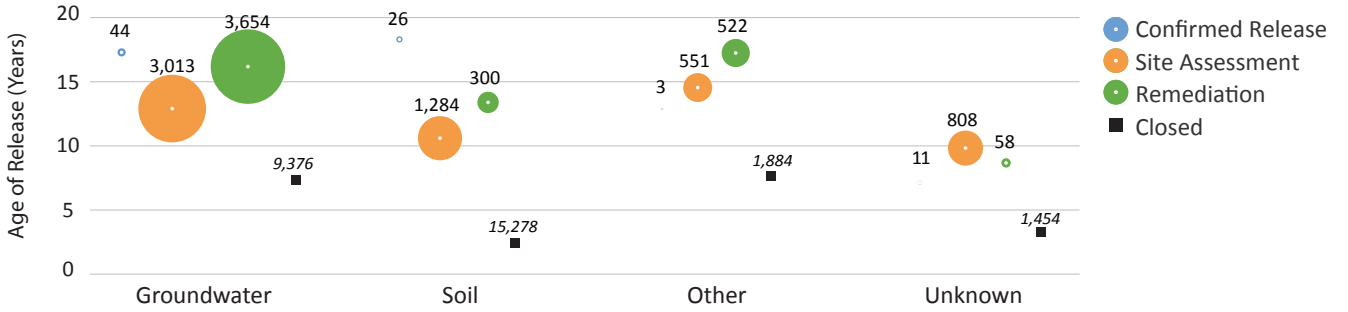
California Finding
27 percent of releases: • contaminate groundwater; • are in remediation; and • are 10 years old or older.

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.	2,733

Groundwater is an important natural resource at risk from petroleum contamination. Releases impacting groundwater make up the majority of California's backlog. In general, groundwater contamination takes longer and is 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 contaminated media into four categories: groundwater (6,711 open releases), soil (1,610 open releases), other media (1,076 open releases; includes vapor and surface water), and "unknown" media, which includes releases with no media specified (877 open releases).[22] Across all media types, more than half of the open releases in the Site Assessment stage are 10 years old or older (Figure 3 below).

In California, 65 percent of open releases (6,711 releases) involve groundwater contamination and have a median age of 15.2 years (Figure 3). In contrast, 33 percent of closed releases (9,376 releases) involve groundwater contamination. These closed releases have a significantly younger median age of 7.2 years compared to the median age of open releases. Of the 3,654 Remediation stage releases with groundwater impacts, 75 percent (2,733 releases) are 10 years old or older and over half of those releases (1,861 releases) are 15 years old or older (Figure 4, page 13). The subset of older releases that contaminate groundwater and are in remediation makes up 27 percent of California's total backlog. Groundwater contamination is typically more complex and difficult to remediate. However, if SWRCB could identify opportunities to improve cleanup efficiencies, it might be able to accelerate the pace of cleanups. For example, using a systematic process to evaluate cleanup progress, current contaminant levels, and treatment technologies might move releases through cleanup and to closure faster.

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

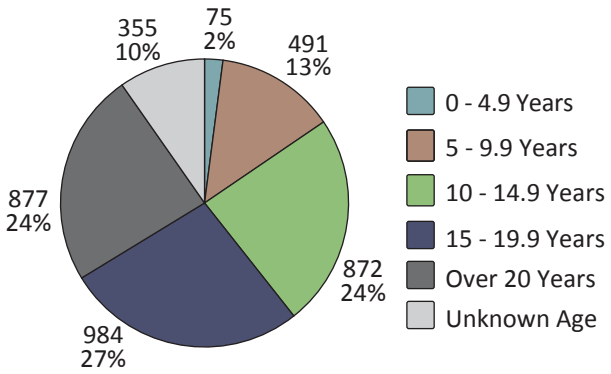


Squares indicating closed releases are not scaled to the number of releases in that stage.

The use of institutional or engineering controls can also reduce the time to closure by eliminating exposure pathways where protective and appropriate. California's oversight agencies have only recorded an average of fewer than five releases per year as closed with institutional controls in place, although the frequency of their use might be more common than is reflected in the GeoTracker database. In addition, evaluation of the cleanup progress of releases with groundwater impacts might identify releases where monitored natural attenuation (MNA) can be applied. In these cases, treatment times need to remain reasonable compared to other methods. California's cleanup costs might be reduced by applying MNA.

22 For a detailed description of contaminated media classifications, see the Chapter Notes section.

Figure 4. Age of Remediation-Stage Releases with Groundwater Impacts



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, approximately half of the 1,284 Site Assessment stage soil cleanups in California are 10 years old or older (669 releases; 7 percent of the backlog) (Figure 3). California might defer the cleanup of soil contamination to address higher risk groundwater contamination. However, California's total number of releases contaminating soil only (1,610 releases; 16 percent of the backlog) offer potential opportunities for reducing the backlog. In general, expediting site assessments and moving forward with remediation could help SWRCB gather more information about difficult sites and move all releases toward closure, thereby reducing the backlog. SWRCB should also encourage RPs and communities to look at other public/private funding options to facilitate assessment, cleanup, and reuse at these sites. For low priority releases without a viable RP, SWRCB should encourage the use of petroleum brownfields grants.

There are also 877 releases (9 percent of the backlog) for which the type of media contaminated is either unknown or not effectively tracked in the GeoTracker database (Figure 3). Only 11 of these releases are in the Confirmed Release stage. However, these releases are not recent; their median age is 7.0 years, which indicates that they are not being assessed quickly. A total of 808 releases in the Site Assessment stage (8 percent of the backlog) and 58 releases in the Remediation stage (less than 1 percent of the backlog) do not list the media impacted and have median ages of 9.8 and 8.6 years, respectively (Figure 3). The media impacted would likely be identified during the assessment and should therefore be known for at least some of the 808 releases undergoing assessment as well as for the 58 releases in the Remediation stage.

California Finding

7 percent of releases:

- impact soil only;
- have not finished site assessment; and
- are 10 years old or older.

Potential Opportunity	Releases
• Continue to use targeted backlog reduction efforts to close old releases with soil contamination with minimal effort. • Encourage RPs to use expedited site assessment to move releases more quickly into remediation.	669

California Finding

9 percent of releases do not have the type of media contaminated electronically tracked in the GeoTracker database.

Potential Opportunity	Releases
Target releases with unknown media contamination for expedited site assessments and use this information to customize the remedial activity and update the GeoTracker database as necessary.	819

CLEANUP FINANCING

California Finding
65 percent of releases have not received state funds.

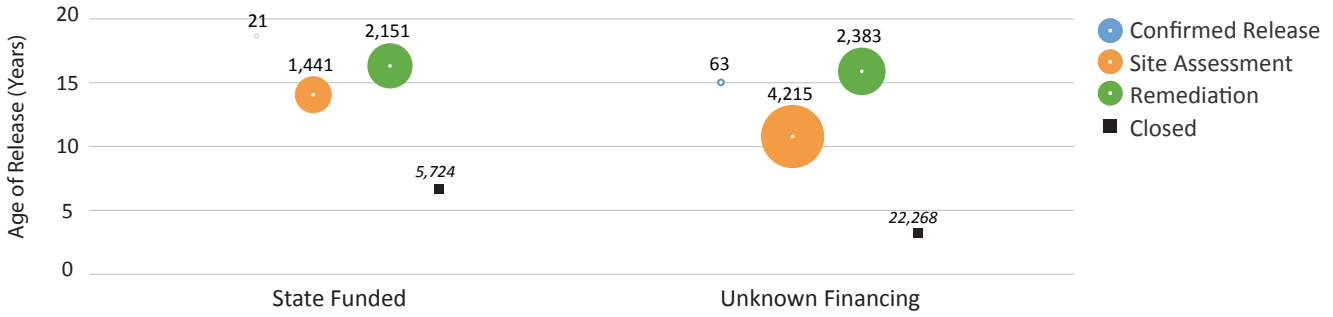
Potential Opportunity	Releases
Explore opportunities to address more releases with the state fund such as: • examine cost-saving measures; and • examine other funding sources, including public/private funding options such as petroleum brownfields grants for low priority releases or financing claim payments.	6,661

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 help analyze the impact of state fund issues on closure rates, EPA evaluated California's progress for those releases with state fund claims and those that have not made claims.

California's UST Cleanup Trust Fund functions as the FR mechanism and pays for all cleanups from tanks that are in compliance with UST laws and regulations. State fund eligibility is not evaluated until a claim is submitted by an RP. SWRCB prioritizes payment of existing claims based on the type of applicant (e.g., individuals and small businesses are paid first). Depending on fund availability, SWRCB establishes a threshold for the payment of claims and, as necessary, will suspend additional commitments for reimbursement. Applicants to the fund are placed into classes (e.g., small businesses are in Class B) and thresholds for payment are set by classes.

According to the GeoTracker database, 3,613 open releases (35 percent of the backlog) have received reimbursements from the UST Cleanup Trust Fund (Figure 5 below). The remaining 6,661 open releases (65 percent of the backlog) have not received state funds because the RP has not submitted a claim or because the claim has not been reimbursed yet. Work has occurred at some of these releases. According to the database, claims have been submitted for 29 percent of these releases (1,957 releases), but as of the date the data were submitted to EPA, California had not distributed state funds on these cleanups yet. No claims have been filed with the UST Cleanup Trust Fund for the remaining 4,704 releases (46 percent of the backlog). SWCRB should consider exploring opportunities to address more releases with the state cleanup fund such as employing cost-cutting measures. For example, open-market competitive bidding for cleanup work could increase the amount of funds available per cleanup. Another opportunity SWCRB could investigate is the availability of additional funding sources through public/private partnerships such as petroleum brownfields grants for low priority releases without a viable RP. If some of the releases are ineligible for the state fund, then SWCRB should consider options such as enforcement to help move these cleanups toward remediation and closure.

Figure 5. Age of Open Releases, by Type of Financing and Stage of Cleanup



The majority of releases that have received state funding are in the Remediation stage (Figure 5). State-funded cleanups in the Remediation stage make up 21 percent of California's backlog (2,151 releases), and the median age of these releases is 16.6 years old (Figure 5). SWCRB should explore opportunities to move these releases toward closure, thereby freeing up resources to address additional releases. The releases in the Remediation stage might be complex and difficult to remediate, but also might remain open for other reasons, such as very slow reduction in contamination from existing remedial systems. If a thorough evaluation determines that active remediation is ineffective in reducing contamination, lower-cost cleanup technologies such as MNA could be considered as an appropriate remedy. If used appropriately and results could be achieved in a similar time frame, this could free up state funds for use at other cleanups and could increase the number of releases that California oversight agencies are able to address and move toward closure. If additional releases could be closed through the use of institutional or engineering controls where protective and appropriate, SWCRB could also use the resources slated for those releases to work on reaching closure at other releases.

PRESENCE OF FREE PRODUCT

California and federal law require that an owner/operator must submit a report on free product within 45 days of release discovery. Although federal regulations require the removal of free product, a large number of relatively old releases with free product present remain in the California backlog. Of the 1,382 releases (13 percent of the backlog) where free product has been reported, 39 percent (537 releases) continue to have free product present on site (Figure 6 below, left). All free product has been recovered from the remaining 61 percent of releases (845 releases). An additional 3,877 releases (38 percent of the backlog) do not have data available regarding the presence of free product.

Figure 6. Presence of Free Product at Open Releases

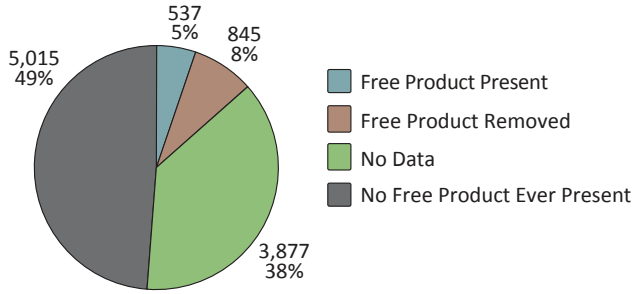
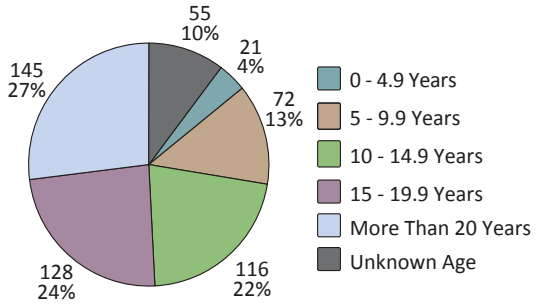


Figure 7. Age of Open Releases with Free Product Present



Of the 537 releases with free product present, 72 percent (389 releases) are 10 years old or older, and 145 releases are 20 years old or older (Figure 7 above, right). Although there are no federal or state-mandated time restrictions on how long it takes to remove the free product, the owner/operator is required to remove as much free product as practicable. The persistence of free product at old releases indicates that owner/operators might not be complying with this requirement and are not effectively removing free product. California should consider enforcement actions at old releases with persistent free product to help ensure the recovery of free product contamination and move cleanups toward closure.

California Finding

21 percent of the backlog is:
- state-funded; and
- in remediation.

Potential Opportunity	Releases
Explore opportunities to move releases toward closure such as: • reevaluate the current remedial plans at state fund eligible releases in long-term remediation to identify releases where more cost-effective plans could be implemented, such as using MNA or using site-specific risk-based decision making; and • consider closing releases using institutional or engineering controls.	2,151

California Finding

5 percent of releases have free product present.

Potential Opportunity	Releases
• Address the presence of free product at releases. • Implement enforcement actions at stalled releases.	537

OVERSIGHT AGENCY BACKLOGS

California Finding
The number of releases and the distribution of releases among stages of cleanup vary among the oversight agencies.

Potential Opportunity	Releases
Develop agency-specific strategies for moving releases toward remediation and closure and updating the GeoTracker database.	Variable number of releases[23]

EPA analyzed cleanup backlogs managed by California administrative agencies to identify patterns and opportunities for targeted backlog reduction strategies within each agency. RWQCBs, LOPs, and LIAs manage oversight of LUST cleanups in California, and 87 percent of the backlog (8,893 releases) falls under the jurisdiction of the RWQBCs and LOPs (Table 1 below). Releases under RWQCBs and LOPs have a similar median age, although a larger proportion of releases within LOP jurisdiction have begun remediation. LIAs are responsible for the remaining 13 percent of the backlog (1,359 releases), but do not receive state funding and are not overseen by SWRCB. Only 19 percent of LIA-managed releases (252 releases) are in the Remediation stage. The appearance of slow cleanup progress might be the result of LIAs not consistently updating the GeoTracker database. California should consider agency-specific efforts to expedite site assessments for pre-remediation releases and to review the treatment technologies in place which might identify opportunities to move them toward remediation and accelerate cleanups. In addition, SWRCB can facilitate sharing of information and best practices among the various oversight agencies to improve overall program management.

Table 1. California Backlog, by Type of Administrative Agency

	RWQCB	LOP	LIA	Unknown
State Backlog Contribution	42%	45%	13%	<1%
Cumulative Historical Releases	12,267	17,732	8,221	46
Closed	7,975/65%	13,131/74%	6,862/83%	24/52%
Open	4,292/35%	4,601/26%	1,359/17%	22/48%
Stage of Cleanup				
Confirmed Release	29/1%	26/<1%	29/2%	0/0%
Site Assessment	2,364/55%	2,196/48%	1,078/79%	18/82%
Remediation	1,899/44%	2,379/52%	252/19%	4/18%
Median Age of Open Releases	13.8 years	14.4 years	13.8 years	11.0 years
Median Age of Closed Releases	5.9 years	3.3 years	2.2 years	4.0 years

23 Opportunities marked as "variable number of releases" relate to programmatic opportunities and affect an unknown number of releases, potentially including all open releases.

NUMBER OF RELEASES PER RP

EPA analyzed the number of releases per RP to identify the RPs that are the largest potential contributors to the state's cleanup backlog.[24] A total of 88 RPs are each associated with 10 or more releases and account for 19 percent of the backlog (1,967 releases) (Table 2 below, left). EPA could not determine the type of business associated with 71 of the RPs who are responsible for 16 percent of the backlog (1,628 releases) because available RP data consisted primarily of the names of RP contacts.[25] Thirteen gasoline retail, distribution, and refining businesses are responsible for 3 percent of the backlog (273 releases).

In addition, 10 oversight agencies have one or more RPs that are each responsible for 20 or more releases (Table 3 below, right). For example, there are 10 RPs with 20 or more open releases each within the Los Angeles RWQCB. Focused efforts engaging these 88 RPs through collaboration or enforcement might expedite closure of many of these releases.

Table 2. RPs with 10 or More Open Releases

Type of RP	Number of Releases	Number of RPs
Unknown Type[26]	1,628	71
Gasoline – Retail/ Distribution/Refining	273	13
Other	38	2
Government – State	14	1
Transportation	14	1
Total	1,967	88
Total	**707**	**31**

Table 3. RPs with 20 or More Releases under a Single Oversight Agency

Oversight Agency	RPs with 20 or More Releases	Number of Releases
Los Angeles RWQCB	10	312
Orange County LOP	6	309
San Diego County LOP	5	167
San Mateo County LOP	4	135
Sacramento County LOP	3	115
Alameda County LOP	3	111
Santa Clara Valley Water District LIA	4	105
Central Valley RWQCB	3	91
North Coast RWQCB	2	64
Santa Clara County LOP	1	20

California Finding

19 percent of releases are associated with 88 RPs each with 10 or more releases.

Potential Opportunity	Releases
Explore possibilities for multi-site agreements (MSAs) or enforcement actions with parties responsible for multiple open releases.	1,967

24 SWRCB provided RP data maintained in the GeoTracker database. These data provide the contact name for the RP, which was in most cases the name of a person rather than an organization.

25 The missing business types for these releases may include the federal government. In addition, approximately 700 releases from DOD facilities were not included in the GeoTracker database at the time of this analysis, so federal government RPs were under-represented in the data set. DOD releases have since been updated in the database.

26 "Unknown Type" includes releases where the facility type could not be easily identified based on an RP's name.

GEOGRAPHIC CLUSTERS

California Finding
64 percent of releases are clustered within a one-mile radius of five or more releases.

Potential Opportunity	Releases
Target releases within close proximity for resource consolidation opportunities.	Targeted number of releases[27]

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 like Los Angeles, San Francisco, Fresno, and Sacramento, 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.

EPA's analysis identified 6,531 releases (64 percent of open releases) located within a one-mile radius of five or more releases (Figure 8 to the right). Of these releases, 3,847 (37 percent of open releases) are located within a one-mile radius of 10 or more other open releases. Approaching the assessment and cleanup needs of an area impacted by LUSTs can be more effective than focusing on individual sites 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.

Figure 8. Map of All Open Releases

State and local governments can utilize geographic clusters for area-wide planning efforts. In fact, California and EPA have begun a multi-agency corridor initiative along Interstate 710 between Los Angeles and Long Beach to accelerate cleanups at LUST sites and promote their reuse and to focus on compliance and prevention measures at the active USTs located in this corridor. EPA would like to continue to work with SWRCB to explore opportunities to promote and enhance the understanding and use of corridors to address LUST releases. EPA encourages states to look for opportunities for resource consolidation and area-wide planning like SWCRB's Interstate 710 Initiative 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 also 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.

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

CONCLUSION

In this state chapter, EPA presented the analysis of LUST data submitted by SWRCB and highlighted information on California's LUST program. Based on the analytic results, EPA identified potential opportunities that could be used to address specific backlog issues in California. 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, California, 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. Final strategies could 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.

California LUST Program Contact Information

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CHAPTER NOTES

CALIFORNIA DATA BY ATTRIBUTE

The following table provides details on the data elements of interest in this analysis. Data were provided by SWRCB 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	California Data	Use in Analysis
Administrative Cost	No data available.	Not Applicable (NA).
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 Financing	Data were obtained from the "CUF_Paid_Amount" field in the GeoTracker LUST Info Summary report. A value greater than zero in this field indicates that the release has received some state funding. These releases were marked as "State Funded" for their cleanup financing.	Examined in the "Cleanup Financing" section.
Cleanup Standards	No site-specific data available.	State-wide standards examined in the national chapter.
Closure Date	Data were obtained from the "STATUS DATE" field in the GeoTracker Cleanup Sites Data Download.	Included in the calculation of release age.
Confirmed Release Date	Data were obtained from the "DISCHARGE_BEGIN_DATE" and "DISCOVERED DATE" fields in the GeoTracker LUST Info Summary Report. If the former was null or invalid, the latter was used, if not also null or invalid. Release dates earlier than 1970 were considered invalid.	Included in the calculation of release age.
Data Date	February 19, 2009 is used for all records. This is the date the data were downloaded.	Included in the calculation of release age.
Federally-Regulated LUST Releases	Data were obtained from the "CASE_TYPE" field in the GeoTracker LUST Info Summary report. A "LUST Cleanup Site" entry in this field identifies the correct universe of releases for this analysis.	Identifies the appropriate universe of releases for analysis.
Free Product	Data were obtained from the "DTFPROD" field in the GeoTracker ESI Data Downloads. Releases with positive values between February 18, 2008, and the date of the data download (February 19, 2009) were counted as currently having free product present. Releases with positive values prior to February 18, 2008, and no positive values since were counted as having free product removed.	Examined in the "Presence of Free Product" section.
Institutional and Engineering Controls	Data were obtained from the "ACTION_TYPE" field in the Geotracker Cleanup Sites Data Download. Releases with "Deed Restriction / Land Use Covenant" entries are counted as releases with institutional controls in place.	Discussed in the "Cleanup Standards" section and examined in the national chapter.
Latitude and Longitude	Data were obtained from the "LATITUDE" and "LONGITUDE" fields in the GeoTracker Cleanup Sites Data Download. 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.
Lead	Data were obtained from the "LEAD_ORGANIZATION" field in the GeoTracker Cleanup Sites Data Download.	Examined in the "Oversight Agency Backlogs" section.

Data Element	California Data	Use in Analysis
Media	Data were obtained from the "MEDIA OF CONCERN" field in the GeoTracker LUST Info Summary Report (see Media Reference Table). 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 surface water contamination were counted as "other." "Unknown" releases might include those releases for which there were 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.
Methyl Tertiary Butyl Ether (MTBE)	No data available.	NA
Monitored Natural Attenuation (MNA)	Data were obtained from the "METHOD" field in the GeoTracker LUST Info Summary Report.	No informative patterns were identified.
Number of Releases per RP	Calculated as the total number of open releases associated a unique RP name.	Examined in the "Number of Releases per RP" section.
Orphan	No data available.	NA
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 "CUF_Paid_Amount" field in the GeoTracker LUST Info Summary Report. This is an aggregate total for each release and is not examined in this analysis as it cannot be adjusted for inflation.	Data not suitable for analysis.
Release Priority	No data available.	NA
RP	Data were obtained from the "RP_NAME" field in the GeoTracker LUST Info Summary report.	Used to calculate the number of releases associated with each unique RP.
RP Recalcitrance	No data available.	NA
Staff Workload	No data available.	NA
Stage of Cleanup	Data were obtained from the "STATUS" field in the GeoTracker Cleanup Sites Data Download (see Stage of Cleanup Reference Table).	Variable in all analyses.
Status	Data were obtained from the "STATUS" field in the GeoTracker Cleanup Sites Data Download (see Stage Reference Table).	Identifies the appropriate universe of releases for tree analysis.
Voluntary Cleanup Program	No data available.	NA

Media Reference Table

Each release record contains a field recording multiple types of media contamination. These entries include both old and new media codes.

Media Code	Media Type
(Blank)	Unknown
A	Other
AQUI	Groundwater
AQUI, CSS, IA	Groundwater

Media Code	Media Type
AQUI, IA, SOIL, SV, UE	Groundwater
AQUI, OTH	Groundwater
AQUI, OTH, SOIL	Groundwater
AQUI, OTH, SOIL, SURFW	Groundwater

Media Code	Media Type
AQUI, OTH, SOIL, SV	Groundwater
AQUI, SED, UE	Groundwater
AQUI, SOIL	Groundwater
AQUI, SOIL, SURFW	Groundwater
AQUI, SOIL, SV	Groundwater
AQUI, SOIL, SV, SURFW	Groundwater
AQUI, SOIL, SV, SURFW, UE, WELL	Groundwater
AQUI, SOIL, WELL	Groundwater
AQUI, SURFW	Groundwater
AQUI, UE	Groundwater
AQUI, WELL	Groundwater
AQUI, WELL, OTH	Groundwater
AQUI, WELL, UE	Groundwater
Diesel, Gasoline	Unknown
F	Unknown
Gasoline	Unknown
Gasoline, Fuel Oxygenates, * * TERT-BUTYL ALCOHOL (TBA), * TERT-BUTYL ALCOHOL (TBA)	Unknown
O	Other
OTH	Groundwater
OTH, OTH	Groundwater
OTH, OTH, OTH	Groundwater
OTH, SOIL	Groundwater
OTH, SOIL, SURFW	Groundwater
OTH, SOIL, SV	Groundwater
OTH, SOIL, SV, UE	Groundwater
OTH, SOIL, UE	Groundwater
OTH, SURFW	Groundwater
OTH, SV	Groundwater
OTH, UE	Groundwater
OTH, WELL	Groundwater
Other Solvent or Non-Petroleum Hydrocarbon	Unknown
S	Soil
SOIL	Soil
SOIL, SOIL	Soil
SOIL, SV	Soil
SOIL, UE	Soil
SOIL, WELL	Groundwater
SURFW	Other
U	Unknown
UE	Unknown
UE, OTH	Other
UE, SOIL	Soil
W	Other
WELL	Groundwater
WELL, AQUI	Groundwater
WELL, SURFW	Groundwater

Stage of Cleanup Reference Table

Each release is assigned a single current status. These status entries were standardized into four stages for this analysis.

Status	Stage
Open	Confirmed Release
Open - Reopen Case	Confirmed Release
Open - Reopen Previously Closed Case	Confirmed Release
Open – Remediation	Remediation
Open - Verification Monitoring	Remediation
Open - Assessment & Interim Remedial Action	Site Assessment
Open - Inactive	Site Assessment
Open - Site Assessment	Site Assessment
Referred	Site Assessment
Completed - Case Closed	Closed