Underground Storage Tank Futures Forecast Tool Users' Guide

U.S. Environmental Protection Agency

Office of Underground Storage Tanks

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Introduction

The UST Futures Forecast tool from the U.S. Environmental Protection Agency is part of a response to the Association of State and Territorial Solid Waste Management Officials' February 2023 paper entitled, *Sustainability of State Financial Assurance Funds for the Underground Storage Tank Programs*.[1] ASTSWMO's report detailed their concerns about converging trends in the transportation and UST universes as a result of an energy transition, including the potential for increasing cleanup expenditures at the same time as many state funds experience decreasing revenues, which may lead them to face financial constraints that can slow their ability to support cleanup activities. Under some scenarios, state funds could even become insolvent. States may experience funding challenges for UST/LUST programs if they do not take action to adjust how they fund their program operations and cleanup programs.

The EPA has not predicted how much petroleum motor fuel will be used over time, and this forecast tool also makes no such prediction. Rather, like retirement planning and bank stress tests, the UST Futures Forecast Tool is intended to be used to explore the effects that potential alternative fuel transition scenarios could have. Exploring alternative future scenarios allows UST cleanup funds and cleanup programs to be prepared should petroleum motor fuel use decline over time. While it is possible that a large fraction of UST systems nationally will close in the next two decades due to declining transportation fuel use, several challenges make it difficult to predict the pace of the decline in fuel use in the U.S. and the impact the decline will have on state UST and LUST programs. Policy makers need to consider a range of possible scenarios when evaluating the ability of their state UST cleanup fund to perform through the energy transition. The EPA hopes the UST Futures Forecast Tool will help states anticipate challenges and test potential solutions to state fund solvency concerns by helping them estimate UST corrective action fund revenues and costs under a variety of declining fuel-use scenarios.

Background

Many variables affect future U.S. fuel demand. Increased vehicle efficiency and vehicle electrification will reduce fuel demand, but other changes in the transportation industry may increase fuel demand, offsetting demand reductions in other areas. There is uncertainty over the rate of impact the variables will have on fuel demand, even if the direction of the impact is clear. The impacts of some variables such as changes in driver preferences, commuting patterns, and fleet operations are unknown. These variables may impact the future size of the national vehicle fleet and the future averages of total U.S. miles driven annually.

[1] Association of State and Territorial Solid Waste Management Officials Tanks Subcommittee and State Fund Financial Responsibility Task Force: *2023 Sustainability of State Financial Assurance Funds for the Underground Storage Tank Programs*. February 2023. https://astswmo.org/2023-sustainability-of-state-financial-assurance-funds-for-the-underground-storage-tank-programs/.

State funds revenues are currently approximately $700 million annually but are expected to decline as fuel use declines and fewer USTs remain in operation. This decline will likely happen gradually, and fuel storage in USTs will remain essential, even if the quantity of storage declines.

At the same time revenues are expected to decline, owners may begin closing the USTs at active motor fuel facilities and temporarily out of service USTs that are no longer needed or economically viable due to reduced sales. Closing more service stations could lead to more release discoveries as many UST releases are discovered when owners assess sites during the UST closure process. National data are limited, but recent data from closures in California between January 2017 and December 2022 found releases were discovered at 29.7% of the 546 facilities that had single wall UST systems closures or upgrades, and at 6.7% of the 1,042 facilities with double wall UST system closures or upgrades[2][3].

In addition, nationally there are approximately 55,000 confirmed releases with ongoing cleanups. These 55,000 ongoing corrective action projects are in various stages of completion. Some have had many years of active remediation and are currently just being monitored, while other corrective action projects have not progressed past the release confirmation stage.

Most state funds currently operate with relatively modest reserves and do not have the cash reserves to fund a large number of new cleanup projects. Most of the 35 states with state funds currently accepting new releases rely significantly on taxes or fees on fuel sales to pay for cleanups. Declining fuel sales will impact UST and LUST programs that receive funding from fuel sales taxes or fees. In addition, a reduction in the number of operating UST systems will lead to a decline in revenue for UST and LUST programs that receive funding from per tank fees. Some states use per tank fees to partially, or wholly fund cleanups. Some states also use their fund revenue to pay for other program activities.

[2] California UST Leak Prevention: *January-December 2022 Annual Report.* https://www.waterboards.ca.gov/ust/leak_prevention/docs/epa-evaluations/2022-jan-dec-leak-prevention-report.pdf

[3] California has a deadline to close all single-wall UST systems by December 31, 2025. The state is specifically tracking and reporting data about the different rates of releases identified at closures between single-wall and double-wall UST systems in their UST Leak Prevention Reports. The EPA understands this type of information is currently available from few, if any, other states.

UST Forecast Futures Tool Overview

The primary goal of the tool is to facilitate state evaluation of potential mismatches between state UST cleanup fund revenues and corrective action costs under a range of energy transition scenarios. The states can examine the effects of various declining fuel use scenarios on facility closures, cleanups, and state fund solvency.

The tool is designed to project challenges and test potential solutions to state fund solvency concerns. The tool is designed to help states estimate the number of release discoveries, state fund and program funding levels, and the potential number of abandoned sites in potential future scenarios. The tool allows states to project the impact of different combinations of potential solutions.

The states are encouraged to run the tool with ranges of assumptions to examine different ranges of likely outcomes. Where firm values are not available, the tool can be run under a range of assumptions to examine the range of likely outcomes. The EPA recognizes that specific projections for many variables related to the changing transportation sector are not available, especially at the state level, so the EPA has structured the tool as a simple spreadsheet to facilitate easy and transparent modifications to fit specific program features. The transportation universe and energy transition will continue to evolve, so states should plan to reevaluate their situation and forecasts on a regular basis.

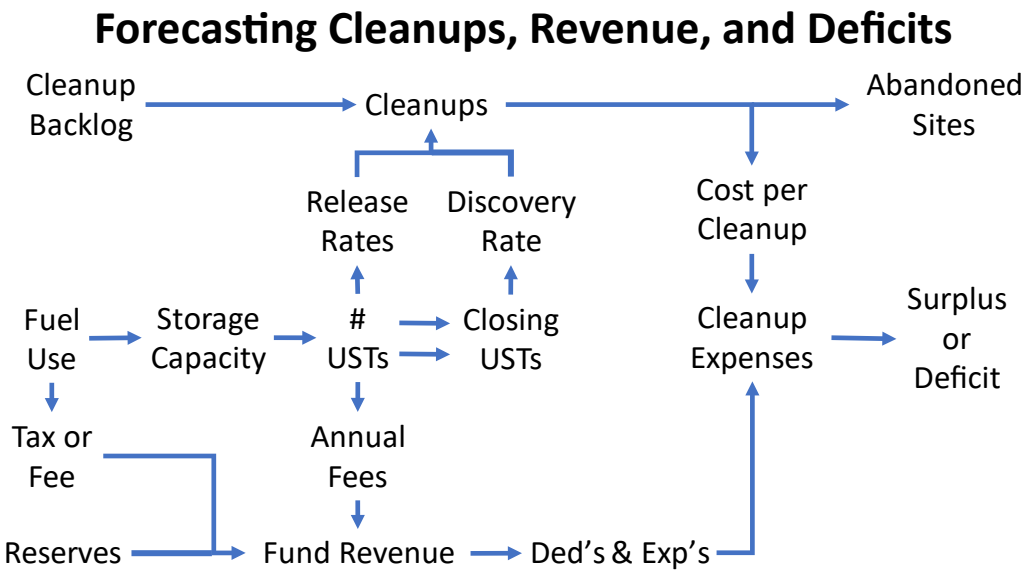
States that perform periodic actuarial reviews of their state funds may want to incorporate the forecast tool into their analysis of future performance.

Data Input and Calculations

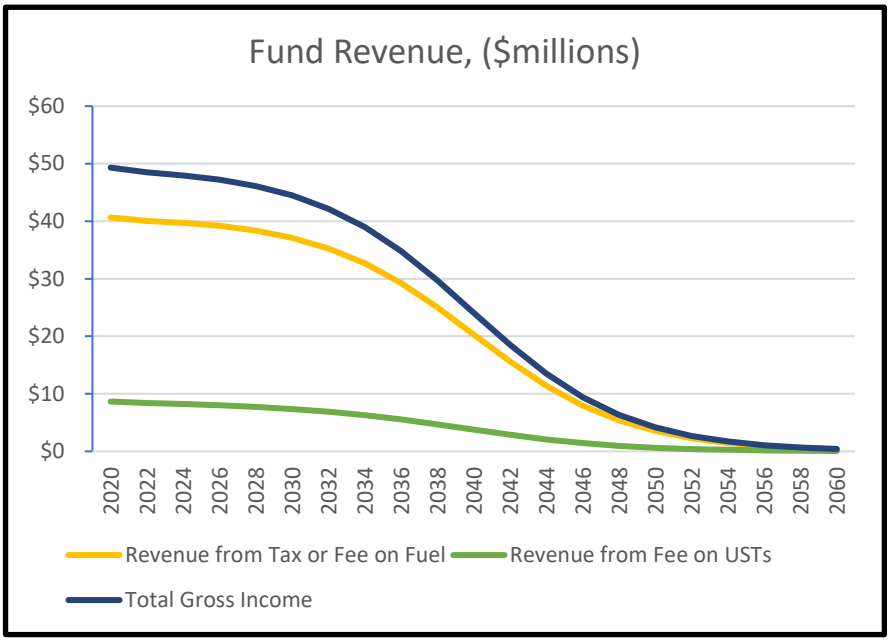
The tool is a spreadsheet with five worksheets – (1) *Data Entry*, (2) *Fuel Use, Tanks, & Sites,* (3), *Releases & Abandons* (4) *Corrective Action Costs,* (5) *Funding & Surplus*. Details on the five worksheets are described below. Data input is made in the first worksheet, and the projection calculations are made in the subsequent four worksheets. The calculation worksheets can be modified by the User. Rows can be added or subtracted to increase or decrease the number of years and formulas can be modified to change the calculations to fit specific program features.

The calculations begin with fuel use, which drives fund revenue and how many USTs are needed. Fund revenue and the changes in UST population are then combined with other variables to project annual UST fees, UST removals, release discoveries, corrective action costs, and ultimately fund surpluses or deficits. The calculation flow is shown graphically in Figure 1.

Figure 1. Calculation Flow



The calculations in the tool are easily modified so states can adapt it to fit their unique structures. The tool includes charts that summarize the results for presentation to management, legislators, and stakeholders. For example, this chart shows revenue projections for a fund.



Worksheet #1 -- Data Entry Worksheet

The *Data Entry* worksheet is found in the first tab. Values from the *Data Entry* worksheet are used in calculations on the remaining worksheets in this spreadsheet. The input data on this worksheet and the formulas they feed can be replaced with specific values on the calculation worksheets that follow this sheet.

The data on this sheet is divided into four areas, corresponding to the remaining four worksheets. Many of the cells in the *Data Entry* worksheet have comments (signified by the red triangle in the upper right of the cell) that explain the purpose of the data and include suggestions on how to establish values. Not all the data is needed to drive the model. For example, if the User does not want to analyze the temporarily out of service USTs, they can leave that field blank.

***Data Entry* Worksheet, Data Input Area #1.**

Tab 1: Fuel Use Decline, Number of Tanks, & Number of Sites

Fuel Use Decline Scenarios

General Data		Straight Line Decline		Logistic Decline	
Starting Year	2020	Yes/No (blank)		Yes/No (bl	YES
# Years	40	End fuel use (mb/d)	0	x_0	10
Initial Fuel Use (mb/d)	0.19			k	0.47

1. **Data Input Area #1. Declining fuel use scenario and Initial Number of Active USTs and Sites**. The data from this section is linked to the second worksheet (*Fuel Use, Tanks, & Sites*) where the calculations are performed.
    a. There are two types of decline curves available in the model: straight line decline and logistic decline curve, which is "S" shaped. The specifics of the curve can be adjusted by selecting an end date for the transition and the shape of the decline curve.
        i. **Starting Year**. This is the year at which the forecast begins. For presentation of results the User may want to begin at peak motor fuel use for their state. 2020 was the peak motor fuel use for the U.S., overall.
        ii. **# Years**. This is the number of years in the decline of fuel use. The User can change this value, but if a longer time period is selected the calculation sheets will need added rows.
        iii. **Initial Fuel Use (mb/d).** This is the starting point for fuel use in millions of barrels per day. State fuel use data should be available from the State Fund's revenue calculation.
        iv. **Straight Line Decline**. This is the simplest fuel use forecast method.

1. **Yes/No (blank)**. This toggles which fuel use decline formula to use. Enter "YES" if using straight line decline; otherwise leave blank.
2. **End fuel use (mb/d)**. This is the daily fuel use at the end of the forecast period, selected above.

v. **Logistic Decline.** This formula creates a fuel use decline curve that is analogous to many product sales over time curves. It is shaped like a backwards "S." The fuel use decline starts slowly and increases each year until the inflection point, when the rate of decline begins to taper.

1. **Yes/No (blank)**. As with the Straight Line Decline, this toggles which fuel use decline formula to use. Enter "YES" if using the Logistic Decline; otherwise leave blank.
2. $\mathbf{x_0}$. This is the number of time periods to the inflection point.
3. **k.** This controls the slope of the decline curve and must be greater than zero.

b. The data for the number of active USTs and sites includes:

i. **Initial # Active USTs.** Use data from state database. Does not include Temporarily Out of Service or Closed sites. TOS is an abbreviation for Temporarily Out of Service.

ii. # USTs/site.

iii. **Initial # Active Sites** does not include TOS or Closed sites.

iv. **Avg. capacity of sites** increases X% over Y years.

v. # sites closed and replaced by new sites X%/year.

vi. **Initial # TOS sites.**

vii. # TOS sites closed X%/year for Y years.

2. **Data Input Area #2.** The second data input area, **Number of Releases and Abandoned Sites** focuses on release discovery, the number of sites in or entering corrective action, and the number of sites that become abandoned. The data from this section is linked to the third worksheet (*Releases and Abandons*) where the calculations are performed. The data in this section includes:

a. **Initial fraction of sites where new releases are discovered at closure** and **Final fraction of sites where new release discovered at closure - X% and Y years**. These two sets of data allow the User to model the release discovery rate and its expected decline as older single walled USTs being replaced with double walled USTs, which have fewer new releases. National data are limited, but recent data from closures in California between January 2017 and December 2022 found releases were discovered at 29.7% of the 546 facilities that had single wall UST systems closures or upgrades,

and at 6.7% of the 1,042 facilities with double wall UST system closures or upgrades[45]. Make the initial and final fractions equal to keep the release discovery rate constant.

b. **Initial # Backlog release sites, % currently in ongoing cleanup** and **% in MNA that will be closed**. The backlog sites that are already in corrective action are included in the first cleanup year. The MNA sites are given a different cost structure. And the remaining fraction of backlog sites are assumed to be stalled at the beginning of the corrective action process and will be addressed over time. Make the % in MNA that will be closed 0 if the User wants to apply the same cleanup costs to all sites.

Tab 2: Number of Releases and Abandoned Sites

Initial fraction of sites where new release discovered at closure	23.6%		
Final fraction of sites where new release discovered at closure - X% and Y years	7.8%	40	
Initial # Backlog release sites - #, % currenty in ongoing cleanup, and % in MNA that will be closed	420	10%	50%
# years over which backlog site cleanups are initiated	30		
# years over which backlog MNA site cleanups are closed	20		
% sites w/ release discovery w/ USTs repaired or replaced - %/year	1.0%		
% of Total Sites to Corrective Action that become abandoned	10%		

c. **# years over which backlog site cleanups are initiated**. This data is used to forecast when the corrective actions of stalled, backlogged sites are restarted. Make this a larger number if expecting the backlogged sites to be addressed over a longer period of time and copy and paste the formulas on the **Backlog to CA** column on the *Releases & Abandons* worksheet to extend out the years in which the corrective actions for back logged sites are reinitiated.

d. **# years over which backlog MNA site cleanups are closed**. The model is set up to show an annual expenditure for the MNA sites until the corrective actions are closed. Make this a large number if expecting the MNA sites to remain open indefinitely and copy and paste the formulas on the MNA columns on the *Releases & Abandons* and *Corrective Action Costs* worksheets to extend out the years of payments for monitoring costs.

e. **% sites w/ release discovery w/ USTs repaired or replaced - %/year**. This factor is to create corrective action sites that continue to be service stations even after a release is discovered during repair or replacement of their USTs.

[4] California UST Leak Prevention: *January-December 2022 Annual Report.* https://www.waterboards.ca.gov/ust/leak_prevention/docs/epa-evaluations/2022-jan-dec-leak-prevention-report.pdf.

[5] California has a deadline to close all single-wall UST systems by December 31, 2025. The state is specifically tracking and reporting data about the different rates of releases identified at closures between single-wall and double-wall UST systems in their UST Leak Prevention Reports. The EPA understands this type of information is currently available from few, if any, other states.

f. **% of Total Sites to Corrective Action that become abandoned**. It is expected that abandonment will become more common as fuel use declines because many of the less economically viable service stations are on smaller parcels, with fewer future use options. The forecast includes Corrective Action Costs for Abandoned sites. Modify the formula in column B of the *Corrective Action Costs* worksheet to remove abandoned sites from the calculation if Abandoned Sites should be excluded from Corrective Action costs. Make the % of Total Sites to Corrective Action that become abandoned 0 if the User does not want to estimate abandoned sites.

3. **Data Input Area #3.** The third area of data input is **Corrective Action Costs**. The parameters here establish the corrective action costs and the time over which the corrective actions take place. While every site is unique, this forecasting tool uses average costs and time frames. The data from this section is linked to the fourth worksheet (*Corrective Action Costs*) where the calculations are performed.

Tab 3: Corrective Action Costs

	Average Cost to Complete the Corrective Action; % of National Average	$212,222	150%	$141,481
	$ spent in first X years	50%	2	
	Years to complete cleanup	12		
	Annual MNA cost	$20,000		

The data in this section includes:

a. **Average Cost to Complete the Corrective Action; % of National Average**. Two methods for establishing average corrective action costs are allowed here. The User can either express the corrective action costs as an average value for the state or as a % of the national average cost from the ASTSWMO survey.

b. **$ spent in first X years**. This factor establishes the fraction of costs that are expended in the first years of the corrective action. The remaining portion of the corrective action costs are distributed evenly over the Years to complete cleanup, which is the next data entry.

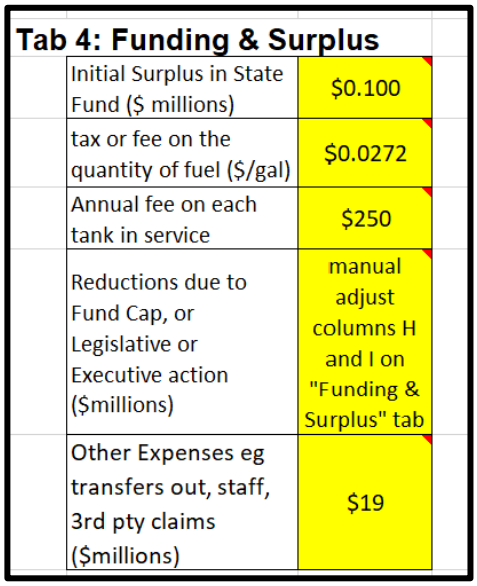
c. **Years to complete cleanup**. This is the average timeframe to complete the corrective action.

d. **Annual MNA cost**. These are the annual monitoring costs for MNA projects. The MNA cost formula in the *Corrective Action Costs* worksheets would have to be modified if the User wishes to have a cost for a separate closure report.

Some funds maintain estimates of the ultimate cost of each ongoing corrective action project. The spreadsheet could be modified to use the fund's estimates of remaining costs for

individual sites, and the above calculations could be applied to future release discoveries and to sites for which future cleanup costs have not been estimated.

4. **Data Input Area #4.** The fourth area of the data entry worksheet is **Funding & Surplus.** This data encompasses the income and constraints on the fund, including:



Tab 4: Funding & Surplus

Initial Surplus in State Fund ($ millions)	$0.100
tax or fee on the quantity of fuel ($/gal)	$0.0272
Annual fee on each tank in service	$250
Reductions due to Fund Cap, or Legislative or Executive action ($millions)	manual adjust columns H and I on "Funding & Surplus" tab
Other Expenses eg transfers out, staff, 3rd pty claims ($millions)	$19

a. **Initial Surplus in State Fund ($ millions).**

b. **Tax or fee on the quantity of fuel ($/gal)**. The User could model scenarios where fuel taxes or fees change over time by directly entering the fees in the *Funding & Surplus* worksheet.

c. **Annual fee on each tank in service**.

d. **Reductions due to Fund Cap, or Legislative or Executive action.** The User should summarize in the *Data Entry* worksheet the cap or legislative action that is being modeled and create a formula to reflect the constraint in the *Funding & Surplus* worksheet. In some cases, such as fund revenue caps, the funding constraints can be expressed as a logical formula. In other cases, the User will need to modify the values in the spreadsheet manually.

e. **Other Expenses e.g. transfers out, staff, 3rd party claims ($ millions)**. The User could model scenarios where staff expenses change over time by directly entering the charges in the *Funding & Surplus* worksheet or by creating a formula for staff expenses that is tied to the number of corrective actions.

Worksheets Two through Five – Calculation Worksheets

Values from the *Data Entry* worksheet are used in calculations on worksheets two through five. The cells that refer back to the *Data Entry* worksheet are highlighted in yellow. The calculation sequence is left to right, and top to bottom. The User can add or subtract rows to change the time frame of the forecast. If adding rows, the last cell in each row with a formula needs to be copied and pasted down for the additional years. The calculations are based on two-year intervals to allow the calculations to fit on a single screen. The User can modify the formulas or replace them with specific data. Various charts are included on each worksheet to help visualize the data and calculations of the worksheet.

Worksheet #2 -- Fuel Use, Tanks & Sites.

	Phase in years													
	40	Storage tank capacity needed			# UST Sites			# USTs		TOS Sites				
Year	Motor Fuel Use (mb/d)	Initial # Active Sites	# Active Sites/Fuel Used (Sites/mb/d)	# Active UST Sites Needed	# Sites Retired from Less Need	# Sites Closed and Replaced w/ New Sites	Cumulative # UST Sites Closed	# USTs / Site	# Active USTs Needed	Initial # TOS Sites	Fraction of Initial TOS Sites Closed	# TOS Sites Cosed	# TOS Sites Remaining	Total # Sites Closed
2020	0.18943	3,026	15,972	3,026	83	30	113	2.8	8,472	200	5.0%	10	190	123
2022	0.18671		15,762	2,943	64	29	206		8,241		5.0%	10	180	103
2024	0.18512		15,552	2,879	77	29	312		8,061		5.0%	10	170	116
2026	0.18263		15,342	2,802	97	28	437		7,845		5.0%	10	160	135
2028	0.17877		15,131	2,705	125	27	589		7,575		5.0%	10	150	162
2030	0.17294		14,921	2,580	163	26	777		7,226		5.0%	10	140	198
2032	0.16435		14,711	2,418	210	24	1,011		6,770		5.0%	10	130	244
2034	0.15226		14,501	2,208	261	22	1,295		6,182		5.0%	10	120	293
2036	0.13622		14,291	1,947	305	19	1,619		5,451		5.0%	10	110	335
2038	0.11657		14,081	1,641	328	16	1,963		4,596		5.0%	10	100	354
2040	0.09471		13,871	1,314	318	13	2,295		3,679		5.0%	10	90	342
2042	0.07286		13,660	995	280	10	2,584		2,787		5.0%	10	80	300
2044	0.05321		13,450	716	224	7	2,815		2,004		5.0%	10	70	241
2046	0.03717		13,240	492	165	5	2,985		1,378		5.0%	10	60	180
2048	0.02508		13,030	327	115	3	3,104		915		5.0%	10	50	129
2050	0.01649		12,820	211	77	2	3,183		592		5.0%	10	40	89
2052	0.01066		12,610	134	50	1	3,235		376		5.0%	10	30	61
2054	0.00680		12,399	84	32	1	3,267		236		5.0%	10	20	43
2056	0.00431		12,189	53	20	0.5	3,288		147		5.0%	10	10	31
2058	0.00272		11,979	33	12	0.3	3,301		91		5.0%	10	0	23
2060	0.00171		11,769	20	20	0.2	3,321		56					20
2062														-
2064														
2066														
2068														
2070														
Total					3,026	295					100.0%	200		3,521

The second worksheet, *Fuel Use, Tanks, & Sites* is where the calculations begin. Calculations included on this worksheet are listed and described below.

- The **Motor Fuel Use** column calculates the decline in motor fuel use in millions of barrels per day (mb/d) based on which formula and parameters are selected in the **Data Entry** sheet.
- **Initial # Active Sites** (does not include TOS or Closed sites).
- **# Active Sites/Fuel Used (Sites/mb/d)** is calculated from the Initial Fuel Use and the Initial # Tanks to determine how many sites are needed to provide the storage capacity needed for fuel dispensing. As fuel use declines the number of sites needed should also decline. This

factor is further modified by the capacity formula (Avg capacity of sites increases X% over Y years) to account for new stations have larger UST capacities and greater monthly sales.

- **# Active UST Sites Needed**. This is a multiplication of the **# Active Sites/Fuel Used** and **Motor Fuel Use.** The number of needed service stations declines with fuel use and increased capacity of newer stations.
- **# Sites Retired from Less Need**. This is the difference between the number of USTs needed from one time period to the next
- **# Sites Closed and Replaced by New Sites**. This is calculated from the **# sites closed and replaced by new sites X%/year** from the *Data Entry* worksheet.
- **Cumulative # Sites Closed**. This total number of Sites closed from the beginning of the forecast.
- **# USTs/site**. This is from the **Data Entry** sheet.
- **# Active USTs Needed** is the **# Active UST Sites Needed** multiplied by the **# USTs/site.**
- **Initial # TOS Sites** is the number of sites with TOS USTs at the beginning of the forecast. It is assumed that none of these sites go back into service, and that they will be closed over time.
- **Fraction of Initial TOS Sites Closed Each Year**. This is taken from the *Data Entry* worksheet.
- **# TOS Sites Closed**. This is the **Initial # TOS Sites** multiplied by the **Fraction of Initial TOS Sites Closed Each Year.**
- **# TOS Sites Remaining**. This will be used in calculating the total number of USTs in the fund revenue calculations.
- **Total # Sites Closed** is the sum of the **# Sites Retired from Less Need**, **# Sites Closed and Replaced by New Sites**, and **# TOS Sites Closed.**

Worksheet #3, Releases & Abandons

The third worksheet, *Releases & Abandons,* builds on the calculations in the *Fuel Use, Tanks, & Sites* worksheet to forecast the number of releases that enter Corrective Action and the number of sites that become abandoned.

- **Backlog to CA** is based on the data in the *Data Entry* worksheet and comprises two components: the sites that are in active Corrective Action at the beginning of the forecast and stalled sites that are restarted and added to Corrective Action.
- **# Sites in MNA That Will Close** is based on the data in the *Data Entry* worksheet and is calculated from the initial number of sites in monitored natural attenuation and decreases over time as the corrective actions are closed. The MNA sites that are not expected to close should be included in ongoing Corrective Action cost calculations.
- **Total # Sites Closed** is from the *Fuel Use, Tanks, & Sites* worksheet.

Year	Backlog to CA	# Sites in MNA That Will Close	Sites w/ releases confirmed at UST closure			# Releases Discovery w/ UST Repair or Replace	Total # Sites to Corrective Action	Abandoned Sites that Need Corrective Action
			Total # Sites Closed	Fraction of Sites Where New Release Discovered at Closure	Discovery at Closure			
2020	42	210	123	24%	29	59	130	13
2022	11	189	103	23%	24	58	92	9
2024	11	168	116	22%	26	56	93	9
2026	11	147	135	21%	29	54	94	9
2028	11	126	162	20%	33	52	96	10
2030	11	105	198	20%	39	48	99	10
2032	11	84	244	19%	46	44	101	10
2034	11	63	293	18%	53	39	103	10
2036	11	42	335	17%	58	33	102	10
2038	11	21	354	16%	58	26	96	10
2040	11	-	342	16%	54	20	85	8
2042	11		300	15%	45	14	70	7
2044	11		241	14%	34	10	55	6
2046	11		180	13%	24	7	42	4
2048	11		129	13%	16	4	32	3
2050	11		89	12%	10	3	24	2
2052			61	11%	7	2	8	1
2054			43	10%	4	1	5	1
2056			31	9%	3	1	4	0
2058			23	9%	2	0	2	0
2060			20	8%	2	-	2	0
2062				8%	-	-	-	
2064								
2066								
2068								
2070								
Total	210		3,521		594	530	1,334	133

- **Fraction of sites where new release discovered at closure** is a calculation based on the **Initial fraction of sites where new release discovered at closure,** and the **Final fraction of sites where new release discovered at closure** from the *Data Entry* worksheet. The calculation is to forecast the decline over time in the fraction of sites where releases are discovered at closure. **Discovery at Closure** is the multiplication of **Total # Sites Closed** and **Fraction of sites where new release discovered at closure.**
- **# Releases Discovery w/ UST Repair or Replace** is the multiplication of the **# UST Sites Needed** and the fraction of sites that are expected to have releases discovered during their operating life (**# sites w/ release discovery w/ USTs repaired or replaced** on the *Data Entry* worksheet).
- **Total # Sites to Corrective Action** is the sum of **Backlog to CA, Discovery at Closure** , and **# Releases Discovery w/ UST Repair or Replace**
- **Abandoned Sites that Need Corrective Action** is the multiplication of the sum of **Total # Sites to Corrective Action** plus **Backlog in MNA** by **% of Total Sites to Corrective Action that become abandoned** from the *Data Entry* worksheet. This forecast does not include the sites that do not require Corrective Action that become abandoned.

Worksheet #4, Corrective Action Costs

The fourth worksheet, *Corrective Action Costs,* combines the calculations in the prior worksheets to forecast costs from **Newly Initiated or On-going Corrective Action Projects** and **MNA Projects** that are expected to close during the projection. It includes the calculations described below.

				Costs by Year ($ millions)																											
				Newly Initiated or On-going Corrective Action Projects																									MNA Projects			Total Costs	
	Total # Sites to Corrective Action	Cost to Complete the Corrective	Action Cost Spread Over Time	Corrective Action Costs for Each Period																								New and On-Going CA	Sites in MNA That	MNA Costs per Site	Period MNA Costs	Period CA Costs	Cumulative CA Costs
Year				2020	2022	###	2026	2028	2030	2032	2034	###	2038	2040	##	##	##	##	##	##	##	##	##	##	##	##						
2020	130	$ 212,222	$106,111	13.8																							$13.8	210	$20,000	$4.2	$18.0	$18
2022	92		$21,222	2.8	9.8																						$12.6	189		$3.8	$16.3	$34
2024	93		$21,222	2.8	2.0	9.8																					$14.6	168		$3.4	$17.9	$52
2026	94		$21,222	2.8	2.0	2.0	10.0																				$16.6	147		$2.9	$19.6	$72
2028	96		$21,222	2.8	2.0	2.0	2.0	10.2																			$18.8	126		$2.5	$21.4	$93
2030	99		$21,222	2.8	2.0	2.0	2.0	2.0	10.5																		$21.2	105		$2.1	$23.3	$116
2032	101				2.0	2.0	2.0	2.0	2.1	10.8																	$20.8	84		$1.7	$22.5	$139
2034	103					2.0	2.0	2.0	2.1	2.2	10.9																$21.2	63		$1.3	$22.4	$161
2036	102						2.0	2.0	2.1	2.2	2.2	10.8															$21.3	42		$0.8	$22.1	$184
2038	96							2.0	2.1	2.2	2.2	2.2	10.2														$20.8	21		$0.4	$21.2	$205
2040	85								2.1	2.2	2.2	2.2	2.0	9.0													$19.6	-			$19.6	$224
2042	70									2.2	2.2	2.2	2.0	1.8	7.4												$17.8	-			$17.8	$242
2044	55										2.2	2.2	2.0	1.8	1.5	5.8											$15.5	-			$15.5	$258
2046	42											2.2	2.0	1.8	1.5	1.2	4.4										$13.1	-			$13.1	$271
2048	32												2.0	1.8	1.5	1.2	0.9	3.3									$10.7	-			$10.7	$281
2050	24													1.8	1.5	1.2	0.9	0.7	2.6								$8.6	-			$8.6	$290
2052	8														1.5	1.2	0.9	0.7	0.5	0.9							$5.6	-			$5.6	$296
2054	5															1.2	0.9	0.7	0.5	0.2	0.6						$4.0	-			$4.0	$300
2056	4																0.9	0.7	0.5	0.2	0.1	0.4					$2.7	-			$2.7	$302
2058	2																	0.7	0.5	0.2	0.1	0.1	0.3				$1.8	-			$1.8	$304
2060	2																		0.5	0.2	0.1	0.1	0.1	0.2			$1.1	-			$1.1	$305
2062	0																			0.2	0.1	0.1	0.1	0.0			$0.5				$0.5	$306
2064	0																				0.1	0.1	0.1	0.0			$0.3				$0.3	$306
2066	0																					0.1	0.1	0.0			$0.2				$0.2	$306
2068	0																						0.1	0.0			$0.1				$0.1	$306
2070	0																							0.0			$0.0				$0.0	$306
Total			$ 212,222																								$283			$23	$306	

- **Total # Sites to Corrective Action**. This is from the third worksheet, *Releases & Abandons* and is the number of new and on-going Corrective Action sites.
- **Average Cost to Complete the Corrective Action**. This is from the *Data Entry* worksheet.
- **Corrective Action Cost Spread Over Time**. This is from the **Data Entry** worksheet. The User can add more rows to this calculation to increase the average length of the Corrective Action.
- **Corrective Action Costs for Each Period**. The **Total # Sites to Corrective Action** and the **Corrective Action Cost Spread Over Time** are multiplied in each of these columns to project corrective action costs that initiate in each period. The User can add more columns and add rows for longer projection periods.
- **Total New and On-Going CA Costs**. This column totals the **Corrective Action Costs for Each Period.**
- **# Sites in MNA That Will Close**. This is the number of ongoing MNA projects from the third worksheet, *Releases & Abandons.*
- **Annual MNA Costs per Site**. This is the average annual costs of the MNA sites from the **Data Entry** worksheet.
- **MNA Costs**. This is the multiplication of the **MNA Projects** and the **Annual MNA Costs per Site.**
- **CA Costs**. This is the sum of **Total New and On-Going CA Costs** and **MNA Costs.**
- **Cumulative CA Costs**. This is the cumulative sum of **CA Costs**.

Worksheet #5 – Funding & Surplus

The fifth worksheet, *Funding & Surplus,* brings the calculations in the prior worksheets together to compare the **Corrective Action Costs** with the **State Fund Revenues**. The calculations in this worksheet are divided into three sections: (1) **Revenue**, (2) **Reductions to Income and Expenses**, and (3) **Periodic** and **Cumulative Surplus or Shortfalls**.

	Revenue ($ millions)						Reductions to Income and Expenses ($ millions)				Periodic		Cumulative	
Year	Initial Surplus in State Fund	Tax or Fee on Fuel ($/gal)	Revenue from Tax or Fee on Fuel	Fee on Each UST ($/UST)	Revenue from Fee on USTs	Total Gross Income	Reductions due to Fund Cap, or Legislative or Executive action	Net Income	Other Expenses	Net Income for UST Corrective Action	Period CA Costs	Period surplus or (shortfall)	Cumulative CA Costs	Cumulative surplus or (shortfall)
2020	0.1	$0.02720	158	$250	4.3	162	$30m annual cap	60	38	22	18	4	18	4
2022		$0.02720	156	$250	4.2	160	$30m annual cap	60	38	22	16	6	34	10
2024		$0.02720	154	$250	4.1	158	$30m annual cap	60	38	22	18	4	52	14
2026		$0.02720	152	$250	4.0	156	$30m annual cap	60	38	22	20	2	72	16
2028		$0.02720	149	$250	3.9	153	$30m annual cap	60	38	22	21	1	93	17
2030		$0.02720	144	$250	3.7	148	$30m annual cap	60	38	22	23	(1)	116	16
2032		$0.02720	137	$250	3.5	141	$30m annual cap	60	38	22	22	(0)	139	15
2034		$0.02720	127	$250	3.2	130	$30m annual cap	60	38	22	22	(0)	161	15
2036		$0.02720	114	$250	2.8	116	$30m annual cap	60	38	22	22	(0)	184	15
2038		$0.02720	97	$250	2.3	100	$30m annual cap	60	38	22	21	1	205	15
2040		$0.02720	79	$250	1.9	81	$30m annual cap	60	38	22	20	2	224	18
2042		$0.02720	61	$250	1.4	62	$30m annual cap	60	38	22	18	4	242	22
2044		$0.02720	44	$250	1.0	45	$30m annual cap	45	29	17	16	1	258	23
2046		$0.02720	31	$250	0.7	32		32	20	12	13	(1)	271	22
2048		$0.02720	21	$250	0.5	21		21	14	8	11	(3)	281	19
2050		$0.02720	14	$250	0.3	14		14	9	5	9	(3)	290	15
2052		$0.02720	9	$250	0.2	9		9	6	3	6	(2)	296	13
2054		$0.02720	6	$250	0.1	6		6	4	2	4	(2)	300	11
2056		$0.02720	4	$250	0.1	4		4	2	1	3	(1)	302	10
2058		$0.02720	2	$250	0.0	2		2	1	1	2	(1)	304	9
2060		$0.02720	1	$250	0.0	1		1	1	1	1	(1)	305	8
2062		$0.02720	-	$250	-	-		-		-	0	(0.5)	306	8
2064		$0.02720	-	$250	-	-		-		-	0	(0.3)	306	8
2066		$0.02720	-	$250	-	-		-		-	0	(0.2)	306	7
2068		$0.02720	-	$250	-	-		-		-	0	(0.1)	306	7
2070		$0.02720	-	$250	-	-		-		-	0	(0.0)	306	7
Total			1,660		42						306	7		

1. **Revenue**

   a. **Initial Surplus in State Fund**. This is the fund surplus at the start of the projection from the *Data Entry* worksheet.

   b. Tax or Fee on Fuel ($/gal). This is the per gallon tax or fee that funds the state fund from the *Data Entry* worksheet. This column can be modified to include changes in the **Tax or Fee on Fuel** over time.

   c. Revenue from Tax or Fee on Fuel. This is the multiplication of the **Motor Fuel Use** from the second worksheet, *Fuel Use, Tanks, & Sites***.**

   d. Fee on Each UST ($/UST). This is the per tank fee or tax that some state funds collect to add to their revenue from the *Data Entry* worksheet.

   e. Revenue from Fee on USTs. This is the multiplication of the sum of the **# Active USTs Needed** and **# TOS Sites Remaining** from the second worksheet by the **Fee on Each UST.**

   f. **Total Gross Income.** This is the sum of Revenue from **Tax or Fee on Fuel** and **Revenue from Fee on USTs** and represents the total amount of revenue raised by taxes and fees for the fund.

2. **Reductions to Income and Expenses**

    a. **Reductions due to Fund Cap, or Legislative or Executive Action**. This is a description of any caps or reduction that reduce the revenue received by the state fund.

    b. **Net Income**. This is the logical expression or formula that represent the reductions described in the previous column.

    c. **Other Expenses**. These are expenses that the fund incurs such as salaries, rent, and inspection fees. The formula in this column calculates the **Other Expenses** to be proportionate to the initial **Other Expenses** and the initial **Net Income**. **Other Expenses** decrease as **Net Income** falls**.**

    d. **Net Income for UST Corrective Action**. This is the subtraction of **Other Expenses** from **Net Income** and represents the revenue available to support Corrective Action costs.

3. **Periodic and Cumulative Surplus or Shortfalls**

    a. **Period CA Costs**. These are the costs by period from the fourth worksheet, *Corrective Action Costs.*

    b. **Annual surplus or (shortfall)**. This is the subtraction of the **Period CA Costs** from the **Net Income for UST Corrective Action.**

    c. **Cumulative CA Costs**. These are the cumulative costs from the fourth worksheet, *Corrective Action Costs***.**

    d. **Cumulative surplus or (shortfall)**. This is the cumulative surplus or shortfall, including the **Initial Surplus in State Fund**.

Questions and Suggestions

We hope you find the Forecasting Tool useful. If you have questions on how to use or modify it, or suggestions to improve it please contact Tom Schruben (Schruben.thomas@epa.gov). Some prompting questions are below, but any feedback is welcome.

- Does the tool provide insights that are beneficial to your program?
- Does the tool provide the graphics you need to explain the concerns and potential solutions to your stakeholders?
- What factors have we not considered or included, that we should?
- How can we improve the tool?
- What other outcomes should we attempt to derive that could be helpful to your program?
- Do you foresee your program using this tool on a periodic basis?
- How difficult is it to develop the factors, and the ranges of factors that drive the forecasts?
- Did you modify any of the formulas to make the analysis better fit your program?
- Who used the tool – state program staff, a consultant, or an actuary?
- Does the tool need to forecast from the actual UST population in the state data base?
- Does the tool need to be able to run scenarios where the oldest stations are closed in order of UST age, UST capacity, or the number of walls?
- Are the supporting materials sufficient?