

The North Dakota Underground Storage Tank (UST) Rules require that all USTs be check for leaks on at least a monthly basis. Manual tank gauging is a method of leak detection that may be used on USTs that are 2,000 gallons or smaller.

Manual tank gauging involves **taking the tank out of service every week for 36 hours or more** while the facility operator measures the tank's contents to see if there are changes in its volume. Significant changes in the volume of the tank's contents over the test period can indicate a possible leak. Manual tank gauging does not check for leaks in the piping system.

Equipment Needed For Manual Tank Gauging

Gauge Stick Or Other Gauges

A gauge stick can be used to measure the depth of liquid in an UST and must be marked or notched in 1/8-inch increments. Check the gauge stick to be sure the end has not been worn or cut off and that it is not warped. The gauge stick should be made of non-sparking material, such as wood, and varnished to minimize the creeping of fuel above the actual level in the tank. A mechanical or electronic tank level monitor can also be used and must be capable of measuring the level of product over the full range of the tank's height to the nearest 1/8 inch.

The EPA booklet “[Manual Tank Gauging for Small Underground Storage Tanks](#)” is available at the NDDEQ Underground Storage Tank Program website to assist you on recording tank measurements.

Equipment Needed For Manual Tank Gauging



MANUAL TANK GAUGING RECORD
 NORTH DAKOTA DEPARTMENT OF ENVIRONMENTAL QUALITY
 DIVISION OF WASTE MANAGEMENT-UNDERGROUND STORAGE TANK PROGRAM
 SFN 59099 (01-2022)

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CLEAR FIELDS

Tank Number	Tank Length	Tank Diameter	Capacity of Tank ³	Month	Year
Facility Name	Address		City	State	ZIP Code

	Day of the Month Starting / Ending	Initial Stick Reading ¹ (1)	Check Initial Stick Reading ¹ (2)	Average Initial Reading $[(1) + (2)] / 2 =$ (3)	Conversion to Gallons ² (4)	Length of Test (Hours) (5)	End Stick Reading ¹ (6)	Check End Stick Reading ¹ (7)	Average End Reading $[(6) + (7)] / 2 =$ (8)	Conversion to Gallons ² (9)	Change in Tank Volume (+) or (-) (4) - (9) = (10)
1st Week	/										
2nd Week	/										
3rd Week	/										
4th Week	/										
Date of this Month's Water Level Check		Amount of Water: Stick Reading			Gallons ²		Total Change in Gallonage gain (or loss)			(11)	

Example Document

Average of the four (4) weekly readings (11)/4 =

Tank Capacity	Weekly Standard (one test)	Monthly Standard (4-test average)	Minimum Duration of Test
Up to 550 gallons	10 gallons	5 gallons	36 hours
551 - 1,000 gal (when largest tank is 64"x73")	9 gallons	4 gallons	44 hours
1,000 gal. (if tank is 46"x128")	12 gallons	6 gallons	58 hours
1,001 - 2,000 gal. ³	26 gallons	13 gallons	36 hours

Compare each weekly reading and the average of the four (4) weekly readings with the standards shown in the table on the left. If the calculated change (gain or loss) exceeds the weekly standard, the UST may be leaking. Also monthly averages of the four (4) weekly test results must be compared to the monthly standard in the same way. If the standards have been exceeded, the North Dakota Department of Environmental Quality - Underground Storage Tank Program **must** be contacted at [701.328.5166](tel:701.328.5166).

¹ Stick measurements must be taken with a gauge stick that is marked to measure liquid to the nearest one-eighth (1/8) of an inch.
² Appropriate calibration chart (supplied by the tank manufacturer) must be used.
³ Manual Tank Gauging can only be used for small tanks. Tanks 1,000 gallons or less can use this method alone, but tanks from 1,001 - 2,000 gallons can only use manual tank gauging when it is combined with tank tightness testing. Manual tank gauging cannot be used for tanks over 2,000 gallons.

Equipment Needed For Manual Tank Gauging

Tank Chart

A tank chart converts the number of inches of liquid in the tank into gallons. The facility operator will need a chart that matches the storage tank being monitored (tank manufacturers usually provide charts for their tanks). If the facility has more than one tank, it will be necessary to obtain a chart for each tank unless the tanks are identical. The tank chart must show conversion to gallons for each 1/8-inch stick reading. If the tank chart does not convert each 1/8-inch reading into gallons, contact the tank manufacturer to get an appropriate chart.

The operator always needs to convert inches into gallons in order to fill out the form correctly and perform the necessary math. To convert inches into gallons, find the stick reading to the nearest 1/8-inch on the tank chart, then read across to the gallons column to find the number of gallons.

Steps To Perform Manual Tank Gauging

Step 1—Find the right testing period

Once each week the facility operator must take the tank out of service for a testing period. The length of the testing period depends on the size of the tank and whether you are using manual tank gauging alone or in combination with tank tightness testing. **During the test period the tank must remain out of service so that nothing is added or removed.**

Tank Size	Minimum Duration Of Test
Up to 550 gallons	36 hours
551-1000 gallons (When tank diameter is 64")	44 hours
551-1000 gallons (When tank diameter is 48")	58 hours
551-1000 gallons (Also requires yearly tank tightness testing)	36 hours

Steps To Perform Manual Tank Gauging

Step 2—Measure the tank's contents

Every week the facility operator must take two liquid level measurements before and after the out of service testing period.

- Take your first stick reading by slowly lowering the gauge stick so that it gently touches the bottom of the tank. Quickly bring the stick back up and read the depth of the fuel indicated on the stick to the nearest 1/8-inch. Enter your reading on the manual tank gauging form.
- Wipe the stick dry with a rag and take a second reading as before. Enter the second reading on the manual tank gauging form.
- After the readings are taken, the tank opening should be closed and secured so that no liquid can be added or removed from the tank.

Steps To Perform Manual Tank Gauging

Step 3—Leak calculations

Every week at the end of the test period, the facility operator must perform some math calculations to determine if a leak has occurred.

- Average the two initial stick readings to the nearest 1/8-inch. Enter the result on the manual tank gauging form.
- The average stick reading of the tank's contents will be in inches. You must convert inches into gallons to calculate the change in the tank volume. Find your stick's reading on the tank chart to the nearest 1/8-inch and enter the results on the manual tank gauging form.
- Average the two end stick readings and convert it to gallons. Enter the results on the manual tank gauging form.
- Subtract the “End Gallons” from the “Initial Gallons” to get the “Change in Tank Volume in Gallons.” Enter the results on the form.

Steps To Perform Manual Tank Gauging

Step 4—Find the right test standards

The weekly and monthly leak test standards depend on the tank size and whether you are using manual tank gauging alone or in combination with tank tightness testing. The test standards are listed below and are also located on the manual tank gauging form.

Tank Size	Minimum Duration Of Test	Weekly Standard (1 Test)	Monthly Standard (4 test average)
Up to 550 gallons	36 hours	10 Gallons	5 gallons
551-1000 gallons (When tank diameter is 64")	44 hours	9 gallons	4 gallons
551-1000 gallons (When tank diameter is 48")	58 hours	12 gallons	6 gallons
551-1000 gallons (Also requires yearly tank tightness testing)	36 hours	13 gallons	7 gallons

Steps To Perform Manual Tank Gauging

Step 5—Compare your measurements to the test standards

Compare the calculated "Change In Tank Volume" to the weekly and monthly test standards for the monitored tank.

- Every week, compare your "Change In Tank Volume" to the weekly test standard. For the purpose of this comparison, consider all numbers to be positive (for example, -16 would become +16). If the "Change In Tank Volume" is not larger than the weekly test standard, the tank passed the weekly test. If the "Change In Tank Volume" is larger than the weekly test standard, the tank failed the weekly test, and you must call the North Dakota Department of Environmental Quality to report the suspected leak.

Steps To Perform Manual Tank Gauging

Step 5—Compare your measurements to the test standards (cont.)

- Once a month, add up the 4 weekly "Change In Tank Volume" numbers. Pay careful attention to positive and negative numbers to get an accurate total. For example, adding +4, +3, -2 and -1 would equal +4. After you have the sum of the 4 weekly tests, divide by 4 to get the monthly test average. Enter the result on the manual tank gauging form.
- Compare your monthly test average to the monthly test standard for your tank. For the purpose of this comparison, again consider all numbers to be positive (for example, a -16 would become a +16). If your "Change In Tank Volume" number is not larger than the monthly test standard, the tank passed the monthly test. If your monthly average "Change In Tank Volume" is larger than the monthly test standard, your tank failed the monthly test and you must call the North Dakota Department of Environmental Quality to report a suspected leak.

Example Manual Tank Gauging Form



Manual Tank Gauging Record

Tank Number 1
 Capacity of Tank² 1000
 Size of tank: Length 11' Diameter 4'

Month March Year 19 98

Facility Name _____
 Address _____
 City, State, Zip _____

	Day of the Month Starting Ending	Initial Stick Reading ¹ (1)	Check Initial Stick Reading ¹ (2)	Average Initial Reading $\frac{(1)+(2)}{2}=(3)$	Conversion to Gallons ² (4)	Length of Test (Hours) (5)	End Stick Reading ¹ (6)	Check End Stick Reading ¹ (7)	Average End Reading $\frac{(6)+(7)}{2}=(8)$	Conversion to Gallons ² (9)	Change in Tank Volume + or (-) $(4)-(9)=(10)$	
1st Week	<u>3-5</u> <u>3-8</u>	<u>26¹/₈</u>	<u>26³/₈</u>	<u>26¹/₄</u>	<u>578.75</u>	<u>63</u>	<u>26¹/₄</u>	<u>26³/₈</u>	<u>26⁵/₁₆</u>	<u>582.4</u>	<u>+ 1.65</u>	
2nd Week	<u>3-12</u> <u>3-15</u>	<u>15³/₄</u>	<u>15⁷/₈</u>	<u>15¹³/₁₆</u>	<u>297.125</u>	<u>63</u>	<u>15⁷/₈</u>	<u>15⁹/₈</u>	<u>15³/₄</u>	<u>295.5</u>	<u>- 1.63</u>	
3rd Week	<u>3-19</u> <u>3-22</u>	<u>40¹/₂</u>	<u>40¹/₄</u>	<u>40³/₈</u>	<u>927.5</u>	<u>63</u>	<u>40³/₈</u>	<u>40¹/₂</u>	<u>40⁷/₁₆</u>	<u>928.75</u>	<u>+ 1.25</u>	
4th Week	<u>3-26</u> <u>3-29</u>	<u>36¹/₈</u>	<u>36</u>	<u>36¹/₁₆</u>	<u>832.5</u>	<u>63</u>	<u>36</u>	<u>36¹/₈</u>	<u>36¹/₁₆</u>	<u>832.5</u>	<u>0</u>	
Date of this month's water level check: <u>3-5</u>										Total Change in Gallonage gain or (loss)		<u>+ 1.27</u> ⁽¹¹⁾
Amount of water: Stick Reading <u>1/4</u> = <u>1.25</u> gallons ²												

Average of the four (4) weekly readings $(11)/4 = \underline{.3}$

Tank Capacity	Weekly Standard (one test)	Monthly Standard (4-test average)	Minimum Duration of Test
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- 1) Stick measurements must be taken with a gauge stick that is marked to measure liquid to the nearest one-eighth ($\frac{1}{8}$) of an inch.
- 2) Appropriate calibration chart (supplied by the tank manufacturer) must be used.
- 3) Manual Tank Gauging can only be used for small tanks. Tanks 1,000 gallons or less can use this method alone, but tanks from 1,001 - 2,000 gallons can only use manual tank gauging when it is combined with tank tightness testing. Manual tank gauging cannot be used for tanks over 2,000 gallons.

Regulatory Requirements

What are the regulatory requirements for manual tank gauging?

- All release detection equipment needs to be tested and inspected every year. These inspections include checking your tank gauging stick for operability and serviceability.
- Ensure that your measuring stick can measure to the nearest one-eighth inch and can measure the level of product over the full range of the tank's height.
- Keep results of your 30-day release detection tests for at least one year.

What To Do If Manual Tank Gauging Indicates A Leak

If the results of manual tank gauging indicate a possible release, you must:

- Contact a service technician **immediately** to investigate the possible leak.
- Empty the product from the suspected leaking tank.
- Report the suspected leaking tank to the North Dakota Department of Environmental Quality at 701-328-5166.