The North Dakota Underground Storage Tank (UST) Rules require that all USTs be checked 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 NDDoH Underground Storage Tank Program website to assist you on recording tank measurements.
### Equipment Needed For Manual Tank Gauging

#### MANUAL TANK GAUGING RECORD

<table>
<thead>
<tr>
<th>Tank Size</th>
<th>Minimum Duration Of Test</th>
<th>Weekly Standard (1 test)</th>
<th>Monthly Standard (4-test average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>up to 550 gallons</td>
<td>36 hours</td>
<td>10 gallons</td>
<td>5 gallons</td>
</tr>
<tr>
<td>551-1,000 gallons (when tank diameter is 64&quot;)</td>
<td>44 hours</td>
<td>9 gallons</td>
<td>4 gallons</td>
</tr>
<tr>
<td>551-1,000 gallons (when tank diameter is 48&quot;)</td>
<td>88 hours</td>
<td>12 gallons</td>
<td>6 gallons</td>
</tr>
<tr>
<td>551-1,000 gallons (also requires periodic tank tightness testing)</td>
<td>36 hours</td>
<td>13 gallons</td>
<td>7 gallons</td>
</tr>
<tr>
<td>1,001-2,000 gallons (also requires periodic tank tightness testing)</td>
<td>36 hours</td>
<td>26 gallons</td>
<td>13 gallons</td>
</tr>
</tbody>
</table>

Circle your tank size, test duration, and weekly/monthly standards in the table below:

Compare your weekly readings and the monthly average of the 4 weekly readings with the standards shown in the table on the left.

If the calculated change exceeds the weekly standard, the UST may be leaking. Also, the monthly average of the 4 weekly test results must be compared to the monthly standard in the same way.

If either the weekly or monthly standards have been exceeded, the UST may be leaking. As soon as possible, call your implementing agency to report the suspected leak and get further instructions.

To see how close you are to the monthly standard, divide the sum of the 4 weekly readings by 4 and enter result here.

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North Dakota UST Operator Training Program

Manual Tank Gauging (MTG) 3
**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.**

<table>
<thead>
<tr>
<th>Tank Size</th>
<th>Minimum Duration Of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 550 gallons</td>
<td>36 hours</td>
</tr>
<tr>
<td>551-1000 gallons (When tank diameter is 64”)</td>
<td>44 hours</td>
</tr>
<tr>
<td>551-1000 gallons (When tank diameter is 48”)</td>
<td>58 hours</td>
</tr>
<tr>
<td>551-1000 gallons (Also requires yearly tank tightness testing)</td>
<td>36 hours</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Tank Size</th>
<th>Minimum Duration Of Test</th>
<th>Weekly Standard (1 Test)</th>
<th>Monthly Standard (4 test average)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 550 gallons</td>
<td>36 hours</td>
<td>10 Gallons</td>
<td>5 gallons</td>
</tr>
<tr>
<td>551-1000 gallons (When tank diameter is 64”)</td>
<td>44 hours</td>
<td>9 gallons</td>
<td>4 gallons</td>
</tr>
<tr>
<td>551-1000 gallons (When tank diameter is 48”)</td>
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<td>36 hours</td>
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<td>7 gallons</td>
</tr>
</tbody>
</table>
**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 Health to report the suspected leak.
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 Health to report a suspected leak.
### Example Manual Tank Gauging Form

Manual Tank Gauging Record

- **Tank Number:** 1
- **Capacity of Tank:** 1000
- **Size of Tank:** Length 11', Diameter 4'
- **Month:** March
- **Year:** 1998

<table>
<thead>
<tr>
<th>Day of the Month</th>
<th>Initial Stick Reading</th>
<th>Check Initial Stick Reading</th>
<th>Average Conversion to Gallons</th>
<th>Length of Test (Hours)</th>
<th>End Stick Reading</th>
<th>Check End Stick Reading</th>
<th>Average Conversion to Gallons</th>
<th>Change in Tank Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Week</td>
<td>3-5</td>
<td>26 3/8</td>
<td>26 7/8</td>
<td>578.75</td>
<td>63</td>
<td>26 7/8</td>
<td>580.4</td>
<td>+1.65</td>
</tr>
<tr>
<td>2nd Week</td>
<td>3-12</td>
<td>15 7/8</td>
<td>15 13/16</td>
<td>297.25</td>
<td>63</td>
<td>15 7/8</td>
<td>295.5</td>
<td>-1.63</td>
</tr>
<tr>
<td>3rd Week</td>
<td>3-17</td>
<td>40 1/2</td>
<td>40 3/8</td>
<td>922.75</td>
<td>63</td>
<td>40 3/8</td>
<td>925.75</td>
<td>+1.25</td>
</tr>
<tr>
<td>4th Week</td>
<td>3-26</td>
<td>36</td>
<td>36 1/16</td>
<td>832.5</td>
<td>63</td>
<td>36 1/16</td>
<td>832.5</td>
<td>0</td>
</tr>
</tbody>
</table>

- **Date of this month's water level check:** 3-5
- **Amount of water:** Stick Reading 3/4 = 1.25 gallons
- **Total Change in Gallonage:** +1.27

- **Average of the four (4) weekly readings:** (11/4) = 2.3

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**Tank Capacity**

- **Weekly Standard (one test):**
  - up to 550 gallons: 10 gallons
  - 551-1,000 gal. (when largest tank is 64 1/2'):
    - 12 gallons
  - 1,000 gal. (if tank is 48 1/2'):
    - 14 gallons
  - 1,001 - 2,000 gal.:
    - 16 gallons

- **Monthly Standard (4-test average):**
  - up to 550 gallons: 5 gallons
  - 551-1,000 gal.:
    - 6 gallons
  - 1,000 gal.:
    - 12 gallons
  - 1,001 - 2,000 gal.:
    - 14 gallons

- **Minimum Duration of Test:**
  - up to 550 gallons: 36 hours
  - 551-1,000 gal.:
    - 38 hours
  - 1,000 gal.:
    - 36 hours
  - 1,001 - 2,000 gal.:
    - 36 hours

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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 (1/8) of an inch.

2. An 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 Health at 701.328.5166.