The Lease Pumper's Handbook

Chapter 12
Gauging and Analyzing Daily Production

Section B

GAUGING DAILY PRODUCTION AND INSPECTING THE TANK BATTERY

B-1. Approaching the Tank Battery.

Over time, the pumper should gain the ability to perform a meticulous but almost automatic review of the tank battery. Before the vehicle has been parked, some problems may have been determined already.

The tank battery is the hub from which most lease pumper activities are controlled each day. When oil production is normal or slightly up, the pumper will feel good and have time to take care of many needs. If production is down, the pumper must check dozens of small potential causes and search for solutions that might have caused the shortage. If production is too high, the pumper is possibly more alarmed than had it been too short and again must investigate many systems in the search for the root cause of the problem.

The visual inspection. An obvious problem that may be seen while approaching the battery is oil or water running across the road. The problem may present itself as a small black streak down the side of a tank or along a line, indicating a pinhole size leak or a loose connection.

If a tank of oil had been available for sale, there may be tire tracks from a gauger's pickup or transport truck. If a sales line valve is open, the gauger has come by and accepted the oil. If tracks are present, then the pumper should also look for a receipt in the communication bottle.

Before leaving the tank battery, the pumper should know:

- How much oil and water are in all of the tanks.
- The height of the fluid levels in all sight glasses.
- The pressures on all gauges.
- The levels of water in the disposal system and pit.
- Whether any oil has been carried over into the water system.

Hopefully, everything will appear normal when looking across from the tank battery walkway.

B-2. Gauging Equipment.

A good gauge line is needed for gauging the tanks. In addition, clean rags or a line wiper are needed to wipe the oil off the gauge line and plumb bob. The lease pumper should never allow oil to drip off the line.

The gauge line. Figure 1 shows a typical gauge line. It consists of a frame, tape, and plumb bob. This is an expensive item, and it must be cared for properly in order to avoid the cost of replacement. Caution must be used to prevent the thief hatch lid from falling on the tape while it is being used and to prevent a kink from developing in the line. The plumb bob is made from ¾-inch

brass and weighs 20-22 ounces. This gives it sufficient weight to pull the tape off the reel as it drops toward the striker plate that is mounted in the bottom of the tank. The striker plate prevents holes from being punched in the bottom of the tank over years of gauging. As indicated in Figure 2, several styles of plumb bobs are available.

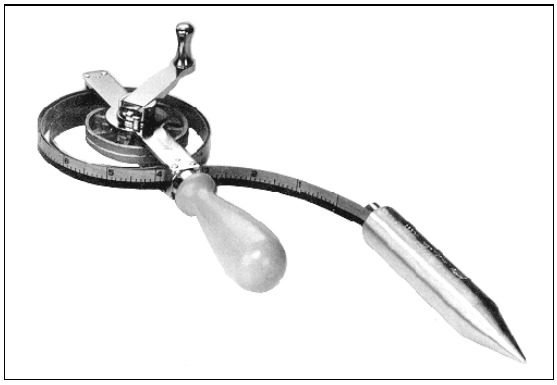

Figure 1. The gauge line with a double-duty tape.
(courtesy of W.L. Walker Company)

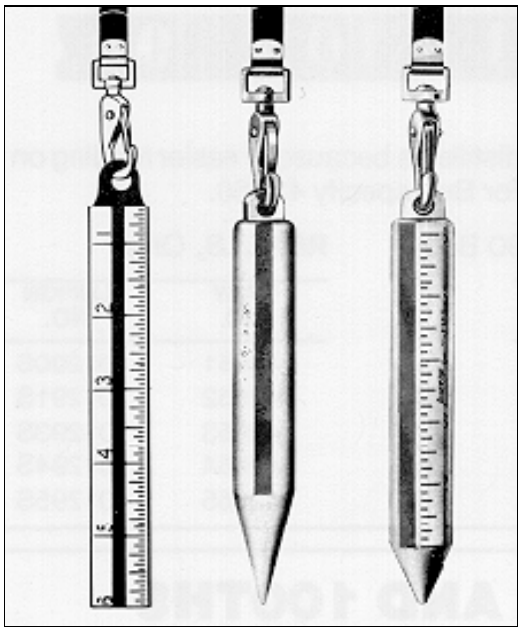

Figure 2. A wide assortment of plumb bobs is available.
(courtesy of W.L. Walker Company)

The line wiper or *little Joe* (Figure 3) is a handy tool. It is mounted on the gauging tool between the handle and the frame. After striking or *tagging* bottom and as the line is reeled, the wiper trigger is squeezed lightly to wipe the line clean. The line wiper pays for itself by dramatically reducing the number of rags consumed while gauging as well as by returning the oil from the line back into the tank.

Figure 3. A line wiper or Little Joe.
(courtesy of W.L. Walker Company)

Gauge lines are available in chrome or nubian (black) finishes or a combination of these two finishes as shown in Figure 4. They are available in inch, hundredths of a foot, and metric scales.

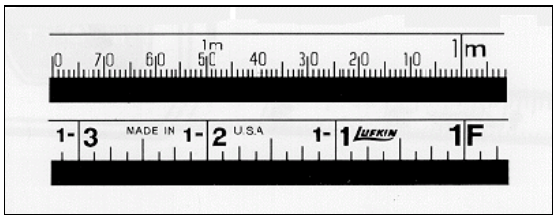

Figure 4. Two styles of gauge lines.
(courtesy of W.L. Walker Company)

Three frames are available. One size holds 18-, 25-, and 33-foot tapes. A second size holds 50-, 66-, and 75-foot tapes. A third size takes 75- and 100-foot tapes. The shorter tapes are more popular for typical lease use.

Chrome-clad tapes are best when gauging heavier, low-gravity crudes. Dark-colored crude stands out distinctly on the chrome line. The chrome-clad line may need to be oiled and dusted to get an accurate reading when gauging lighter crudes.

Nubian lines are best when gauging light crudes and distillates. Distillate or condensate is often so clear that, in a transparent glass, it looks like water. Since it evaporates off the gauge line before the gauge can be read, oil or powder may need to be put on the line before gauging to give a clear reading. Similar problems may also be encountered when gauging water.

Since water will drop out of the crude oil when it is produced into the stock tank, the bottom must be checked occasionally to see how much water is being accumulated. In cold weather, more may be carried over than during the summer months. At appropriate times it must be determined how much free water is in the stock tank. This can be determined by using a *thief* or *gauging paste* on the gauge line.

The thief can quickly determine how much water is on the bottom of a tank. It is dropped into the tank and a bottom sample is pulled. While wearing plastic or rubber gloves, the lease pumper must pour the sample across the palm of one hand while it is over the thief hatch. As it turns from free oil into sludge, the water and BS&W levels can be determined. The thief manufactured by the W. L. Walker Company is commonly used (Figure 5). Use of the thief is covered more extensively in Chapter 13, Testing, Treating, and Selling Crude Oil.

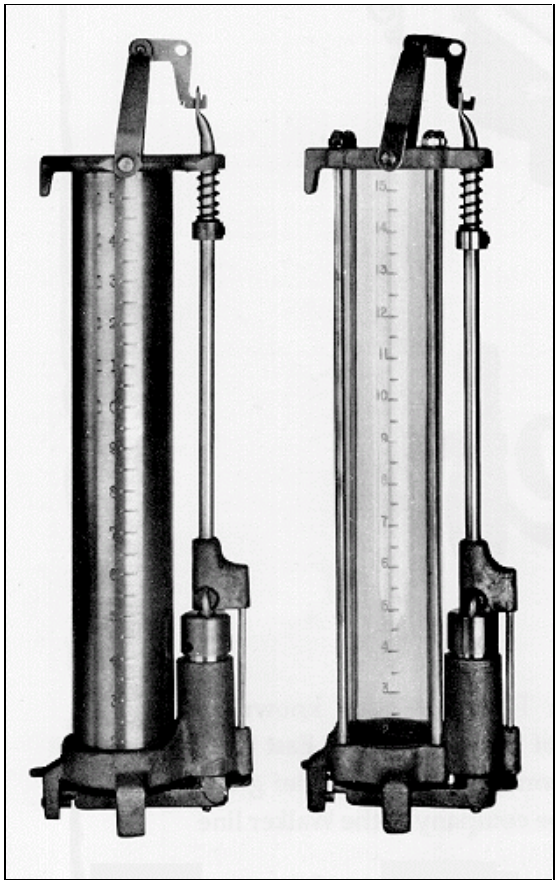

Figure 5. The Tulsa thief with brass and clear barrels, and a 12-inch trip rod.
(courtesy of W.L. Walker Company)

The second way to determine water level is by using a gauging paste such as Kolor Kut (Figure 6). This golden brown paste will retain its color in crude oil, but will turn a brilliant red when it comes into contact with water. It is applied to the line at an estimated spot for the water level, then the tank is gauged. The use of Kolor Kut is further discussed in Chapter 13.

Figure 6. Kolor Kut paste.
(courtesy of W.L. Walker Company)

B-3. Gauging Oil and the Grease Book.

Before the lease pumper gauges the tank, an approximate gauge should already be known. The pumper should know to the nearest ¼ inch how much oil there should be on any day based on the previous day's reading and the expected daily production.

The pumper should carry a daily gauge book or *grease book* that contains all gauge readings over a period of several months. This book is not the same as the larger and more extensive lease records book that is carried in the glove compartment. The daily gauge book is small enough to be kept in a pocket but is large enough to record gauges for four months to a year, depending upon how it is set up and how extensively it is used. Occasionally a pumper will carry a small pad while taking readings and then transfer the gauge readings to the grease book later. With this procedure the grease book remains clean. The setup and use of the grease book is reviewed more thoroughly in Chapter 19.

Gauging the stock tank. There are multiple techniques for gauging tanks. Some gaugers lower the plumb bob into the tank by unreeling the handle, being careful that the line never touches the edge of the thief hatch but stays in the center of the opening. Others drop it in and step back with the line almost horizontal as it is sliding over the edge of the thief hatch and into the tank. By using a light thumb pressure on the line, it slides very freely into the tank.

Regardless of the technique used, the line should be slowed down several inches before the plumb bob touches bottom. Then it should be lowered gently by hand until the plumb bob touches the bottom lightly. The line may need to be raised and lowered, or *spudded*, several times to work through sludge but without bouncing the plumb bob. If the plumb bob is bounced even slightly, the line will produce false readings. Oil will surge up the line, the plumb bob will lean to the side, and the line will show as much as ½ inch more oil than is in the tank.

The pumper must learn to gauge tanks accurately. If a tank is gauged ten times, the reading should never vary more than 1/8 of an inch between the highest and the lowest readings. However, the lease pumper's gauging procedures may result in slightly different readings than those of other gaugers, such as the one who purchases the oil.

As soon as the tank has been gauged, the pumper should review the previous day's gauge and calculate the production quantity. The number of barrels over or short should be noted immediately. If the accuracy of the gauge is suspect or if the difference is too great, the tank should be gauged again. Section 12-C discusses the action needed if the oil is long or short.

Gauging water levels. Even if the oil readings agree with what was expected, the gauger should check the water tank while at the tank battery, look at the gauge level in the sight glasses, and be sure that everything is functioning normally. Meter readings at the battery (such as the number of barrels of water to the disposal system) should be read and recorded.

Switching tanks and opening equalizer lines. Equalizer lines should always be opened well before they are needed. If the tank is available, the equalizer can be opened before a condition should cause the tank to overflow. It is embarrassing to wash oil from the side of a tank because of a miscalculation, and this also creates unnecessary problems for the company.

Alternate day gauging. When there are a large number of wells to gauge, production is marginal, and the leases are many miles apart, it may be more practical to gauge some of the tank batteries every other day. This allows more time to work on the lease and eliminates many miles of hard driving.

With a marginal lease it is occasionally feasible, when both management and the pumper agree, to split days off and not have a relief pumper. Some pumpers prefer this approach.