



Exceeding Expectations

Have you ever wondered why a recipe never tastes the same each and every time it's made even though **you** used the same ingredients, the same skillet for the same period of time in the same kitchen? This is a perfect example of what we call **repeatability** in the oil industry.

- **Repeatability** is the acceptable difference between duplicate test results obtained by the **same technician** using the **same equipment** in the **same laboratory** when testing the **same sample** by the **same method**.

Now, have you ever wondered why **you and a friend** can't get the same recipe to taste the same? Well that would be a close example of what the petroleum industry terms **reproducibility**.

- **Reproducibility** is the acceptable difference between two single independent test results obtained by the **different technicians** using **different equipment** in **different laboratories** when testing the **same sample** by the **same method**.

Typically the variance with reproducibility is greater than that of repeatability. Repeatability & reproducibility are the main causes why one laboratory may obtain a different result than another on the same sample whether within the same lab, different branches of the same inspection company or between two entirely different inspection companies.

Who determines the Repeatability and Reproducibility and how is it determined and communicated to the laboratory performing the test method?

The precision of a test method is determined on an individual basis through the performance of an inter-laboratory study conducted specifically to determine the precision and bias in a controlled environment. This information is then communicated to the analysts through publication of the method.

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WHAT TO DO IF YOUR RECIPE JUST DOESN'T TASTE RIGHT?

What drives those performing blends insane is when the test results do not meet the calculated min / max specifications. Imagine this scenario...

The tank you are blending is 150,000 barrels, that's 6,300,000 gallons. The inspector acquires three levels of the tank and a composite sample in most cases, a quart at each level. That quart is further broken down by the time the sample goes through an array of tests for a specific slate. In the GC lab, a single drop of the sample is placed on a slide to represent the molecular composition of an ENTIRE 6,300,000 gallons.

Now let's say, the flash point is determined to be off test. (Flash Point for the record has a repeatability factor for Method D56 of 2 degrees F (below 140 F degrees) and a reproducibility factor of 8 degrees (below 140 degrees F degrees). The barge is waiting to load at the dock and the demurrage clock is ticking or the pipeline is an hour from startup time. What is the best option(s) for a scheduler when the actual result is not what it is calculated or expected to be?

Here are some tips for schedulers when your recipe doesn't taste right before adding costly ingredients...of course, always follow your company guidelines first but here's a few highly recommended suggestions...

- First, request a retest from your inspector. In the meantime, redo your blend calculations. This is the most cost effective and quickest thing to do while your tests are being redone. Don't forget to ask your inspector if the test blends linearly and take repeatability and reproducibility factors into account when blending.
- If time, value and money don't outweigh your barge demurrage rates or pipeline downtime charges, circulate product for as long as time permits, that is if the tank has the capabilities and have another set of samples pulled after recirculation and the tank has settled.
- Ask your inspector to do a hand blend, again if time permits.
- If time is of the essence, instruct your inspector to resample while retesting original sample.
- Know your tank field ...and ask your inspector if the gauging / sampling standpipe is slotted allowing for a representative sample. Older tanks without slotted standpipes may need to be sampled from different areas of the tank if safety allows, in order to get a more representative sample.

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