

Method Detection Limits and Your Work

What does a '<' result mean?

When you receive your report, it may include one or more results that have a '<' (less than) in front of them, for example, 'Lead' reported as < 0.01 mg/kg.

This means the result is less than the laboratory's detection limit for this method for lead; 0.01 mg/kg. The detection limit is the concentration below which the laboratory cannot accurately analyse the lead concentration, or say whether it is present or not.

Why can't the laboratory say that there is nothing in my sample?

It is impossible to say definitively something is not present at all. There are limitations to how low any testing method can detect and measure a particular substance. The sensitivity of a testing method will also vary from substance to substance.

As an example, consider your kitchen scales. A set of scales may measure from a few kilograms down to 1 gram, to the nearest gram. When weighing 50 grams of sugar, the scales are fine for the purpose, with a possible error of $\pm 1\%$. You will have weighed somewhere between 49.5 and 50.5 grams, when the scales are showing '50'. When weighing 1 gram of sugar however, you will have somewhere between 0.5 and 1.5 grams on the pan, which is a possible error of $\pm 50\%$. This illustrates that the measurement becomes more uncertain as you head towards the limit of the scales (or any instrument).

Now consider if you put 0.2 grams of sugar on the scales. The reading will be '0'. In this case, you know something is there as you can clearly see the sugar on the pan. The scales however cannot measure that low. In other words, you are trying to measure below the lowest limit (i.e. the detection limit) of the scales. If you want to weigh 0.2g accurately, you will need a different set of scales.

In the laboratory, we measure things at levels far below this example, and a visual check is not possible. We have to trust our methods and instrumentation to tell us whether something is there or not and if present, at what level.

What Detection Limit is Suitable for my Work?

When testing a sample, there is often a need for a requested analyte either to meet a certain minimum level, or to assess the result against a specified limit.

Choosing the right method for the purpose is important to ensure you receive the most appropriate results at the best price. Typically, the lower the detection limit, the more difficult, complex and therefore expensive the testing is. Hill Labs offers testing at a variety of levels for many tests for various purposes, such as screen, trace levels.

When testing against a regulatory or critical limit, the detection limit needs to be sufficiently lower than that limit to ensure the results are a meaningful. Ideally, this is ten-fold below the required limit. Hill Labs offers reporting options for regulatory or critical limits.

For the above reasons, it is important to discuss the background and purpose of your testing requirements with the lab, so that we can choose the most appropriate test for your samples.

Our Aim is to make your Job Easier

If you have any further questions about detection limits, please do not hesitate to contact the laboratory. We are eager to understand your testing needs and ensure we meet them consistently, so that your decision-making is easier and more meaningful. We hope you are satisfied with the additional information available to you and find it useful when interpreting your results.