

An assay card looks simple at first glance, usually a printed tag or a compact report that travels with material, projects, or batches. In practice, it is one of the most practical documents in a lab or a field workflow. It is where raw numbers become something you can act on: how much gold is likely in a sample, whether the results are consistent with expectations, and what the lab thinks about reliability.

When people say “the assay card says...” they are usually talking about more than a single value. They mean the full story: the grade the assay indicates, the method used, the sample handling details, the detection limits, and the signs that the numbers are trustworthy.

Below is a plain-English guide to what assay cards typically contain, what they reliably tell you, what they can hide, and how to use them without getting misled.

## **What an assay card actually is**

An assay card is a written record of an analytical measurement for a specific sample. Depending on the industry and the lab, it may be printed on cardstock, issued as a formal laboratory sheet, or stored digitally but formatted the same way every time. The key idea is repeatability: the document ties a test result to a particular sample identity, testing method, and quality context.

In mining and mineral processing settings, assay cards often accompany drill core, grab samples, composite samples, concentrates, slags, or leach residues. In precious metals work, gold is commonly reported on these cards, usually as a concentration such as grams per tonne or ounces per ton.

Two things matter for day-to-day work:

1. The assay card tells you the reported result for that sample.
2. It gives enough context for you to judge whether you should believe it.

That second point is why two assay cards can show “similar” gold grades but lead to different decisions, because one includes clearer method details, appropriate calibration, and acceptable QA checks, while the other does not.

## **The parts you should look for, even if the card looks crowded**

Most assay cards share a recognizable structure. The exact wording varies, but the logic stays consistent. Here are the elements that tend to show up and why they matter.

### **Sample identification and chain of custody**

A good assay card makes it hard to lose the plot. You should be able to trace the sample back to where it came from: sample ID, sampling date, client, project, sometimes location coordinates, and batch or lot identifiers. If the card includes a chain-of-custody section, it often documents who received the sample and when.

This matters because sample mix-ups are not hypothetical. In busy warehouses and remote field programs, the most expensive assay is the one that belongs to a different rock.

If you have a project where samples are frequently split, subsampled, or re-composited, pay attention to whether the assay card indicates the correct sub-sample weight and whether it notes any deviations from the original plan.

### **The analytical result and its units**

The central data is usually the concentration of the element of interest, such as gold. Labs typically report in a unit system that matches their standard practice for that method. You might see grams per tonne, milligrams per kilogram, or ounces per ton. If the assay card also includes a conversion statement, that can prevent costly misunderstandings.

A quiet source of error is not the lab, it is the handoff. People sometimes copy a number without the unit and assume it is already in their preferred format. When you're comparing drill results across campaigns, confirm you are comparing the same units.

## **Detection limits, reporting thresholds, and "below detection"**

Every lab method has a floor. The assay card often shows a detection limit or a reporting threshold. This is especially important for elements that are not always present at measurable levels, or when you are working near the lower end of expected grades.

When an assay card reports "not detected" or "below detection limit," the numeric value may not mean what non-specialists assume. It is not the same as zero. For modeling, you need to know whether the lab is reporting a censored value, a truncated value, or a placeholder.

This matters for gold exploration and reserve estimation. How you treat low or censored results can change grade-tonnage curves and model outcomes more than people expect, particularly when the dataset includes many low-grade holes.

## **Method description and preparation details**

Assay results come from methods. If you do not know the method, you do not truly know the result. An assay card often lists the digestion or extraction method for the ore or sample matrix, the measurement technique, and key parameters.

For gold, common categories include fire assay with gravimetric finish, aqua regia digestion with instrumentation, or other digestion schemes depending on sample type. Some methods are better for free-milling gold, while others handle refractory material more effectively. Even without deep metallurgy, you can often infer method intent from the way the card describes digestion chemistry and sample preparation.

Equally important is whether the card specifies sample prep steps like crushing, pulverizing, and the final grind size. Fine grind increases homogeneity but also changes handling and contamination risk. If the prep details are missing or inconsistent, that can be a warning sign.

## **Quality control checks and QA flags**

The most useful assay cards include at least some QA/QC context. This can range from internal control standards and blanks, to replicate checks, matrix controls, and reference material verification. Many labs also mark results with flags if something was unusual.

You may see qualifiers like "re-run," "estimated," or method-specific notes, or you may see a section for "precision" and "accuracy" where the lab summarizes performance for that batch.

The practical value is simple: QA checks help you answer whether the lab got it right for that sample and that batch, not just for an average day.

## **Dates, batch numbers, and lab sign-off**

You want to know when the lab ran the sample, and what batch it was part of. This matters for troubleshooting. If you later find a problem, you need to identify whether it was a one-off equipment issue, a calibration problem that day, or a batch handling issue.

A lab sign-off or verifier section can also help with traceability, especially for regulated reporting.

## **A concrete example: why two gold assay cards can behave differently**

Imagine two assay cards for gold-bearing rock from the same target zone. Both show a similar grade, say around the same grams per tonne. If you only glance at the grade, you might treat them as equivalent.

Now consider what you might find when you read deeper:

- Card A includes method notes, detection limits, and a QA flag that indicates the batch control results were within acceptance criteria.
- Card B reports the gold grade but the card shows a less complete QA section and a qualifier that suggests the result was estimated due to a higher uncertainty or a rework step.

In a drill program, if Card B's uncertainty is higher and you treat it as the same confidence as Card A, you can end up overweighting a few points in your model. That can shift the interpreted mineralized envelope, especially if the low-to-mid grade boundary depends on those samples.

This is not theoretical. I have seen exploration teams spend weeks arguing about geology when the issue was actually document-level confidence: which samples were truly measured under stable conditions and which ones were subject to additional uncertainty.

The assay card is where that argument should have been settled quickly.

## **What assay cards tell you about reliability (and what they cannot)**

An assay card can strongly support a good decision, but it cannot guarantee truth. There are two reasons: uncertainty always exists, and different steps contribute risk.

### **The strongest signals of reliability**

In my experience, assay cards are most informative when they include consistent method details, meaningful detection limits, and visible QA context for the batch. When these are present, you can usually build a defensible workflow:

- You can identify samples that are below detection and treat them appropriately in modeling.
- You can identify qualifiers and decide whether to include or down-weight them.
- You can compare results within a consistent method framework.

### **Where assay cards can mislead you**

Assay cards are only as good as the data pipeline that produced them. Common failure modes include:

- Sample mislabeling before analysis.
- Incomplete sample prep details.
- Results reported without clarity on units.

- Method mismatch to sample type, such as using a digestion scheme that under-captures gold in refractory material.
- Overreliance on a “single number” without reading uncertainty context.

It is also possible for a lab to run a correct measurement on a compromised sample. If the sample was contaminated or poorly handled after sampling, the assay card can still be accurate for the wrong material.

So the right mindset is not “the assay card tells me everything.” It is “the assay card tells me what was measured, under what method conditions, and with what QA context, for this sample identity.”

That is a big difference.

## **How assay cards fit into the larger sampling and testing workflow**

Assay cards rarely live alone. They sit at the end of a chain that starts in the field or at a plant. A typical flow looks like this:

- Sampling occurs, often with specific protocols for spacing, compositing, and labeling.
- Samples are transported to a lab under controlled conditions.
- The lab prepares the sample, runs the chosen analytical method, and applies QA/QC.
- The assay card is issued, frequently with batch info and sometimes with flags.
- Downstream decisions occur: grade control, process optimization, exploration modeling, trading and settlement, or regulatory reporting.

When problems happen downstream, it is often not the lab’s fault but a mismatch between the way the sampling plan assumed heterogeneity and the way the lab method handles it.

For example, if a rock body is very heterogeneous and the program relies on composites, the assay card will give you a result for that composite. It does not represent every micro-unit inside the original rock. If later someone treats composite assays as if they were point measurements, the model becomes misleading.

## **Reading gold grades correctly: unit discipline and uncertainty awareness**

Gold is a useful test case because it is valuable, which makes errors financially painful. It is also present in different minerals, meaning method choice affects recoveries.

Even if you are not performing technical QA, you can still apply practical discipline:

- Confirm the units on each assay card before comparing values.
- Check for qualifiers that indicate estimated results or re-runs.
- Look for detection limits if you are working near low-grade boundaries.
- Track method consistency across the dataset, not just within a single batch.

Gold reporting is also sensitive to decimal handling. If you are exporting from lab systems into spreadsheets, verify that your import does not truncate significant digits. I have seen results rounded by intermediate systems and then mistakenly treated as precise.

If the assay card contains a stated precision or uncertainty, use it. If it does not, ask your lab about typical variability for that method and sample type. You do not need to overcomplicate it, but you do need to know whether your decisions are being made on precise measurements or on approximate ones.

# When you should ask follow-up questions to the lab

Sometimes you can spot a red flag directly on the assay card, and sometimes you only realize something is odd after you compare results to adjacent samples or historical patterns.

When questions arise, your goal is to clarify what is uncertain, not to challenge the lab unnecessarily. Labs generally respond best to specific questions tied to the document.

Here is what I usually ask for, when the assay cards show something that could affect decisions:

- The exact analytical method and any relevant deviations from the standard procedure.
- The QA/QC performance for that particular batch, including control and blank outcomes.
- How values below detection are handled in the reporting format.
- Whether the sample prep steps were consistent with similar samples in the program.
- The units and any conversion factors applied before reporting.

Those five questions cover most “why does this look wrong?” moments without turning the conversation into a blame game.

## Edge cases: the kinds of results that need extra care

Assay cards often include qualifiers that are easy to overlook because they sit in a small corner of the sheet. Those qualifiers can carry important meaning.

Common edge cases include:

1. Dilutions or re-runs: Some labs re-run samples when results exceed linear calibration ranges or when the first run does not meet acceptance criteria. The assay card may include a note about dilution factors or re-test logic. If you ignore that, you can misread the grade.
2. Estimated values: A lab might label a result as estimated due to instrument response issues, matrix interference, or calibration uncertainty. If your downstream model assumes all values have the same quality, you can introduce bias.
3. Mixed sample types: If the program includes both ore and concentrates, method performance and prep consistency differ. The assay card may not fully convey how different matrices were handled unless the lab uses separate reporting conventions.

The practical approach is to treat qualifiers as data with meaning, not as clutter. If you cannot act on the nuance today, at least tag it so you can decide later.

## Why assay cards matter in procurement, settlement, and compliance

In some settings, assay cards are not just technical records, they are settlement documents. That includes certain trading arrangements and regulated sampling regimes where payment or reporting depends on the assay.

When assay cards govern money or compliance, reliability and traceability become non-negotiable. In those cases, teams usually *gold bars and bullion* want more than just the numerical result. They want:

- Evidence that correct method and calibration were followed.
- QA records for the batch.
- Clear labeling of the sample and any preparation steps.

- Consistent units and reporting thresholds.

This is where you see the difference between an assay card that is merely a number sheet and one that supports defensible audit trails.

## Practical tips for using assay cards without turning your process into guesswork

You do not need to memorize every analytical detail to handle assay cards well. You do need a consistent habit: read the document as a system, not as a single metric.

A simple discipline helps:

- First, confirm identity and units.
- Then, confirm method and detection limits.
- Finally, check QA qualifiers or batch context.

You can do that quickly once you develop a routine.

If you are managing a dataset, build rules that your team can follow. It can be as straightforward as separating “clean measured results” from “flagged or estimated results” and keeping a separate category for below detection values.

That small structure can prevent a lot of silent damage in models, blend calculations, and reconciliations.

## A short comparison: assay cards vs. Lab certificates

In many environments, people use “assay card” and “certificate of analysis” interchangeably. They are related, but they are not always identical.

Document	Typical purpose	What you should expect to find
assay card	quick identification of result tied to a specific sample and method	sample ID, grade (often gold), units, method or prep notes, detection limits, QA flags
certificate of analysis	formal compliance document, often for batches or shipments	similar results, plus more emphasis on traceability, approval, and sometimes accreditation language

The practical takeaway is not to obsess over naming. It is to treat any document as a data source that must be read for identity, units, method context, and QA.

## How assay cards evolve with new methods and digital workflows

Assay cards are not static. Labs update methods, add instrumentation improvements, and tighten QA rules. Digital systems also change how documents are generated.

In some programs, you now get a digital assay report with the assay card format plus downloadable metadata: instrument run IDs, calibration curves, and batch QA summaries. That can be excellent for technical teams. For operators or field staff, too much information can be distracting, so the readable “card” format still matters.

Regardless of the delivery method, the core question stays the same: what does the assay card tell you about the measurement, and what does it tell you about confidence?

If the new digital system removes the context that used to be on the card, ask the lab how you should capture that context elsewhere. Cutting corners on QA context is rarely worth it.

# Common mistakes people make when they treat assay cards like a simple score

Most misreads are predictable. They happen because it is tempting to reduce a complex process to a single number. The trouble is that assay workflows are full of steps, and each step can shift the meaning of the final result.

Here are a few mistakes I have seen repeatedly:

- Using the gold value while ignoring the unit system or conversion note.
- Assuming “not detected” means zero when modeling.
- Treating flagged or estimated results as fully equivalent.
- Comparing results across different methods without adjusting expectations for method bias.
- Copying values from one assay card into another context and losing the sample identity link.

The fix is usually procedural. Make unit checks non-negotiable. Keep qualifiers in your dataset instead of overwriting them. And when you build models, treat QA flags and detection limits as first-class information, not footnotes.

## Getting the most value from assay cards: a workflow mindset

If you manage samples or use assay results for decisions, the best approach is to treat assay cards as part of a workflow, not a standalone artifact. You can do that with a straightforward mindset that your team can apply consistently:

- 1) Confirm that the sample identity and method context match the expectations for that program.
- 2) Read the gold grade alongside units and detection limits.
- 3) Respect QA flags and qualifiers instead of smoothing them away.

That approach sounds obvious, but in practice it takes discipline. The payoff is fewer surprises, cleaner reconciliations, and better confidence in the decisions you make with the numbers.

## What to do if your assay cards are missing key context

Sometimes you will receive assay cards that look complete but actually omit the details you need. Perhaps the detection limit is missing, or QA batch outcomes are not listed, or the method is described too vaguely for your compliance requirements.

If that happens, do not just accept the document and move on. Ask for clarification early. The reason is practical: once downstream decisions are made, the cost of revising them rises fast.

The right follow-up depends on your use case, but you can usually start by requesting a batch-level summary for QA and method confirmation, plus the reporting units and detection limits used for that assay format.

When labs can provide that context cleanly, you gain reliability without adding extra delay. When they cannot, you at least know your constraints and can adjust your decision process.

## Final word on why assay cards are still worth reading closely

An assay card is often treated as a formality, a document you glance at while focusing on the “real work” of modeling, geology, or operations. That is a mistake. The assay card is where measurement reality meets decision-making.

For gold, that means it is where you confirm that the number is in the right units, derived from a method appropriate to the sample type, and accompanied by the QA context that tells you whether the result is solid or merely plausible.

Read it like a technical document, even when it arrives looking like a simple slip of paper. The extra attention often prevents expensive rework later, and it makes your decisions defensible when someone asks, “How do you know?”