CHEMISTRY: CASE STUDY

NEXTIER

Turning Unknowns into Answers with Proppant Identification

CHALLENGE

Proppant began appearing in a producing well during a new frac.

SOLUTION

NexTier performed a multi-method analysis to identify the material.

RESULT

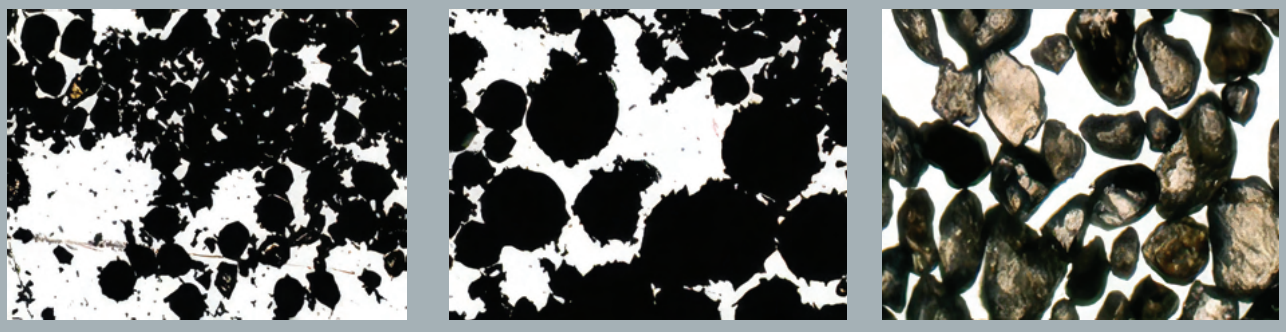
Comprehensive testing determined the origin of the proppant and allowed the operator to make confident, informed decisions about all three wells.

When proppant began appearing in a producing well completed in 2014, a Permian Basin operator grew concerned that the material could be tied to an active frac in early 2025.

The operator needed to quickly determine whether the material indicated proppant breakthrough from the new completion, or residual proppant from historic operations. To protect production and avoid unnecessary downtime, the operator turned to NexTier's Chemistry Innovation Center (CIC) for clarity.

NexTier's CIC implemented a multi-method analysis to determine the proppant's origin. Two field samples, taken ten days apart, were evaluated using microscopy, sieve analysis, and x-ray diffraction. Figure 1.

Microscopy testing revealed high sphericity consistent with **ceramic proppant**, not the 40:140 mesh sand pumped in 2025.



Sample 1 | Sample 2 | Typical 40:140 mesh sand

Fig. 1

Sieve analysis showed both samples contained **>50% 20:40 mesh proppant** and **>85% material coarser than 40:140 mesh** which did not match the most recent completion design.

X-Ray diffraction identified compositions of **>55% aluminum-silicon oxide** and **<10% quartz**, confirming the proppant corresponds to 2 different grades of **man-made ceramic proppant**. (Local sand typically contains >85% quartz.)

Sample 1

Phase Name	Weight Ratio
Aluminum Silicon Oxide	58.23%
Corundum	34.14%
Boron Carbide Nitride	2.61%
a-SiO_2, Quartz Low High HP	2.01%
Silicon Carbide	3.01%

Sample 2

Phase Name	Weight Ratio
Aluminum Silicon Oxide	59.94%
Corundum	15.98%
Boron Carbide Nitride	2.10%
a-SiO_2, Quartz Low High HP	8.99%
Silicon Carbide	2.10%
Tri-Magnesium Silicate	10.98%

NexTier confirmed that the proppant samples were 2 different **ceramic proppants from the 2014 completion**, not material from the 2025 frac which eliminated concerns around proppant breakthrough from the new well and avoiding unnecessary remediation or operational changes.

Within three days, NexTier helped the operator to quickly pinpoint the source of the proppant, eliminating uncertainty, preventing costly missteps, and keeping operations running smoothly.