With the aggressive growth of drilling activity in all US land basins in 2018, we have seen an alarming increase in cement related failures.

As an independent cement lab and consulting firm, CSI Technologies regularly conducts cement failure analyses, which are designed to help operators and service companies identify factors which caused, or contributed to, a failed cement operation.

Key Factors to Cement FAILURE & Steps to Avoid them

We have compiled our recent findings, categorizing the major contributing factors identified by the investigations, along with our recommendations for avoiding future cement failure.

**Bulk Material Management**
Systematically conduct audits of both bulk plants and material weigh out sheets. Confirm adequate sampling techniques are regularly followed and consider additional bulk site confirmation evaluation for high profile cement operations.

**Cement Chemistry**
Thoroughly review lab reports and ensure that all are conducted according to API Spec 10B. Identify chemical tolerances and incremental concentration changes to understand material sensitivity.

**Pumping / Losses**
Review simulation software to ensure that accurate fracture and pore pressures are established for maximum anticipated pump rates. If possible, ensure well is static prior to beginning cementing operations. Consider pre-job treatments and LCM laden spacers to aid in lift when circulating densities are expected to breech fracture gradient. Once established, ensure maximum pump rates / pressures are not exceeded.

**Downhole Conditions / Engineering**
Confirm bottom hole static temperatures are accurate and incorporated correctly into simulation software. Take special care if mud weight / hole gauge / casing depth changes and that simulation properly reflects these modifications.

**Slurry Preparation / Mixing**
Ensure all automatic densometers are calibrated prior to execution. Confirm density with a pressurized mud balance frequently through operations. Establish metrics to monitor density control. Track performance.

What should you do if a cement failure occurs?

Establish a protocol to ensure samples of all relevant materials are collected prior to every cement job. (Do not forget water!)

- Collect minimum of 20# of dry cement from location (roughly half a 5 gal bucket).
- Collect minimum of 1 gal mix water.
- Collect a mud sample from time of job.
- Properly label all samples (don’t forget to identify lead from tail, and note the container number of which the sample was recovered if applicable). Collect relevant job data.
- Pressure / Rate / Density data from cementing operations
- Mud report at time of job.
- Daily Drilling Report(s) from time of drilling TD through cement job. Note: if losses or issues occurred while drilling, they may be valuable to the investigation as well.
- Cement Slurry Lab Report(s).
- Engineering / Simulation reports from cement service provider. These validate the slurry design conditions.

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