

Assuring Wellbore Isolation

Building the well right.



Isolating Potential Flow Zones During Well Construction

API Standard 65 – Part 2

API Standard 65 - 2

Document highlights industry recommended cementing and well construction techniques to help ensure cementing jobs include proper

Planning

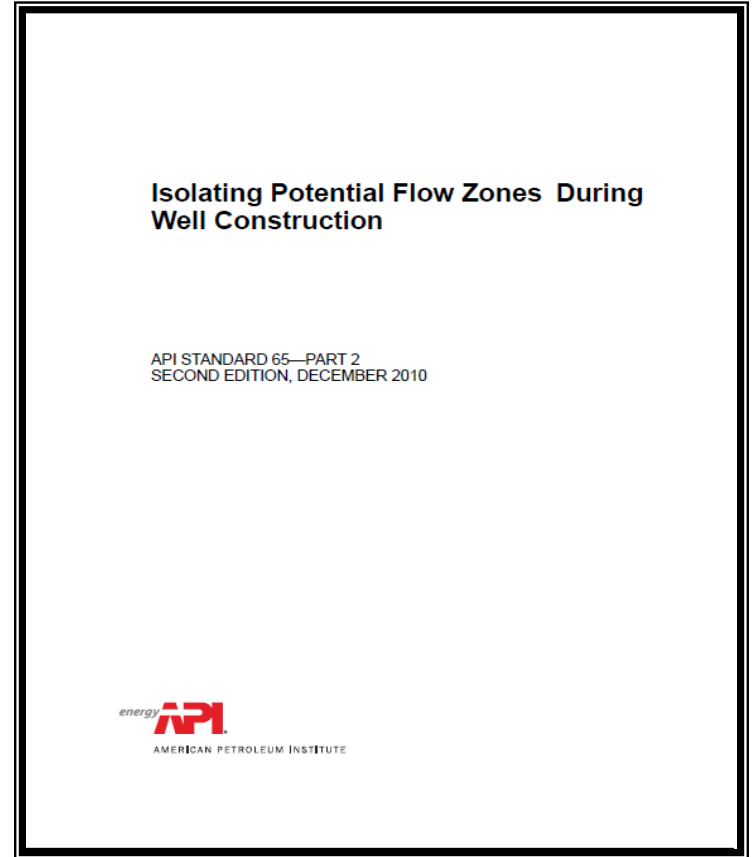
Design

Testing

Execution

API Standard 65 - 2

- Defined Mechanical Barriers
- Cement as a Barrier
- Cementing Practices
- Post Cement Job Analysis
- Process Summary



Barrier Definition

A component or practice that contributes to the total system reliability by preventing liquid or gas flow if properly installed.



Cementing Practices

- Industry accepted design best practices
 - Hole quality - Drilling fluid properties
 - Engineering design
 - Mud removal - Slurry design & testing
- Industry accepted execution best practices
 - QA/QC - Execute as per design

Best Cementing Practices

- Determine the objectives of the job
- Design to meet the objectives
- Evaluate against the design

Pre Job Engineering

- Utilize Pre-Job Engineering Software
 - Simulates fluid placement and pressures
 - Optimizes rates and volumes for cement placement
- Pre-Job Laboratory Data
 - Design of the cement slurry to meet well requirements

Pre-Job Execution Design Parameters

- Placement rates
- Pre-job drilling fluid circulation rates and volumes
- Utilization of downhole tools
 - Centralizers, float equipment, etc.

Job Execution Plans

- Anticipated Pressures
- Design Fluid Rates
- Volumes for all fluids
- Density control of all fluids



Evaluation

- Data Sets Available
 - Pre-job engineering, laboratory and execution
 - Job execution logs
 - Post job testing and logging

Job Execution Data

- Volume or rate of returns
 - Full, partial or none (lost circulation)
- Surface returns of tracer fluids
 - Spacer or cement returns to surface
- Pressures during job
 - Plug bump or lift pressures

Evaluation

- Comparison of field execution data with plan
 - Pressures, rates and densities as per plan
- Pressure integrity testing
 - Shoe tests, liner top testing, etc.
- Cement evaluation logging
 - Sonic, ultrasonic

Cementing Job Analysis & Evaluation

- Evaluate events prior to, during and immediately after the job to determine the probability that job objectives were met
- Pressure tests (positive and/or negative)
- Logging tools
 - Temperature logs for TOC determination
 - Cement evaluation logs

Evaluation & Verification

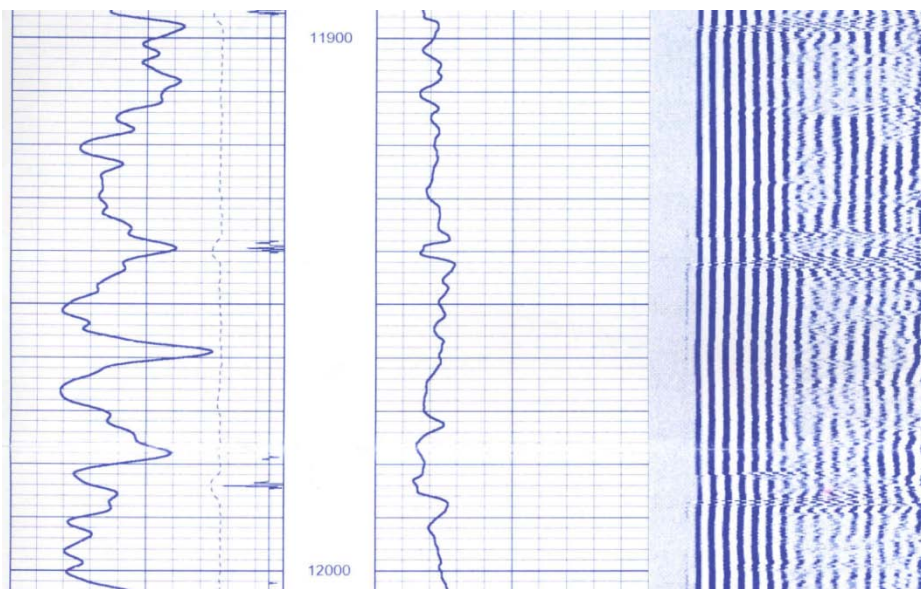
- Should not depend on a single set of data
- Consideration should be given to “as designed” and “as built” comparisons
- Combined data should be evaluated
 - “Does It Make Sense?”

Evaluation – Value of Cement Evaluation Logs

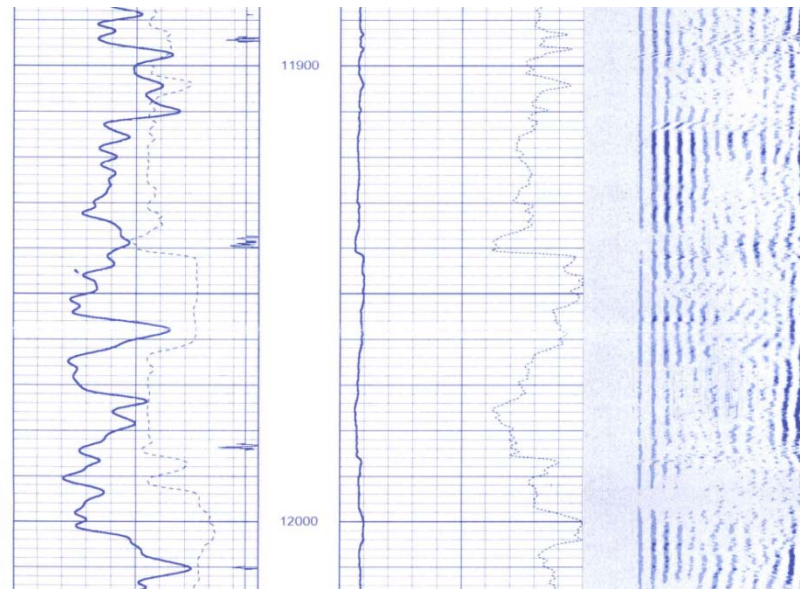
Without a clear understanding of what happened on location, the evaluation of cement quality from only electronic logging is highly subject to error and “interpretation bias.”

Do not attempt to perform wellbore cementing evaluation based on one single data set.

Example Cement Bond Logs



Log run under 0 psi



Log run with 1,500 psi

Well Construction Summary

- Define the design objectives of the well
- Establish plan to meet the objectives
- Develop plan to evaluate the execution
- Assure the execution met the well objectives

Standard 65-2

Document identifies best practices while recognizing all practices can not be used on every well.

Provides an avenue for discussion between the operator and other parties in risk mitigation, design requirements and evaluation criteria during well construction.

Questions

