Course Title: **Cementing Operations**

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<th>Discipline</th>
<th>Drilling Engineering</th>
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<td>Level</td>
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<td>Duration</td>
<td>5 Days</td>
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**Prerequisites**  Participants should have a basic knowledge of the oil and gas industry. Some understanding of cement use will be needed. They will also need to bring a hand calculator and be prepared to perform exercises in class.

Cementing is a fundamental element of effective well construction. By understanding cement chemistry, additive use, and lab procedures the participants will able to build a solid foundation to design and execute cement jobs. Mud removal and centralization will be taught so that the participants can apply effective processes to ensure cement job success.

Special purpose cements will be discussed in a way to show when they should and should not be used, as well as how they can be used to solve challenges encountered in complex and extreme well environments. Foamed, engineered particle sized, flexible, and salt cements will also be covered in detail.

During this course, participants will practice cementing calculations, as well as job design exercises and cement evaluation methods using real-life examples. Liner cementing and stage cementing jobs will be developed in the classroom. Cement design software will also be demonstrated.
Day 1

Cement Placement and Primary Cement

- Primary cementing overview
- Criteria for successful cementing
- Casing hardware
- Cement chemistry

On the first day, the importance of effective cement placement will be taught, as well as the hardware used to accomplish quality primary cement jobs. Mud removal methods, techniques, and systems will be covered so that the participants will be able to recommend appropriate methods for their wells.

Day 2

Cementing Additives

- Cementing additives
- Rheology
- Cement laboratory equipment
- Mud removal techniques
- Temperature prediction and importance in job success
- Set cement properties

The proper use of additives is critical to a successful efficient cement job. On this day, participants will learn how additives can affect cement slurries, the job, and the long term integrity of the well. An understanding of lab procedures and what the tests results mean will help ensure futures jobs are accurately evaluated. Participants will also learn how to estimate or measure temperatures so that slurries can be designed with minimal risk and WOC time needed.
Day 3

Special Purpose Cements

- Salt cementing
- Gas migration control
- Foamed cement
- Engineered particle slurry cements
- Lost circulation

On the third day, through lecture and demonstration, participants will learn about the different types of special purpose cements used at high and low temperatures. Unstable fluid columns, plastic formations, and conditions, which are conducive to gas migration, will be covered.

Day 4

Cement Job Designs and Calculations

- Primary cement job design
- Primary cementing calculations
- Stage and liner cementing
- High angle and horizontal cementing
- Deepwater, plug, and squeeze cementing

The fourth day will focus on the more practical aspect of the cement job design as well as calculations. Also, some of the more technical jobs will be explained so participants can learn to appreciate the challenges of a more complicated cement job. For participants who may be involved in deepwater operations, they will have a chance to learn how the special application is addressed and why it is different from conventional cementing operations. Remedial and abandonment cementing jobs will be discussed as well.
Day 5

Cement Job Execution, Procedures, and Evaluation

- Cement job execution
- Cement job procedures
- Cement quality evaluation
- Sonic and ultrasonic tools
- Cementing design and evaluation software

On the last day participants will apply what they have learned into actual job designs and outline job procedures. Tools used to measure the quality of the cement behind pipes will be explained and participants will also get a chance to apply that knowledge to well logs. A complete review of the course will be given to ensure a thorough understanding of the topics covered during the entire five day course.