Peer Review Plan

Date: October 31, 2023

BSEE Funding Source or Author's Division: Office of Offshore Regulatory Programs
Emerging Technologies Branch 45600
Woodland Road
Sterling, VA 20166

Title: Evaluation of Technology Assessment Program (TAP) 728 - Well Stimulation Effects on Annular Seal of Production Casing in OCS Oil and Gas

Subject and Purpose: This project was a request by BSEE for research into the effect annular seal of production casing oil well. Creating and maintaining wellbore integrity is vital to safe, sustainable well operation to produce hydrocarbons. Uncontrolled flow of hydrocarbons through an unsealed annular space into another zone or to the surface signals a well control issue. Severity of this uncontrolled flow ranges from minor to potentially catastrophic. Loss in integrity most commonly occurs due to failure of a cement seal placed in the annulus between one of the well's casings and the borehole wall. Primary well cementing, a common well construction operation designed to create a sealed wellbore from the surface to the target producing zone(s), is aimed to establish wellbore integrity. However, the results of these construction operations are not always successful. At times, incomplete removal of drilling fluid during cement placement produces flow paths in the annulus. Formation fluid pressures combined with hydrostatic pressure decline of the cement column as it sets can allow fluid channeling through the unset cement, resulting in short-term fluid migration. Finally, cyclic stresses created in the cement annulus by subsequent well operations such as casing integrity testing, perforation, or hydraulic fracturing can induce cement seal failure and subsequent fluid flow paths through the annulus.

The bond between the cement sheath and the formation rock is affected by temperature and pressure changes. Drastic changes in pressure or temperature in the casing as a result of fracturing or remedial operations can affect the integrity of the cement, the cement-casing bond, or the cement-formation interface. Cement-rock interface de-bonding can also occur due to shrinking of the cement. The presence of unremoved drilling fluid due to inefficient displacement in conjunction with cement shrinkage will result in the creation of annular gaps that creates paths for gas migration. Preventive methods include proper cement designs to ensure adequate mechanical properties and to prevent shrinkage. Additionally, completion design and operation optimization can maximize cement seal placement effectiveness and minimize the effects of stresses during hydraulic fracturing operations.

This peer review will evaluate and assess the testing methods, assumptions, data quality, the strengths of any inferences made, and the overall strengths and limitations of the research report.

Impact of Dissemination: BSEE considers this study influential scientific information, which. requires a robust evaluation that the scientific community and stakeholders will accept. This study's findings may directly impact the production methods, industry specifications, best. practices, and selection for equipment utilized for high-pressure and high temperature offshore. oil and gas operations. The results from this study are essential for reviewing new projects in deeper waters for offshore operations.

Timing of Review: August 22, 2023-August 21, 2024 (Total peer review process of not more than 12

months is desired for this project.)

Manner of Review, Selection of Reviewers, and Nomination Process:

This peer review shall be conducted through the contract BSEE BPA Process. This process will provide for a panel of qualified subject matter experts (SMEs) selected by the agency in order to achieve an optimum level of expertise across the spectrum of issues. The SMEs will be required to maintain both balance and independence while minimizing any potential conflicts of interest. The public will not be consulted in the nomination of potential peer reviewers.

Primary criteria for peer reviewers include the following:

- Petroleum engineer.
- Practical experience and specific knowledge in cementing, well workover, as well as well integrity

The secondary tier of criteria should include the following:

- At least one from inside of the wind industry
- At least one from outside of the wind industry

Reviewers may be selected from academia, industry, and federal government. The group of reviewers shall not include multiple reviewers from the same affiliation and shall strive to include various perspectives on the issue considered.

Expected Number of Reviewers:

Three reviewers, plus contractor oversight, and writing personnel.

Requisite Expertise:

- Subject Matter Experts with five years of experience in a relevant field (such as Petroleum Engineering, Mechanical Engineering, and Material Scientist, Practical experience and knowledge specific to the evaluated technology with materials properties (cement), mechanical testing, FEA for evaluating fatigue design, fatigue due to stresses and fracture behavior of metallic, and cement material, data analysis and assessment skills, sour service environmental, familiarity) and should also have some other strong credentials, e.g., a Ph.D. with a substantial publication or patent record specific to the evaluated technology, a young investigator award, or a strong pedigree (e.g., a Ph.D. from a high caliber institution or under a recognized leader in the field).
- Publications and Patents. Qualified experts often have many peer-reviewed journals and/or patents on the evaluated technology.
- Other evidence is that the person is a recognized expert in the field. Qualified experts have often managed a public policy program that has had a national impact, has a record of bringing innovations to the market or holds vital patents.
- In a relevant field, an advanced degree - Ph.D., Sc.D., D.Eng., MS, or MBA. Experts with only a bachelor's degree should have other experience and or a record of significant accomplishments indicating their expertise.

- Relevant awards. Qualified experts may have received a prestigious award such as the National Medal of Science, American Chemical Society National Award, Young Investigator Award, R&D 100 Award, or other awards specific to technology (e.g., Fuel Cell Seminar Award).
- Key Society Membership. Qualified experts may be members of a society like the National Academy of Sciences (NAS), the National Academy of Engineering (NAE), the American Physics Society, a National Laboratory Fellow, etc.

Opportunity for Public Comment:

At the time of this peer review plan's posting, the research report will be available on BSEE's Peer Review Public Posting website located here: https://www.bsee.gov/what-we-do/research/peer-review. BSEE welcomes public comment, especially from those with experience with tension leg platforms. BSEE invites the public to comment within the 30-day window indicated on the website through the process described below, which is consistent with the guidance on the website:

- For comments pertaining to this peer review plan, send emails to: bsee_peerreviewplancomments@bsee.gov
- For comments pertaining to the research, send emails to: bsee_researchpubliccomment@bsee.gov

In the subject line list of a public comment email, please state: "TAP 728 - Well Stimulation Effects on Annular Seal of Production Casing in OCS Oil and Gas" + the words "peer review plan" or "research" + the words "public comment."

- List out any comments, questions, feedback by number (ex. 1, 2, 3, etc.)
- If referencing any sources of published information, please list the complete source information in a recognized reference format (such as APA)
- Please include your name, contact information, and affiliation

The agency will provide public comments deemed significant and relevant to the peer reviewers to address during their review.

Agency Contact: John Ajak