



Peer Review Plan

Date: March 20, 2018

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) Project 766.

Subject and Purpose: The subject of this study is "Characterizing the behavior of Inconel clad F22 material in high pressure-high temperature, corrosive environments." This study implements physical material testing with finite element analysis modeling to predict material performance in a specified high pressure-high temperature (HPHT), corrosive environment.

Offshore oil and gas drilling and production operations are occasionally conducted in high pressure ($\geq 15,000$ psi) high temperature ($\geq 350^\circ\text{F}$) (HPHT), and highly corrosive (H_2S , Cl , S and CO_2) conditions. These harsh environments pose operational challenges for equipment currently used by the oil and gas industry. The purpose of TAP 766 (awarded in 2015) was to conduct physical material testing and develop a finite element analysis (FEA) model to predict the failure modes and define fatigue and fracture behavior of a weld-overlay clad material in HPHT, sour gas environments.

Current regulations require that offshore oil and gas operators submit detailed information that demonstrates equipment are capable of performing in the applicable HPHT environment as specified in submitted applications for permit to drill (APD), applications for permit to modify (APM), and deepwater operations plans (DWOP) (30 CFR 250.804). BSEE has a need to determine whether or not operators' submissions are acceptable and equipment is fit for service based upon proper modeling, safety factors, appropriate applicable standards, and whether appropriate design bases were applied. This peer review will evaluate and assess the TAP 766 project results.

Impact of Dissemination: This study is considered by BSEE to be highly influential scientific information. This study's findings may have a direct bearing on the methods, industry standards, best practices, and material selection for equipment utilized for high pressure and high temperature offshore oil and gas operations. The study's results may suggest the need for revisions of respective industry standards and could affect how BSEE and industry interpret those standards. The results from this study are important for new projects in deeper waters offshore.

Timing of Review: April 2018 – September 2018 (A four month review period with a total peer review process of not more than 6 months is desired for this project.)



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

This peer review shall be conducted through the contract BAA/BPA Process. The selected peer reviewers shall achieve an optimum level of expertise across the spectrum of issues, balance and independence while minimizing any potential conflicts of interest.

Primary criteria for peer reviewers include the following:

- Material science and engineering, corrosion background.
- Practical experience with metallic material testing and evaluation, metallography, material properties testing, microscopy, mechanical testing, corrosion testing and analyses, environmental testing, and analytical chemistry.
- Practical experience and knowledge of corrosion behavior including stress corrosion cracking (SCC) of nickel-based alloys, metallic material fatigue and fracture behavior.
- Practical experience with design of offshore equipment in high pressure and high temperature environments.

The secondary tier of criteria should include the following:

- No more than two persons from the oil and gas industry
- At least one from outside of the oil and gas 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:

- Material science and engineering background.
- Oil and gas industry background
- Practical experience with metallic material testing and evaluation, metallography, material properties testing, microscopy, mechanical testing, corrosion testing, environmental testing, and analytical chemistry.
- Practical experience and knowledge of corrosion behavior including stress corrosion cracking of nickel-based alloys, metallic material fatigue and fracture behavior.
- Practical experience with design of offshore equipment in high pressure and high temperature environments.

Opportunity for Public Comment:

The report is available on BSEE's Technology Assessment Project (TAP) website located here: <https://www.bsee.gov/research-record/tap-766-determination-fracture-and-fatigue-fracture-behavior-equipment-constructed-with-cladded-weld-materials>. BSEE welcomes public comment,



especially from those with particular experience with materials and high pressure, high temperature topics, however the opportunity for public comment is not incorporated into the BSEE plan for the peer review of this document.

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