United States Department of the Interior
BUREAU OF SAFETY AND ENVIRONMENTAL ENFORCEMENT
WASHINGTON, DC 20240-0001

June 22, 2018

MEMORANDUM

TO: Scott Angelle, Director

FROM: Douglas Morris, Chief, Office of Offshore Regulatory Programs

SUBJECT: HPHT Recommendations

The HPHT Team has completed their review of the final Argonne National Laboratory Report (ANL), *Evaluation of Pressure Rating Methods Recommended by API RP 17TR8.* The ANL reports notes the uncertainty related to the current design practices used for high pressure and high temperature equipment and recommends the use of engineering judgement along with additional test data to verify and validate designs.

I have attached the June 18, 2018 recommendations of the HPHT Team. These recommendations include a project-by-project review of the design basis by BSEE and the use of qualified independent third parties to assist in this review. The underlying premise of these recommendations is that the burden of proof to demonstrate safety rests with the operators.

I support the recommendations of the HPHT Team and believe that they adequately address the issues and uncertainties raised in the ANL study. In the long term, I recommend that BSEE take the following steps:

- If the API 17TR8 document is going to be used by the industry as the basis for designing HPHT equipment, then we should encourage the industry upgrade the document from a technical report to a standard.
- We should continue our existing activity with NASA related to the development of probabilistic risk assessments (PRA) for new and emerging equipment. NASA has been working with operators such as Anadarko in the development of PRAs for 20K equipment and this activity could provide a supplemental method for identifying and mitigating risks.
- We should encourage industry groups such as Deepstar to continue to conduct research to validate methods for HPHT subsea applications and to make this information publicly available.

Please let me know if you have any questions.

Attachment

INFORMATION MEMORANDUM

TO: Doug Morris, Chief Offshore Regulatory Programs June 18, 2018

FROM: Michael Pittman, Russell Hoshman, and Christy Lan

SUBJECT: BSEE Actions Taken with Regard to Argonne National Laboratory Report, *Evaluation of Pressure Rating Methods Recommended by API RP [sic] 17TR8—Internal Guidance*

Current regulations require that offshore oil and gas operators submit detailed information that demonstrates equipment are able to perform in the applicable high pressure and high temperature (HPHT) environment in their permits for applications to drill, applications for permit to modify, and deepwater operations plans (see 30 C.F.R. § 250.804). Argonne National Laboratory (ANL) prepared a report on HPHT equipment rating and qualification methods. BSEE established revised procedures as a result of this report and input from industry. We will take comments into consideration and revise these procedures if necessary. This memorandum provides a summary and status report.

I. Issue

The following bullets summarize the key points concerning the subject ANL report and related documents.

- The ANL report did not prove or disprove that a 1.8 load factor on ASME Boiler and Pressure Vessel Code VIII Division 3 (ASME Div 3) global plastic collapse analysis is appropriate. ANL recommended more validation work to determine if 1.8 is an appropriate load factor for ASME Div 3 global plastic collapse when applied to subsea oil and gas equipment.
- The API 17TR8 Committee, as reflected in their report, ASME, and BSEE all agree that the application of engineering judgment and the use of first principles in designs are critical.
- Primary and secondary barrier systems and any component or equipment that could cause a barrier failure must be carefully designed, verified, and validated for the site-specific environmental conditions to ensure protection from potential consequences.
- Because these are highly specialized projects requiring specialized technical abilities, BSEE requires adequate technical review of all HPHT projects submitted to BSEE for approval.
- The ANL report raised a concern about the method of evaluating combined stresses for linear elastic analysis.
- BSEE desires more clarity about the applicability of ASME Div 3 to subsea applications.

II. Background

Increasingly, applications for permit to drill in the Gulf of Mexico Outer Continental Shelf Region involve HPHT environments. BSEE has a need to determine whether or not these applications are acceptable based upon proper modeling, testing, safety factors, correct application of standards, and appropriate application of design basis. BSEE awarded a contract to ANL in 2014 to fulfill this information need. Subsequently BSEE awarded a contract to EnDyna for a peer review of the ANL report. The peer review was completed in July 2017.

The industry expressed a number of concerns via a February 2018 API technical committee document about the ANL report and its conclusions and recommendations. An independent commentator also provided remarks on the conclusions and recommendations of the ANL report in an unsolicited correspondence provided to BSEE. A second report by ANL strictly focusing on post-test material analysis will be posted with the primary report.

III. Concerns /Controversial Topics

Because of the significant costs associated with HPHT projects, regulatory certainty is a major industry concern. Project costs for HPHT projects can exceed 10 billion dollars. Even before a project is approved by the government, the operator may incur research, design, and technology development costs of over one billion dollars. Project timelines and government mandated diligence require projects to be producing within a proscribed number of years of granting a lease. Regulatory risk including the consistency of the government review process remains a significant concern. Industry and ANL differ on the applicability of ASME BPVC Section VIII Div 3 to subsea equipment, and uncertainty remains as to the extent of validation of the ASME Div 3 code for subsea oil and gas equipment.

IV. Alternative

As a potential alternative to BSEE's internal review process for HPHT equipment design, BSEE encouraged the industry in a meeting with operators and representatives of trade organizations in January 2018 to establish a standard on the topic under an approved ANSI standards framework.

V. BSEE Observations and Actions

Regarding the ANL report, the peer review report, related documents, and communication with industry on this topic, BSEE makes the following observations:

- BSEE, industry, and ANL agree that good engineering judgment and the use of first principles in design are essential. These principles are laid out in API TR 17TR8.
- BSEE is careful to not assume liability in such matters as equipment design and fulfillment of standards, fulfillment of industry guidance, and fulfillment of regulatory requirements that remain on the operator.

- BSEE has not seen sufficient evidence of the applicability of ASME Div 3 for subsea oil and gas and we encourage the industry to continue to validate the design methodology for subsea equipment.

Additionally, BSEE has taken the following responsive actions and established internal guidance:

- BSEE has an interim policy document on new technology including HPHT (IPD) 2015-003 in effect that guides our review actions in such matters. It helps to underscore the principle of "burden on the operator."
- BSEE has determined that our review of new technologies, including HPHT projects, will focus on the primary and secondary barrier systems and any other component or equipment that could cause the failure of the primary or secondary barrier system.
- BSEE has determined that it is prudent to require a qualified independent third party review of certain HPHT equipment for projects submitted to BSEE for approval.
- When evaluating combined stresses for linear elastic analysis, BSEE will follow the guidance in API Standard 6X.
- BSEE will continue to share information and listen to industry concerns as we develop our procedures for HPHT equipment review.
- If subsea equipment is designed to ASME Section VIII Div 3, BSEE is requiring an additional load case to be evaluated using the site specific pressure and temperature to determine the resulting load factor for Plastic Collapse.
- BSEE considers the current load factor for global plastic collapse to be acceptable as long as all the conditions in API 17TR8 have been met and BSEE has reviewed and accepted their site-specific analysis.