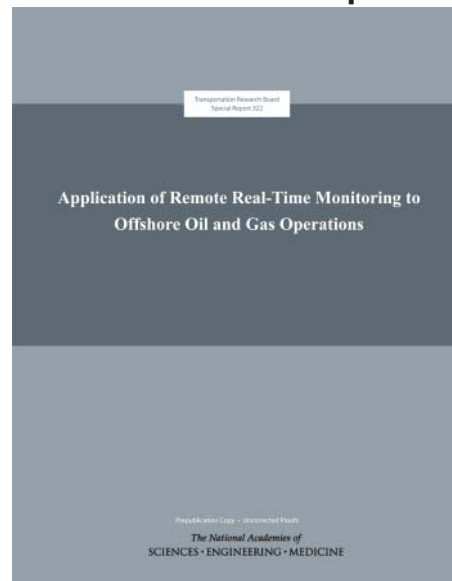


Application of Remote Real-Time Monitoring to Offshore Oil and Gas Operations

The Transportation Research Board's (TRB's) Special Report 322: Application of Remote Real-Time Monitoring to Offshore Oil and Gas Operations advises the Bureau of Safety and Environmental Enforcement (BSEE) of the U.S. Department of the Interior on the use of remote real-time monitoring (RRTM) to improve the safety and reduce the environmental risks of offshore oil and gas operations and on the role that RRTM could play in condition-based maintenance (CBM). BSEE requested the study through TRB's Marine Board.

As part of the study, the committee organized a workshop in Houston, Texas, on April 20–21, 2015—presentations and discussions are summarized in TRB's Conference Proceedings on the Web 17: Application of Real-Time Monitoring of Offshore Oil and Gas Operations: Workshop Report.



The committee's workshop and final reports addressed five tasks (summarized here):

- *The critical operations and specific parameters from offshore facilities that should be monitored.*
- *The role that automation and the use of predictive software tools should play in RRTM.*
- *The role that condition-based monitoring could play in RRTM and how the monitored equipment could be tailored to RRTM.*
- *Whether RRTM could be incorporated into BSEE's regulatory scheme.*
- *How BSEE could leverage RRTM to enhance its safety enforcement program.*

The committee found that the use of RRTM varies across the oil and gas industry, and that diverse RRTM technologies are available. No RRTM standard or standard practice exists, and the industry exhibits varying levels of maturity in its use of RRTM. A standard approach therefore is not likely to work or to be needed for every company or every well.

Real-time data are generated and collected on the rig and are used by offshore personnel in decision making. Although RRTM provides the rig with technical support and access to onshore expertise, U.S. industry representatives believe that situational awareness on the offshore facility is important and that responsibility and authority for operational decision making should remain offshore.

The committee did not recommend or validate a definitive list of critical operations and parameters for RRTM. A standard list for all operations is not practical in view of the variability in operating conditions, geology, and scope and scale of facilities; the evolution of technology; consideration of human factors; and the incorporation of RRTM in a risk-based regulatory approach.

The committee views RRTM as best available and safest technology (BAST), when such technologies are consistent with the principles of ALARP (as low as reasonably practicable). The director of BSEE establishes BAST through a documented process, but determining RRTM as BAST would not mandate its use. The decision to use

RRTM depends on whether the technologies are available and economically feasible. BSEE could use existing regulatory requirements, such as the Safety and Environmental Management System (SEMS) plan, to advance appropriate use of RRTM. By addressing RRTM in the SEMS plans, operators could determine circumstances under which RRTM should be used, and BSEE could challenge operators when it believes that RRTM is necessary for managing risk.

As sensor technology advances and data transmission improves, issues with managing massive volumes of real-time data will grow. With more RRTM of offshore operations, cybersecurity risks associated with the increased use of technology will rise. Control systems for critical rig-based equipment, not originally designed for connectivity, are likely to be at risk.

RRTM could help achieve a longer-term goal of offshore systems CBM—with blowout preventers (BOP) providing a promising initial case. Before moving forward with CBM, however, BSEE and industry representatives will need to ensure that BOP operational data and maintenance history are collected and stored continually over the lifetime of the equipment to allow the development of predictive models.

RRTM information, prioritized by risk, could also benefit BSEE in its inspection activities and support inspectors' review of safety-related information prior to visiting offshore facilities.

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Recommendation 1.

BSEE should pursue a more performance-based regulatory framework by focusing on a risk-based regime that allows industry to determine relevant uses of RRTM based on assessed levels of risk and complexity.

Recommendation 2.

BSEE should monitor the spectrum of RRTM technologies and best practices by using either an internal BSEE group, such as the agency's proposed Engineering Technology Assessment Center, or an external organization, such as the Ocean Energy Safety Institute.

Recommendation 3.

BSEE should continue to encourage involvement of all stakeholders in the development of risk-based goals and standards that govern offshore oil and gas processes. Specifically, BSEE should work with the American Petroleum Institute (API), the International Association of Drilling Contractors, and other relevant stakeholders with the goal of forming an API standing technical committee (as opposed to an ad hoc committee) to establish minimum requirements for which critical operations (and parameters) are monitored and which data are collected and monitored in real time. In addition, BSEE, along with this technical committee, should propose standards for communication protocols between onshore and offshore facilities when RRTM is used.

Recommendation 4.

BSEE should encourage API to work with original equipment manufacturers, drilling contractors, and relevant industry trade associations to establish one or more BOP CBM pilot projects, with the goal of an API publication.

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