Literature Review:

Bureau of Safety and Environmental (BSEE) Oversight

BSEE was established in 2011 in response to the Deepwater Horizon oil spill and replaced the Minerals Management Service as the responsible regulatory authority for offshore installations. This Bureau falls under the Department of Interior and is charged with overseeing compliance with nearly all Federal Regulations related to the oil and natural gas industry on the U.S. Outer Continental Shelf (OCS). Responsibilities include developing, implementing, and enforcing regulations concerning oil, gas, and sulfur exploration, development, and production operations. According to its website, “Central to BSEE’s mission is the continuous improvement of its regulatory functions involving worker safety, emergency preparedness, environmental compliance, and conservation of resources.” BSEE collaborates with several other agencies, including NOAA to monitor endangered species, DoD on projects affecting the OCS and shorelines, DoT for pipeline safety and spill prevention, and EPA to enforce pollutant discharge regulations, among others.

Within BSEE, the Offshore Safety Improvement Branch is generally responsible for oversight of safety-related operations, including aviation safety. This office also maintains programs to manage medical standards, electrical system standards, and security risk, and provides oversight of Safety & Environmental Management Systems (SEMS).

BSEE employs a hybrid approach to its oversight activities, employing both prescriptive-and performance-based methods, though the vast majority of its oversight practices are prescriptive in nature, relying on audits to ensure compliance with regulations, lease terms, and approved plans. Data on the BSEE website indicates it audits 2,000 facilities in Gulf of Mexico, Pacific and Alaskan waters on an annual basis to ensure compliance with prescriptive regulations. However, BSEE also requires all operators to submit performance measure data, and this performance data is used to influence decisions regarding the allocation of inspection resources to focus oversight on larger and more complex operators.

# Regulatory Foundations

Title 30 of the Code of Federal Regulations establishes the regulatory framework for the offshore oil and gas industry. Of particular interest is Chapter II, Subpart B, “Offshore.” Within this subchapter Parts 250 through 285 describe the bulk of the regulations for OCS facilities. Of particular interest is § 250.1900 – 1933, as this subpart provides requirements for a SEMS program at each facility. This subpart is similar in nature to 14 CFR §5, where requirements for aviation Safety Management Systems are provided. Of note, while this part includes definitions of key terms, terms associated with risk management such as risk, hazard, likelihood, and severity are not defined.

Within this section, § 250.1911 prescribes hazard analysis as the technique that must be used to manage risk. However, there are no requirements for methodology or guidance on how to conduct a hazard analysis. Instead, the guidance only requires the individual(s) conducting the hazard analysis to be familiar with the technique.

§ 250.1912 provides requirements for change management and requires change procedures to be included within the SEMS program. These procedures apply to changes or modifications to equipment, operating procedures, personnel, materials, or operating conditions. Included in the guidance is a requirement to assess the “Impact of the change on safety, health, and the coastal and marine environments.” However, there is no guidance connecting this requirement to the hazard analysis requirements in the previous subsection, so formal hazard analysis is not required in support of any change. Additionally, there is no requirement to notify BSEE of any changes nor is the operator required to provide results of the assessment on the impact of the change except when requested as part of an audit or inspection.

Subsequent sections focus on operations and incident investigation. § 250.1920 provides requirements for audits, with a standard interval of 3 years between audits. § 250.1924 describes how BSEE determines SEMS program effectiveness. However, this section is entirely prescriptive in nature, with no performance requirements. Instead, this section only describes inspections of documentation related to the SEMS program.

30 CFR Parts 250 through 285 include a multitude of prescriptive safety requirements that are not part of the SEMS program, nor are they included in SEMS audits or inspections. For instance, § 250.490 discusses Hydrogen Sulfide and provides numerous safety requirements, such as the requirement for personnel safety equipment:

(k) **Personnel safety equipment:**

(1) What additional personnel-safety equipment do I need? You must ensure that your facility has:

(i) Portable H2S detectors capable of detecting a 10 ppm concentration of H2S in the air available for use by all personnel;

(ii) Retrieval ropes with safety harnesses to retrieve incapacitated personnel from contaminated areas;

(iii) Chalkboards and/or note pads for communication purposes located on the rig floor, shale-shaker area, the cement-pump rooms, well-bay areas, production processing equipment area, gas compressor area, and pipeline-pump area;

(iv) Bull horns and flashing lights;

(v) At least three resuscitators on manned facilities, and a number equal to the personnel on board, not to exceed three, on normally unmanned facilities, complete with face masks, oxygen bottles, and spare oxygen bottles.

(2) *What are the requirements for ventilation equipment?* You must:

(i) Use only explosion-proof ventilation devices;

(ii) Install ventilation devices in areas where H2S or SO2 may accumulate;

(iii) Provide movable ventilation devices in work areas. The movable ventilation devices must be multidirectional and capable of dispersing H2S or SO2 vapors away from working personnel.

(3) *What other personnel safety equipment do I need?* You must have the following equipment readily available on each facility:

(i) A first-aid kit of appropriate size and content for the number of personnel on the facility

(ii) At least one litter or an equivalent device.

During BSEE inspections, compliance with these types of requirements may be evaluated, but the process is not connected to evaluation of the SEMS program, and it is entirely prescriptive in nature with no performance requirements associated with Hydrogen Sulfide operations or incidents.

# SEMS Oversight and Enforcement Program (OEP)

Developed in 2019, the SEMS OEP establishes BSEE policy for oversight and enforcement of compliance by OCS operators with SEMS regulations. The document describes a national policy whereby operators are responsible for the effectiveness of its SEMS program. The policy also relies on independent auditors to provide prescriptive oversight by assessing the design, implementation, and maintenance of an operator’s SEMS program by comparing the operator’s documentation to applicable regulations. BSEE’s role is to inspect facilities and review audit reports, and to collect and monitor incident reports for “frequency and relative seriousness.” Based on the operator’s documented incident performance and judgment of OEP Specialists, additional audits may be directed to search for possible “systemic weaknesses in an operator’s SEMS.”

During BSEE inspections, OEP Specialists may issue an Incident of Noncompliance (INC) to document deficiencies with a SEMS program, or administrative failures regarding audit plans or corrective action plans as applicable. However, the policy makes no provision for an INC to be issued in response to the operator’s incident performance, and no other tools are described for use by OEP specialists. The policy does not contain any guidance or standard for acceptable incident performance in terms of either frequency or seriousness.

# Performance Measures

Each year, all OCS operators are required to submit Performance Measure Data by March 31. The data is broken down quarterly and summarizes the number of injuries or illnesses sustained during production, drilling, or construction operations. However, the seriousness of personnel injuries and the extent of any damage incurred is not reported. The data does include the number of hours worked by company and contract employees to establish an exposure metric that could be used as the basis for an expression of risk. However, there is no indication on the BSEE website or in any related documentation that BSEE uses risk as an influence on decision-making. Finally, the number of oil spills and total volume of spilled oil in barrels is reported.

# Audit Analysis Reports

Four audit analysis reports have been produced since BSEE’s inception, and two of these reports are publicly available via the BSEE website.

## October 2020 Report

This report refers to the third round of SEMS audits, with each round roughly encompassing a three-year period based on the required frequency of audits for most operators. The report finds that compared to previous audits, “there appears to be a general movement on the SEMS maturity path away from the need to design and establish SEMS policies and procedures …” The report recommends that BSEE improve its oversight by focusing more on “operator-specific risk management practices and less on SEMS design.” The report itself includes numerous details regarding percentages of operators who have successfully implemented various elements of a SEMS program versus those with deficiencies. There is no data in the report regarding incident rates or trends, and the report finds no evidence of SEMS being effective in terms of achieving the objectives of reduced injury and environmental incidents. However, the report optimistically states that “The benefits of a SEMS investment (e.g. better safety and environmental performance) will become clearer as companies increase efforts on implementation …” due to expected changes in organizational behavior.

## February 2024 Report

The second report covers the 4th cycle of SEMS audits. This report echoes its predecessor, citing “stalled progress towards SEMS maturity and effectiveness.” The report does find some improvement in some of the specific SEMS elements, but these are mostly administrative elements. The report states that elements that are fundamental to achieving SEMS objectives were responsible for most of the identified deficiencies, including hazard analysis and operating procedures among the most deficient areas. Additionally, the report finds that “many corrective actions proposed by operators were remedial or superficial in nature” and noted the “recurrence of deficiencies from prior SEMS audits” suggests a need for new or modified processes need to be added across all operator assets and maintained over time. In terms of proposed actions, the report suggests there may be a need for updating SEMS regulatory requirements, and a corresponding need for BSEE to focus its oversight and monitoring actions on the most important, and most deficient, elements of SEMS.

The bulk of the 2024 report is a mirror image of its 2020 predecessor with identical tables summarizing administrative data such as deficiencies in documentation and SEMS maturity levels with categorical breakdowns. Once again, there is no data presented regarding injuries, damage, or environmental impact, nor is there any analysis of the effect of SEMS or BSEE oversight on such data.

The most notable , and arguably most valuable aspect of this report is found on its last two pages within a “Discussion and Next Steps” section. The report points out that “SEMS audits have been focused on assessing conformance with a 19-year-old management system standard and a 13-year-old regulation. Accredited auditors often use checklists (e.g., COS 1-01) to verify conformance with the 17 SEMS elements defined by these documents.” It goes on to recommend “using updated performance-based management” and to focus on “system performance rather than the prescriptive requirements for documents found in the SEMS regulation.” It goes on to recommend that BSEE should take a new approach to SEMS oversight and “adopt more comprehensive approaches to operational risk management, which go beyond basic conformance and compliance” with regulations.

# External Analysis Report

Citation: Transportation Research Board, 2012. *Special Report 309: Evaluating the Effectiveness of Offshore Safety and Environmental Management Systems*, Washington, DC: The National Academies Press.

This report was developed by the Transportation Research Board, a division of the National Research Council supporting the National Academies of Science and Engineering. Its title is misleading, but the information provided is valuable to any regulatory agency interested in improving its oversight capabilities.

This report was initiated in 2009 at the request of the Department of the Interior’s Minerals Management Service (MMS), the predecessor of BSEE. The goal was to develop alternative oversight activities that would be more effective in protecting human safety and the environment than the inspection procedures in place at the time, procedures that had been in use for approximately 30 years. MMS had proposed a rule that would have required offshore operators to adopt industry best practices published by the American Petroleum Institute (API) in 2004.

While the Transportation Board was conducting research and preparing its report, the Deepwater Horizon-Macondo accident occurred in April of 2010. In its wake, MMS officials requested the research be paused while the accident was investigated, and subsequently, the Department of the Interior undertook a major reorganization that led to BSEE being established in 2011 as part of the MMS restructuring. Simultaneously, new regulations were introduced that required offshore operators to develop and maintain SEMS practices that were largely based on the API standards. This led to a change in the scope and title of the report to cover the topic cited above. However, since none of the SEMS programs had been implemented by the time the report was published, it was not possible to evaluate the effectiveness of SEMS through observation. Instead, the report draws from its previous research to describe methods by which BSEE may evaluate SEMS effectiveness and provides recommendations for oversight methods the Transportation Board believes would reduce operational and environmental risks.

Within the report itself, the committee emphasizes the importance of safety culture, and the report stresses that “the agency will need to adopt and evolve an evaluation system for SEMS that emphasizes the assessment of attitudes and actions rather than documentation and paperwork.” Ultimately, the report makes recommendation for BSEE to “take a holistic approach to evaluating the effectiveness of SEMS programs.” This approach must include:

* Inspections
* Audits
* Key performance indicators
* A whistleblower program

The report provides detailed explanations of each element, highlighting the dependent nature of these four areas and interaction between them as explanation and justification for the term “holistic.” The key performance indicators must be tied to the objectives of safety and environmental protection, such as the number of injuries, degree of damage, and amount of oil or gas spilled. These indicators are essential to enabling performance-based oversight, and the report also mentions the value of benchmarking US performance against international operators. It emphasizes the need for highly trained and experienced inspectors to look at more than just facility policies and paperwork, but to interact with on-site personnel, observe operations, and examine hardware to gauge the understanding of a SEMS approach and to assess its influence on the organizational culture, and ultimately on well-defined performance metrics.

# Benchmarking Oil & Gas against Nuclear Regulatory Guidance

The BSEE website indicates that its oversight capability is comprised of both prescriptive and performance-based approaches. However, the literature reviewed thus far indicates that the actual oversight is prescriptive in nature. By comparing Transportation Research Board recommendations to BSEE audit reports, it becomes clear that that BSEE is unaware of what is intended by performance-based oversight. While the Department of the Interior executed a substantial reorganization in the wake of the Deepwater Horizon accident, it seems reasonable to assume that the personnel who were formally offshore experts within MMS migrated to the new BSEE organization in 2011. A natural human tendency would be to continue audits and inspections in the manner they had been done for decades prior to the reorganization, and this seems to be evident in the literature.

BSEE does have elements of PBO in place, especially with regard to data collection of key performance indicators. However, there is no indication that this data is used for anything other than supporting a decision to conduct additional audits or inspections for large or complex facilities, or facilities that experience a higher-than-normal rate of incidents.

The Nuclear Regulatory Commission provides an explanation with example of its performance-based regulation. In a skydiving example, it proposes that there might be a requirement for parachutes to open above 5,000 feet. In a prescriptive-based regulation, the operator would be required to use specific tools to accomplish this, such as a manual ripcord with specifications or an automatic actuating device of some type. In a performance-based operation, the operator is allowed to determine how to best achieve the desired results, and oversight is conducted by gathering data. For instance, the actual opening altitude could be recorded for each jump, creating a probability distribution that could be used to estimate the likelihood of an incident (opening below 5,000’) or an accident where a person is injured or killed.

For BSEE to adopt a performance-based oversight methodology, existing performance-based requirements should be retained while prescriptive requirements should be replaced by performance-based requirements. As an example, in the previous example of Hydrogen Sulfide, the requirement for “detectors capable of detecting a 10 ppm concentration of H2S in the air” is an example of a performance-based requirement. In contrast, “Retrieval ropes with safety harnesses,” and “Bull horns and flashing lights” are prescriptive in nature. The performance-based requirement lends itself to data collection and objective, data-driven measurement and subsequent management. As an example, facilities might record the number of operations or operational hours drilling in an H2S environment (an exposure metric), and the number of times a 10 ppm concentration is detected (a hazard), and the number of injuries, fatalities, or environmental impacts (incidents) caused by such a hazard as well as how severe the incidents were.

# BSEE Oversight Summary

BSEE provides oversight of all OCS operations in the US and advertises performance-based oversight as one of its capabilities. However, a review of reported oversight activities reveals that the organization has a limited understanding of, and application of performance-based oversight. Instead, the vast majority of BSEE’s oversight is prescriptive in nature. Anecdotal statements (accompanied by a noticeable lack of evidence) in reviewed documents indicates that the combination of regulations requiring the implementation of SEMS and BSEE’s oversight has not resulted in a measurable change in the safety of offshore operations. Nonetheless, BSEE’s experience may provide value by informing other regulatory agencies of the challenges associated with a desired transition to (or addition of) performance-based oversight.