



Managing Environmental, Health, and Safety Risks:

A closer look at how three federal agencies respond

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The ability of the federal government to manage current and future environmental, health, and safety (EHS) risks associated with offshore energy exploration and production depends in large part on the capability—technical, legal, and managerial—of the responsible regulatory agency. Following the *Deepwater Horizon* oil spill, the practices of the Minerals Management Service (MMS, now the Bureau of Ocean Energy Management, Regulation and Enforcement, or BOEMRE) came under fire.

In comparing MMS's practices with those of the Federal Aviation Administration (FAA), which regulates aviation safety, and the Environmental Protection Agency (EPA), which administers close to 30 statutes, we identify opportunities to improve regulatory

capacity and safety performance in managing deepwater energy production.

Historically, offshore oil spills have resulted from three types of incidents: platform events, pipeline events, and tanker spills. Before the *Deepwater Horizon* oil spill, the Outer Continental Shelf area regulated by MMS had not suffered a platform or pipeline spill larger than 1 million gallons since 1970, according to MMS records. In the past, tankers accounted for most spill volume, but since 1990 that distribution has shifted toward non-tanker sources.

Planning, regulatory, and permitting processes include three key elements relevant to understanding how safety and environmental management might be improved: regulatory decisionmaking, risk

assessment and planning processes, and inspection and compliance processes.

Regulatory Decisionmaking

The three agencies—MMS, FAA, and EPA—set standards in several ways, including the extent to which they draw upon consensus-based, voluntary standards as the basis for agency regulations; their use of performance-based versus prescriptive regulations; and their use of independent analyses, including peer review, to identify, recommend, and assess regulations and safety.

Voluntary Consensus Standards

Federal law encourages use of voluntary, consensus-based standards: companies, regulators, and others work together to establish best practices and standards for technology and operational procedures. They are more commonly used in MMS, and now BOEMRE, than in either the FAA or EPA. A review of agency records and industry performance indicates that use of such standards does not, per se, appear to compromise safety or result in lowest-common-denominator standards. Considerations include extent of participation in the standard-setting process by diverse stakeholders with relevant expertise, agency use of independent reviews when evaluating whether to incorporate such standards in its regulations, and transparency of safety and environmental performance goals.

Performance-Based versus Prescriptive Standards

MMS relied primarily on prescriptive standards, though the agency, prior to the *Deepwater Horizon* disaster, had begun using some performance-based regulations. In a prescriptive system, laws and regulations set specific structural, technical (engineering and equipment), and procedural require-

ments to address environmental, health, and safety hazards. In contrast, a performance approach emphasizes clear safety standards, audits, verification, investigations, and significant interaction between industry and the regulator to undertake joint safety studies and develop regulations. For example, Norway and the United Kingdom require companies to build a safety case that identifies risks at specific offshore sites and shows how their technologies and practices would mitigate those risks to specific safety performance levels.

BOEMRE has sought other ways to enhance safety practices and encourage development of safety cultures within firms, including issuance of a new Safety and Environmental Management System (SEMS) rule. The new rule parallels a similar trend at the FAA, which is conducting a rule-making to develop a safety management system under a congressional mandate. SEMS, which requires external auditing by a federal agency, applies to overall company practices rather than to site-specific performance assessment, mitigation measures, and operational procedures.

The Value of Independent Review

MMS depended on various organizations and processes to provide outside advice, peer review, and assessment of its regulatory and related activities. However, the agency did not have regular procedures for conducting peer review of its risk models, safety standards, and regulations. MMS also used incident panels to review accidents, spills, and other compliance issues, but it managed these panels internally.

The air transportation industry, in contrast, relies on an independent agency, the National Transportation Safety Board (NTSB), which evaluates all airplane crashes and related safety incidents, and makes recommendations to the FAA for regulatory

action and evaluates FAA responses. NTSB also conducts safety studies and reviews regulatory programs for the other transportation agencies.

The FAA also uses independent forums or institutions to provide peer review, recommendations, and other input into the regula-

tory process. Working with industry, the agency formed the Civilian Aviation Safety Team in 1998, with the goal of reducing fatal commercial accidents by 80 percent by 2007. Once the FAA identifies an area of concern and begins its investigation for rulemaking, it relies on joint industry-FAA committees to develop recommendations on the appropriate regulatory response, although the agency is not bound by their recommendations.

Among the three agencies, EPA has placed the greatest emphasis on peer review and independent analysis. It has established a formal policy for conducting peer review of scientifically and technically based outputs, including economic and social science products, which inform its decisions. Peer review is deemed to occur when the designated work products are evaluated by relevant experts who were not involved in creating these products. EPA also relies on a series of committees established under the authority of the Federal Advisory Committee Act to obtain advice on a wide range of environmental issues.

Risk Assessment and Planning

In order to grasp how risk management is done for offshore oil and gas projects, three broader institutional and decision-



making questions need to be addressed. What formal, regular, and transparent processes exist to periodically review, validate, and improve risk models used by the agency and industry? How is information generated by models used to inform decisionmaking, including decisions about risk mitigation? What standards, if any, are used as the benchmark or goal for managing and mitigating risk?

Concerns have been raised about how risk-modeling results were used to inform decisionmaking prior to the Macondo spill, because any initial estimate of extremely low probability of a spill has cascading effects.

More broadly, even if risk models are useful in estimating probabilities of a spill and projecting likelihood that such spills will result in adverse impacts, problems remain. Risk models do not establish what constitutes acceptable or tolerable risk. Central challenges in determining safety policy are whether to set a quantitative risk standard and whether and how to use quantitative risk analysis. In general, MMS did not set numeric standards for unacceptable, tolerable, and acceptable risk either in its planning process or in setting safety standards.

Despite such challenges, other agencies, including EPA and the FAA, use numerical

risk thresholds or ranges of tolerable risk. For example, in support of its wide array of regulatory actions, EPA has issued scientific documents outlining principles and concepts that guide risk assessment for carcinogenicity and other risks. For these purposes, the agency has established a lifetime human health risk range of 1 in 10,000 to 1 in 1,000,000 as generally acceptable for regulatory decisions and for site cleanup. Substantial portions of EPA's \$2.9 billion program and management budget are devoted to quantitative risk assessments, as well as to technology and economic assessments, including regulatory impact analyses.

The FAA has adopted a structural approach to ensuring safety. The agency's *System Safety Handbook* sets out a matrix of the severity and likelihood of an incident—establishing specific ranges that identify unacceptable and tolerable risks—as a basis for prioritizing agency response. The FAA is also enhancing its risk assessments

by adopting a proactive approach to data analysis to identify precursors that could result in aviation safety risks. The FAA views this shift as necessary because, as accidents become increasingly rare, it is harder to identify safety issues through traditional reactive analyses.

Development of a much broader database of events through voluntary self-reporting is an important aspect of this new approach, but requires revisions in reporting incentives by resolving noncompliance issues through corrective action rather than through punishment or discipline.

Inspections, Compliance, and Enforcement

Enforcement challenges for all three agencies include how to target inspection and enforcement resources, including use of tools to identify highest-risk activities and poor performers; generate full reporting of compliance and safety incidents and issues, since agency inspectors cannot review all

sites and equipment at all times; foster corrective actions by the regulated entity; and enhance overall accountability by regulated entities for their safety and environmental performance.

Several years ago, MMS began testing risk-based approaches to inspections. The agency developed criteria associated with higher risks—that is, noncompliance issues



that were considered to hold the greatest potential to result in major accidents or environmental harm. Both the FAA and EPA include inspections and compliance as critical activities. The FAA uses a formal enforcement decision tool for determining the appropriate responses to violations.

Recommendations

Based on our comparative evaluation of regulatory structures and management practices at MMS (now BOEMRE), we offer a number of recommendations.

Risk Assessment and Risk Management

- » Set quantitative thresholds or standards for acceptable, tolerable, and unacceptable risk. In reviews of particular rules, techniques, and practices, deviations from these standards should be based on rigorous analysis. Actual decisions about any deviations from the standards should be made at the highest levels of the agency.

- » Use accident precursor analysis, if feasible, instead of historical spill data to develop risk assessments of low-probability major oil spills by identifying the failure probabilities of accident components.

Regulatory Processes and Best Practices

- » Emphasize safety and environmental performance-based approaches to risk management through which each firm identifies site-specific risks, articulates specific safety (risk-reduction) performance goals, and shows how those goals will be achieved through the techniques, practices, and mitigation measures it deploys at the site. Require independent, third-party audits and periodic agency audits of operators' self-assessments and performance at each site.

- » Establish clear risk thresholds. These

should be used to evaluate alternative compliance options and develop specific guidance on implementation by regional and field offices. The agency can also apply these thresholds to determine whether compliance alternatives meet established performance goals.

- » Establish independent peer review to determine whether the regulations are adequate for achieving the standards. The peer review groups should include strong representation from outside the regulated community. Independent reviews and risk thresholds should become formal, regular requirements of the agency's oversight.

- » When deciding whether to incorporate the results of voluntary consensus standards in regulations, be sure to consider the extent of participation by diverse stakeholders with relevant expertise, the use of independent reviews, and the transparency of safety and environmental performance goals.

Enforcement and Compliance

- » Create a stronger incentive system for operators and contractors to report risks and problems without penalty (similar to programs developed by both the FAA and EPA). The program would not apply to actions associated with criminal violations, fatal accidents, and major injuries.

- » Continue and strengthen the annual operator reviews, in which corrective actions are discussed. This process reinforces a focus on improvement, targeting poor performers and repeated incidents of noncompliance. The discussions do not replace continued use of penalties and legal sanctions, where warranted, to address criminal violations, fatal accidents, and major injuries. However, they enhance those traditional compliance tools by directing attention to corrective action, particularly for repeat instances of noncompliance. ●