

August 06, 2018

Scott A. Angelle
Department of the Interior
Bureau of Safety and Environmental Enforcement (BSEE)
Regulations and Development Branch
45600 Woodland Road, VAE-ORP
Sterling, VA 20166

Via HTTP://www.regulations.gov

Re: Oil and Gas and Sulfur Operations in the Outer Continental Shelf—Blowout Preventer Systems and Well Control Revisions, 83 Fed. Reg. 22,128 (May 11, 2018), Docket No. BSEE-2018-0002.

Dear Director Angelle:

Thank you for the opportunity to comment on the proposed revisions to the Blowout Preventer Systems and Well Control Rule (“Proposed Rule”).¹ The undersigned organizations and their members strongly support protections for our nation’s marine resources and environment, which necessarily include reducing the probability of blowouts and protecting the safety of workers involved in offshore drilling. For that reason, we supported the 2016 enactment of the Blowout Preventer Systems and Well Control Rule (“2016 WCR”) as an important step towards improving offshore safety. Unfortunately, rather than strengthening the protections just recently put into place, the Proposed Rule dangerously rolls back provisions meant to safeguard workers, maintain well control, prevent blowouts, and provide the minimum amount of oversight needed to protect our nation’s marine and coastal ecosystems and resources. While offshore drilling can never be risk-free, it can be made safer for both wildlife and the workers involved. To maintain abundant coastal resources, vibrant fisheries, and the health and safety of workers, the Bureau of Safety and Environmental Enforcement (“BSEE”) must ensure that marine and coastal ecosystems, and current and future oil drilling operations are safe from both minor and catastrophic oil spills.²

Protecting against the risk of oil spills is more important than ever now, as the Department of the Interior has begun promoting a massive increase in oil and gas production

¹ The sources cited in this letter have been provided separately to BSEE via mail. BSEE must consider the sources in its rulemaking, and the sources must be included in the administrative record. *See, e.g.,* 5 U.S.C. § 553(c); *Nat’l Ass’n of Chain Drug Stores v. U.S. Dep’t of Health & Human Servs.*, 631 F. Supp. 2d 23, 26 (D.D.C. 2009).

² We submit and incorporate by reference comments by Professor Robert Bea, attached as Ex.A to this letter. Professor Bea is a former offshore oil and gas worker and engineer, an expert on safety in offshore oil and gas activities, and acted as a lead investigator into the failures of the BP Macondo Well in the Gulf of Mexico. We also agree with and incorporate by reference the comments separately submitted by the Natural Resources Defense Council and Southern Environmental Law Center.

throughout more than 90% of Federal waters. Yet, at the same time that Interior is actively ramping up oil and gas production, the Proposed Rule includes rollbacks that remove important safety measures. Both the National Commission on the BP Deepwater Horizon Oil Spill's Report to the President and the Chief Counsel's Report identified that the rapidly expanding breadth of oil and gas production—and the inability of regulatory oversight to keep pace with it—was foundational to the missteps that lead to the Macondo well explosion and the loss of lives in the *Deepwater Horizon* disaster.³

The undersigned groups urge BSEE to withdraw the Proposed Rule and terminate the rulemaking process. The Proposed Rule, if promulgated, would significantly weaken the important safeguards the Department of the Interior instituted after the *Deepwater Horizon* disaster. In addition to the fatal flaws in BSEE's approach to this rulemaking, we are especially opposed to four changes that BSEE is proposing to make: (1) weakening the default drilling margin requirement; (2) eliminating the BSEE-approved verification organization ("BAVO") regime; (3) eliminating certain blowout preventer ("BOP") requirements; and (4) removing minimum real-time monitoring ("RTM") requirements. Rolling back these regulations puts the environment, the economy, and workers' lives at risk.

Should BSEE choose to proceed nonetheless, it must first provide analysis and data upon which the Proposed Rule is based to comply with the fair notice requirements of the Administrative Procedure Act ("APA"). The APA requires BSEE to provide specific proposed revisions with data and analysis supporting those revisions and to request further public comments on those specific proposed revisions, rather than simply ask for comments on a broad range of topics. BSEE also must perform a Quantitative Risk Analysis before it can rationally conclude that the changes ensure "safety." BSEE must provide information to demonstrate that the Proposed Rule will meet the best available science and technology requirements of the Outer Continental Shelf Lands Act ("OSCLA"). BSEE must also take a "hard look" at the significant impacts of its proposal by preparing an Environmental Impact Statement ("EIS") analyzing the impacts of the proposed changes. The National Environmental Policy Act ("NEPA") requires that BSEE take a "hard look" at the direct, indirect and cumulative impacts that the Proposed Rule will have on water resources, wildlife, coastal habitats, marine species, air quality, and sociocultural and economic systems in an EIS. Finally, BSEE must address the full scope of the Proposed Rule pursuant to the Endangered Species Act ("ESA") by completing consultation on the effects of removing environmental and worker protections on endangered and threatened species and critical habitat.

BACKGROUND

The 2010 *Deepwater Horizon* catastrophe in the Gulf of Mexico highlights how a single accident can lead to the loss of human life, devastate marine ecosystems, and cause tens of billions of dollars in economic damage. On April 20, 2010, the crew on the *Deepwater Horizon* oil rig performed steps to temporarily abandon the well and allow for a production installation to

³ See *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling*, Report to the President, National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling (2011) (hereinafter "National Commission Report"); *Macondo: The Gulf Oil Disaster*, Chief Counsel's Report, National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling (2011) (hereinafter "Chief Counsel's Report").

extract hydrocarbons.⁴ One crucial step in the process was to install a surface cement plug to keep hydrocarbons below the seafloor.⁵ However, the drilling team did not properly install the cement barrier, and subsequently misinterpreted the results of the cement integrity test.⁶ As the team removed drilling fluid, the pressure levels decreased above the reservoir, allowing hydrocarbons to rise past the failed cement barrier.⁷ Once fluids gushed onto the drilling rig floor, indicating a blowout, the team attempted to activate the BOP.⁸ The team activated both automated and manual emergency systems within the BOP in an attempt to shear the drill pipe and seal the well.⁹ However, the intense pressure in the well caused the drill pipe to buckle, preventing the BOP from sealing the well.¹⁰ The result was an explosion, fire, and uncontrolled eruption of oil and gas from the well into the Gulf of Mexico that lasted months, causing widespread environmental and economic damage.¹¹

The *Deepwater Horizon* disaster killed 11 rig workers, released over 200 million gallons of oil, fouled thousands of miles of coastline, endangered public health, and killed billions of birds, marine mammals, sea turtles, and fish.¹² The ongoing effects of the spill include lingering oil residues that have “altered the basic building blocks of life.”¹³ A recent study found that fish species have still not recovered to their full richness almost a decade after the spill.¹⁴ In other areas with a significant presence of offshore oil rigs, fisheries are now particularly vulnerable to future catastrophic oil spills.¹⁵ Investigative reports into the disaster agree that “the ecological scope of impacts from the *Deepwater Horizon* incident was unprecedented, with injuries

⁴ U.S. Chem. Safety & Hazard Investigation Bd., *Investigation Report Volume 1* (2014), available at http://www.csb.gov/assets/1/7/Vol_1_Final.pdf (hereinafter “U.S. Chem. Safety & Hazard Investigation Report”).

⁵ *Id.*

⁶ *Id.* at 16.

⁷ *Id.* at 16.

⁸ *Id.* at 16.

⁹ *Id.* at 17.

¹⁰ *Id.* at 17.

¹¹ *Id.* at 17.

¹² R. Fikes et al., *Four Years into the Gulf Oil Disaster: Still Waiting for Restoration* (2014), http://www.nwf.org/~media/PDFs/water/2014/FINAL_NWF_deepwater_horizon_report_web.pdf; see generally NOAA, *Deepwater Horizon Oil Spill Final Programmatic Damage Assessment and Restoration Plan and Final Programmatic Environmental Impact Statement, Deepwater Horizon NRDA Trustees*, at 1-14 through 1-15 (2016) (hereinafter “NOAA, Final Damage Assessment”) (Retrieved from <http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan>). While this quotation is taken from the first chapter of the assessment, please consider the information contained in all 8 chapters, which have been included with this letter. The NRDA Trustees’ assessment of damage to natural resources estimates that tens of thousands of birds were killed, tens of thousands of marine mammals were killed, over 100,000 sea turtle adults and hatchlings were killed, and billions of fish were killed. The lasting effect of the loss of adult reproduction continues to contribute to the devastating loss of life. *Id.* at 4-483; see also 83 Fed. Reg. 29,212, 29,232 (June 22, 2018), Table 4 (summarizing the effects of the *Deepwater Horizon* oil spill on marine mammals in the Gulf of Mexico).

¹³ Oliver Milman, *Deepwater Horizon Disaster Altered Building Blocks of Ocean Life*, *The Guardian* (June 28, 2018), available at <https://www.theguardian.com/environment/2018/jun/28/bp-deepwater-horizon-oil-spill-report>

¹⁴ Steven A. Murawski and Ernst B. Peebles, *Comparative Abundance, Species Composition, and Demographics of Continental Shelf Fish Assemblages throughout the Gulf of Mexico*, 10 *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science* 325, 343 (2018).

¹⁵ *Id.*

affecting a wide array of linked resources across the northern Gulf ecosystem.”¹⁶ The released oil “was toxic to a wide range of organisms, including fish, invertebrates, plankton, birds, turtles, and mammals . . . [and] caused a wide array of toxic effects, including death, disease, reduced growth, impaired reproduction, and physiological impairments that made it more difficult for organisms to survive and reproduce.”¹⁷ Additionally, these reports highlighted the lack of safety procedures, oversight, and experience as leading causes of the *Deepwater Horizon* blowout.¹⁸ The National Commission’s President’s Report, which was commissioned in the aftermath of *Deepwater Horizon*’s devastating loss of well control, noted that industry has been given decades to regulate itself in terms of worker safety and environmental stewardship and has done neither.¹⁹ Government oversight along with industry investments in safety and a culture of preparedness are needed if oil and gas operations are to be pursued in the OCS.

The President’s Report found that among the chief actors that set the stage for the BP disaster was the government itself, which played a key role in setting the policies that shaped offshore oil and gas activities in the Gulf.²⁰ The record produced in the aftermath from detailed investigations into the policies and actions of government and industry led the commission to conclude that “without effective government oversight, the offshore oil and gas industry will not adequately reduce the risk of accidents, nor prepare effectively to respond in emergencies.”²¹

In response to the devastating loss of human life, marine biodiversity, and economic productivity in the Gulf of Mexico, and with the guidance of investigations conducted by the National Commission, the Chief Counsel, the U.S. Chemical Safety & Hazard Investigation Board, the National Academy of Engineering, BSEE, and other independent researchers, BSEE initiated a rulemaking in 2015 to minimize future well-control incidents.²² After extensive public process, including addressing recommendations from the National Commission’s Report to the President, the Chief Counsel’s Report, and the Report from the National Academy of Engineering and meeting with stakeholders at public forums, BSEE determined that there were significant benefits to clarifying and strengthening offshore drilling regulations and accordingly finalized the 2016 WCR.²³ The 2016 WCR specifically improved worker safety on offshore oil and gas rigs and reduced the probability of catastrophic environmental damage due to well blowouts. According to BSEE, that rule was promulgated in order to strengthen, clarify, and streamline regulations pertaining to blowout prevention and well control systems while offering benefits to society by reducing the probability of incidents involving oil spills.²⁴ It also offered

¹⁶ NOAA, Final Damage Assessment, at 1-14 through 1-15. *See also* National Commission Report, at 182 (“Because the *Deepwater Horizon* spill was unprecedented in size, location, and duration, deepwater ecosystems were exposed to large volumes of oil for an extended period.”).

¹⁷ NOAA, Final Damage Assessment, at pp. 1-14 through 1-15 (2016).

¹⁸ National Commission Report, at 215; U.S. Chem. Safety & Hazard Investigation Report.

¹⁹ *See* National Commission Report, at 214-247.

²⁰ National Commission Report, at 250.

²¹ National Commission Report, at 217.

²² 81 Fed. Reg. 25,888, 25,890 (Apr. 29, 2016); *see generally*, Chief Counsel’s Report; *Macondo Well Deepwater Horizon Blowout: Lessons for Improving Offshore Drilling Safety*, National Academy of Engineering (2012) (hereinafter “National Academy of Engineering Report”).

²³ 80 Fed. Reg. 21,504, 21,508-09 (April 17, 2015).

²⁴ 81 Fed. Reg. at 25,986.

benefits to industry in the form of time-savings that would have, over ten years, exceeded the overall cost of the rule.²⁵

In addition to addressing safety concerns stemming from the *Deepwater Horizon* disaster, the 2016 WCR recognized that loss of well control (“LWC”) incidents were happening at the same rate five years after that incident as they were before, despite new regulations and improvements in industry standards and practices in the interim.²⁶ In 2013 and 2014, there were eight and seven LWC incidents per year, respectively—a rate on par with pre-*Deepwater Horizon* LWCs.²⁷ One LWC, the 2013 Walter Oil and Gas incident, resulted in an explosion and subsequent fire on the rig lasting over 72 hours, completely destroying the rig and resulting in a financial loss approaching \$60 million.²⁸ This incident occurred in part due to the crew’s inability to identify critical well control indicators and in part due to the failure of critical well control equipment.²⁹ Blowouts such as these can lead to much larger incidents that pose a significant risk to human life and can cause serious environmental damage.³⁰

During the rulemaking process for the 2016 WCR, BSEE recognized the importance of collecting the best ideas on the prevention of well control incidents/blowouts to assist in the development of the proposed rule, and thus solicited the knowledge, skillset, and experience possessed by the offshore oil and gas industry.³¹ BSEE participated in meetings, trainings, and workshops with industry, standards-setting organizations, and other stakeholders.³² BSEE found that the “provisions with the highest costs to industry (such as [Real Time Monitoring] requirements for well operations and alternating [Blow Out Prevention] control station function testing) would have the largest impact on reducing spills.”³³ BSEE also determined that despite costs to industry, the 2016 WCR would result in net benefits from the avoided costs associated with oil spills related to personal injuries, natural resource damages, lost hydrocarbons, spill containment and cleanup, lost recreational opportunities, and impacts to commercial fishing.³⁴

Along with a gain in net benefits, BSEE also determined that ensuring the “integrity of the wellbore and maintaining control over the pressure and fluids during well operations are critical aspects of protecting worker safety and the environment.”³⁵ The 2016 WCR addressed BOP system design, performance, and reliability, and RTM, specifically in relation to numerous recommendations for improvement from the investigations following the *Deepwater Horizon*

²⁵ *Id.* at 25,889.

²⁶ *Id.* at 25,890.

²⁷ *Id.* See also https://www.bsee.gov/sites/bsee_prod.opengov.ibmcloud.com/files/2014_annual_report_final.pdf

²⁸ 81 Fed. Reg. at 25,890. See also BSEE, DOI, Investigation of Loss of Well Control and Fire South Timbalier Area Block 220, Well. No. A-3 OCS-G24980—23 July 2013 (July 2015), available

at https://www.bsee.gov/sites/bsee_prod.opengov.ibmcloud.com/files/southtimbalier-220-panel-report9-8-2015.pdf (hereinafter “DOI Investigation”).

²⁹ See DOI, Investigation.

³⁰ 81 Fed. Reg. at 25,890.

³¹ *Id.* at 25,891. See also 80 Fed. Reg. at 21508-09.

³² 81 Fed. Reg. at 25,891.

³³ *Id.* at 25,986.

³⁴ *Id.* at 25,986.

³⁵ *Id.* at 25,890.

disaster.³⁶ BOP equipment and systems are critical components of many well operations. BSEE recognized in the 2016 WCR the necessity of having strengthened BOP systems in place and included the extensive experience of industry in the development of the rule.³⁷ The 2016 WCR has contributed to a reduction in well control incidents. Available data from BSEE on the number of loss of well control incidents show they have been declining since fiscal year 2013 and reduced to zero in fiscal year 2017.³⁸

Despite these important and effective protections, BSEE is proposing to remove and/or weaken some of the very important safety measures it put into place and strengthened under the 2016 WCR, to reduce reporting requirements, to allow deviations in drilling margins without requiring justifications, and to replace the agency's oversight of important last-resort BOP system devices in the Proposed Rule. In the proposed rollback, BSEE acknowledges the existing rule has been beneficial, but the agency is changing its position based solely on industry concern and BSEE's purported need to address regulatory burdens (as expressed in, *inter alia*, the President's Executive Order 13771 and the Secretary's Order No. 3350).³⁹

COMMENTS ON THE PROPOSED RULE

The Proposed Rule fails to explain why the considerations addressed by the final 2016 WCR (worker safety, time-savings benefits to industry, better environmental protection from oil spills) are no longer relevant. The Proposed Rule acknowledges the reforms adopted by the 2016 WCR were beneficial by: incorporating industry standards; adopting reforms to well design, well control, casing, cementing, real time well monitoring, and subsea containment requirements; and implementing many of the recommendations resulting from various investigations of the *Deepwater Horizon* disaster.⁴⁰ Despite these benefits, BSEE offers little justification for revising these rules. Rather than explain why the agency is abruptly reversing course after such extensive investigations, reports, workshops with industry, blowout statistics, economic loss, and the detailed descriptions of benefits that the 2016 WCR provided, the Proposed Rule only offers conclusory statements about burdens to industry and the concerns of operators raised after parts of the 2016 WCR went into effect.⁴¹ Solely because of complaints from industry and a misguided analysis of supposed "regulatory burdens," BSEE seeks to satisfy industry with these proposed revisions that are light on analysis on how this rule would continue to safeguard workers and protect the environment from a disaster like *Deepwater Horizon* and heavy on assertions about lifting regulatory burdens for industry and burdensome paperwork for regulators. But BSEE provides no evidence that the existing rule *is* actually a burden or that removing safeguards will ensure adequate protections remain in place.⁴² Without pointing to any studies, investigations, reports, or public solicitations for information, BSEE proposes to roll back the safeguards put into place after years of independent inquiry and informed decisionmaking after the *Deepwater*

³⁶ *Id.* at 25,890. See also U.S. Chem. Safety & Hazard Investigation Report; Kyle Carter, with E. van Oort and A. Barendrecht, *Improved Regulatory Oversight Using Real-Time Data Monitoring Technologies in the Wake of Macondo*, Society of Petroleum Engineers (2014).

³⁷ 81 Fed. Reg. at 25,891.

³⁸ See <https://www.bsee.gov/stats-facts/offshore-incident-statistics>

³⁹ See 83 Fed. Reg. 22,128, 22,129, 22,131 (May 11, 2018).

⁴⁰ *Id.* at 22,130.

⁴¹ *Id.*

⁴² See *id.* at 22,129.

Horizon disaster. These safeguards were in effect for only two years during which time loss of well control was reduced to zero during federal fiscal year 2017.⁴³ The proposed rollbacks weaken safety for workers and protection of the environment by increasing the risk and frequency of losses of well control.

I. The Rulemaking Does Not Comply with the Fair Notice Requirement of the APA.

Many of BSEE's proposed amendments to the 2016 WCR are no more than vague announcements that BSEE may change certain provisions. But the APA requires that an agency engaged in rulemaking give the public adequate notice of the substance of a new rule so that the public has a meaningful opportunity to comment on the agency's plans.⁴⁴ The notice of proposed rulemaking "shall include . . . the terms or substance of the proposed rule or a description of the subjects and issues involved."⁴⁵ Interested persons must have "an opportunity to participate in the rule making through submission of written data, views, or arguments."⁴⁶ "The object, in short, is one of fair notice."⁴⁷

"[A]n agency proposing informal rulemaking has an obligation to make its views known to the public in a concrete and focused form so as to make criticism or formulation of alternatives possible."⁴⁸ A notice "must disclose in detail the thinking that has animated the proposed rule and the data upon which the rule is based."⁴⁹ "Such disclosure is necessary because it is this detail and data that allow the public to generate meaningful criticism, which serves as the basis for meaningful comment."⁵⁰ Absent such disclosure, the agency risks "operat[ing] with a one-sided or mistaken picture of the issues at stake in a rule-making."⁵¹

At several places in the Proposed Rule, BSEE simply requests suggestions for how it could amend certain 2016 WCR provisions without providing any fair notice of how the agency actually plans to amend those provisions. Moreover, BSEE fails to disclose any of the analysis or data on which other revisions in the Proposed Rule are based, thereby precluding meaningful public criticism. Therefore, BSEE is not complying with the requirements of the APA, 5 U.S.C. § 553.

A. The Proposed Rule does not provide fair notice of how BSEE plans to amend the 2016 WCR.

The Proposed Rule in many places supplies only open-ended statements announcing BSEE's general intent to revise the 2016 WCR. These broad pronouncements fail to give the

⁴³ See <https://www.bsee.gov/stats-facts/offshore-incident-statistics>.

⁴⁴ 5 U.S.C. § 553.

⁴⁵ *Id.* § 553(b)(2).

⁴⁶ *Id.* § 553(c).

⁴⁷ *Long Island Care at Home, Ltd. v. Coke*, 551 U.S. 158, 174 (2007).

⁴⁸ *Home Box Office, Inc. v. FCC*, 567 F.2d 9, 36 (D.C. Cir. 1977).

⁴⁹ *Id.* at 35; see also *Portland Cement Ass'n v. Ruckelshaus*, 486 F.2d 375, 392–93 (D.C. Cir. 1973), *cert. denied*, 417 U.S. 921 (1974) (requiring EPA to disclose for comment the "test results and procedures" supporting proposed rule).

⁵⁰ *Ohio Valley Envtl. Coal. v. U.S. Army Corps of Eng'rs*, 674 F. Supp. 2d 783, 802 (S.D.W. Va. 2009) (citing *Home Box Office*, 567 F.2d at 35–36).

⁵¹ *Connecticut Light & Power v. Nuclear Regulatory Comm'n*, 673 F.2d 525, 530 (D.C. Cir. 1982).

public fair notice of the agency’s plans. For example, BSEE proposes to amend 30 C.F.R. § 250.414, which sets forth requirements for “safe drilling margins.” These drilling margins, which are part of an operator’s permit to drill, “are used to determine the downhole fluid program and ensure fluid densities are capable of controlling the estimated pore pressure and formation fluids while not fracturing formations”⁵²—*i.e.*, they are critical to preventing blowouts like *Deepwater Horizon*. Currently, § 250.414 requires a minimum drilling margin of 0.5 pound per gallon (ppg) and allows deviations in certain circumstances.⁵³ The Proposed Rule states that BSEE is considering “revis[ing] or remov[ing]” this 0.5 ppg margin by “replacing it with a more performance-based standard” that would set the margin on a case-by-case basis or by “potentially providing for a different drilling margin or multiple drilling margins that are specific to the conditions in which the wells are drilled.”⁵⁴ These three proposed alternatives unhelpfully cover the entire universe of options for amending the 0.5 ppg standard.

Nothing in BSEE’s proposal suggests what the performance-based standard might be based on, the range of numeric drilling margins BSEE is considering, or what “conditions” might be relevant to a standard that provides “multiple” drilling margins. Instead, BSEE asks the public to address these significant omissions, seeking input on suggested “criteria” that could be used in an alternative approach, noting that “the rulemaking could specify what documentation operators would need to submit,” and requesting ideas for “supplemental data [that] would provide an adequate level of justification for deviating from the 0.5 ppg drilling margin.”⁵⁵ Such broad-reaching requests provide no indication of how BSEE intends to modify the safe drilling margin under § 250.414. As such, there is no proposed “rule” on which the public can intelligently comment. Here, BSEE’s open-ended requests for “criteria” that could be used in an open-ended alternative approach and for “supplemental data” that might justify deviating from a 0.5 ppg drilling margin⁵⁶ similarly fail to give the public fair notice of what BSEE is considering and why.⁵⁷ BSEE therefore is prohibited under the APA from adopting any changes to the drilling margin requirements in a final rule.

BSEE’s proposed revision to RTM requirements (30 C.F.R. § 250.724) also does not inform the public of what BSEE intends to do. Under the Proposed Rule, BSEE would eliminate “many of the prescriptive real-time monitoring requirements [in § 250.724] and mov[e] towards a more performance-based approach.”⁵⁸ The Proposed Rule, however, does not suggest what a “more performance-based approach” might require. Instead, the Proposed Rule simply (1) eliminates requirements that RTM plans be certified and that real-time data be transmitted, as gathered, to onshore personnel and stored for recordkeeping, 30 C.F.R. § 250.724(b); and (2) purports to maintain, with certain revisions, the requirement that operators develop a RTM

⁵² 80 Fed. Reg. at 21,513.

⁵³ 83 Fed. Reg. at 22,132–34. *See also* 30 C.F.R. § 250.414(c).

⁵⁴ 83 Fed. Reg. at 22,133.

⁵⁵ 81 Fed. Reg. at 25,896.

⁵⁶ *Id.*

⁵⁷ *See Prometheus Radio Project v. F.C.C.*, 652 F.3d 431, 450 (3d Cir. 2011) (remanding proposed rule for lack of fair notice where agency’s broad questions were “simply too general . . . to have fairly apprised the public of the Commission’s new approach to cross-ownership” and did not indicate “which characteristics the Commission was considering or why”).

⁵⁸ 83 Fed. Reg. at 22,137.

plan.⁵⁹ At the same time, however, the Proposed Rule seeks comments on “alternative means to meet the purposes of RTM.”⁶⁰ Nothing in the Proposed Rule indicates whether BSEE might, contrary to its apparent assertions,⁶¹ replace the RTM plan with some alternative approach; nor does the Proposed Rule provide any hints as to what such an alternative approach might be. Instead, as noted, the Proposed Rule asks the public to supply that critical information.⁶² The open-ended nature of BSEE’s proposed revision to § 250.724 significantly undermines meaningful public comment on an existing regulation that BSEE previously stated “reduces the risks of spills and fatalities,”⁶³ and thus is crucial to oil spill prevention. BSEE therefore is prohibited under the APA from adopting any changes to the RTM requirements in a final rule.

BSEE similarly fails to set forth a concrete proposal when it requests comment on whether it should revise the requirement that BOP systems be tested at least every 14 days (under 30 C.F.R. § 250.737), suggesting that it might change the testing frequency to either 7 days or 21 days.⁶⁴ As BSEE acknowledges, BOP testing “ha[s] traditionally been the primary method of verifying the capability of in-service equipment,”⁶⁵ and thus is essential to ensuring that BOP systems prevent oil spills. Yet, without citing any analysis or data BSEE states that “potential technologies . . . may improve the operability and reliability of BOP systems,” which could render the current testing requirement unnecessary.⁶⁶ Nothing in the Proposed Rule identifies what technologies BSEE is referring to, what types of circumstances or information might compel BSEE to amend § 250.737, or how BSEE might re-structure § 250.737 in light of such information. Instead, BSEE solicits such information from the public, seeking comment, with accompanying analysis and data, on the “circumstances and environments” in which “testing frequency [should] be increased or decreased.”⁶⁷ Until BSEE supplies the public with a concrete, well-supported proposal for amending § 250.737, subject to the notice and comment requirements of the APA, BSEE may not amend the testing frequency in § 250.737.

Because many of BSEE’s proposed revisions fail to define the “course of action [BSEE] has selected,”⁶⁸ the public cannot intelligently critique the Proposed Rule.

B. The Proposed Rule does not provide fair notice of the data and studies on which the proposed revisions are based.

BSEE has failed to provide data or studies supporting its assertions in the Proposed Rule that the proposed revisions will not adversely affect safety or the environment. “In order to allow for useful criticism, it is especially important for the agency to identify and make available technical studies and data that it has employed in reaching the decisions to propose particular

⁵⁹ 83 Fed. Reg. at 22,152.

⁶⁰ *Id.* at 22,137.

⁶¹ *See id.* at 22,152.

⁶² *Id.* at 22,137.

⁶³ 80 Fed. Reg. at 21,511 (explaining that real-time monitoring “help[s] ensure the functionality and operability of the BOP system” and “assist[s] rig personnel in identifying and evaluating abnormalities before they become critical issues”).

⁶⁴ 83 Fed. Reg. at 22,143.

⁶⁵ *Id.*

⁶⁶ *Id.*

⁶⁷ *Id.*

⁶⁸ *See Batterton v. Marshall*, 648 F.2d 694, 706 (D.C. Cir. 1980).

rules.”⁶⁹ An agency may not “play hunt the peanut with technical information.”⁷⁰ Nor may an agency “promulgate rules on the basis of inadequate data.”⁷¹ Rather, the public must “be aware of the information the agency finally decides to rely on in taking agency action.”⁷²

The Proposed Rule fails to cite any data or analysis to support BSEE’s critical determinations, including the agency’s repeated claims that the Proposed Rule would “ensur[e] safety and environmental protection.”⁷³ For example, the Proposed Rule would remove all references to BSEE-approved verification organization (“BAVO”) from 30 C.F.R. § 250.732, which governs the independent third party requirements for BOP systems and related components.⁷⁴ BSEE claims, without citing any support, that this change would not impact safety because it has long been industry practice to conduct the certifications and verifications that a BAVO would do.⁷⁵ As BSEE explained in 2016, however, safe BOP systems, given their importance and complexity, require “independent engineering reviews” free from the influence “of the parties whose crucial equipment and processes the BAVO will review and evaluate.”⁷⁶ Nothing in the Proposed Rule provides any basis for concluding that BSEE oversight is no longer necessary despite the industry’s long-standing “culture of complacency.”⁷⁷ Because BSEE failed to support its conclusion that the industry is equipped to police itself, the public cannot intelligently comment on BSEE’s proposed revision to BAVO requirements.

The Proposed Rule also proposes to decrease the shear ram testing timeframe (30 C.F.R. § 250.732(b)(2)(ii)) from 30 minutes to 5 minutes, stating that laboratory and historical data indicate that the change would not undermine safety because “five minutes is adequate to demonstrate effective sealing.”⁷⁸ BSEE does not cite any analysis or data to support this conclusion. Shear rams seal off wells in emergency situations,⁷⁹ and thus are critical safety devices. Though the Proposed Rule states that “BSEE will continue to interact with testing facilities to ensure that new protocols or test data do not show a need for a longer test period,”⁸⁰ this ongoing analysis should be completed, and provided to the public, before BSEE substantially weakens § 250.732(b)(2)(ii).⁸¹ At minimum, BSEE must make available the loosely referenced data so the public can make informed comments on the proposed revision.

⁶⁹ *Connecticut Light & Power v. Nuclear Regulatory Comm’n*, 673 F.2d 525, 530 (D.C. Cir. 1982).

⁷⁰ *Id.* at 530–31; *see also Am. Radio Relay League, Inc. v. F.C.C.*, 524 F.3d 227, 238–39 (D.C. Cir. 2008) (agency must disclose “central source of data for its critical determinations”).

⁷¹ *Portland Cement Ass’n*, 486 F.2d at 393.

⁷² *Nat’l Asphalt Pavement Ass’n v. Train*, 539 F.2d 775, 779 n.2 (D.C. Cir. 1976); *see also Connecticut Light & Power Co.*, 673 F.2d at 530–31 (“An agency commits serious procedural error when it fails to reveal portions of the technical basis for a proposed rule in time to allow for meaningful commentary.”).

⁷³ *See, e.g.*, 83 Fed. Reg. at 22,130, 22,132, 22,138, 22,139, 22,142, 22,144. *See generally* section III, *infra*.

⁷⁴ 83 Fed. Reg. at 22,138.

⁷⁵ *Id.*

⁷⁶ 81 Fed. Reg. at 25,948. The Presidential Commission on *Deepwater Horizon* similarly warned that the offshore drilling industry and its many players have consistently failed to demonstrate a commitment to safety. National Commission Report, *Part III: Lessons Learned: Industry, Government, Energy Policy* (recommending increased oversight given lack of incentives to adequately self-police).

⁷⁷ *See id.* at ix, 293.

⁷⁸ 83 Fed. Reg. at 22,138.

⁷⁹ National Commission Report, at 93.

⁸⁰ 83 Fed. Reg. at 22,138.

⁸¹ *See Portland Cement Ass’n*, 486 F.2d at 393 (agency may not promulgate rules on basis of inadequate data).

The Proposed Rule also would remove a paragraph requiring that subsea BOP systems be able to mitigate compression of pipe between the shearing rams and a related paragraph requiring that these systems have a centering mechanism (30 C.F.R. § 250.734(a)(16)(i) & (ii)).⁸² BSEE claims that eliminating these requirements likely would not undermine safety since readily available technological advances (in just two years) can accomplish the same goals and “be swapped with current components.”⁸³ BSEE, however, does not offer any examples of such technologies or any justification for its conclusion that these new devices are sufficiently safe. BSEE also fails to justify its apparent assumption that all operators will soon adopt this new technology irrespective of costs and other countervailing considerations, thereby making the existing regulations unnecessary. Absent information about the technologies BSEE is referring to, the studies supporting their effectiveness, and the basis for BSEE’s hasty assumption regarding industry-wide adoption, the public cannot intelligently comment on the proposed revision.⁸⁴ Further, it is unclear whether BSEE has even evaluated its decision to remove § 250.734(a)(16)(i) and (ii). BSEE solicits comment and data on the effectiveness of (1) “requiring shear rams to center pipe or wire while shearing” and (2) “requiring shear rams to have the capability to shear any pipe or wire in the hole without a separate centering mechanism”—*i.e.*, the very paragraphs BSEE proposes to remove.⁸⁵ BSEE’s failure to disclose the basis for its proposed change to such a critical safety measure violates the fair notice requirement of the APA, 5 U.S.C. § 553.

A similar problem arises in BSEE’s ill-defined proposal to amend the 0.5 ppg safe drilling margin requirement in § 250.414.⁸⁶ To support amending this section, BSEE simply states that it has approved alternative drilling margins 32 times (out of 305 wells drilled) and asks the public to supply “supplemental data” that might justify deviating from the standard.⁸⁷ BSEE, however, does not provide any information about why it believes those 32 deviations were justified. Moreover, as BSEE explicitly recognizes, the 0.5 ppg standard is based on a National Academy of Engineering recommendation that endorses that standard absent “[a]dditional evaluations and analyses” firmly establishing an alternative.⁸⁸ BSEE, however, does not cite any such data or analysis. BSEE also does not explain why the approval process for deviations is unduly burdensome or why that process is no longer necessary for ensuring that blowouts do not occur. As above, these analyses are critical to the public’s ability to intelligently comment on the Proposed Rule. BSEE may not rely on data later supplied by the public to

⁸² 83 Fed. Reg. at 22,140.

⁸³ *Id.*

⁸⁴ BSEE also fails to justify removing the requirement in § 250.733 that surface BOP stacks have an alternative cutting device for shearing electric-, wire-, or slick-line when blind shear rams are unable to adequately cut and seal during a blowout. 83 Fed. Reg. at 22,139. Instead, BSEE simply states that shear rams now have “increased design capabilities, which are capable of shearing these types of lines” and asks the public to supply the omitted analysis and data. *Id.* BSEE does not indicate which new shear rams have the claimed capability, why such technology means an alternative cutting device is no longer necessary, or why BSEE assumes that industry will immediately adopt this technology. The absence of such information violates APA § 553.

⁸⁵ Less than two years ago, BSEE rejected industry requests to eliminate these paragraphs, explaining that “it is safer to have the pipe centered while shearing . . .” and stating that “this performance-based requirement will encourage development and use of technology to center the pipe while shearing.” 81 Fed. Reg. at 25,962. Nothing in the Proposed Rule justifies reversing the current regulations.

⁸⁶ 83 Fed. Reg. at 22,133–34.

⁸⁷ *Id.* at 22,133.

⁸⁸ *Id.* at 22,133–34.

support an amendment to an important safety measure.⁸⁹ Of course, BSEE must also consider all the same documents that the agency considered, directly or indirectly, when promulgating and finalizing the 2016 WCR.

BSEE's failure to cite supporting analysis or data and its frequent calls for the public to fill in its omissions indicate that BSEE has yet to evaluate the safety and environmental consequences of the Proposed Rule. Because the notice of proposed rulemaking is not concrete or well-supported, the Proposed Rule violates the fair notice requirement of the APA 5 U.S.C. § 553.

II. The Proposed Rule Does Not Comply with OCSLA's Best Available and Safest Technology Requirements.

BSEE must ensure that the Proposed Rule requires the "best available and safest technologies" ("BAST") unless BSEE determines that the incremental benefits of using such technologies are clearly insufficient to justify the costs.⁹⁰ Here, BSEE has failed to justify the proposed rollbacks as meeting BAST and failed to demonstrate that the Proposed Rule will in fact ensure BAST. The Secretary of the Interior charged BSEE with authority to regulate oil and gas development and production operations in the OCS under OCSLA.⁹¹ One of OCSLA's primary purposes is to ensure that all operations in the OCS "be conducted in a safe manner . . . using technology, precautions, and techniques sufficient to prevent or minimize the likelihood of blowouts, loss of well control, fires, spillages, . . . or other occurrences which may cause damage to the environment or to property, endanger life or health."⁹² To that end, the Secretary of the Interior "shall require on all new drilling and production operations and, wherever practicable, on existing operations, the use of the best available and safest technologies which the Secretary determines to be economically feasible, wherever failure of equipment would have a significant effect on safety, health, or the environment."⁹³ Only when the Secretary "determines that the incremental benefits are clearly insufficient to justify the incremental costs of utilizing such technologies" can the Secretary decline to require the best available and safest technology.⁹⁴

BSEE's implementing regulations further define this duty. The regulations require that BSEE balance energy resource development with the protection of the human, marine, and coastal environments,⁹⁵ by, among other things, requiring the use of "best available and safest technology" and requiring that operations "utiliz[e] recognized engineering practices that reduce risks to the lowest level practicable when conducting design, fabrication, installation, operation, inspection, repair, and maintenance activities," unless BSEE determines that the use of BAST "would not be practicable."⁹⁶ BSEE, in turn, has defined BAST to mean "the best available and safest technologies that the BSEE Director determines to be economically feasible wherever

⁸⁹ See *Connecticut Light & Power*, 673 F.2d at 530 (agency must "identify and make available technical studies and data that it has employed in reaching the decisions to propose particular rules").

⁹⁰ 43 U.S.C. § 1347(b).

⁹¹ 30 C.F.R. § 250.101.

⁹² 43 U.S.C. § 1332(6).

⁹³ 43 U.S.C. § 1347(b).

⁹⁴ *Id.*

⁹⁵ 30 C.F.R. § 250.101(b)(2).

⁹⁶ 30 C.F.R. § 250.107(a)(3) & (c)(1), (3).

failure of equipment would have a significant effect on safety, health, or the environment.”⁹⁷ OCSLA and its implementing regulations, therefore, require BSEE to ensure, through its regulations, that oil and gas operations in the OCS employ the best available and safest technology, unless BSEE determines the narrow impracticability exception applies. BSEE has failed to ensure or otherwise determine that the Proposed Rule meets these obligations.

BSEE previously determined that the 2016 WCR incorporated and required the best available and safest technologies. BSEE stated that the BAST standard justified the technological requirements in the final rule, “many of which were derived from recommendations based on exhaustive investigations and reports on the *Deepwater Horizon* incident, and on input from experts representing equipment manufacturers, the offshore oil and gas industry, government, academia, and environmental organizations focused on identifying appropriate technological standards.”⁹⁸ Here, before rescinding and revising technological requirements BSEE already found to be “the best available and safest,” BSEE must ensure that those revisions are equally as good as the original requirements by demonstrating compliance with BAST.

BSEE, however, has not determined whether the Proposed Rule ensures that BAST requirements are still satisfied. For example, BSEE is removing the requirement to use a 0.5 ppg margin for drilling wells, but has not evaluated whether its proposed “performance-based” approach for drilling margins is the best available and safest technological requirement. BSEE is also proposing to revoke the requirement to have an alternative cutting device for surface BOP stacks, but has not determined whether removing that requirement would ensure use of best available and safest technologies.

BSEE’s failure to justify its revisions is especially stark because available evidence demonstrates that the Proposed Rule does not in fact require the best available or safest technologies available to industry. As Professor Bea made clear in his letter, the Proposed Rule does not implement BAST but instead increases uncertainties and the risk of major failures in offshore oil and gas systems. BSEE must determine whether its revisions to the well control rules will still ensure use of the best available and safest technologies and justify its conclusion. BSEE may not adopt the proposed revisions unless it determines that the benefits of the original provisions, which BSEE has already determined to meet BAST requirements, are clearly insufficient to justify the incremental costs of utilizing such technologies.

III. BSEE Must Properly Evaluate Whether the Proposed Revisions Are Actually “Safe” and Should Follow Commonly Accepted Safety Regimes.

BSEE asserts throughout the Proposed Rule that the proposed rollbacks “ensure safety,” do not “impact” or “reduce” safety, and provide the “same levels of safety” as the 2016 WCR.⁹⁹ But nowhere does BSEE define what it means by “safety” or “safe.” BSEE states it considered “qualitative and quantitative safety and environmental factors related to the proposed rule,”¹⁰⁰ but does not state what those factors are or how, exactly, the agency considered them. The

⁹⁷ 30 C.F.R. § 250.105.

⁹⁸ 83 Fed. Reg. at 25,901.

⁹⁹ *E.g., id.* at 22,134, 22,138, 22,144.

¹⁰⁰ *Id.* at 22,145.

attached comments by Professor Robert Bea¹⁰¹ explain that a validated Quantitative Risk Analysis must be performed to determine whether the proposed revisions are in fact “safe,” and, in particular, just as “safe” as the original 2016 WCR.¹⁰² BSEE actually conducted a form of Quantitative Risk Analysis when it assessed the safety value of the 2016 WCR.¹⁰³ The agency cannot simply abandon that approach here.

Professor Bea also explains that BSEE must evaluate the true costs and benefits of changes to safety resulting from the proposed revisions. Specifically, he notes, “Validated quantitative monetary analyses indicate that the BSEE proposed WCR revisions initial cost reductions will result in important increases in the Likelihoods and Consequences (direct and indirect, on-site and off-site) of future [Major System Failures or Major Accident Events],”¹⁰⁴ *i.e.*, the cost reductions identified in the Proposed Rule likely will increase the risk of catastrophic oil spills in the OCS. Again, BSEE did a variation of this analysis for the 2016 WCR, and cannot abandon that approach.¹⁰⁵

BSEE must also evaluate safety with respect to the different geographical environments in which the oil and gas operators who will be subject to the Proposed Rule will be operating. BSEE justifies and describes the Proposed Rule in the context of oil and gas operations in the Gulf of Mexico. However, the current administration is proposing to open oil and gas leasing in other OCS environments, including in the Atlantic, Pacific, and Arctic Oceans.¹⁰⁶ Each ocean presents different constraints, challenges, and risks of operations. The experiences of BSEE and oil and gas operators with implementing the 2016 WCR in the Gulf of Mexico likely do not reflect how the 2016 WCR (or the Proposed Rule) would be implemented in other environments. BSEE must evaluate whether the revisions will ensure safety in all relevant environments, given the likely conditions and operations in those environments.

Another critical component of evaluating the proposed revisions’ safety is assessing the human and organization factors in the systems risk assessment and management processes. In particular, Professor Bea explains that BSEE must demonstrate whether removing certain provisions, such as the specified RTM requirements, will affect the human and organizational factors that contribute to risks; in other words, whether the revisions increase the risk of human error or remove a check on human error through offshore and onshore teams reconciling and coming to consensus on how to proceed.¹⁰⁷ Such an analysis is critical to understanding whether BSEE’s proposal to rescind such built-in safety checks would impermissibly undermine safety.

¹⁰¹ Comment of Robert Bea, *Subject: Bureau of Safety and Environmental Enforcement (BSEE) proposal to revise the current Blowout Preventer Systems and Well Control final rule (WCR) 2–5* (Aug. 1, 2018), attached as Ex. 1 (hereinafter “Bea Comment”).

¹⁰² The National Academy of Engineering similarly recommended in its review of the *Deepwater Horizon* disaster that “[q]uantitative risk analysis should be an essential part of goal-oriented risk management systems.” National Academy of Engineering Report, at 121.

¹⁰³ BSEE, Regulatory Impact Analysis for the 2016 WCR, RIN: 1014-AA11 (April 11, 2016), at 53-76; *see* Bea Comment, at 2.

¹⁰⁴ Bea Comment, at 5–8.

¹⁰⁵ BSEE, Regulatory Impact Analysis for the 2016 WCR, RIN: 1014-AA11 (April 11, 2016), at 53-76; *see* Bea Comment, at 5–6.

¹⁰⁶ BOEM, 2019-2024 National Outer Continental Shelf Oil and Gas Leasing Draft Proposed Program (Jan. 2018).

¹⁰⁷ Bea Comment, at 8–15.

Finally, BSEE should consider whether its approach to safety in the Proposed Rule is reasonable in light of the System Risk Assessment & Management regimes implemented in offshore oil and gas development programs in other countries and in other high-risk industries in the United States.¹⁰⁸ Specifically, BSEE must ask whether its baseline for what it considers “safe” is unreasonably low compared to commonly accepted safety standards in other countries or industries.

IV. Changing the Drilling Margin Prescriptive Requirements Fails to Ensure that Drilling Margins Are Safe and Significantly Compromises Drilling Safety.

We strongly oppose changing the drilling margin requirements in § 250.414. The existing requirements ensure that well pressures are kept at a minimum safe margin, and already provide ample flexibility for operators. BSEE has provided no evidence that its proposed changes—or any new changes it may add to a final rule in response to comments—will not reduce safety or increase the risk of a loss of well control. Nor has BSEE provided evidence that the current process for requesting approval to use alternate drilling margins is inadequate. On the contrary, BSEE previously rejected similar proposed modifications to the drilling margin requirements when it issued the 2016 WCR, based on the evidence before it. And, as explained above, the existing 2016 WCR regulations clearly have been working; the drilling margin requirements likely are a significant reason for that success.

BSEE’s proposal details only two additions to § 250.414: to add “and analogous” and “if available” to paragraph (c)(3).¹⁰⁹ BSEE, however, requested comments on far more extensive—but not at all detailed—revisions, including 1) replacing the 0.5 ppg drilling margin standard with a “performance based, case-by-case standard,” 2) criteria BSEE could use to apply alternative approaches for ensuring a safe drilling margin, and 3) whether drilling should be allowed to continue in certain circumstances without receiving alternative safe drilling margin approval from BSEE; the agency has not specifically proposed changes to these provisions.¹¹⁰ As explained in section I.A above, BSEE may not enact new revisions in the final rule that it did not specifically propose in the draft rule or on which it did not provide an opportunity for public comment.

Insofar as BSEE is considering changing the drilling margin requirements or approval process for using alternate margins, we strongly oppose eliminating or reducing the existing prescriptive requirements. The evidence and expert studies—including those BSEE considered in promulgating the 2016 WCR—demonstrate that the prescriptive requirements in the 2016 WCR serve an important safety function, correcting the previous, flawed regime that allowed operators to select drilling margins without necessarily ensuring their safety. That regime was a key contributor to the *Deepwater Horizon* blowout: the drilling team continued drilling to the point that they could maintain only a very narrow drilling margin, which compromised its ability to safely seal the well. BSEE stated in the 2016 WCR that it developed the drilling margin requirements “based on the information revealed during investigations of the *Deepwater Horizon*

¹⁰⁸ See *id.* at 15–20.

¹⁰⁹ 83 Fed. Reg. at 22,134.

¹¹⁰ See *id.* at 22,133 (“In the proposed rule text, the drilling margin requirements are mostly unchanged.”).

incident.”¹¹¹ For example, the National Academy Report stated that a minimum drilling margin should be required that is adequate to prevent fracturing during “unforeseen pressure surges or rate and fluid property fluctuations,” and recommended a value of 0.5 ppg.¹¹² BSEE must consider these recommendations and other information it considered for the 2016 WCR before determining whether changing the drilling margin requirements will ensure safety.

In fact, BSEE already considered and rejected in the 2016 WCR rulemaking, based on the evidence before it, the suggestion to move from a prescriptive drilling margin regime to a performance-based one.¹¹³ There is no suggestion that anything has changed since that time and that same evidence strongly supports retaining the existing drilling margin requirements.

BSEE cannot reduce that minimum without establishing that a narrower margin will be “safe.” As described in Professor Bea’s comments, BSEE must first define what “safe” means in the context of drilling margins.¹¹⁴ Interior’s 2011 joint investigation team similarly recommended that the agency define what “safe” means.¹¹⁵ Once it sets a definitional standard for “safe,” BSEE then must establish whether a narrower margin would meet that definition before it can rationally adopt such a narrower margin. For example, BSEE should consider the rate of kicks or fluid losses under different margins. BSEE has not provided any evidence that using a narrower drilling margin does not result in a higher rate of kicks, or otherwise is equally as safe as a 0.5 ppg margin. For these reasons, we oppose removing or reducing the 0.5 ppg minimum drilling margin, and oppose providing different drilling margins for specific conditions that may be less than 0.5 ppg.

We also oppose removing or changing the requirement that an operator receive BSEE approval before continuing drilling with a drilling margin narrower than 0.5 ppg. There is no need to revise the current rule to provide more “flexibility” to use smaller drilling margins because the 2016 WCR already provides that flexibility. BSEE does not explain why that process is inadequate. Indeed, BSEE provides no example of an operator being denied “flexibility” to use a smaller drilling margin where circumstances warrant. On the contrary, the current BSEE approval process is important to ensuring that any operations using a smaller drilling margin are done safely; in other words, that a smaller drilling margin is “appropriate.”

Multiple expert panels investigating the *Deepwater Horizon* disaster recommended establishing a default safety limit and requiring agency approval before that limit may be exceeded.¹¹⁶ Requiring agency approval for departures from prescribed standards has several benefits, as described in section IX below. Including this additional level of review also protects against potential human error during the operator’s decision to use a smaller drilling margin.

¹¹¹ 80 Fed. Reg. at 21,513 (citing U.S. Dep’t of Interior, *Report Regarding the Causes of the April 20, 2010 Macondo Well Blowout* 202 (September 14, 2011) (hereinafter “DOI Joint Investigation Report”)).

¹¹² National Academy of Engineering Report, at 39–40, 43 (citing Bourgoyne, A. T., M. E. Chenevert, K. K. Millheim, and F. S. Young, Jr. 1991. *Applied Drilling Engineering*. SPE Textbook Series, Vol. 2. Society of Petroleum Engineers, Richardson, Tex; Aadnoy, B. S., I. Cooper, S. Z. Miska, R. F. Mitchell, and M. L. Payne. 2009. *Advanced Drilling and Well Technology*. Society of Petroleum Engineers, Richardson, Tex.).

¹¹³ See 81 Fed. Reg. at 25,894, 25,916.

¹¹⁴ Bea Comment, at 2–5.

¹¹⁵ DOI Joint Investigation Report, at 202.

¹¹⁶ E.g., National Academy of Engineering Report, at 121–22.

Without BSEE review, potential human error by the operator would go uncorrected and could result in a loss of well control due to inadequate drilling margins.¹¹⁷ The requirement also ensures operators take the time to conduct the analyses necessary to “justif[y] and document[]” departing from the default drilling margin.¹¹⁸ This justification requirement demands that operators more carefully conduct and validate their analyses than would be the case if they did not need to gain approval.¹¹⁹ This is particularly important because any type of analytical uncertainty in modelling could result in a blowout. Without requiring BSEE approval, operators may employ smaller drilling margins in situations where they are *not* appropriate. For that reason, BSEE stated that one purpose of requiring approval is so BSEE can “ensure the use of drilling mud with properties (e.g., density, viscosity, additives) best suited for a specific well interval and based on well-specific drilling and geological parameters.”¹²⁰ Therefore, BSEE must retain its approval process to ensure that operators only use smaller drilling margins when they have been conclusively determined to be “safe.” The safety benefit of the process far outweighs the minimal burden on industry.¹²¹

If BSEE does decide to switch to a performance-based standard, it must require operators to satisfy a set of criteria that ensure the proposed drilling margins are “safe.” BSEE must quantify what level of risk it considers safe, and require operators to submit evidence and calculations to BSEE demonstrating that their drilling margins will fall within the acceptable risk.¹²² In other words, BSEE must have clear, defined, enforceable criteria to determine whether the proposed drilling margin will be safe; it cannot simply accept an operator’s conclusory statements that its proposal is safe.

Finally, the mere fact that BSEE has approved narrower drilling margins 32 times since the 2016 WCR became effective provides no support for the proposed changes to the drilling margin requirements: it does not support that the smaller margins are safe, that the 0.5 ppg minimum margin is unnecessary, or that the BSEE approval requirement is superfluous. As an initial matter, BSEE has not established it was justified in granting the 32 departures. BSEE provides no evidence that it analyzed in those cases whether the alternate margin would, in fact, be safe, as opposed to simply deferring to an operator’s claim of safety. If the departures could not be quantified as “safe,” then BSEE’s approvals do not support the proposition that operator decisions to use smaller margins tend to be safe or warranted. In addition, BSEE does not indicate whether it ever has denied or returned a departure request. Such denials would undermine the concept that allowing operators to determine drilling margins under a performance-based standard would always result in operators using a safe drilling margin.

¹¹⁷ See Bea Comment, at 8–15.

¹¹⁸ 81 Fed. Reg. at 25,895.

¹¹⁹ Cf. 80 Fed. Reg. at 21,513 (explaining that with prescriptive requirements, “operators would be able to better understand BSEE requirements and design fluid programs accordingly”).

¹²⁰ 81 Fed. Reg. at 25,895; see also *id.* at 25,916.

¹²¹ Any industry concerns about a broad burden of this requirement should be tempered by BSEE’s intent under the WCR to “identify and focus its resources on the potentially higher risk well sections where the safe drilling margin may be of greater concern.” 81 Fed. Reg. at 25,516.

¹²² See Bea Comment, at 2–5.

Without significantly more evidence, BSEE cannot justify that changing the drilling margin requirements will not affect safety. For the above reasons, we oppose any changes or rescissions of any drilling margin provisions in § 250.414.

V. Replacing BSEE-Approved Verification Organizations with Independent Third Parties Compromises Safety Inspection Integrity.

We strongly oppose BSEE's proposals to replace BAVOs with independent third parties to conduct the inspections and certifications required by many of the Part 250 provisions.¹²³ Requiring agency approval of verification organizations provides critical oversight to ensure that the organizations are capable of conducting the necessary, complex technical analyses; that the organizations do, in fact, rigorously apply the necessary standards; and that the organizations demonstrate integrity and operate truly independently from the industry they inspect. Shifting back to the uncertified third-party model removes an important accountability measure that safety systems throughout the world have found necessary.

Several panels studying the *Deepwater Horizon* disaster advocated for a system of agency-certified offshore inspectors and auditors to remedy shortcomings with the existing independent third-party system. Such a change was long overdue to bring the U.S. verification system up to par with most of the offshore regulatory regimes throughout the world. BSEE has provided no justification for regressing to the antiquated, ineffective third-party system. BSEE has provided no evidence that the previously identified problems with the independent third-party system have been remedied, or that an independent third-party system will be as effective at ensuring safety as a BAVO system. In fact, there are several reasons the third-party system would *not* be as effective. There is no rational basis for rescinding the BAVO system and returning to the flawed, pre-*Deepwater Horizon* inspection and certification system.

The panel recommendations and expert studies that informed BSEE's development of the 2016 WCR strongly support the need to switch from an independent third-party inspection and certification system to one in which the agency certifies and oversees the verification organizations. For example, the National Academy of Engineering report recommended that BSEE "develop requirements for determining the competence of examiners and their independence from the operating company" and specify "responsibilities for developing well examination schemes, ensuring scheme effectiveness, and ensuring that appropriate actions are taken on recommendations made by the well examiner."¹²⁴ The first recommendation is particularly important, given the National Commission's caution that industry's incentive to avoid costs can undermine self-policing efforts.¹²⁵ The Commission accordingly noted that "even in industries with strong self-policing, government also needs to be strongly present, providing oversight and/or additional regulatory control."¹²⁶

¹²³ See 83 Fed. Reg. at 22,135, 138, 22,140, 22,142 (proposing to eliminate BAVO requirement in §§ 250.462, .731, .732, .734, .738, .739).

¹²⁴ National Academy of Engineering Report, at 123.

¹²⁵ See National Commission Report, at 225, 234–35.

¹²⁶ *Id.* at 234.

BSEE sought to implement those recommendations through the BAVO requirements in the 2016 WCR. BSEE stated in the proposed 2016 WCR that it “believes that the importance and complexity of BOP systems and the fact that they might be operated at various worldwide locations throughout their service life warrants a thorough and regular assessment of the systems and verification that design, installation, maintenance, inspection, and repair activities are documented and traceable.”¹²⁷ Because of the importance and complexity of those systems, BSEE determined that verification organizations must “be limited to those that can clearly demonstrate the capability to perform this comprehensive detailed technical analysis.”¹²⁸ BSEE stated the existing independent third-party verification system used by industry was inadequate: “the development of more rigorous industry testing protocols is critical to demonstrating the performance of BOP equipment.”¹²⁹ The BAVO system, on the other hand, “would provide BSEE with an additional layer of review and verification at all steps in the development process.”¹³⁰

In the final 2016 WCR, BSEE expressly rejected the suggestion that requiring BSEE certification of verification organizations is unnecessary or does not provide additional value.¹³¹ Rather, BSEE concluded that it “believes that these certification and verification provisions will serve as a useful tool for BSEE and the industry to better ensure—as compared to the current rules and industry practices—that equipment and processes function as intended to protect safety and the environment.”¹³² “[A]pproval of verification organizations by BSEE will ensure that the BAVOs are independent of the parties whose crucial equipment and processes the BAVO will review and evaluate.”¹³³

As it considers rescinding or revising the BAVO requirements, BSEE must thoroughly consider the evidence in the final 2016 WCR supporting the need for a BAVO system. For example, BSEE should consider the conclusions of the Columbia Accident Investigation Board, which reviewed the importance of independent verification entities to ensuring safety of the U.S. Navy’s submarine fleet.¹³⁴ In addition to the above findings, BSEE noted in the final 2016 WCR that “[o]ther regulatory regimes throughout the world use similar systems.”¹³⁵ BSEE must consider evidence from such other regulatory regimes—in all high-risk technical settings, not only offshore drilling—as to the need for and value of requiring agency certification of testing or oversight organizations.

BSEE may not rationally rescind the BAVO system unless it can demonstrate that the evidence supporting its previous conclusions in the 2016 WCR was wrong or that identified shortcomings of the previous third-party system have been remedied. In addition, BSEE must

¹²⁷ 80 Fed. Reg. at 21,522.

¹²⁸ *Id.*

¹²⁹ *Id.*

¹³⁰ *Id.*

¹³¹ 81 Fed. Reg. at 25,945.

¹³² *Id.*

¹³³ *Id.* at 25,948; *see also id.* at 25,948–49 (explaining BAVO system “is necessary to ensure that BSEE receives accurate information regarding BOP systems so that BSEE may ensure the system is appropriate for the proposed use”).

¹³⁴ Columbia Accident Investigation Bd., *Report Vol. 1*, at 182–84 (2003).

¹³⁵ *Id.* at 25,948.

demonstrate that switching from the BAVO system to an independent third party system will be equally as effective at ensuring safety. BSEE has not done either. Indeed, there continue to be incidents of independent third-party inspectors failing to apply proper standards and demonstrating a lack of independence from the regulated entities.¹³⁶

The proposed independent third-party system will not be as effective as the BAVO system at ensuring safety for at least two reasons. First, the burden under the BAVO system for showing whether a verification organization has the integrity and capability to rigorously apply the necessary technical analysis provides more incentive for verification organizations to hold themselves to a higher standard. The BAVO system requires the verification organization to demonstrate to BSEE that it meets a high standard, whereas under the independent third-party system, the burden is on BSEE to discover if and when a verification organization is not adequately implementing the protocols. Second, the independent third-party system does not provide BSEE with adequate tools to deal with performance problems by the verification organizations or with patterns of flawed verifications. The Safety and Environmental Management System (“SEMS”) audit and permitting process verification BSEE cites in the Proposed Rule lacks equivalency to a certification system.¹³⁷ Those mechanisms can be used only on a case-by-case basis to remedy individual flawed verifications, not as a way to correct a pattern of flawed verifications. BSEE cites no mechanism that would allow it to restrict the use of independent third-parties that have been shown to have lax standards or otherwise have demonstrated a pattern of flawed verifications. The BAVO system, on the other hand, gives BSEE a straightforward mechanism to prevent continued or future flawed verifications by a verification organization with performance problems: BSEE can simply revoke its approval of that organization. If BSEE moves from a BAVO system to relying on independent third parties, it must promulgate a mechanism to disqualify third-party organizations that do not consistently demonstrate integrity and rigorous technical analysis, and it must develop a system that ensures that BSEE is actively aware of such problems.

Finally, BSEE has provided no evidence for its assertion that the BAVO system would impose an undue burden on either verification organizations or offshore operators. In the final 2016 WCR, BSEE estimated that the BAVO system would result in a mere \$10,000 in annual costs to operators and verification organizations. BSEE has provided no evidence that such a small annual cost outweighs the critical benefits of the BAVO system. Without significantly more evidence, BSEE cannot justify replacing the BAVO system with an independent third-party verification system. For the above reasons, we oppose any changes to or rescissions of the BAVO requirements in §§ 250.462, .731, .732, .734, .738, .739.

VI. Revising the Blowout Preventer System Requirements Significantly Compromises Safety.

We strongly oppose BSEE’s proposed revisions to the BOP system requirements in §§ 250.730, 250.733, and 250.734. Investigations of the *Deepwater Horizon* disaster revealed several ways in which the BOP system catastrophically failed. Experts identified numerous

¹³⁶ E.g., U.S. Dep’t of Justice, *Company to Pay \$9.5 Million Fine for False Reporting of Safety Inspections and Clean Water Act Violations That Led to Explosion in Gulf of Mexico* (Feb. 23, 2017).

¹³⁷ See 83 Fed. Reg. at 22,138.

technology upgrades necessary to ensure BOPs would not fail in similar ways in the future. The 2016 WCR added §§ 250.730, 250.733, 250.734, and other provisions to compel operators to adopt these critical upgrades. Revising or removing those requirements, as proposed, would allow operators to continue using BOPs that are unable to effectively close and seal a wellbore under the range of conditions encountered including high-pressure, high-temperature drilling environments. BSEE's proposed change would severely compromise drilling safety and substantially increase the risk of blowouts versus the more protective 2016 WCR BOP system requirements.

The BOP system is the final check to prevent a loss of well control from becoming a catastrophic blowout. The chain of human and engineering errors that occurred onboard the *Deepwater Horizon* would not have resulted in an uncontrolled oil spill had the rig's BOP system been designed better to respond to the unexpected conditions that occurred. The National Academy of Engineering identified a number of deficiencies in the BOP system's design process:

1. The Academy could find no evidence that the BOP design criteria or performance envelope was ever fully integrated into an overall well control system perspective, nor that BOP design was consistent with the BOP's critical role in well control.
2. While individual subsystems of various BOP designs have been studied on an ad hoc basis over the years, the Academy could find no evidence of a reliability assessment of the entire BOP system, which would have included functioning at depth under precisely the conditions of a dynamic well blowout. Furthermore, the committee could find no publicly available design criteria for BOP reliability.
3. The entire BOP system design is characterized by a previously identified lack of redundancy:
 - There is only one [blind shear ram].
 - One shuttle valve is used by both control pods.
 - Each [multiplexer] cable is incapable of monitoring the entire BOP system independently.
4. No design consideration appears to have been given to [blind shear ram] performance on pipe in compression.
5. The [blind shear ram] was not designed to shear all types and sizes of pipe that might be present in the BOP system.
6. The [blind shear ram] probably did not have the capability of shearing or sealing any pipe in significant compression.
7. There was a lack of BOP status monitoring capabilities on the rig, including

- Battery condition,
- Condition of the solenoid valves,
- Flow velocity inside the BOP system,
- Ram position,
- Pipe and tool joint position inside the BOP system, and
- Detection of faults in the BOP system and cessation of drilling operations on that basis.¹³⁸

The Academy accordingly recommended:

BOP systems should be redesigned to provide robust and reliable cutting, sealing, and separation capabilities for the drilling environment to which they are being applied and under *all* foreseeable operating conditions of the rig on which they are installed. . . . The design capabilities of the BOP system should be improved so that the system can shear and seal *all* combinations of pipe under *all* possible conditions of load from the pipe and from the well flow, including entrained formation rock and cement, with or without human intervention. Such a system should be designed to go into the “well closed” position in the event of a system failure. This does not mean that the BOP must be capable of shearing every drill pipe at every point. It does mean that the BOP design should be such that for any drill string being used in a particular well, there will always be a shearable section of the drill pipe in front of some [blind shear ram] in the BOP.¹³⁹

The Chief Counsel’s Report similarly recommended that requiring a second shear ram would mitigate the risk of not being able to shear the pipe if one of the rams were opposite a non-shearable component.¹⁴⁰

BSEE sought to implement many of these recommendations in the 2016 WCR.¹⁴¹ In response to various comments that the certain new BOP standards should not be required in the final rule, BSEE explained that each of the standards is necessary to ensure that BOP systems are capable of shearing and sealing a drilling stack.¹⁴² BSEE now proposes to eliminate BOP system requirements it previously concluded are necessary to ensure safety. BSEE has provided no evidence that the requirements no longer are necessary or that BOP systems applying the proposed standards would be equally as effective and safe as those adopting the technology required in the original 2016 WCR. BSEE therefore may not rationally conclude that the proposed revisions ensure safety. Indeed, there are multiple reasons the proposed revisions would weaken BOP system safety and effectiveness.

¹³⁸ National Academy of Engineering Report, at 71–72; *see also* Chief Counsel’s Report, at 203–19.

¹³⁹ National Academy of Engineering Report, at 73 (emphases added).

¹⁴⁰ Chief Counsel’s Report, at 205.

¹⁴¹ *See* 80 Fed. Reg. at 21,508–10; 30 C.F.R. §§ 250.730–.739.

¹⁴² *E.g.*, 81 Fed. Reg. at 25,950–51.

Existing § 250.730(a) states that a BOP system “must be capable of closing and sealing the wellbore *at all times*.”¹⁴³ This unambiguous language about a BOP system’s key capability is weakened by the Proposed Rule’s specification of only certain circumstances in which the BOP system must function: only “in the event of flow due to a kick.” The proposed language does not cover other circumstances when closing and sealing of the wellbore may be needed. To maximize safety, BSEE should utilize the existing language of § 250.730(a).

Section 250.730(c)(1) also reduces the safety and effectiveness of BOP systems by limiting information exchange about equipment failures. We oppose the new language because:

1. The new language is not specific as to who must be notified at BSEE or at other entities, such as the equipment manufacturer, and
2. If third parties receive data and reports on behalf of BSEE, it will be substantially more difficult for the public to acquire those data and reports using the Freedom of Information Act. Since this section focuses on equipment failure, it likely would be important for technical experts and others to acquire and review the equipment failure information to make recommendations to prevent similar failures in the future.

BSEE previously explained that it was necessary for the reports to be submitted directly to the agency “since it is important that BSEE be aware of the results of failure analyses in order to help BSEE identify potential trends and, if appropriate, make others aware of a potential problem that may require action to prevent similar failures or to improve equipment reliability.”¹⁴⁴ BSEE provides no explanation or support for why submitting reports to third-parties will be equally effective at meeting those objectives. For this reason, BSEE should maintain the original language in § 250.730(1)(c). BSEE should also maintain the original language in § 250.730(c)(2) for submitting the analysis report to the Chief, Office of Offshore Regulatory Programs and to the equipment manufacturer. Likewise, BSEE should maintain the existing language for notification in § 250.730(c)(3) and delete the proposed language in § 250.730(c)(4).

Proposed § 250.730(c)(2) also is problematic and the existing regulatory language should not be changed. Under the existing regulation, “an investigation and failure analysis” must be “performed within 120 days of the failure to determine the cause of the failure.”¹⁴⁵ The proposed language significantly delays this timeline by allowing a failure analysis to begin “within 120 days of the failure”—far too long to start an investigation given the propensity for memories to change during a four-month period and the need to correct problems quickly. BSEE originally added this requirement to “allow BSEE to notify the industry and international community of any significant safety issues related to equipment design, and potentially prevent future incidents.”¹⁴⁶ BSEE adopted the original timeframes because it concluded, “There is value to concluding the analysis, and providing the results to the manufacturer at a reasonably early date after the failure, so that any necessary follow up actions can be taken sooner, and thus potentially

¹⁴³ 30 C.F.R. § 250.730(a) (emphasis added).

¹⁴⁴ 81 Fed. Reg. at 25,944.

¹⁴⁵ 30 C.F.R. § 250.730(c)(2).

¹⁴⁶ 80 Fed. Reg. at 21,521.

prevent additional related failures from occurring.”¹⁴⁷ And in the proposed 2016 WCR, BSEE noted that the original timeframes were “consistent with other previously incorporated API standards.”¹⁴⁸ BSEE does not explain why the industry’s own internal standards are too stringent. Rather, its only support for the proposed change is that “certain operations would not be able to meet the original timeframes.”¹⁴⁹ But BSEE provides no evidence or explanation for that assertion. In fact, BSEE expressly rejected a previous suggestion to extend the timeframes as unreasonable.¹⁵⁰ We support the 120-day failure analysis completion date in the existing regulations to ensure that any needed changes to equipment are identified rapidly so remedial changes could be made at problematic wells as soon as possible to prevent additional failures.

BSEE’s proposed revisions to § 250.733 also would weaken the near-term effectiveness of BOP systems. BSEE provides no support for its proposal to extend the deadline to comply with the surface BOP stack requirements, other than claiming that the change would minimize some sort of unsubstantiated “confusion” about differing compliance dates for surface BOP stacks and subsea BOP stacks and that the change could “potentially minimize the technical and economic challenges” of upgrading surface BOP stacks. As an initial matter, the regulations are very clear as to the compliance dates for surface and subsea BOP stacks: they are listed in different regulatory sections, so there should be no confusion as to which date applies to which type of BOP stack. Further, by relying solely on the apparent economic benefits of delaying the compliance date, BSEE completely ignores the significant harm to safety during the two-year delay. BSEE stated in the 2016 WCR that “surface BOPs on floating production facilities (like subsea BOPs) generally present higher risks than surface BOPs on fixed facilities.”¹⁵¹ Thus, the risks of a blowout will be significant during the delay. Moreover, BSEE previously determined that the April 29, 2019 compliance date would not impose a burden on industry, stating that date “will give the industry adequate time to plan, design, and develop surface BOP equipment that can meet the dual shear ram requirement on new floating production facilities.”¹⁵² For these reasons, maintaining the April 29, 2019 compliance date is necessary to improve safety in a timely manner.

BSEE also is proposing to remove the requirement to have an alternative cutting device used for shearing electric-, wire-, or slick-line if the blind shear rams are unable to cut and seal under maximum anticipated surface pressure.¹⁵³ If BSEE is to eliminate the alternate cutting device requirement, it must ensure that its regulations require that the blind shear rams themselves be capable of shearing electric-, wire-, and slick-line. In particular, BSEE must ensure that the currently commercially available shear rams can reliably shear these types of lines.

BSEE’s proposed revisions to § 250.734 also would substantially reduce the safety and efficacy of subsea BOP stacks, contravene the recommendations of the *Deepwater Horizon* panels, and are unsupported by any evidence or rational explanation. BSEE proposes to revise

¹⁴⁷ 81 Fed. Reg. at 25,944.

¹⁴⁸ 80 Fed. Reg. at 21,521.

¹⁴⁹ 83 Fed. Reg. at 22,137.

¹⁵⁰ 81 Fed. Reg. at 25,944.

¹⁵¹ *Id.* at 25,954.

¹⁵² *Id.*

¹⁵³ 83 Fed. Reg. at 22,139.

paragraph (a)(1)(ii) by clarifying that a “combination of the” shear rams be capable of shearing the listed components. That revision negates the necessary redundancy provided by the existing requirement that “both” shear rams possess that capability. BSEE imposed that dual ram requirement in the 2016 WCR to address the situation where a non-shearable component is located opposite the shear ram:

BSEE does not believe that one shear ram can ensure the ability of a subsea BOP to shear a drill string in the event of a potential emergency. The various investigations of the *Deepwater Horizon* incident recommended increasing the shearing capabilities of the BOP, including the use of dual shear rams on subsea BOPs. BSEE determined that use of dual shear rams would increase the likelihood that a drill string can be sheared, and ensures the well can be shut in and secured, by requiring that a shearable component is opposite a shear ram.¹⁵⁴

By requiring only that the combination of shear rams be capable of shearing all the listed components, the proposed revision could result in a situation where one of the shear rams is located opposite a non-shearable component, such as a joint (so cannot shear any part of the drill string), while the other shear ram is able to shear only part of the drill string; i.e., the shear rams cannot shear the string in “combination” because one ram is blocked by a non-shearable component. BSEE provides no support for the proposition that the proposed change would “still ensur[e] all critical shearing capabilities” and “would not impact safety.”¹⁵⁵ BSEE states the revisions “would better align the functionality of the BOP system with API Standard 53,”¹⁵⁶ but BSEE previously concluded that very same standard “cannot provide the same level of assurance” as the dual shear ram requirements in § 250.734.¹⁵⁷ BSEE has not demonstrated that a BOP using the revised standards will be equally effective as a BOP using the original WCR standards.

BSEE’s proposed revisions to the accumulator requirements in § 250.734(a)(3) would reduce safety and severely weaken the ability of the subsea BOP system to function in the event of a lost connection to the surface rig. BSEE explained in the proposed 2016 WCR that the accumulator system located subsea must be able to “provide closure of the BOP components and operate critical functions in case of a loss of the power fluid connection to the surface.”¹⁵⁸ BSEE does not explain how removing the reference to the subsea location of accumulator capacity would ensure that the accumulator system can adequately function if there is a loss of the power fluid connection to the surface. BSEE acknowledges that under existing industry practice, the surface and subsea accumulator capacity works together to achieve full functionality.¹⁵⁹ So the accumulator system necessarily cannot achieve full functionality if the connection between the surface and subsea accumulator capacity is severed. BSEE therefore must continue to require that the necessary accumulator capacity be located subsea. For similar reasons, BSEE should retain the requirement in § 250.734(a)(3)(iii) for dedicated bottles.

¹⁵⁴ 81 Fed. Reg. at 25,956.

¹⁵⁵ 83 Fed. Reg. at 22,139.

¹⁵⁶ *Id.*

¹⁵⁷ 81 Fed. Reg. at 25,956–97.

¹⁵⁸ 80 Fed. Reg. at 21,523.

¹⁵⁹ 83 Fed. Reg. at 22,139.

Finally, BSEE's proposed revisions to § 250.734(a)(16) would reduce safety and fail to ensure effective operation of a BOP. As an initial matter, BSEE may not enact new revisions in the final rule based on comments solicited "about the effectiveness of requiring shear rams to center pipe or wire while shearing, or requiring shear rams to have the capability to shear any pipe or wire in the hole without a separate centering mechanism" because BSEE did not specifically propose such revisions in the draft rule or provide an opportunity for public comment on them, as explained in section I.A above.¹⁶⁰ The existing requirements for a centering mechanism and the ability to mitigate compression of the pipe between the shear rams are critically important to ensuring that a BOP can effectively shear the drill string in high-pressure conditions like those that caused the *Deepwater Horizon* BOP to fail. BSEE claims that the proposed revisions will not reduce effectiveness because it assumes, without support, that "operators will continue to substitute new components" that have improved shearing capabilities for old ones.¹⁶¹ Even if the new components accomplish the shearing objectives in the existing 2016 WCR, BSEE cannot simply rely on industry's voluntary upgrades as a suitable replacement for regulatory requirements that components meet certain standards, particularly when operators are discouraged from upgrading by the components' extremely high cost. BSEE provides no evidence that voluntary upgrades will be equally effective as requiring that BOPs actually have the necessary shearing capability. BSEE rejected such an approach in the original WCR:

BSEE understands that some rams may be capable of shearing on the rams' cutting edges, without centralizing the pipe. However, it is safer to have the pipe centered while shearing in order to optimize shearing capabilities and reduce risk by ensuring that the pipe to be sheared is across the shearing surfaces. It is not BSEE's intention to inhibit applicable technological advancements, however; in fact, BSEE believes this performance based requirement will encourage development and use of technology to center the pipe while shearing.¹⁶²

Likewise, retaining requirements for centering and mitigating compression does not preclude operators from substituting new, improved shear blades for old ones. The mere fact that newer technology exists and may be used provides no basis for eliminating the existing requirements in § 250.734(a)(16).

Without significantly more evidence, BSEE cannot justify that changing the BOP system requirements will not affect safety or that proposed revisions to these requirements would be equally effective as those required under the original 2016 WCR. For the above reasons, we oppose any changes or rescissions of any BOP system provisions in § 250.734.

¹⁶⁰ See 83 Fed. Reg. at 21,523. The final 2016 WCR similarly explains: "Subsea accumulator charge normally comes from the surface, but in an emergency the connections to the surface may be lost and/or the accumulator may have already operated multiple BOP components, which may have reduced the accumulator fluid pressure needed to successfully shear and seal." 81 Fed. Reg. at 25,896.

¹⁶¹ 83 Fed. Reg. at 21,523.

¹⁶² 81 Fed. Reg. at 25,962.

VII. Removing Real-Time Monitoring Requirements Significantly Compromises Safety.

We strongly oppose BSEE’s proposals to replace so-called “prescriptive” RTM requirements in § 250.724 with a supposedly “performance-based” approach.¹⁶³ The existing requirements in § 250.724—which are not so much “prescriptive” as merely minimum standards for operators’ performance-based systems¹⁶⁴—are an essential part of effective well control and blowout prevention. The reason these requirements are so important is that they ensure that onshore and offshore technical personnel are in agreement before proceeding with a difficult drilling decision; i.e., in situations where there may be several perspectives on whether proceeding would be sufficiently safe. As BSEE previously explained, this onshore/offshore teamwork approach makes certain that all important technical issues are taken into account, not just those that are readily apparent to offshore technical staff who may be operating in a high-pressure, fast-moving, decisionmaking environment.¹⁶⁵ Substantial evidence, studies, and expert reviews support the need for minimum RTM requirements. BSEE’s proposed approach would leave too much discretion to operators to adopt a “real-time monitoring system” that is not capable of, or not effective at, ensuring that such critical, expeditious communication and information sharing actually occurs and is sufficiently utilized.

That is precisely what happened during the BP *Deepwater Horizon* tragedy. According to the Chief Counsel’s report for the National Commission on the BP *Deepwater Horizon* Oil Spill and Offshore Drilling:

[BP] clearly recognized the value of having a second set of eyes onshore—with engineering skills—monitoring well data and supporting rig personnel. Yet, the Macondo team did not use the real-time monitoring equipment it already had in place, relying instead on its well site leaders to alert onshore team members when and if there were issues.

BP explained the disconnect by noting that it is difficult for onshore monitoring personnel to understand the significance of data without knowing what is happening on the rig. But these challenges can be overcome. Redundant shoreside monitoring would clearly have helped in several instances at Macondo—for instance, during the negative pressure test.¹⁶⁶

Several expert reports on the *Deepwater Horizon* disaster recommended new RTM requirements; not only that data be transmitted shoreside in real-time, but that qualified personnel on shore be required to review the data as they come in and have the ability to

¹⁶³ See 83 Fed. Reg. at 22,137.

¹⁶⁴ A 2018 National Academy of Sciences report entitled “Designing Safety Regulations for High-Hazard Industries” stated that “commonly held views of the advantages and disadvantages of [regulatory] design types—whether characterized as “prescriptive,” “performance-based,” or something else—can be overly generalized and potentially misleading as a guide for making regulatory choices suited to particular problems and conditions.” Available at, <https://www.nap.edu/catalog/24907/designing-safety-regulations-for-high-hazard-industries>, at p. 19.

¹⁶⁵ See, e.g., 81 Fed. Reg. at 25,896.

¹⁶⁶ Chief Counsel’s Report, at 242; see also National Academy of Engineering Report, at 39 (“Although data were being transmitted to shore, it appears that no one in authority (from BP onshore management or a regulatory agency) was required to examine test results and other critical data and render an opinion to the personnel on the rig before operations could continue.”).

immediately communicate with and advise rig personnel on abnormalities and unusual conditions before they become critical issues.¹⁶⁷ Several companies, including BP, already were using shoreside monitoring centers, but the National Academy of Engineering found, “The sophistication of these centers varies, and how the data are used differs from company to company.”¹⁶⁸ The National Academy also noted that “many offshore operations do not have real-time monitoring centers.”¹⁶⁹ Accordingly, it was necessary to both require RTM centers and to set minimum standards for how those centers operate and how data are used; minimum standards such as ensuring that shoreside personnel are qualified to detect when the data indicate problems and communicate those issues to rig personnel, unlike the system BP had in place during the *Deepwater Horizon* disaster. And, more recently, a National Academies of Science report found that RTM has several benefits for industry that “include increased efficiency, decreased downtime and operational disruptions, reduced equipment damage, improved safety, and overall reduction in risk.”¹⁷⁰

BSEE proposed the RTM requirements in the 2016 WCR in response to the recommendations from the *Deepwater Horizon* reports, noting that the requirements would “increase the level of oversight throughout operations” and enable “[o]nshore personnel [to] review data and help rig personnel conduct operations in a safe manner.”¹⁷¹ The final rule eliminated provisions commenters perceived were overly prescriptive, describing the remaining requirements as “performance-based.”¹⁷² BSEE explained that based on the evidence before it, the remaining provisions would “improve safety and environmental protection significantly and that such improvements will be seen over time.”¹⁷³

BSEE has provided no evidence or explanation as to why it was wrong to previously conclude that the so-called “prescriptive” standards in subsections (b) and (c) significantly improve safety. Nor has BSEE provided any evidence that RTM will be as effective at improving safety without those provisions. BSEE simply asserts, without support, that the benefits will be the same.¹⁷⁴ For the deletion of the important “prescriptive” requirements to be rational, BSEE must provide actual analysis to support that conclusion, including defining what “benefits” it is using to compare the two versions, the degree to which each version achieves each benefit, and whether there are any benefits to the existing version that would be lost by deleting “prescriptive” requirements. In addition, as Professor Bea explains, BSEE must evaluate whether the proposed revisions increase the likelihood of human error occurring or being unchecked and leading to a loss of well control.¹⁷⁵

BSEE’s proposed “performance-based” requirements are greatly inadequate because a plan to only make RTM data available to BSEE upon request will not serve the purpose of this

¹⁶⁷ See 80 Fed. Reg. at 21,520.

¹⁶⁸ National Academy of Engineering, at 103.

¹⁶⁹ *Id.*

¹⁷⁰ Nat’l Academies of Science, *Application of Remote Real-Time Monitoring to Offshore Oil and Gas Operations* 1 (2016) (hereinafter “National Academies RTM Report”).

¹⁷¹ 80 Fed. Reg. at 21,520.

¹⁷² 81 Fed. Reg. at 25,897.

¹⁷³ *Id.* at 25,939.

¹⁷⁴ 83 Fed. Reg. at 22,137.

¹⁷⁵ Bea Comment, at 8–15.

section. Such data would be available only after the fact. The reason existing § 250.724(b) includes onshore RTM, preservation of RTM data, access by BSEE to those data, and development of a RTM plan is that *all* of these measures are necessary to prevent serious safety incidents. Indeed, the recent National Academies of Science report explained that for RTM to be effective at early kick detection, it must implement many of the requirements listed in § 250.724(b), such as immediate transmission of data to onshore personnel and the ability of onshore personnel to communicate with offshore personnel.¹⁷⁶ And, as noted above, loss of well control incidents have been declining in recent years to zero in fiscal year 2017, likely at least in part due to improved RTM requirements and activities.

Without significantly more evidence, BSEE cannot justify that changing the RTM requirements will not affect safety. Eliminating the essential prescriptive, RTM requirements would be a significant backward step for safety, and thus the existing language in this section should be maintained. For the above reasons, we oppose any changes or rescissions of any drilling margin provisions in § 250.414.

VIII. Other Revisions Compromise Safety.

We also oppose BSEE's proposed revisions to § 250.423 and to the BOP system testing frequency because they would compromise safety. BSEE proposes to remove the term "and cementing" after "upon successfully installing" in § 250.423(a) and (b) to improve "flexibility."¹⁷⁷ But BSEE already determined in the 2016 WCR that it is necessary to wait until after cementing to engage the lockdown mechanism.¹⁷⁸ BSEE explained why that is so:

If the operator determines under § 250.428(c) that the cement job is adequate (i.e., successful), then the latching/locking mechanisms should be engaged. If there are indications of an inadequate cement job, actions should be taken in accordance with § 250.428 to ensure proper cementation *before* the latching or locking mechanisms are engaged.¹⁷⁹

BSEE does not explain why its prior rationale was inaccurate or does not apply. Accordingly, BSEE should retain the requirement that the latching/locking mechanism not be engaged until after cementing.

As in the 2016 WCR, BSEE is soliciting comments on whether to change the BOP system testing frequency, but has not specifically proposed a change. As explained in section I above, BSEE cannot adopt a new testing frequency in the final rule that it did not propose in the proposed rule. In addition, BSEE has already determined in the 2016 WCR that "14-day pressure testing for drilling and completion BOPs . . . is effective for its purpose and that . . . it is appropriate to retain that interval for such BOPs and to apply the same requirement to workover

¹⁷⁶ National Academies RTM Report, at 53–54.

¹⁷⁷ 83 Fed. Reg. at 22,134.

¹⁷⁸ 81 Fed. Reg. at 25,920.

¹⁷⁹ *Id.*

and decommissioning BOPs.”¹⁸⁰ BSEE may not reasonably extend that interval “in the absence of new data demonstrating that 21-day testing would be as protective as 14-day testing.”¹⁸¹

IX. Eliminating Required BSEE Approval for Deviations Compromises Safety.

BSEE has proposed or is considering rescinding several provisions that require operators to seek agency approval before deviating from minimum safety standards.¹⁸² We strongly oppose such efforts to weaken agency oversight. Requiring agency approval when industry seeks to deviate from a regulatory standard is an important part of government oversight of industry practices, and in this case, has particular safety benefits for workers and the environment.

In the aftermath of the *Deepwater Horizon* disaster, the Report to the President concluded: “The record shows that without effective government oversight, the offshore oil and gas industry will not adequately reduce the risk of accidents, nor prepare effectively to respond in emergencies.”¹⁸³ Moreover, the Commission found that the lack of agency review of the modifications of the drilling permits associated with the Macondo well contributed to the disaster.¹⁸⁴ BSEE sought to remedy the agency review problems in several contexts in the 2016 WCR by requiring BSEE approvals for certain modifications.¹⁸⁵ BSEE explained that such approval processes would facilitate information-sharing that would result in substantially improved safety.¹⁸⁶

Requiring operators to ask permission to depart from a regulatory standard demands that the operator more thoroughly analyze the necessity and appropriateness of the deviation before going to the agency. The result is a final decision that is based on careful thought and documentation; it provides the operator an incentive to double-check for errors before proceeding. An operator is only going to ask for a variance from a regulation if the operator believes it has a strong justification for the deviation being requested. Requiring permission forces industry to self-audit its modification practices. As the Report to the President makes clear: “Government oversight must be accompanied by the oil and gas industry’s internal reinvention: sweeping reforms that accomplish no less than a fundamental transformation of its safety culture.”¹⁸⁷ The 2016 WCR implemented just such an oversight measure that also took into account that variability exists in the OCS and some deviation from a standard could be warranted.¹⁸⁸

Not only is requiring the operator to apply for a variance from a regulation beneficial for the safety of a specific drilling operation, but it also gives the agency a better understanding of current industry practices and the effectiveness of agency rules and regulations in practice by requiring documentation for modification requests. Having this information on hand could make

¹⁸⁰ 81 Fed. Reg. at 25,899.

¹⁸¹ *Id.*

¹⁸² *See e.g.* 83 Fed. Reg. at 22,132-22,133.

¹⁸³ National Commission Report, at 217.

¹⁸⁴ *Id.* at 83.

¹⁸⁵ *See e.g.* 81 Fed. Reg. at 25,895.

¹⁸⁶ *See e.g.* 81 Fed. Reg. at 25,916.

¹⁸⁷ National Commission Report, at 217.

¹⁸⁸ *See* 81 Fed. Reg. at 25,895.

future regulations more targeted, strengthen weak points in the regulatory scheme, and generally provide a more comprehensive picture of oil and gas drilling operations on the OCS, which is what the Department of the Interior lacked in the lead-up to the *Deepwater Horizon* catastrophe.¹⁸⁹ The National Commission’s Chief Counsel Report specifically highlighted how prescriptive and performance-based regulations applied uniformly to all offshore wells without agency oversight significantly undermined safety and increased environmental risk, with catastrophic results.¹⁹⁰

If BSEE is to remove requirements for agency approval of variances from regulatory standards, it must provide evidence that removing the requirements would not affect safety or result in riskier drilling practices. BSEE may not simply cite the number of approvals it has granted in the past. Just because the agency has approved most or all variances in the past does not mean all future deviations from the standards will be justified. As a corollary to the concepts described above, eliminating the agency approval requirement likely will lead to more careless deviations from standards in the future.

In its comprehensive investigation, the President’s Commission found that safety is compromised when changing technology and changing industry structure outpace regulations.¹⁹¹ The inability of the agency responsible for overseeing oil and gas operations on the OCS to maintain up-to-date technical drilling safety requirements and the industry’s rapidly evolving deepwater technology seriously compromised the ability of the Minerals Management Service to do its job.¹⁹² What the *Deepwater Horizon* disaster illustrates, and the investigations into the circumstances that led to such a catastrophe make clear, is that past practice on the OCS does not prove future actions or abilities. Neither BSEE nor industry can assume drilling practices will remain static, which, in the case of *Deepwater Horizon*, was a fatal mistake that BSEE must never repeat.

X. The Proposed Rule is Unconstitutional.

In the Proposed Rule, BSEE states the proposed rollbacks are an “Executive Order 13771 deregulatory action.”¹⁹³ However, Executive Order 13771 itself is unconstitutional. The E.O. violates the constitutional separation of powers by directing agencies to consider factors that go beyond and conflict with the statutory factors Congress has directed the agencies to consider in implementing federal statutes. The Constitution gives Congress the power to enact laws. While the President may sign or veto legislation, it is black letter constitutional law that the President may not unilaterally amend statutes. BSEE may only exercise the authority delegated to it by Congress and must adhere strictly to the limits of that authority. Nowhere has Congress

¹⁸⁹ See e.g. National Commission Report, at 78, “Mismanagement and Misdirection,” (“[B]y acting in parallel fashion, with little coordination in decisionmaking and resource allocation, program implementation, regulatory interpretation, and enforcement policies” the agency’s management of oil and gas industry was inconsistent.).

¹⁹⁰ Chief Counsel’s Report, at 251, 253. The Chief Counsel Report explains, for example, that Minerals Management Service (“MMS”) “personnel did not review the data in [submitted] charts, let alone verify . . . whether the predictions aligned with offset data from other wells in the area. . . . (Indeed, MMS personnel rarely questioned any statements or predictions contained in permit applications.)” *Id.* at 253.

¹⁹¹ National Commission Report, at 73.

¹⁹² *Id.* See also Chief Counsel’s Report, at 251, 253.

¹⁹³ 83 Fed. Reg. at 22,144.

authorized BSEE to adopt or eliminate regulations solely for the purpose of reducing costs to regulated industries. Instead, BSEE must enact (and maintain) any and all regulations necessary and appropriate to carry out its duties under the Outer Continental Shelf Lands Act (“OCSLA”), the ESA, and other applicable laws.

The laws that BSEE is charged with implementing have strong conservation mandates. OCSLA requires that operations in the Outer Continental Shelf “be conducted in a safe manner . . . using technology, precautions, and techniques sufficient to prevent or minimize the likelihood of blowouts, loss of well control, fires, spillages, . . . or other occurrences which may cause damage to the environment or to property, or endanger life or health.”¹⁹⁴ As described above, OCSLA also specifically requires BSEE to implement the best available science and technology in regulating oil and gas production in order to ensure protection to the environment and to human health. The ESA requires BSEE not only ensure that the actions it authorizes, funds, or carries out do not jeopardize the continued existence of federally endangered or threatened species or adversely affect their critical habitat, but to affirmatively use its authority to protect and promote the recovery of listed species.¹⁹⁵ The Supreme Court has made clear that agencies may not sacrifice the protection of listed species for the sake of saving costs to industry.¹⁹⁶ The President may not override these statutory duties by executive order; nor may BSEE avoid them by relying on that executive order.

In the Proposed Rule, BSEE focused almost exclusively on the costs to industry, while ignoring the very environmental and safety benefits that OCSLA and other statutes direct the agency to consider.¹⁹⁷ In doing so, BSEE summarily concluded that the proposed rollbacks would ensure continued safety and environmental protection, without providing any evidence or analysis to support its statements, and simply assumed that the benefits of maintaining the existing regulations would total \$0. This approach stands in stark contrast to its analysis of benefits in the 2016 WCR. In 2016, BSEE meticulously quantified and monetized the potential benefits of the 2016 WCR, including the value gained from time savings, reductions in oil spills (*e.g.*, related to natural resource damages, the value of lost hydrocarbons, spill containment and cleanup, lost recreational opportunities, and impacts to commercial fishing), and reductions in fatalities.¹⁹⁸ To adequately compare costs and benefits and, thus, determine the cost-effectiveness of the 2016 WCR, BSEE calculated the benefits under different risk-reduction scenarios that varied the probabilities of potential oil spills and the number of preventable deaths.¹⁹⁹ BSEE has conducted no such analysis of the Proposed Rule and, thus, has violated its statutory obligations, among other things, to ensure that operations in the OCS are “conducted in a safe manner.”²⁰⁰

¹⁹⁴ 16 U.S.C. § 1851(a)(1).

¹⁹⁵ *Id.* § 1536(a)(1) & (2).

¹⁹⁶ *Tennessee Valley Auth. v. Hill*, 437 U.S. 153, 174, 184 (1978) (finding that agencies are bound “to halt and reverse the trend toward species extinction, whatever the cost,” and to afford that task “the highest of priorities.”); *see also Babbitt v. Sweet Home Chapter of Communities for a Great Oregon*, 515 U.S. 687, 698–99 (1995) (quoting *TVA* with approval).

¹⁹⁷ BSEE, Initial Regulatory Impact Analysis for the Proposed Rule, RIN: 1014-AA39 (March 2018), at 39-47.

¹⁹⁸ BSEE, Regulatory Impact Analysis for the 2016 WCR, RIN: 1014-AA11 (April 11, 2016), at 53-76.

¹⁹⁹ *Id.*

²⁰⁰ 16 U.S.C. § 1851(a)(1).

E.O. 13771 is also unconstitutional because it directs agencies to violate and exceed their legal authority in violation of the President’s obligations under the Take Care Clause, which requires the President to faithfully ensure compliance with the law. The unconstitutionality of the E.O. is fully described in the plaintiffs’ motion for summary judgment in *Public Citizen v. Trump*, No. 17-253 (D.D.C. filed May 15, 2018) (ECF 16) (submitted with these comments).

Because both E.O. 13771 itself and any reliance upon it are unconstitutional and otherwise unlawful, BSEE cannot eliminate or rollback any of the 2016 WCR regulations in reliance on the E.O.

XI. The Proposed Rule Fails to Comply with the National Environmental Policy Act.

The National Environmental Policy Act (“NEPA”) requires all federal agencies to analyze the environmental impacts of proposed major actions to “ ‘prevent or eliminate damage to the environment and biosphere’ by focusing Government and public attention on the environmental effects of proposed agency action.”²⁰¹ NEPA is designed to ensure “that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast.”²⁰² NEPA analyses must be conducted at “the earliest possible time to insure that planning and decisions reflect environmental values.”²⁰³

Central to NEPA is the requirement that, before taking any federal action that “*may* significantly degrade some human environmental factor,” an agency must prepare an environmental impact statement (“EIS”).²⁰⁴ Under certain circumstances, the agency can prepare an environmental assessment (“EA”) that provides “sufficient evidence and analysis for determining whether to prepare” an EIS and that contributes to the agency’s compliance with NEPA.²⁰⁵ When a “substantial question” is raised about whether a project may have a “significant” environmental impact, an EIS must be prepared.²⁰⁶ The standard triggering an EIS is “low.”²⁰⁷

In both an EA and EIS, agencies must take a “hard look” at environmental consequences that “does not improperly minimize negative side effects.”²⁰⁸ “[A]ll foreseeable direct and indirect impacts” as well as cumulative impacts of a proposed action must be analyzed.²⁰⁹ All “high-quality” information and “[a]ccurate scientific analysis” must be used, including accurate scientific interpretations of data and studies.²¹⁰ Agencies must identify their methodologies, indicate when information is incomplete or unavailable, acknowledge scientific disagreement and data gaps, and evaluate indeterminate adverse impacts based on approaches or methods

²⁰¹ *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 371 (1989) (quoting 42 U.S.C. § 4321).

²⁰² *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).

²⁰³ 40 C.F.R. § 1501.2.

²⁰⁴ *Steamboaters v. F.E.R.C.*, 759 F.2d 1382, 1392 (9th Cir. 1985) (emphasis in original).

²⁰⁵ 40 C.F.R. §§ 1508.9, 1501.4.

²⁰⁶ *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1332 (9th Cir. 1992).

²⁰⁷ *Klamath-Siskiyou Wildlands Ctr. v. Boody*, 468 F.3d 549, 562 (9th Cir. 2006).

²⁰⁸ *N. Alaska Envtl. Ctr. v. Kempthorne*, 457 F.3d 969, 975 (9th Cir. 2006).

²⁰⁹ *Idaho Sporting Congress, Inc. v. Rittenhouse*, 305 F.3d 957, 973 (9th Cir. 2002), *overruled on other grounds*, *The Lands Council v. McNair*, 537 F.3d 981 (9th Cir. 2008) (en banc).

²¹⁰ *See* 40 C.F.R. § 1500.1(b).

“generally accepted in the scientific community.”²¹¹ “Speculation is . . . implicit in NEPA,” thus agencies may not “shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as ‘crystal ball inquiry.’”²¹²

When evaluating whether environmental impacts “may” be significant, an agency must consider all relevant circumstances, including “society as a whole (human, national), the affected region, the affected interests, and the locality.”²¹³ An agency also must consider the intensity of the impact, including the degree to which the proposed revisions “may adversely affect an endangered or threatened species or its [critical] habitat,” the degree to which the “possible effects” on the environment are “highly uncertain or involve unique or unknown risks,” and the “[u]nique characteristics of the geographic area.”²¹⁴ “Preparation of an EIS is mandated where uncertainty may be resolved by further collection of data, or where the collection of such data may prevent speculation on potential . . . effects.”²¹⁵ “‘[R]easonably foreseeable significant adverse effects’ includes impacts which have catastrophic consequences, even if their probability of occurrence is low.”²¹⁶ Thus, the Council on Environmental Quality (CEQ)²¹⁷ has directed that agencies must “[e]nsure that NEPA documents . . . include an analysis of reasonably foreseeable impacts associated with low probability catastrophic spills for oil and gas activities on the Outer Continental Shelf.”²¹⁸

A. The Draft EA fails to take a “hard look” at the impacts of the Proposed Rule.

1. The Draft EA fails to disclose and analyze impacts to water resources.

In evaluating the impacts of the Proposed Rule, BSEE completed a draft EA. The Draft EA concludes that “proper adherence to the requirements outlined in the Proposed Rule would result in a likely reduction of routine discharges compared to [the 2016 WCR]” and that less frequent testing likely would reduce wear on “critical BOP and wellhead components” and, thus, reduce the risk of oil spills.²¹⁹ Nothing in the Draft EA, however, offers any quantitative, or even qualitative, analysis to support BSEE’s statement that the Proposed Rule would have any meaningful impact on equipment durability or that such purported durability gains could reduce

²¹¹ *Id.* §§ 1502.22(b)(2), (4), 1502.24.

²¹² *Selkirk Conservation All.*, 336 F.3d at 962 (quoting *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d 1062, 1072 (9th Cir. 2002)).

²¹³ 40 C.F.R. § 1508.27(a).

²¹⁴ *Id.* § 1508.27(b).

²¹⁵ *Native Ecosystems Council v. U.S. Forest Serv.*, 428 F.3d 1233, 1240 (9th Cir. 2005) (alteration in original) (quoting *Nat’l Parks & Conservation Ass’n v. Babbitt*, 241 F.3d 722, 731–32 (9th Cir. 2001)).

²¹⁶ 40 C.F.R. § 1502.22(b)(4).

²¹⁷ CEQ promulgates binding regulations to help federal agencies implement NEPA; CEQ regulations are entitled to “substantial deference.” *Marsh v. Oregon Nat. Res. Council*, 490 U.S. 360, 372 (1989).

²¹⁸ CEQ, REPORT REGARDING THE MINERALS MANAGEMENT SERVICE’S NATIONAL ENVIRONMENTAL POLICY ACT POLICIES, PRACTICES, AND PROCEDURES AS THEY RELATE TO OUTER CONTINENTAL SHELF OIL AND GAS EXPLORATION AND DEVELOPMENT 26 (Aug. 16, 2010), available at <https://www.doi.gov/sites/doi.gov/files/migrated/news/pressreleases/upload/CEQ-Report-Reviewing-MMS-OCS-NEPA-Implementation.pdf>.

²¹⁹ BSEE, Draft Environmental Assessment on Oil and Gas and Sulfur Operations in the Outer Continental Shelf—Blowout Preventer Systems and Well Control Revisions—1014-AA39, at 25 (December 6, 2017) (hereinafter “Draft EA”).

oil spill risks versus the 2016 WCR.²²⁰ The Draft EA also does not identify which requirements in the Proposed Rule would result in water quality improvements, nor does the Draft EA analyze why those requirements would benefit water quality.

While an EA is “not intended to be a lengthy document, it must at a minimum address the considerations relevant to determining whether an EIS is required.”²²¹ “General statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided.”²²² The scant analysis in the Draft EA does not analyze the significance of eliminating safeguards designed to prevent oil spills, as required under NEPA, nor does the Draft EA attempt to justify the absence of that analysis. Moreover, it is entirely foreseeable that eliminating safeguards specifically designed to prevent offshore oil spills in remote OCS waters may lead to severe environmental impacts, as BSEE itself has acknowledged.

For example, BSEE’s conclusion that the Proposed Rule likely would yield water quality benefits conflicts with BSEE’s analysis in the EA for the 2016 WCR. In 2016, BSEE concluded that the additional safety and environmental benefits of the 2016 WCR, including its more frequent testing requirements, would more than offset risks arising from any potential marginal decrease in equipment durability.²²³ The Draft EA does not cite any evidence, or provide any explanation, justifying the opposite conclusion.

BSEE’s conclusion that the Proposed Rule would benefit water quality also conflicts with the analysis of two alternatives in the Draft EA: the 2016 WCR (“no action” alternative) and Alternative 2, an alternative that retains more rigorous testing requirements than the Proposed Rule. In evaluating these alternatives, the Draft EA states that “retaining the additional testing requirements and greater accumulator capacity required by existing regulations could reduce the likelihood of a loss of well control and discharge of hydrocarbons.”²²⁴ Reduced testing, the Draft EA explains, might “fail to identify a BOP that is not equipped to operate properly when actually needed,” which could result in a potentially “catastrophic discharge of hydrocarbons (and associated environmental impacts).”²²⁵ Though the Draft EA recognizes that increased testing could implicate equipment durability, it concludes, on balance that “Alternative 2 is expected to have minor beneficial impacts on the environment” versus the Proposed Rule.²²⁶ The Draft EA, therefore, recognizes that more protective regulations, including those requiring more frequent testing like the 2016 WCR, likely will result in greater environmental benefits than less

²²⁰ The proposed 2016 WCR requested comments that could provide a basis for reducing the testing frequency to twenty-one days, but “no new studies or technical data were submitted.” See BSEE, Oil and Gas and Sulphur Operations in the Outer Continental Shelf—Blowout Preventer Systems and Well Control, Final Environmental Assessment at 16 (Apr. 2016) (hereinafter “2016 WCR EA”). Nothing in the Draft EA suggests that BSEE now has obtained such data or analysis.

²²¹ *Grand Canyon Tr. v. F.A.A.*, 290 F.3d 339, 345 (D.C. Cir. 2002) (citation omitted) (citing 40 C.F.R. § 1508.9(a)(1)).

²²² *Klamath-Siskiyou Wilderness Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 994 (9th Cir. 2004) (quoting *Neighbors of Cuddy Mountain v. U.S. Forest Serv.*, 137 F.3d 1372, 1380 (9th Cir. 1998)).

²²³ 2016 WCR EA at 15–16.

²²⁴ Draft EA at 24.

²²⁵ Draft EA at 24.

²²⁶ Draft EA at 24.

protective regulations such as the Proposed Rule. When evaluating the Proposed Rule, however, the Draft EA concludes the opposite.

The Draft EA also impermissibly disregards²²⁷ recent peer-reviewed scientific analyses and analyses conducted by federal agencies indicating that oil spill impacts to water resources may be even more severe than previously thought. For example, a June 2018 study finds that oil spill impacts on water quality can be very persistent. The 5 million barrels of oil spilled during *Deepwater Horizon*, along with the approximately 47 thousand barrels of chemical dispersants that were applied, remained in the marine environment for many months.²²⁸ Further, eight years after the oil spill, 11 to 30 percent of the spilled oil—approximately 550,000 to 1.5 million barrels—remains unaccounted for and may have been deposited on the seafloor, coastal beaches, and marshes,²²⁹ thereby continuing to threaten water resources.

Oil-contaminated sediment can travel long distances, transported by both the blowout itself and ocean currents.²³⁰ These contaminated sediments can enter the water column and cause large patches of sheen and oil on the surface.²³¹ Post-spill mitigation, such as burning, exacerbates these problems by introducing hydrocarbon byproducts into the marine environment; surface currents then may transport these hydrocarbon byproducts long distances.²³² Large quantities of spilled oil may alter the chemistry of the ocean “with unforeseeable results.”²³³ Volatile organic compounds (VOCs), such as benzene, toluene, ethylbenzene, and xylenes, dissolve readily in water and “can have acutely toxic effects.”²³⁴ Mid-weight organic compounds, such as polycyclic aromatic hydrocarbons, “tend to pose the greatest risk in the environment” because they persist for longer periods of time.²³⁵ These toxic compounds readily attach to particles that have settled or are suspended in the water column and can be ingested by fish.²³⁶ People who consume large quantities of fish contaminated with polycyclic aromatic hydrocarbons can suffer various health problems, including growth reduction, endocrine alteration, cancer, and birth defects.²³⁷ These toxins are introduced into the marine environment through several pathways, including oil spills and incomplete combustion of fossil fuels.²³⁸

²²⁷ See 40 C.F.R. § 1500.1(b) (“Accurate scientific analys[e]s . . . are essential to implementing NEPA.”); *Custer Cty. Action Ass’n v. Garvey*, 256 F.3d 1024, 1034 (10th Cir. 2001) (agencies must take a “hard look at the environmental consequences of proposed actions utilizing public comment and the best available scientific information”).

²²⁸ Leila J. Hamdan et al., *The Impact of the Deepwater Horizon Blowout on Historic Shipwreck-associated Sediment Microbiomes in the Northern Gulf of Mexico*, SCI. REPORTS, June 2018, at 1, available at <https://www.nature.com/articles/s41598-018-27350-z>.

²²⁹ *Id.*

²³⁰ BOEM, CATASTROPHIC SPILL EVENT ANALYSIS: HIGH-VOLUME, EXTENDED-DURATION OIL SPILL RESULTING FROM LOSS OF WELL CONTROL ON THE GULF OF MEXICO OUTER CONTINENTAL SHELF 29 (2017), available at <https://www.boem.gov/Catastrophic-Spill-Event-Analysis> (hereinafter “BOEM, Catastrophic Spill Event Analysis”).

²³¹ *Id.*

²³² *Id.*

²³³ *Id.* at 30.

²³⁴ *Id.*

²³⁵ *Id.*

²³⁶ E.O. Nwaichi & S.A. Ntorgbo, *Assessment of PAHs Levels in Some Fish and Seafood from Different Coastal Waters in the Niger Delta*, 3 TOXICOLOGY REP. 167, 168 (2016), available at <https://www.sciencedirect.com/science/article/pii/S2214750016300051>.

²³⁷ Nwaichi & Ntorgbo, at 171.

²³⁸ *Id.*

Failing to adequately prevent oil spills, thus, would exacerbate an existing environmental and public health problem. A massive blowout also could release methane into the water column, potentially causing harm to fish.²³⁹

Nearshore and onshore water quality, including water in bays, estuaries, nearshore, and coastal areas, also degrades as a result of oil spills in the OCS.²⁴⁰ The impacts of a catastrophic spill on these waters could be significant,²⁴¹ with contamination arising from a host of sources, including oil, gas, and their respective components and from cleanup and mitigation efforts.²⁴²

Recent studies also indicate that the current methods for cleaning up oil spills are far less effective than previously thought. For example, an April 2018 study finds that chemical dispersants rapidly become less effective at breaking down oil, including under common environmental conditions.²⁴³ Exposure to sunlight can decrease the effectiveness of dispersants by 30 percent.²⁴⁴ Dispersants also can become far less effective under ideal conditions (*i.e.*, cloudy weather and high-wind) or when applied to photochemically weathered oil, including under average wind and sunlight conditions.²⁴⁵ Such losses in effectiveness can drop below the U.S. Environmental Protection Agency’s (“EPA”) minimum “effectiveness threshold” of 45 percent.²⁴⁶ Photochemical changes to oil, *i.e.*, oxidation from sunlight, can occur quickly, including over hours to days.²⁴⁷ Thus, “responders may have much shorter windows of opportunity than previously thought—especially in sunny weather—to apply dispersants effectively.”²⁴⁸

Even when effective, the use of chemical dispersants can harm water resources and the species that depend on them. In 2017, the Bureau of Ocean Energy Management (“BOEM”) found that applying chemical dispersants on spilled oil can have significant adverse impacts on the food web.²⁴⁹ After chemical dispersants break down oil, the dispersed oil can become highly

²³⁹ *Id.* at 31.

²⁴⁰ BOEM, Catastrophic Spill Event Analysis, at 32.

²⁴¹ *Id.*

²⁴² *Id.*

²⁴³ Collin P. Ward et al., *Photochemical Oxidation of Oil Reduced the Effectiveness of Aerial Dispersants Applied in Response to the Deepwater Horizon Spill*, 5 ENVTL. SCI. & TECH. LETTERS 226, 226, 228 (2018).

²⁴⁴ Ward et al., at 226, 228.

²⁴⁵ *Id.* at 229; Press Release, Nat’l Sci. Found., Sunlight Reduces Effectiveness of Dispersants Used to Clean Up Oil Spills (Apr. 25, 2018), available at https://www.nsf.gov/news/news_summ.jsp?cntn_id=245099 (citing Ward et al.) (“Dozens of aerial dispersant applications still would not have achieved EPA-designated effectiveness levels even under the best-case scenarios for aerial dispersant spraying: cloudy weather (which would limit photochemical weathering) and high-wind conditions (which would transport oil farther from the spill area before sunlight transformed it).”).

²⁴⁶ Ward et al., at 229.

²⁴⁷ *Id.* at 228–29.

²⁴⁸ Lonny Lippsett, *A Long Trail of Clues Leads to a Surprise About Oil Spills*, OCEANUS (Apr. 25, 2018), available at <https://www.whoi.edu/oceanus/feature/a-long-trail-of-clues-leads-to-a-surprise-about-oil-spills> (citing Ward et al.).

²⁴⁹ BOEM, Catastrophic Spill Event Analysis, at 33.

toxic to microorganisms²⁵⁰ and may disrupt coastal microbial food webs.²⁵¹ Such disruptions could impair the production of zooplankton and fish.²⁵² By failing to provide a reasoned explanation of how the Proposed Rule may affect water resources and by entirely ignoring the recent scientific analysis, the Draft EA does not comply with the “hard look” requirement of NEPA.

2. The Draft EA fails to disclose and analyze impacts on wildlife and on offshore, nearshore, and coastal habitats.

In evaluating the impacts of the Proposed Rule on wildlife and offshore, nearshore, and coastal habitats, the Draft EA simply reiterates its unsupported conclusion that the Proposed Rule would decrease such impacts through “proper adherence to the requirements outlined in the Proposed Rule” and by reducing wear on equipment, rig downtime, and the risk of a loss of well control.²⁵³ The Draft EA does not explain, much less analyze, the basis for this conclusion, which, as above, conflicts with BSEE’s evaluation of the 2016 WCR.²⁵⁴ Nothing in the Draft EA, for example, provides any indication of which requirements in the Proposed Rule would decrease impacts to species and habitat or any analysis of how compliance with such requirements would provide the purported benefits. A “convincing statement of reasons . . . is crucial to determining whether the agency took a ‘hard look’ at the potential environmental impact of a project.”²⁵⁵ The Draft EA, however, offers no such rationale.

Moreover, the Draft EA asserts, without any accompanying analysis, that harm to wildlife and habitat would be only “temporar[y].”²⁵⁶ Recent peer-reviewed studies and federal agency analyses, however, indicate that adequate oil spill prevention is crucial given the long-term and significant threats to species and habitat. BSEE must evaluate the Proposed Rule in light of such analyses, including by carefully scrutinizing, based on accurate scientific research, how the proposed revisions to the WCR 2016 might impact these resources.²⁵⁷

a. Habitat

Among other adverse impacts, oil spills can degrade and destroy habitat, decrease food abundance, and cause physical disturbance.²⁵⁸ Oil spills in the OCS threaten numerous types of habitat, including habitat in the immediate vicinity of the spill, deep sea areas, and coastal and

²⁵⁰ *Id.*

²⁵¹ *Id.* (citing Alice C. Ortmann *et al.*, *Dispersed Oil Disrupts Microbial Pathways in Pelagic Food Webs*, PLOS, July 2012, at 1, available at <http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0042548&type=printable>).

²⁵² Ortmann *et al.*

²⁵³ Draft EA at 25.

²⁵⁴ As explained above, BSEE previously concluded that the environmental benefits of the 2016 WCR would be more beneficial to the environment than alternatives that imposed less rigorous requirements. As explained above, BSEE has concluded that more protective regulations, including the 2016 WCR, likely would result in greater environmental benefits than less protective regulations. *See supra* text accompanying notes 227-30.

²⁵⁵ *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1212 (9th Cir. 1998) (*Save the Yaak Comm. v. Block*, 840 F.2d 714, 717 (9th Cir. 1988)).

²⁵⁶ Draft EA at 26.

²⁵⁷ *See* 40 C.F.R. § 1500.1(b); *Custer Cty. Action Ass’n*, 256 F.3d at 1034.

²⁵⁸ NOAA, Final Damage Assessment, at 4-670 through 4-684.

nearshore regions. In the Gulf of Mexico, oyster reefs, seagrass beds, beaches, tidal mud flats, mangroves, marshes, and wetlands all are at risk of oil spill-related contamination.²⁵⁹ During *Deepwater Horizon*, for example, more than 1,300 miles of Gulf shoreline were impacted by spilled oil, harming aquatic and terrestrial species and birds.²⁶⁰ The spill destroyed oyster reefs, which provide habitat for various aquatic organisms, including shellfish, crabs, and finfish, and also serve as important filters that maintain and improve water quality.²⁶¹

“Coastal estuaries are among the most biologically productive habitats on earth,” and are at particular risk from marine oil spills.²⁶² Salt marshes, a type of coastal wetland, provide critical coastal buffers²⁶³ and supply important ecosystem services, including nursery habitat, primary production, coastal protection, and carbon sequestration.²⁶⁴ Their ability to provide such services requires an abundance of plant species,²⁶⁵ which oil intrusion can compromise substantially.²⁶⁶ *Deepwater Horizon*, for example, decreased vegetation along the edges of marshes by an average of 18 percent in fall 2010 (a few months after the spill), 20 percent in fall 2011, and 25 percent in fall 2012.²⁶⁷ The oil spill also significantly reduced vegetative cover in interior marsh areas.²⁶⁸ More than one year after the spill, concentrations of toxins in salt marshes exceeded normal levels by two to three times.²⁶⁹ Oil spills, thus, can have long-term and significant consequences for estuaries and other coastal habitats.

The water surface also provides habitat for an array of species. In the Gulf of Mexico and in the Atlantic, for example, Sargassum mats, which are composed of brown algae that float in island-like masses, provide habitat for many species including marine fish, invertebrates, loggerhead sea turtles, and commercially important fish like dolphin fish, amberjacks, and tuna.²⁷⁰ Oil spills can destroy this unique habitat in three primary ways: (1) oil can accumulate on the surface of the mats, which exposes animals to high concentrations of contaminants; (2) the

²⁵⁹ *Id.* at 4-670 through 4-679.

²⁶⁰ *Id.* at 4-304, 4-670 through 4-679.

²⁶¹ *Id.* at 4-379, 4-388, 4-392, 4-436, 5-53 through 5-54.

²⁶² Andrew Whitehead, *Interactions between Oil-Spill Pollutants and Natural Stressors Can Compound Ecotoxicological Effects*, 53 INTEGRATED & COMP. BIOLOGY 635, 635 (2013), available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3895973>.

²⁶³ NOAA, Final Damage Assessment, at 3-16, 4-675 (“Coastal marsh and mangroves are habitats critical to the overall health of the northern Gulf of Mexico,” providing a vast array of ecosystem services and serving as protective buffers against storms and flooding).

²⁶⁴ Mark W. Hester et al., *Impacts of the Deepwater Horizon Oil Spill on the Salt Marsh Vegetation of Louisiana*, 216 ENV'T'L POLLUTION 361, 361 (2016), available at https://ac.els-cdn.com/S0269749116304535/1-s2.0-S0269749116304535-main.pdf?_tid=261e05ac-f805-4acc-9436-2e50cd87525c&acdnat=1531989123_5c16eeefb004c01e636bb33cf34a971b0.

²⁶⁵ *Id.*

²⁶⁶ *Id.*

²⁶⁷ *Id.* at 363–64.

²⁶⁸ *Id.* at 369.

²⁶⁹ NOAA, Final Damage Assessment, at 4-304.

²⁷⁰ Tara L. Casazza and Steve W. Ross, *Sargassum: A Complex ‘Island’ Community at Sea*, NOAA OCEAN EXPLORER (Aug. 25, 2010), <https://oceanexplorer.noaa.gov/explorations/03edge/background/sargassum/sargassum.html>; NOAA, Final Damage Assessment, at 4-149, 4-155 (“*Sargassum* is a key habitat of the ecosystem in the northern Gulf of Mexico, providing the only naturally occurring floating structure in an otherwise featureless open ocean”—important habitat for sea turtles, marine birds, fish, and invertebrates).

application of dispersants can cause the mats to sink below the surface; and (3) reduced oxygen levels can stress animals that live in the mats.²⁷¹ Thus, both spilled oil and the use of chemical dispersants to break it up can cause significant harm.²⁷²

The water column also provides important habitat for numerous species, including jellyfish, marine mammals, and diving birds.²⁷³ Such species feed, migrate, seek shelter, and reproduce in these waters.²⁷⁴ Deep-sea habitats, including sediments and coral reefs, are home to bottom-dwelling organisms, including plankton, forage fish, and invertebrates.²⁷⁵ Sperm whales dive into these near-freezing, sunless areas to feed on squid, skate, fish, and sharks.²⁷⁶ Oil spills, as observed in the aftermath of *Deepwater Horizon*, can cause long-term contamination to surface waters, deep waters, and bottom sediments.²⁷⁷ Such impacts can be severe and long-term. Four years after *Deepwater Horizon*, for example, bottlenose dolphins and sea turtles continued to die in record numbers.²⁷⁸ This die-off has been attributed to the oil spill.²⁷⁹ Similarly, twenty-five years after the 1989 Exxon Valdez oil spill, oil from the spill continued to contaminate beaches in Alaska.²⁸⁰

b. Wildlife

Exposure to oil and chemicals used in oil cleanup efforts can cause significant harm to wildlife. Floating oil can contaminate plankton, algae, fish eggs, and the larvae of various invertebrates,²⁸¹ which may then poison the fish and marine mammals that feed on them with the potential to cause premature death.²⁸² Oil also can destroy the insulating ability of fur-bearing mammals, such as sea otters, and the water repellence of bird feathers, leaving wildlife exposed to harsh elements and at risk of death from hypothermia.²⁸³ In addition, contamination from oil spills can stunt development and growth, impair reproduction, compromise immune systems, cause heart defects, and decrease resilience to rapid changes in temperature, salinity, and

²⁷¹ Sean P. Powers et al., *Novel Pathways for Injury from Offshore Oil Spills: Direct, Sublethal and Indirect Effects of the Deepwater Horizon Oil Spill on Pelagic Sargassum Communities*, PLOS, Sept. 2013, at 6, available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3783491/pdf/pone.0074802.pdf>.

²⁷² Powers et al., at 7.

²⁷³ NOAA, Final Damage Assessment, at 4-149, 4-154 through 4-155.

²⁷⁴ *Id.*

²⁷⁵ *Id.* at 3-20, 4-155.

²⁷⁶ *Id.* at 4-591 through 4-592.

²⁷⁷ See, e.g., *id.* at 4-227 (“In general, [benthic] resource recovery is expected to be on the order of decades to hundreds of years, based on the uniformity of environmental conditions and slow progression of change in deep-sea environments, and the fact that some organisms killed by the spill were hundreds of years old (e.g., deep-sea coral).”); Hamdan et al., at 1.

²⁷⁸ Christine Dell’Amore, *Gulf Oil Spill ‘Not Over’: Dolphins, Turtles Dying in Record Numbers*, NAT’L GEOGRAPHIC (Apr. 9, 2014), available at <https://news.nationalgeographic.com/news/2014/04/140408-gulf-oil-spill-animals-anniversary-science-deepwater-horizon-science/>.

²⁷⁹ *Id.*

²⁸⁰ Jane J. Lee, *Oil from the Exxon Valdez Spill Lingers on Alaska Beaches*, NAT’L GEOGRAPHIC (Mar. 3, 2014), available at <https://news.nationalgeographic.com/news/2014/03/140301-exxon-valdez-oil-spill-alaska-beaches-ocean-science>; NOAA, *Lingering Oil from Exxon Valdez Oil Spill*, NEWS (Feb. 26, 2018), <https://www.fisheries.noaa.gov/feature-story/lingering-oil-exxon-valdez-spill>.

²⁸¹ U.S. Fish & Wildlife Service, *Effects of Oil on Wildlife and Habitat* (June 2010), available at <https://www.fws.gov/home/dhoilspill/pdfs/DHJICFWSOilImpactsWildlifeFactSheet.pdf>.

²⁸² *Id.*; NOAA, *How Does Oil Impact Marine Life?*, available at <https://oceanservice.noaa.gov/facts/oilimpacts.html>.

²⁸³ *Id.*

hypoxia.²⁸⁴ Given the long lifetime of low to moderate concentrations of oil in the environment recovering from such impacts can take a long time.²⁸⁵ Bottom-dwelling organisms may take an especially long time to recover, as oil contamination in sediment is particularly persistent.²⁸⁶ Various environmental stressors exacerbate these impacts, including low temperatures, influxes of freshwater into marine environments, and previous exposure to oil contamination.²⁸⁷

Oil spills can cause significant harm to marine mammals, including by increasing death rates, impairing reproduction, decreasing immune system function, and causing lethargy and brain lesions.²⁸⁸ Marine mammals, such as dolphins, gray whales, and killer whales, may not be able to detect or avoid oil spilled on the surface,²⁸⁹ and thus may be regularly exposed to it. Moreover, some marine mammals, such as killer whales, begin exhaling before they reach the surface.²⁹⁰ As a result, whales may be committed to inhaling oil on the surface, including evaporating oil, as they come up to breathe.²⁹¹ Inhaling oil can cause marine mammals to lose consciousness and drown.²⁹² Marine mammals also can be harmed by ingesting oil-contaminated fish and other prey.²⁹³ Even under optimal conditions, it can take decades for marine mammals to recover from such impacts.²⁹⁴ Numerous marine mammal species inhabit the OCS and surrounding waters. Among others, the Gulf of Mexico is home to twelve species of whales, nine types of dolphins, and the West Indian manatee.²⁹⁵ Harbor seals, killer whales, stellar sea lion, gray whale, and eastern north Pacific right whale inhabit the Gulf of Alaska.²⁹⁶

Oil spill-related impacts on wildlife can be severe. During *Deepwater Horizon*, hundreds of fish species were exposed to oil, including red snapper, bluefin tuna, and spotted sea trout.²⁹⁷ The spill killed trillions of larval fish and invertebrates in offshore surface, deep oceanic, and estuarine waters.²⁹⁸ The number and type of fish species living on the reefs declined significantly, and food in reef systems became less abundant.²⁹⁹ Oil that reached the shoreline and river water released in response to the spill killed billions of shellfish.³⁰⁰ Between 56,100 and 102,400 birds, representing dozens of species, died as a result of the spill,³⁰¹ and at least 93

²⁸⁴ Whitehead, at 53.

²⁸⁵ *Id.*

²⁸⁶ *Id.*

²⁸⁷ *Id.*

²⁸⁸ NOAA, Final Damage Assessment, at 4-598 through 4-637.; C.O. Matkin et al., *Ongoing Population-Level Impacts on Killer Whales Orcinus Orca Following the 'Exxon Valdez' Oil Spill in Prince William Sound, Alaska*, 235 MARINE ECOLOGY PROGRESS SERIES 269, 277 (2008).

²⁸⁹ Matkin et al., at 269, 270.

²⁹⁰ *Id.* at 276, 277.

²⁹¹ *Id.*

²⁹² *Id.* at 277.

²⁹³ *Id.*

²⁹⁴ *Id.* at 279.

²⁹⁵ NOAA, Final Damage Assessment, at 4-585 through 4-586.

²⁹⁶ NOAA, *Marine Mammals of the Alaska Region*, in OUR LIVING OCEANS (2009), available at <https://spo.nmfs.noaa.gov/olo6thedition/32--Unit%2021.pdf>.

²⁹⁷ NOAA, Final Damage Assessment, at 4-105 through 4-106, 4-429.

²⁹⁸ *Id.* at 4-208 through 4-209, 5-22 through 5-23.

²⁹⁹ *Id.* at 4-436, 4-673 through 4-674, 4-681, 5-54, 5-78 through 5-79.

³⁰⁰ *Id.* at 4-289, 4-379, 5-54.

³⁰¹ *Id.* at 4-509 through 4-510.

different species of birds were injured.³⁰² Killed and injured birds included federally listed Audubon's shearwater, American oystercatcher, band-rumped storm-petrel, great shearwater, least tern, magnificent frigatebird, masked booby, piping plover, sandwich tern, and Wilson's plover, among others.³⁰³ The population of federally listed sea turtles also declined significantly, with about 4,900 to 7,600 large juvenile and adult sea turtles and about 55,000 to 160,000 small juvenile sea turtles perishing as a result of the spill.³⁰⁴ Barataria Bay bottlenose dolphins suffered an increased death rate of 35 percent, increased failed reproduction of 46 percent, and increased adverse health impacts, such as adrenal and lung disease and low reproductive success, of 37 percent.³⁰⁵ The population of Bryde's whales declined by about 22 percent, and the population of federally endangered sperm whales declined by about 7 percent.³⁰⁶ Such losses will have long-term consequences, impairing reproduction and recruitment for multiple generations.³⁰⁷

The Exxon Valdez oil spill in Prince William Sound also caused significant harm to wildlife. Eighty-one percent of harbor seals in Prince William Sound were found to be oiled and unusually disoriented and lethargic, making them easy prey for whales.³⁰⁸ Killer whale pods, some of which fed on oil-contaminated harbor seals, suffered dramatic population declines. In the year after the spill, one pod lost 33 percent of its population and another pod lost 41 percent.³⁰⁹ The recovery of these pods in the years following the spill was slow, and some whale pods continued to decline nearly two decades later.³¹⁰

c. Federally endangered and threatened species

Numerous federally endangered and threatened species inhabit, and otherwise depend on, habitat that would be affected by oil spills in the OCS. By eliminating critical oil spill prevention measures, the Proposed Rule threatens significant harm to these sensitive species. Among other listed species, the Gulf of Mexico provides habitat for at least four whale species (fin, sei, sperm, and Gulf of Mexico Bryde's), five sea turtle species (green, hawksbill, leatherback, Kemp's ridley, and loggerhead), four types of beach mice (Alabama, Choctawhatchee, St. Andrew, and Perdido Key), six species of birds (piping plover, wood stork, everglades snail kite, Cape Sable seaside sparrow, Roseate tern, and whooping crane), two species of fish (gulf and pallid sturgeons), seven types of coral (rough cactus, pillar, lobed star, mountainous star, boulder star, elkhorn, and staghorn), West Indian manatees, and several species of plants (beach jacquemontia, Florida perforate cladonia, Garber's spurge, key tree cactus, and beautiful

³⁰² *Id.* at 4-493 through 4-500.

³⁰³ *Id.*

³⁰⁴ *Id.* at 4-571, 4-576.

³⁰⁵ *Id.* at 4-618.

³⁰⁶ *Id.* at 4-618, 4-631.

³⁰⁷ *Id.* at 4-211 (recovery of water column species could take decades), 4-260, 4-274–4-275 (recovery of benthic resources could take decades to “hundreds of years”), 4-362, 4-379 (declines in oysters imperil “sustainability of oysters in the northern Gulf of Mexico”), 4-577 (recovery of federally listed sea turtles “will require decades of sustained efforts”), 4-633–4-634, 4-636–4-637 (recovery of marine mammals, including federally endangered sperm whales, will take decades).

³⁰⁸ Matkin *et al.*, at 277.

³⁰⁹ *Id.* at 269, 273–76.

³¹⁰ *Id.*

pawpaw).³¹¹ Critical habitat in the Gulf of Mexico also would be threatened by oil spills in the OCS, including designated habitat for Gulf sturgeon,³¹² whooping crane, plovers, and sea turtles.³¹³

The Atlantic OCS and surrounding areas are home to at least six endangered mammal species (North Atlantic right whale, blue whale, fin whale, sei whale, humpback whale, sperm whale),³¹⁴ five species of endangered and threatened sea turtles (hawksbill, Kemp’s ridley, and leatherback, green, and loggerhead),³¹⁵ three threatened and endangered species of marine and coastal birds (piping plover, roseate tern, and Bermuda petrel),³¹⁶ and three endangered marine fish species (smalltooth sawfish, Atlantic sturgeon, shortnose sturgeon).³¹⁷ Listed species within the Gulf of Alaska include, among others, stellar sea lions and at least seven species of whales (blue, fin, humpback, North Pacific right, Western North Pacific gray, sei, and sperm).³¹⁸

Oil spill impacts on endangered and threatened species could be significant. A 2007 final EIS for eleven oil and gas lease sales in the Gulf of Mexico OCS found that many of the at least twenty-one identified endangered or threatened species in the area would suffer deleterious impacts from oil spills.³¹⁹ The Gulf sturgeon, a federally “threatened” species, could take “several decades or more” to recover from *Deepwater Horizon*.³²⁰ In addition to the exposure pathways explained above, scientists have observed tar balls from decades-old oil spills washing up on beaches in the Gulf of Mexico, threatening nesting sites for endangered Kemp’s ridley sea turtles and critical habitat for the endangered whooping crane.³²¹ Whooping cranes, which can come into contact with tar balls when they forage in estuarine and bay waters, can ingest tar balls and become fouled by them.³²² Once fouled, whooping cranes may transport the tar balls back to their nests, where the tar balls could harm their offspring.³²³ Threatened and endangered sea turtles, which forage, rest, and migrate in underwater canyons,³²⁴ also may be exposed to oil contamination in sediment that accumulates in these underwater areas.³²⁵

³¹¹ NOAA, Gulf of Mexico’s Threatened and Endangered Species, *available at* http://sero.nmfs.noaa.gov/protected_resources/section_7/threatened_endangered/Documents/gulf_of_mexico.pdf; U.S. Fish & Wildlife Service, Federally Listed Wildlife and Plants Threatened by Gulf Oil Spill, <https://www.fws.gov/home/dhoilspill/pdfs/FedListedBirdsGulf.pdf>.

³¹² Minerals Mgmt. Serv., Final Environmental Impact Statement, Gulf of Mexico OCS Oil and Gas Lease Sales: 2007-2012, 4-199 (2007) (hereinafter “Gulf FEIS”), *available at* <https://www.boem.gov/BOEM-Newsroom/Library/Publications/2007/2007-018-Vol1.aspx>.

³¹³ Gulf FEIS, at 4-238, 4-286, 4-288.

³¹⁴ BOEM, Atlantic OCS: Proposed Geological and Geophysical Activities, Final Programmatic Environmental Impact Statement x (2014) (hereinafter “Atlantic PEIS”), *available at* <https://www.boem.gov/BOEM-2014-001-v1/>.

³¹⁵ Atlantic PEIS, at xv.

³¹⁶ Atlantic PEIS, at xvi.

³¹⁷ Atlantic PEIS, at xviii.

³¹⁸ *Endangered, Threatened, Proposed Candidate, and Delisted Species in Alaska*, NOAA (May 13, 2014), *available at* https://www.fws.gov/alaska/fisheries/endangered/pdf/consultation_guide/4_species_list.pdf.

³¹⁹ Gulf FEIS, at 4-238.

³²⁰ NOAA, Final Damage Assessment, at 4-419.

³²¹ Gulf FEIS, at 4-238.

³²² Gulf FEIS, at 4-238, 4-286, 4-288.

³²³ Gulf FEIS, at 4-238, 4-286, 4-288.

³²⁴ BOEM, *Gulf of Mexico OCS Proposed Geologic and Geophysical Activities: Western Central and Eastern Planning Areas*, E-59–E-74 (2017), *available at* <https://www.boem.gov/BOEM-2017-051-v3/>.

³²⁵ Hamdan *et al.*

Despite the severity of oil spill-related impacts on habitat and wildlife, including endangered and threatened species, the Draft EA offers only an unsupported statement that the Proposed Rule likely would reduce such harm.³²⁶ By failing to take a “hard look” at the impacts of the Proposed Rule on species and habitat, including by evaluating accurate scientific information, the Draft EA violates NEPA.

3. The Draft EA fails to disclose and analyze impacts to air quality.

The Draft EA evaluates the impacts of the Proposed Rule on air quality in a single sentence: air quality in the immediate vicinity of a well operation “could be affected by emissions from vessels and equipment,” but “there [likely] would be lower impacts to air quality than under the current regulations” assuming “proper adherence to the requirements outlined in the Proposed Rule.”³²⁷ The Draft EA offers no quantitative, or even qualitative, analysis to support this conclusion. Moreover, as above, the Draft EA fails to even identify which requirements in the Proposed Rule would contribute to lower air quality impacts.

BSEE’s conclusion that the Proposed Rule would benefit air quality conflicts with the findings of peer-reviewed studies, which indicate that failing to adequately prevent oil spills poses a significant risk to air quality and human health. For example, a 2012 *PNAS* study finds that aerosol particles of respirable sizes from *Deepwater Horizon* caused a “significant air quality issue for populated areas along the Gulf Coast.”³²⁸ By mass, hydrocarbons evaporating from oil constituted the largest air emissions,³²⁹ including air pollutants classified as “hazardous” by EPA.³³⁰ These emissions reacted with nitrous oxides in the atmosphere to form ozone, peroxyacetyl nitrate, and other pollutants.³³¹ Hydrocarbon emissions traveled far from the oil spill site, polluting air in the Houston Ship Channel.³³² Emissions of aerosols, such as black carbon, and particulate matter, including very small particulates that can travel deep into lungs, were found at the spill site and downwind, including the Gulf Coast.³³³ These emissions, which were released from evaporating oil and burning oil on the surface,³³⁴ may have “had a measurable effect on ambient levels of aerosol particles in coastal communities directly downwind wind of the spill.”³³⁵ Additional air quality problems arose from emissions of ozone, carbon monoxide, and nitrogen oxide caused by oil evaporation, burning oil, and ships performing recovery and cleanup operations.³³⁶ Under different conditions than *Deepwater Horizon*, e.g., spills closer to shore or under different weather patterns, air quality impacts could

³²⁶ Draft EA at 26.

³²⁷ Draft EA at 25 (emphasis in original).

³²⁸ Ann M. Middlebrook et al., *Air Quality Implications of the Deepwater Horizon Oil Spill*, 109 *PNAS* 20,280, 20,280 (Dec. 11, 2012), available at <http://www.pnas.org/content/pnas/109/50/20280.full.pdf>.

³²⁹ Middlebrook et al., at 20,281.

³³⁰ *Id.* at 20,281. Such hazardous air pollutants included benzene, toluene, and naphthalene. *Id.*

³³¹ *Id.*

³³² *Id.*

³³³ *Id.* at 20,282–83.

³³⁴ *Id.* at 20,283.

³³⁵ *Id.* at 20,283, 20,285. Such particles “typically survive for days in the lower atmosphere,” which facilitates their ability to travel long distances. *Id.*

³³⁶ *Id.* at 20,283.

be even more severe.³³⁷ Because the Draft EA fails to take a “hard look” at the air quality impacts of the Proposed Rule, including in light of recent scientific analysis, the Draft EA does not comply with NEPA.

4. The Draft EA fails to disclose and analyze impacts to sociocultural systems, commercial and recreational fisheries, tourism, and recreation.

The Draft EA concludes, without any accompanying analysis or support, that the Proposed Rule likely would have “minor beneficial impacts” on sociocultural systems, commercial and recreational fisheries, tourism, and recreation, noting that the impacts from an oil spill or blowout on such resources would only be “temporar[y].”³³⁸ This unsupported conclusion violates the hard look requirement of NEPA, and it disregards the long-term impacts of oil spills on such resources. Conclusions that impacts are insignificant must be supported by a “convincing statement of reasons.”³³⁹

The impacts of failing to adequately prevent oil spills on sociocultural systems, commercial and recreational fisheries, tourism, and recreation can be significant. Following *Deepwater Horizon*, for example, significantly fewer people visited the Gulf, with visitors to shoreline areas dropping by nearly 13 million.³⁴⁰ The spill also cost the Gulf of Mexico seafood industry between \$51.7 million and \$952.9 million in lost sales and between 740 to 9,315 jobs in the seafood industry.³⁴¹ Fish populations will take decades to recover, with high-turnover populations recovering in about 10 years, and other populations not recovering for more than three decades.³⁴² By failing to take a “hard look” at such impacts, the Draft EA does not comply with NEPA.

B. The Draft EA fails to disclose and analyze cumulative impacts.

The Draft EA fails to analyze cumulative impacts. Cumulative impacts are “the impact[s] on the environment which result[] from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.”³⁴³ Such impacts “can result from individually minor but collectively significant actions taking place over a period of time.”³⁴⁴ “NEPA is, ‘in large measure, an attempt by Congress to instill in the environmental

³³⁷ See *id.* at 20,284 (“The spill was also far enough offshore that there was some dispersion of the pollutants before they reached populated areas.”).

³³⁸ Draft EA at 26–27.

³³⁹ *Blue Mountains Biodiversity Project*, 161 F.3d at 1212.

³⁴⁰ Memorandum from Nathan Braun to Craig O’Connor, NOAA, B2 – Estimating Lost Visits Using a Parametric Model 4 (Sept. 1, 2015), available at <https://www.fws.gov/doiddata/dwh-ar-documents/940/DWH-AR0026646.pdf>.

³⁴¹ BOEM, AN ANALYSIS OF THE IMPACTS OF THE DEEPWATER HORIZON OIL SPILL ON THE GULF OF MEXICO SEAFOOD INDUSTRY 148 (2016) (hereinafter “BOEM DWH Seafood Analysis”), available at <https://www.boem.gov/ESPIS/5/5518.pdf>.

³⁴² Cameron H. Ainsworth et al., *Impacts of the Deepwater Horizon Oil Spill Evaluated Using an End-to-End Ecosystem Model*, PLOS, Jan. 25, 2018, at 9, available at <http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0190840&type=printable>.

³⁴³ 40 C.F.R. § 1508.7.

³⁴⁴ *Id.*

decisionmaking process a more comprehensive approach so that long term and cumulative effects of small and unrelated decisions could be recognized, evaluated and either avoided, mitigated, or accepted as the price to be paid for the major federal action under consideration.’³⁴⁵

A cumulative impact analysis must identify (1) the area in which the effects of the proposed action will be felt; (2) the impacts that are expected in that area from the proposed action; (3) other past, present, proposed, and reasonably foreseeable actions that have had or are expected to have impacts in the same area; (4) the impacts or expected impacts from these other actions; and (5) the overall impact that can be expected if the individual impacts are allowed to accumulate.³⁴⁶ An “EA must give a realistic evaluation of the total impacts and cannot isolate a proposed project, viewing it in a vacuum.”³⁴⁷

The Draft EA evaluates cumulative impacts in a single perfunctory statement: because the proposed changes were purposely selected because “they could not result in a material reduction to safety or environmental protection,” BSEE does not expect “any material cumulative effects on OCS resources.”³⁴⁸ Nothing in the Draft EA supports this conclusion, nor does the Draft EA provide any indication of how BSEE determined that the proposed revisions would not materially reduce safety or environmental protection. Further, the Draft EA states that BSEE has only considered cumulative impacts with respect to “OCS resources”³⁴⁹—an impermissibly narrow inquiry given the vast geographic area that could be impacted by oil spills in the OCS.

The Draft EA also disregards well-established evidence indicating that eliminating protections designed to prevent oil spills in the OCS may exacerbate impacts of past, present, and reasonably foreseeable future actions within the affected areas. Coastal waters in the Gulf of Mexico, for example, already are impaired by urban and agricultural runoff, including suspended solids, heavy metals, pesticides, oil, grease, and nutrients.³⁵⁰ This problem, which is becoming more severe as the population grows,³⁵¹ is contributing significantly to the Gulf of Mexico dead zone, an area of extremely low oxygen that cannot support animal life,³⁵² including federally listed species. In July 2017, this oxygen-depleted area grew to 8,776 square miles (about the size of New Jersey), destroying additional habitat, killing fish and other marine life, and impairing fish reproduction.³⁵³ Oil spills exacerbate such harm. Generally, natural degradation of oil occurs as a result of microbes consuming oil through aerobic respiration in which tiny organisms

³⁴⁵ *Del. Riverkeeper Network v. Fed. Energy Reg. Comm’n*, 753 F.3d 1304, 1314 (D.C. Cir. 2014) (quoting *NRDC v. Callaway*, 524 F.2d 79, 88 (2d Cir.1975)).

³⁴⁶ *Grand Canyon Tr. v. F.A.A.*, 290 F.3d 339, 345 (D.C. Cir. 2002).

³⁴⁷ *Id.*

³⁴⁸ Draft EA at 29.

³⁴⁹ Draft EA at 29.

³⁵⁰ BOEM, Catastrophic Spill Event Analysis, at 33.

³⁵¹ *Id.*

³⁵² *Gulf of Mexico ‘Dead Zone’ is the Largest Ever Measured*, NOAA (Aug. 2, 2017), available at <http://www.noaa.gov/media-release/gulf-of-mexico-dead-zone-is-largest-ever-measured>.

³⁵³ *Id.*; see also *Hypoxia Leads to Atlantic Croaker Decline in Gulf of Mexico, Models Show*, NAT’L CTRS. FOR COASTAL AND OCEAN SCI. (Aug. 1, 2017), available at <https://coastalscience.noaa.gov/news/hypoxia-leads-to-atlantic-croaker-decline-in-the-gulf/> (explaining that chronic large low-oxygen zones in Gulf of Mexico could reduce long-term population of Atlantic croaker by 25 percent).

“breathe” oxygen and “burn” hydrocarbons for energy,³⁵⁴ thereby further depleting marine oxygen levels. Offshore oil spills are just one of many causes of oil contamination in the Gulf of Mexico. Petrochemical facilities and oil refineries in Louisiana and Texas release about 26,324 barrels of oil per year into Gulf waters,³⁵⁵ and about 980,392 barrels of hydrocarbons enter the Gulf through natural seeps.³⁵⁶ In total, about 5.5 million barrels of oil enters Gulf waters each year.³⁵⁷ The Draft EA does not analyze, or even mention, how the elimination of oil spill-prevention measures might amplify such water quality problems, oxygen-depletion problems, or the resulting harm to species and habitat.

Moreover, the current administration is taking concrete steps to open up offshore and near-shore areas to oil and gas development and to remove protections for sensitive marine environments. An April 2017 executive order reversed former President Obama’s decision to bar new oil and gas development in sensitive areas of the Arctic and Atlantic Oceans.³⁵⁸ Soon thereafter, the U.S. Department of Interior announced that it was reviewing whether to rescind protections for five marine national monuments, including Northeast Canyons and Seamounts Marine National Monument in the Atlantic Ocean.³⁵⁹ In April 2018, the U.S. Department of Interior published a notice of environmental review, proposing to allow oil and gas development on the Arctic National Wildlife Refuge’s coastal plain.³⁶⁰ Such additional oil and gas development would significantly increase the risk of offshore oil spills, thereby making adequate oil spill prevention in the OCS even more critical. The Draft EA’s cursory and impermissibly narrow cumulative impacts analysis fails to take the hard look that NEPA requires.

C. BSEE’s one-sided evaluation of economic impacts violates NEPA.

In evaluating the Proposed Rule, BSEE relied on incomplete economic information by quantifying only its purported economic benefits. Such “[m]isleading economic assumptions can defeat [NEPA review] by impairing the agency’s consideration of the adverse environmental effects of a proposed project[, and] . . . by skewing the public’s evaluation.”³⁶¹ The evaluation of environmental impacts “must be taken objectively and in good faith, not as in exercise of form over substance, and not as a subterfuge designed to rationalize a decision already made.”³⁶²

³⁵⁴ AM. ACAD. OF MICROBIOLOGY, MICROBES & OIL SPILLS FAQ 2, 7–8 (2011), available at <http://www.dfo-mpo.gc.ca/science/documents/coe-cde/cooger-crpgee/microbes-eng.pdf>.

³⁵⁵ BOEM, Catastrophic Spill Event Analysis, at 33.

³⁵⁶ *Id.*

³⁵⁷ *Id.* at 34.

³⁵⁸ Juliet Eilperin, *Trump Signs Executive Order to Expand Drilling off America’s Coasts: “We’re Opening it Up.”*, WASHINGTON POST, Apr. 28, 2017.

³⁵⁹ U.S. Dep’t of Interior, Press Releases, *Interior Department Releases List of Monuments Under Review, Announces First-Ever Formal Public Comment Period for Antiquities Act Monuments*, May 5, 2017, available at <https://www.doi.gov/pressreleases/interior-department-releases-list-monuments-under-review-announces-first-ever-formal>.

³⁶⁰ 83 Fed. Reg. 17,562 (Apr. 20, 2018).

³⁶¹ *Hughes River Watershed Conservancy v. Glickman*, 81 F.3d 437, 446 (4th Cir. 1996).

³⁶² *Forest Guardians v. U.S. Fish & Wildlife Serv.*, 611 F.3d 692, 712 (quoting *Metcalf v. Daley*, 214 F.3d 1135, 1142 (9th Cir. 2000)).

The Proposed Rule repeatedly touts the economic benefits of eliminating “redundant and unnecessary” requirements in the 2016 WCR.³⁶³ According to BSEE, the Proposed Rule would yield a “positive annual effect on the economy of \$100 million or more,”³⁶⁴ and industry would save \$98.6 million annually over ten years.³⁶⁵ This analysis, however, completely ignores the crippling economic consequences of failing to prevent an oil spill that could have been prevented under the 2016 WCR. *Deepwater Horizon* cost the Gulf of Mexico seafood industry between \$51.7 million and \$952.9 million in lost sales.³⁶⁶ These lost sales resulted in additional losses of \$21.4 to \$392.7 million in value added, \$21.6 to \$309.8 million in income, and 740 to 9,315 jobs in the seafood industry.³⁶⁷ Moreover, to redress harm to natural resources, BP had to pay up to \$8.8 billion for the costs of environmental restoration.³⁶⁸ These costs represent only a fraction of the economic toll caused by *Deepwater Horizon*, yet they still dwarf BSEE’s purported economic benefits from the Proposed Rule. Moreover, as explained, BSEE’s one-sided economic evaluation stands in stark contrast to BSEE’s economic evaluation of the 2016 WCR, where BSEE meticulously quantified and monetized the value gained from time savings, reductions in oil spills, and reductions in fatalities.³⁶⁹

An agency may not “sweep[] negative evidence under the rug.”³⁷⁰ By failing to account for adverse economic impacts, BSEE “defeat[ed] the ‘hard look’ function” of NEPA.³⁷¹

D. BSEE must prepare an EIS analyzing the impacts of the Proposed Rule.

When a “substantial question” is raised about whether a project may have a “significant” environmental impact, an agency must prepare an EIS.³⁷² As explained above, there is, at minimum, a substantial question as to whether the Proposed Rule may cause a significant environmental impact. It is entirely foreseeable that eliminating safeguards specifically designed to prevent offshore oil spills in remote OCS waters, as the Proposed Rule would do, will cause significant harm to water resources, habitat, wildlife (including federally endangered and threatened species), air quality, and socioeconomic resources. Yet, BSEE has entirely ignored such consequences. Because the Proposed Rule may have a significant environmental impact, BSEE must prepare an EIS.

In evaluating these impacts, BSEE must utilize robust, accurate scientific analyses to determine how the proposed revisions, individually and collectively, may affect the environment.³⁷³ BSEE’s analysis may “not improperly minimize negative side effects.”³⁷⁴

³⁶³ See, e.g., 83 Fed. Reg. at 22,130, 22,132, 22,136, 22,139, 22, 145.

³⁶⁴ 83 Fed. Reg. at 22,143.

³⁶⁵ 83 Fed. Reg. at 22,143.

³⁶⁶ BOEM DWH Seafood Analysis, at 148.

³⁶⁷ *Id.*

³⁶⁸ Dep’t of Interior, *Deepwater Horizon*, <https://www.doi.gov/deepwaterhorizon>.

³⁶⁹ BSEE, Regulatory Impact Analysis for the 2016 WCR, RIN: 1014-AA11 (April 11, 2016), at 53-76.

³⁷⁰ *Nat’l Audubon Soc’y v. Dep’t of the Navy*, 422 F.3d 174, 194 (4th Cir. 2005).

³⁷¹ See *Sierra Club v. Flowers*, 423 F. Supp. 2d 1273, 1338 (S.D. Fla. 2006) (“Misleading information about economic impacts can defeat the ‘hard look’ function of an EIS.”).

³⁷² *Greenpeace Action*, 14 F.3d at 1332.

³⁷³ See 40 C.F.R. § 1500.1(b); *Custer Cty. Action Ass’n*, 256 F.3d at 1034.

³⁷⁴ *N. Alaska Envtl. Ctr.*, 457 F.3d at 975.

XII. The Proposed Rule Does Not Comply with the Endangered Species Act.

The Endangered Species Act provides a “means whereby the ecosystems upon which endangered species and threatened species depend may be conserved . . . [and] a program for the conservation of such endangered and threatened species”³⁷⁵ Under section 7(a)(2),³⁷⁶ “[e]ach Federal agency shall, in consultation with and with the assistance of [the U.S. Fish and Wildlife Service and National Marine Fisheries Service], insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of those species’ designated “critical habitat.”³⁷⁷ Actions subject to this requirement include “any action authorized, funded, or carried out” by an agency.³⁷⁸ Action agencies must engage in formal consultation with the Services whenever their actions “may affect” listed species.³⁷⁹

As explained above, the Proposed Rule threatens to harm federally endangered and threatened species and their critical habitat by increasing the likelihood and severity of oil spills. Recent studies indicate that the risks to habitat and species are even more significant than previously thought.³⁸⁰ For example, toxic oil- and dispersant-containing sediment can rapidly accumulate in canyons³⁸¹ where endangered species like leatherback sea turtles often forage, rest, and migrate.³⁸² Moreover, oil spill-related contamination, including oil, dispersants, and discharges from cleanup vessels, can travel long distances, polluting bottom sediment, waters, and shoreline environments far from the spill site itself.³⁸³ Such contamination can cause significant and long-term harm to listed species and their habitat,³⁸⁴ with recovery spanning decades.³⁸⁵

Despite well-established evidence that listed species could suffer significant harm if BSEE rescinds or weakens measures designed to prevent oil spills, the Draft EA concludes without support that the “proposed [rule] would not affect either individuals of threatened and endangered species or their critical habitat.”³⁸⁶ Based on this flawed conclusion, BSEE has declined to consult with the U.S. Fish and Wildlife Service and National Marine Fisheries Service.³⁸⁷ The failure to consult with the Services violates the Endangered Species Act.

³⁷⁵ 16 U.S.C. § 1531(b).

³⁷⁶ 16 U.S.C. § 1531(a)(2)

³⁷⁷ *Id.* § 1536(a)(2).

³⁷⁸ *Id.*

³⁷⁹ *Id.*

³⁸⁰ Hamdan *et al.*, at 11; Ward *et al.*

³⁸¹ See Hamdan *et al.*, at 11.

³⁸² BOEM, *Gulf of Mexico OCS Proposed Geologic and Geophysical Activities: Western Central and Eastern Planning Areas*, E-59–E-74 (2017), available at <https://www.boem.gov/BOEM-2017-051-v3/>.

³⁸³ BOEM, *Catastrophic Spill Event Analysis*, at 29; Hester *et al.*, at 363–64, 369; Hamdan *et al.*

³⁸⁴ See *supra* text accompanying notes 275-77, 282, 312-13, 315, 329-36.

³⁸⁵ See, e.g., Whitehead, at 53 (explaining that recovering from oil spill impacts can take a long time given the long lifetime of low to moderate concentrations of oil in the environment); Matkin *et al.*, at 279 (explaining that recovering from oil spills can take decades for marine mammals, even under optimal conditions).

³⁸⁶ Draft EA at 29.

³⁸⁷ Draft EA at 29.

CONCLUSION

For the reasons described above, BSEE should withdraw the Proposed Rule and terminate the rulemaking process.

Thank you for your consideration of these comments.

Respectfully,

Christopher Eaton
Associate Attorney
Earthjustice

Lois Epstein
Engineer & Arctic Program Director
The Wilderness Society

Leah Donahey
Legislative Director
Alaska Wilderness League

Jane Davenport
Senior Attorney
Defenders of Wildlife

Vicki Nichols Goldstein
Founder & Executive Director
Inland Ocean Coalition

Sarah Chasis
Senior Director, Oceans
Natural Resources Defense Council

William Rossiter
Vice President
NY4WHALES

Richard Charter
Coastal Coordination Program
The Ocean Foundation

Sierra B. Weaver
Senior Attorney
Southern Environmental Law Center

Marta Darby
Associate Attorney
The Sierra Club

Cynthia Sarthou
Executive Director
Gulf Restoration Network

Miyoko Sakashita
Oceans Director
Center for Biological Diversity

Marcie Keever
Director, Oceans & Vessels Program
Friends of the Earth

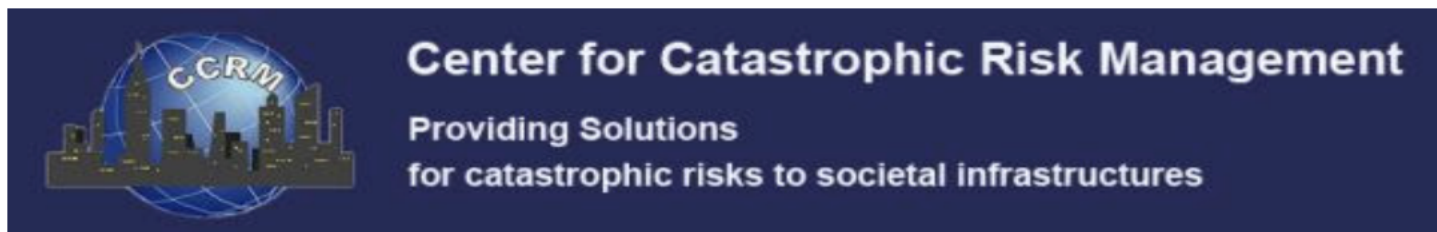
Natalie Levine
Program Manager, Park Resource Protection
National Parks Conservation Association

Lisa Baraff
Program Director
Northern Alaska Environmental Center

Michael Stocker
Director
Ocean Conservation Research

Pete Stauffer
Environmental Director
Surfrider Foundation

Exhibit A



August 1, 2018

Subject: Bureau of Safety and Environmental Enforcement (BSEE) proposal to revise the current Blowout Preventer Systems and Well Control final Rule (WCR)

Introduction

This commentary addresses four primary topics associated with the BSEE’s proposed revisions in the WCR:

- 1) Evaluations of the effects on ‘Safety’ of offshore oil and gas drilling, completions, and decommissioning,
- 2) Evaluations of the ‘Costs and Benefits of Safety’ associated with the proposed changes in the WCR,
- 3) Evaluations of ‘Human and Organizational Factors’ in System Risk Assessment & Management Processes, and
- 4) International offshore oil and gas industry Goal Based Safety Case Regime System Risk Assessment & Management Processes.

Background

In July 1960, I started my career working for the offshore oil and gas industry as a drill rig ‘roughneck’ working on Shell Oil Company’s ‘Rig 11’ located in southern Louisiana. For the next 18 years, I worked for Shell Oil Company and Shell Development Company in a wide variety of engineering, management, operating and maintenance, research and development assignments and locations. I was chief engineer of Shell’s Central Offshore Engineering Group, and manager of Shell Development Company’s Offshore Research and Development Groups.

During the period 1978 through 1988, I worked as a consulting offshore oil and gas exploration, production, and transportation engineer in 26 different countries and 79 locations in those countries. In January 1989, I was appointed as a tenured faculty member in the College of Engineering, University of California, Berkeley. During the period 1989 through 2011, I worked for the international offshore oil and gas industry and regulatory agencies on a wide variety of research and development projects that focused primarily on System Risk Assessment and Management Processes (SRAM) that would be implemented by industry and regulatory groups. In April 2000, I received the U.S. Minerals Management Service award for Corporate Leadership.

I retired from the faculty of the University of California in 2012 and have continued my work as an Associate of the University’s Center for Catastrophic Risk Management (CCRM). CCRM is a inter-disciplinary group that focuses on topics associated with SRAM and performs Root Causes Investigations of major failures associated with a wide variety of engineered systems including those associated with the oil and gas industry – onshore and offshore. During the period 2010 – 2012, CCRM performed an industry – government sponsored Root

Causes investigation of the failure of the BP Deepwater Horizon Macondo Well in the Gulf of Mexico. The investigation group was identified as the Deepwater Horizon Study Group (DHSG).¹ A series of public progress reports, a final report and series of ‘special topics’ White Papers were developed and published by the DHSG.² The DHSG reports and White Papers address all of the key issues involved in the current BSEE proposed WCR revisions.³

Safety

Safety is formally defined as “freedom from undue exposure to injury and harm.” Repeatedly, BSEE has claimed that the proposed WCR changes would not reduce Safety and Environmental Protection. Thus far, BSEE has not produced and documented any validated substantiation for those claims. **Before any of the WCR changes proposed by BSEE are implemented by government and industry, validated Quantitative Risk Analyses (QRA) should be performed by BSEE to determine the truth or fiction contained in those claims.**

During the past 6+ decades, due to the extreme importance of the word ‘Safe’ as it concerns engineered systems that operate in hazardous environments (e.g. commercial public nuclear power generation and aviation transportation systems), the proven knowledge has been developed and validated to determine quantitatively how the Safety of a given offshore oil and gas exploration, production, and transportation ‘System’ are influenced by different internal and external ‘Environments’.⁴

As addressed in the last section of this Commentary, this knowledge has been successfully incorporated by several other countries in their offshore oil and gas resources development regulatory and industrial ‘Higher Risk’ Environments (e.g. United Kingdom, Norway, Australia, New Zealand). The International Standards Association has issued Standards and Guidelines for Risk Management (ISO 31000). In System Risk Assessment and Management (SRAM), Safety is characterized as the combinations of the Likelihood and Consequences (Risks) of Major System Failures or Major Accident Events (MAE) that are ‘Tolerable’: the Risks are ‘As Low As Reasonably Practicable’ (ALARP) (Figure 1). Higher potential Consequences of Major System Failures require lower Likelihoods of occurrence.

Validated quantifications of the Risks associated with MAEs is of particular importance for High Risk Systems as detailed in the 2016 Regulatory Impact Analysis for Oil and Gas Operations in the Outer Continental Shelf – Blowout Preventer Systems and Well Control report.⁵ Consideration of the Cognitive Science associated with important decision-making indicates the validated quantification of the Likelihoods and Consequences of MAEs

¹ <http://ccrm.berkeley.edu/deepwaterhorizonstudygroup/index.shtml>

² <http://ccrm.berkeley.edu/ccrmresearchpublications.shtml>
http://ccrm.berkeley.edu/deepwaterhorizonstudygroup/dhsg_resources.shtml

³ <https://drive.google.com/open?id=150udSu4dP9-WISlt97B22KHUhCbJ77zE>

⁴ ‘Systems’ include the combination of: 1) Operators, 2) Organizations, 3) Hardware, 4) Procedures, 5) Structures, 6) Environments, and 7) Interfaces between these components. These components are inter-connected, inter-dependent, and highly inter-active. ‘Environments’ include Internal and External natural, social –cultural, and political conditions, forces, and effects. ***A System is a collection of elements (components) that interact with each other to function as a whole.***

⁵ <https://drive.google.com/open?id=1-MNfL3i6Hw7JBgmJ2jLUL46N0bBD-Dms>

(e.g. loss of well control in High Risk oil and gas drilling operations) provides major improvements in the reliability of decision making for complex systems that operate in hazardous environments.⁶

Section 21(b) of the Outer Continental Shelf Lands Act (OCSLA) mandates that the Secretary of the Interior:

“shall require, on all new drilling and production operations and, wherever practicable, on existing operations, the use of the best available and safest technologies which the Secretary determines to be economically feasible, wherever failure of equipment would have a significant effect on safety, health, or the environment, except where the Secretary determines that the incremental benefits are clearly insufficient to justify the incremental costs of utilizing such technologies.”

In the aftermath of the Macondo well blowout and Deepwater Horizon explosion in 2010, various analyses of the causes of the incident (for example, NAE and NRC 2012)⁷ identified the need for government agencies to incorporate **more sophisticated approaches for assessing and managing risks** associated with offshore activities. Accordingly, the Bureau of Safety and Environmental Enforcement (BSEE) considered ways of enhancing the approach it uses in implementing the Best Available and Safest Technologies (BAST) mandate. **This BSEE BAST Mandate Requirement included the use of validated quantified assessments of the Risks associated with MAEs in offshore oil and gas exploration and production operations and the implementation of effective Risk Prevention and Mitigation processes that would develop Risks that are As Low As Reasonably Practicable (ALARP).**⁶

During 2016, I was asked by several environmental preservation groups in Australia and the Australian Parliament to review and comment on a proposal by industry to drill a series of exploratory oil and gas wells in the Great Australian Bight. The industry operator was BP. BP proposed to use exploratory drilling systems that were configured to include the primary improvements that had been identified as a result of BP’s internal investigation of the causation of the Deepwater Horizon Macondo well blowout in the Gulf of Mexico. These improvements included some, but not all, of the improvements that were included in BSEE’s post-Macondo WCR regulations.

Unlike BSEE, the Australian offshore and gas development regulatory agency, NOPSEMA (National Offshore Petroleum Safety and Environmental Management Agency), has implemented and further developed the U.K. Health and Safety Executive’s ‘Safety Case Regime’ that required development of validated quantitative analyses of the proposed exploratory drilling System’s Safety and Risks associated with major failures; e.g. uncontrolled blowouts. This Goal Based regulatory ‘Safety Case Regime’ required that the proposed operator define an exploratory drilling System that would develop Risks of Major Accident Events (MAEs) that were As Low As Reasonably Practicable (ALARP). Systems were judged to be ‘Safe’ only if the Risks associated with MAEs were determined to be ALARP (Figure 1).

Even though the BP proposal included some post-Macondo improvements defined during BP’s investigation of that MAE, the validated quantitative assessment of the Risks associated with an uncontrolled blowout that occurred during exploratory drilling indicated Risks that were not ALARP (Figure 2). Additional procedures and processes were needed to enable development of ALARP Risks associated with an uncontrolled blowout during exploratory well drilling (Figure 3). **These additional procedures and processes included Real-Time**

⁶ <https://drive.google.com/open?id=1nRx7cTBDvFYqjYscdGQGtMLqP9HgtQeQ>

⁷ https://drive.google.com/open?id=1OqOApcakLcm_OJ2cCSDFJuvybWC_sbIj
https://drive.google.com/open?id=1PUeBRYHHbBcfGMvqoirNz_UPgWArX4G

Monitoring advisory systems⁸, development of Higher Reliability Organizations (HROs) with Higher Reliability Management (HRM), and Higher Reliability Systems (HRSs) and staging of nearby operational Capping Stack and Relief Well Drilling Systems.⁹

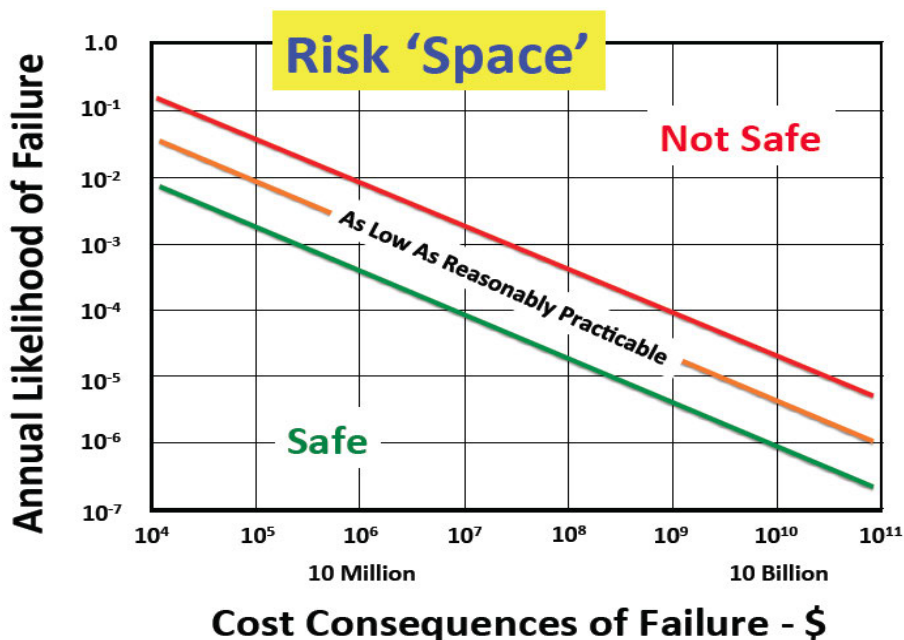


Figure 1: The Likelihood and Consequences of Major Accidents define the Risk Space combined with definition of ALARP Risks to determine Safe and Not Safe Risks.

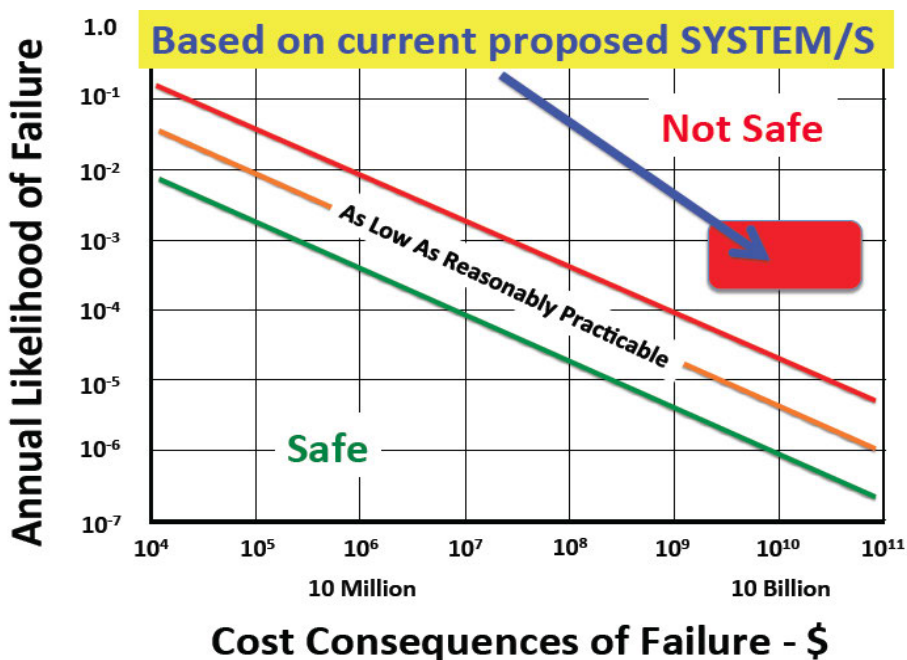


Figure 2: The Risk/s of an uncontrolled blowout associated with the currently proposed BP GAB exploratory drilling Systems.

⁸ <https://drive.google.com/open?id=1ShJXSsVFzmpGarup7enWt1WwqMq3bVSp>

⁹ <https://drive.google.com/open?id=1s4i4Cr7hgt6TOOsyEwKtIWWOrdemeeSc>

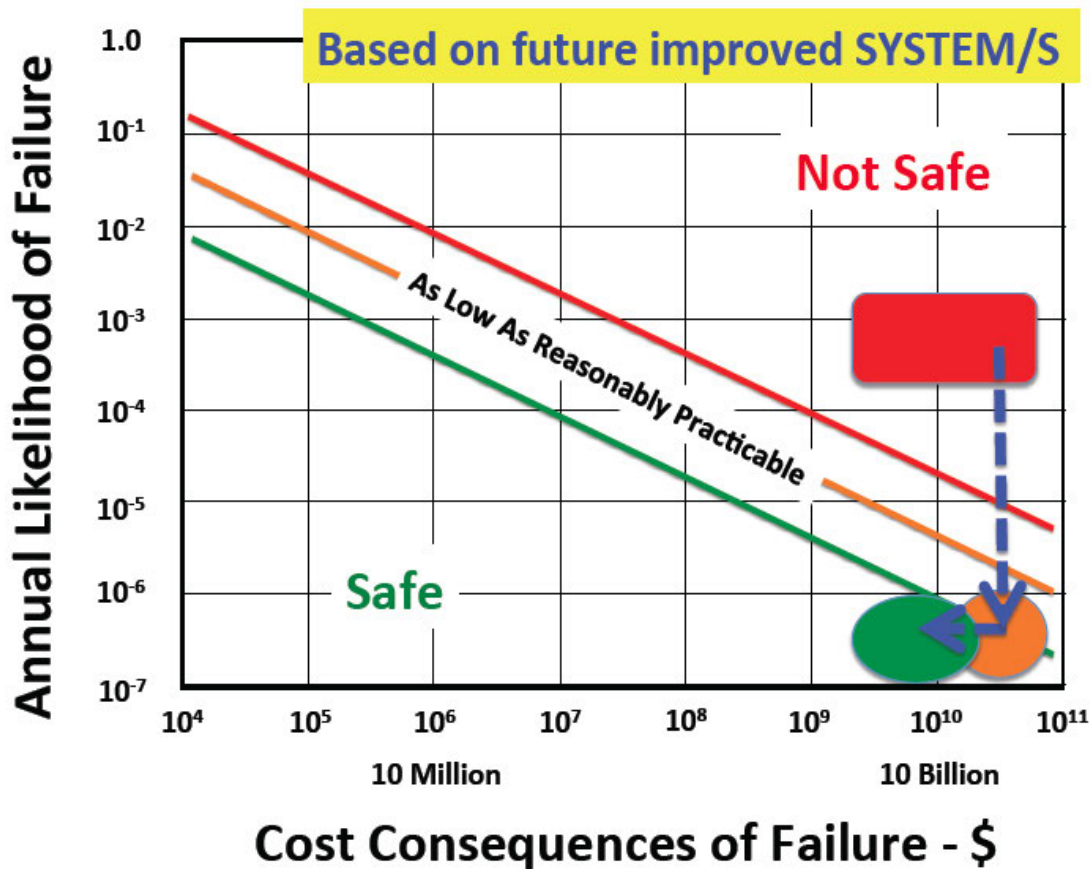


Figure 3: The Risk of an uncontrolled blowout associated with specified improvements to the BP GAB exploratory drilling Systems.

This experience indicates that if the proposed BSEE WCR modifications were implemented by industry operating in High Risk Environments (e.g. ultra deep waters, high productivity oil and gas wells, very environmentally sensitive areas), the Risks of MAEs resulting in uncontrolled blowouts would not be ALARP; the oil and gas exploration and production wells would have Risks that were not ‘tolerable’ or ‘acceptable’ and were not ‘Safe’ as currently contended by BSEE.

Costs & Benefits of Safety

Safety costs monetary resources. In a commercial industrial context, these monetary resources must be developed from the income derived from produced goods and services: ‘Profit’. Profit provides the resources required to develop Safety. These important monetary resources are measured and quantified.

More Safety costs more Money. But, frequently not recognized, Safety can save money due to the costs of future major accidents – failures that are prevented, not realized.⁴ In the U.S., unlike Money, it is rare to find Safety properly validated, quantified and measured. More often, quantified Monetary Resources are compared with ‘subjective’ unvalidated ‘estimates’ of Safety.

Monetary Cost – Benefit analyses that properly account for the initial costs required to develop a given level of Safety and for the future ‘present valued’ costs of MAEs that are ‘saved’ (not realized, avoided), define the ALARP Safe combinations of the Likelihoods and Consequences of MAEs (Figures 4 and 5).

Previous industry and government agency experience has clearly demonstrated it is of critical importance that the Costs of unrealized MAEs are accounted for in analyses of the Costs and Benefits of Safety. BSEE made

advancements in this accounting as part of their Cost – Benefit analyses associated with the 2016 WCR regulations. **However, the documentation produced to date by BSEE clearly indicates that comprehensive evaluations of Costs and Benefits of the proposed WCR revisions have not been developed as required by BSEE’s BAST.** Instead BSEE has incorrectly ‘rationalized’ that the initial cost reduction benefits due to the proposed WCR revisions will not reduce Safety.

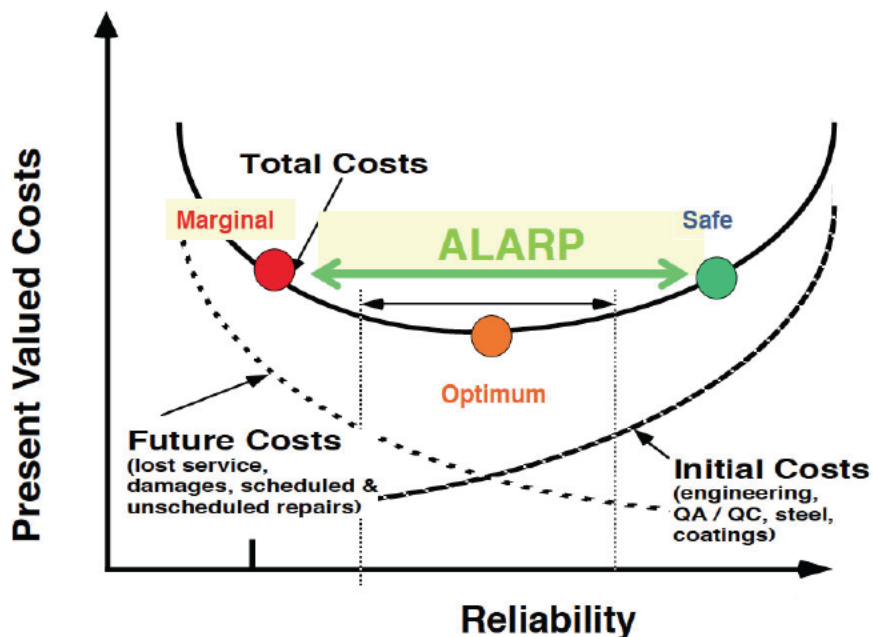


Figure 4: Cost – Benefit economics evaluations of the ALARP range of System Reliability (Likelihood of not realizing MAEs).

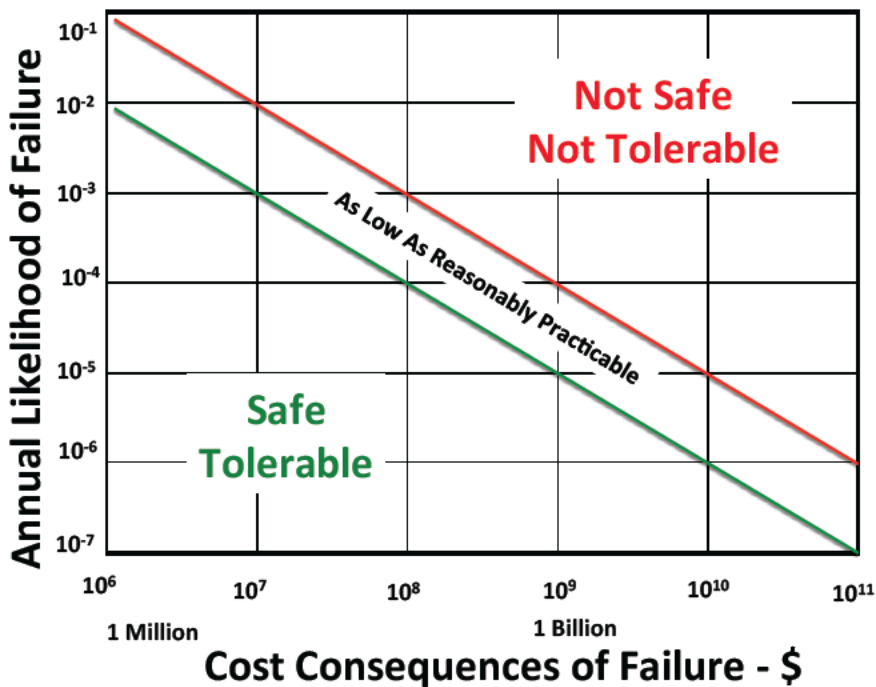


Figure 5: Monetary analysis of the initial and future costs of MAEs expressed as the Annual Likelihood of MAEs (Failure).

There are two additional frames of reference that are used to help define ALARP and Total Monetary Cost Optimized definitions of ‘Safety’ for complex engineered systems that operate in hazardous environments:
 1) Historic ‘Tolerable’ or ‘Acceptable’ Risks that define ‘Safe’ (Figure 6), and
 2) Current ‘Standards of Practice’ Risks that define ‘Safe’ (Figure 7).

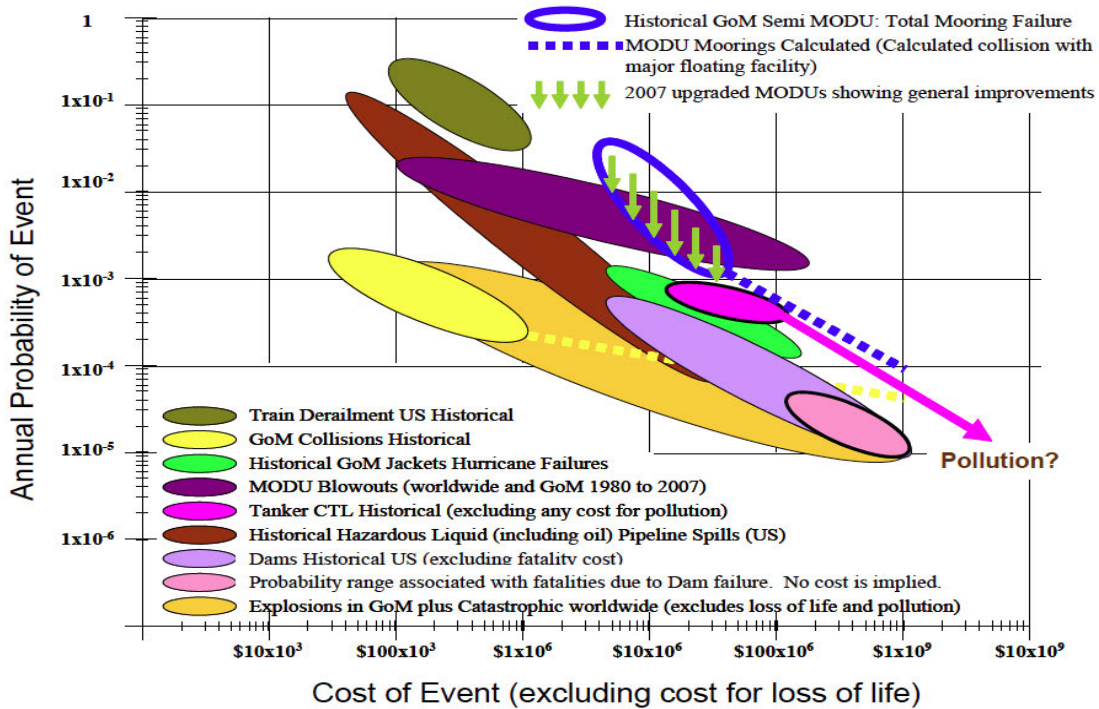


Figure 6: Historic ‘Standards of Practice’ definitions of ‘Acceptable’ or ‘Tolerable Risks’ – from Joint Industry-Government sponsored Blow-Out Risk Assessment (BORA) Project.

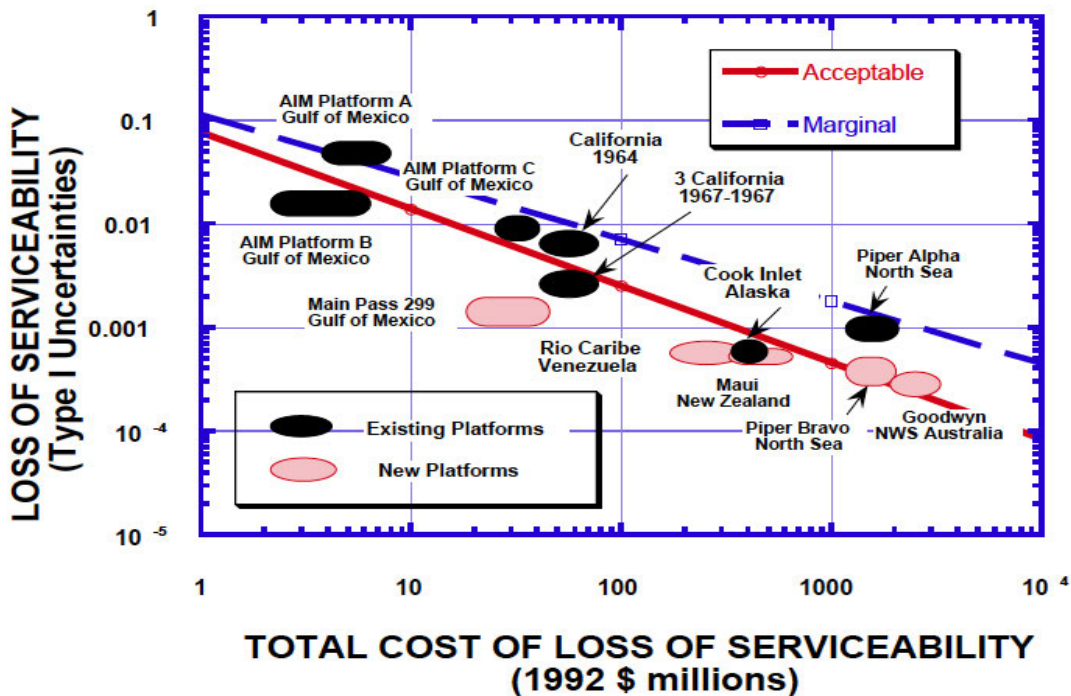


Figure 7: Current ‘Standards of Practice’ ALARP definitions for offshore oil and gas production platform operations.¹⁰

¹⁰ <https://drive.google.com/open?id=1JWPvW9yw7MVHTsNzYGDz8f2dRf6E2M7Y>

The referenced validated quantitative monetary analyses performed by the author⁹ indicate the BSEE proposed WCR revisions initial cost reductions will result in important increases in the Likelihoods and Consequences (direct and indirect, on-site and off-site) of future MAEs. While ‘initial costs’ of prevention of MAEs might be reduced, these initial cost savings will be eliminated by the present-valued ‘future costs’ of WCR MAEs not properly prevented and mitigated (both are required).

Human & Organizational Factors

The following is a summary of important observations that have resulted from a long-term study (1988-2018) of more than 630 well documented major failures and accidents (MAE) involving engineered systems.¹¹ Sufficient reliable documentation was available about these failures and accidents to understand the roles of the various components that comprised the systems during their life-cycle phases leading to the accident or failure; in many cases, personnel who had participated in the developments were interviewed to gain additional insights about how and why the accidents and failures had developed. Extensive care was exercised to neutralize biases in this work (e.g. triangulation of multiple reliable sources).

Defining failure

In this work, *failure due to Major Accident Events (MAE)* has been defined as realizing undesirable and unanticipated compromises in the *quality* of the engineered system. Quality is characterized as resulting from the integrated effects of five attributes: 1) *serviceability* (fitness for purpose), 2) *safety* (freedom from undue exposure to harm or injury), 3) *durability* (freedom from unanticipated degradation in the quality attributes), 4) *resilience and sustainability* (excess delays in recovering from MAE, inability to provide acceptable Quality without future negative impacts on future generations and the environment), and (5) *compatibility* (meets business and social objectives – on, time, on budget, and happy customers, including the public and the environment).

Defining the System

The *System* involved in development of failures need to be carefully defined and evaluated. Seven primary interactive, inter-related, and highly adaptive components have been defined to characterize Engineered Systems:

- structure (provides support for facilities and operations),
- hardware (facilities, control systems, life support),
- procedures (formal, informal, written, computer software),
- environments (external, internal, social),
- operators (those who interface directly with the system),
- organizations (institutional frameworks in which operations are conducted), and
- interfaces among the foregoing.

This is not a static mechanical System; it is dynamic and organic, changing with time. The work clearly identified the importance of system interfaces in the development of failures; for example, breakdowns in communications frequently developed at the interface between the operators and the organizations that controlled resources, means, and methods; communication malfunctions at organization-to-organization interfaces were even more prevalent.

¹¹ <https://drive.google.com/open?id=1lwzC5yMAqWN7wWH-p0r9kVPOfMhgimKj>
<https://drive.google.com/open?id=1g2kSMaQYgw80uqKTuMqYMELc5xhMI27->
<https://drive.google.com/open?id=1MkQUne3fNEQp3MgiJZ3ptxHAs6VjxQ6S>

Understanding the life-cycle

The work indicated that it was essential to identify how the system had been developed throughout its life-cycle to the point of failure including development of the concept/s, design, construction, operation, maintenance, and for some systems, decommissioning. The history (heritage) of a system generally had much to do with development of failures. This work indicated that in a very large number of cases, the seeds for failure were sown very early in the life of a particular system; during the concept development and design phases. These seeds were allowed to flourish during the operation and maintenance phases, and with the system in a weakened or severely challenged condition, it failed.

Uncertainties

Uncertainties that were major contributors to the accidents and failures have been organized into four major categories:

- natural variability,
- analytical modeling uncertainties,
- human and organizational task performance uncertainties, and
- human knowledge related uncertainties.

Often, it was not possible to develop unambiguous definitions and evaluations of these uncertainties. A fundamental purpose of this definition was to help direct efforts to understand and manage better the sources and effects of the different categories and sources of uncertainties. There is no deep philosophical basis for this definition; it is heuristic.

We have met the enemy

The studies of major failures clearly showed that the factors involved in causation of the failures (direct cost more than 1988 U.S. \$ 1 millions) most often (80 % or more) involved human, organizational and knowledge uncertainties.¹² These were identified as *Extrinsic factors (not belonging to the essential nature)*. In this work, human and organizational performance uncertainties and knowledge related uncertainties were grouped as extrinsic factors. **The remaining 20% of the causation factors involved natural and model related uncertainties.** These were identified as *Intrinsic factors (belonging to the essential nature)*. In this work, natural variability and analytical modeling uncertainties have been grouped as intrinsic factors.

The analyses summarized here have shown that all of the proposed BSEE WCR revisions will result in significant increases in the Extrinsic Uncertainties that are dominant in causation of major failures in offshore oil and gas exploration and production Systems.¹³

Life-cycle failures

Of the extrinsic factors, about 80% of these developed and became evident during operations and maintenance activities; frequently, the maintenance activities interacted with the operations activities in an undesirable way. Of the failures that occurred during operations and maintenance, more than half of these failures could be traced to seriously flawed engineering concept development and design; the physical system may have been designed according to accepted standards and yet was seriously flawed due to limitations and imperfections that were embedded in the standards and/or how they were used. Frequently, engineered systems

¹² <https://drive.google.com/open?id=1wgry5epnbUXfJhorkCoPPno20TuBS418>

¹³ <https://drive.google.com/open?id=1ibet0dTEFEvvdqNhyNJBBrw3BCeT6PoI>
https://drive.google.com/open?id=0B0_jjqbhy5meNINhZVJxQ2JiTDg

were designed that could not be built, operated, and maintained as originally intended. Changes (work-arounds) were made during the construction process to allow the construction to proceed; flaws were introduced by these changes or flaws were introduced by the construction process itself. After the System was placed in operation, modifications were made in an attempt to make the System more workable or to facilitate the operations, and in the process additional flaws were introduced. Thus, during operations and maintenance phases, operations personnel were faced with a seriously deficient or defective System that could not be operated and maintained as intended.

Of the 20% of failures that did not occur during operations and maintenance of the Systems, the percentages of failures developing during the design and construction phases were about equal. There are a large number of ‘quiet’ failures that develop during these phases that represent project failures and frequently these failures end up in legal proceedings.

How's of MAE failures

The classifications of how engineered Systems fail developed here are based on the study of failures and accidents cited earlier. This classification is heuristic and intended to identify the key modes (how's) in which malfunctions or failures develop (why's are not identified). This approach was taken so that when the activities or actions were identified they could be evaluated for mitigation.

Operator malfunctions

There are many different ways to define, classify and describe operator (those who have direct interfaces with the system) malfunctions. Operator malfunctions can be defined as actions taken by individuals that can lead an activity to realize a lower quality and reliability than intended. These are malfunctions of commission. Operator malfunctions also include actions not taken that can lead an activity to realize a lower quality than intended. These are malfunctions of omission. Operator malfunctions might best be described as action and inaction that result in lower than acceptable quality to avoid implications of blame or shame. Operator malfunctions also have been described as mis-administrations and unsafe actions. Operator errors result from operator malfunctions.

Frequently, the causes of accidents are identified as the result of ‘human errors.’ **This identification is seriously flawed because human errors are results, not causes.** This is an important distinction if one is really interested in understanding how malfunctions develop and how their development might be impeded or eliminated.

Operator malfunctions can be described by types of error mechanisms. These include slips or lapses, mistakes, and circumventions. Slips and lapses lead to low quality actions where the outcome of the action was not what was intended. Frequently, the significance of this type of malfunction is small because these actions not are easily recognized by the person involved and in most cases easily corrected.

Mistakes can develop where the action was intended, but the intention was wrong. Circumventions (violations, intentional short-cuts) are developed where a person decides to break some rule for what seems to be a good (or benign) reason to simplify or avoid a task. Mistakes are perhaps the most significant because the perpetrator has limited clues that there is a problem. Often, it takes an outsider to the situation to identify mistakes.

Based on studies of available accident databases on engineered systems, and studies of case histories in which the acceptable quality of these systems has been compromised, a taxonomy of human malfunctions is summarized as follows:

- Communications – ineffective transmission of information
- Slips – accidental lapses
- Violations – intentional infringements or transgressions

- Ignorance – unaware, unlearned
- Planning & Preparation – lack of sufficient program, procedures, readiness, and robustness
- Selection & Training – not suited, educated, or practiced for the activities
- Limitations & Impairment – excessively fatigued, stressed, and having diminished senses
- Mistakes – cognitive malfunctions of perception, interpretation, decision, discrimination, diagnosis, and action

The sources of mistakes or cognitive malfunctions (operators, organizations) are:

- Perception – unaware, not knowing
- Interpretation – improper evaluation and assessment of meaning
- Decision – incorrect choice between alternatives
- Discrimination – not perceiving the distinguishing features
- Diagnosis-incorrect attribution of causes and or effects
- Action- improper or incorrect carrying out activities

This study of MAE failures clearly indicates that the single leading factor in operator malfunctions is communication breakdowns. Communications can be very easily flawed by ‘transmission’ problems and ‘reception’ problems. Feedback that is so important to validate communications frequently is not present nor encouraged. Language, culture, societal, physical problems, and environmental influences can make this a very malfunction prone process. In team settings, 'authority gradients' (lethal arrogance) are frequently responsible for breakdowns in communications ("do not bother me with the facts, I already have my mind made up").

Organization malfunctions

Analysis of the history of failures of engineered systems provides many examples in which organizational malfunctions have been primarily responsible for the failures. Organization malfunction is defined as a departure from acceptable or desirable practice on the part of a group of individuals that results in unacceptable or undesirable results. Based on the study of case histories of failures of engineered systems, studies of Higher Reliability Organizations (HRO) that are able to consistently deliver High Reliability Systems (HRS), a classification of organization malfunctions is as follows:

- Communications – ineffective transmission of information
- Culture – inappropriate goals, incentives, values, and trust
- Violations – intentional infringements or transgressions
- Ignorance – unaware, unlearned
- Planning & Preparation – lack of sufficient program, procedures, readiness
- Structure & Organization – ineffective connectedness, interdependence, lateral and vertical integration, lack of sufficient robustness
- Monitoring & Controlling – inappropriate awareness of critical developments and utilization of ineffective corrective measures
- Mistakes – cognitive malfunctions of perception, interpretation, decision, discrimination, diagnosis, and action

Frequently, the organization develops high rewards for maintaining and increasing production; meanwhile the organization hopes for quality and reliability (rewarding ‘A’ while hoping for ‘B’). The formal and informal rewards and incentives provided by an organization have a major influence on the performance of operators and on the quality and reliability of engineered systems. In a very major way, the performance of people is influenced by the incentives, rewards, resources, and disincentives provided by the organization. Many of these aspects are embodied in the ‘culture’ (shared beliefs, artifacts) of an organization. This culture largely results from the history (development and evolution) of the organization. Cultures are extremely resistant to change.

Several examples of organizational malfunctions recently have developed as a result of efforts to down-size and out-source as a part of re-engineering organizations. Loss of corporate memories (leading to repetition of errors), inadequate 'core competencies' in the organization, creation of more difficult and intricate communications and organization interfaces, degradation in morale, unwarranted reliance on the expertise of outside contractors, cut-backs in quality assurance and control, and provision of conflicting incentives (e.g. cut costs, yet maintain quality) are examples of activities that have led to substantial compromises in the intended quality of systems. Much of the down-sizing ('right-sizing'), outsourcing ('hopeful thinking'), and repeated cost-cutting ('remove the fat until there is no muscle or bone') seems to have its source in modern 'business consulting.' While some of this thinking can help promote 'increased efficiency' and maybe even lower CapEx (Capital Expenditures), the robustness (damage and defect tolerance) of the organization and the systems it creates can be greatly reduced. Higher OpEX (Operating Expenditures), more 'accidents', and unexpected compromises in desired quality and reliability can be expected; particularly over the long-run.

Experience indicates that one of the major factors in organizational malfunctions is the culture of the organization. Organizational culture is reflected in how action, change, and innovation are viewed; the degree of external focus as contrasted with internal focus; incentives provided for risk taking; the degree of lateral and vertical integration of the organization; the effectiveness and honesty of communications; autonomy, responsibility, authority and decision making; rewards and incentives; and the orientation toward the quality of performance contrasted with the quantity of production. The culture of an organization is embedded in its history.

One of the major culture elements is how managers in the organization react to suggestions for change in management and the organization. Given the extreme importance of the organization and its managers on quality and reliability, it is essential that these managers see suggestions for change (criticism?) in a positive manner. This is extremely difficult for some managers because they do not want to relinquish or change the strategies and processes that helped make them managers.

Structure / hardware / equipment malfunctions

Human malfunctions can be initiated by or exacerbated by poorly designed and engineered systems that invite errors. Such systems are difficult to construct, operate, and maintain. A classification system for hardware (equipment, structure) related malfunctions is as follows:

- Serviceability – inability to satisfy purposes for intended conditions
- Safety – excessive threat of harm to life and the environment, demands exceed capacities
- Durability – occurrence of unexpected maintenance and less than expected useful life
- Resilience & Sustainability – delayed recovery from MAEs, and inability to deliver required Quality characteristics without undue negative impacts on future generations and the environment
- Compatibility – unacceptable and undesirable economic, schedule, and aesthetic characteristics

New technologies compounds the problems of latent system flaws (structural pathogens). Excessively complex design, close coupling (failure of one component leads to failure of other components) and severe performance demands on systems increase the difficulty in controlling the impact of human malfunctions even in well operated systems. The field of ergonomics (people-hardware interfacing) has much to offer in helping create 'people friendly' engineered systems. Such systems are designed for what people will and can do, not what they should do. Such systems facilitate construction (constructability), operations (operability), and maintenance (maintainability, repairability).

The issues of System Robustness (defect or damage tolerance), design for constructability, and design for IMR (Inspection, Maintenance, Repair) are critical aspects of engineering systems that will be able to deliver acceptable quality. Design of the system to assure robustness is intended to combine the beneficial aspects of configuration, ductility, excess capacity, and appropriate correlation (it takes all four!). The result is a defect

and damage tolerant system that is able to maintain its quality characteristics in the face of HOF malfunctions. This has important ramifications with regard to engineering system design criteria and guidelines.

Design for constructability is design to facilitate construction, taking account of worker qualifications, capabilities, and safety, environmental conditions, and the interfaces between equipment and workers. Design for IMR has similar objectives. Reliability Centered Maintenance (RCM) has been developed to address some of these problems, and particularly the unknowable and HOF aspects.

It has become painfully clear that the majority of engineering design codes and guidelines do not provide sufficient direction for creation of robust – damage – defect tolerance systems. Thinking about sufficient damage tolerance and inherent stability needs rethinking. Thinking about designing for the ‘maximum incredible’ events needs more development. While two engineered systems can both be designed to ‘resist the 100-year conditions’ with exactly the same probabilities of failure, the two structures can have very different robustness or damage stability. The ‘minimum’ CapEx system will not have a configuration, excess capacity, ductility, or appropriate correlation to allow it to weather the inevitable defects and damage that should be expected to develop during its life. Sufficient damage tolerance almost invariably results in increases in CapEx; the expectation and the frequent reality is that OpEx will be lowered. But, one must have a ‘long-term’ view for this to be realized.

Current research has clearly shown that the foregoing statements about structure and hardware robustness apply equally well to organizations and operating teams. Proper configuration, excess capacity, ductility, and appropriate correlation play out in organizations and teams in the same way that they do in a structure and hardware. It is when the organization or operating team encounters defects and damage – and is under serious stress, that the benefits of robustness become evident. A robust organization or operating team is not a repeatedly downsized (lean and mean), out-sourced, and financially strangled organization. A robust organization is a Higher Reliability Organization (HRO) with High Reliability Management (HRM) that consistently develops Higher Reliability Systems (HRS).¹⁴

Procedure & software malfunctions

Based on the study of procedure and software related problems that have resulted in failures of engineered systems, A classification system for procedure or software malfunctions is as follows:

- Incorrect - faulty
- Inaccurate - untrue
- Incomplete - lacking the necessary parts
- Excessive Complexity - unnecessary intricacy
- Poor Organization - dysfunctional structure
- Poor Documentation - ineffective information transmission

These malfunctions can be embedded in engineering design guidelines and computer programs, construction specifications, and operations manuals. They can be embedded in contracts (formal and informal) and subcontracts. They can be embedded in how people are taught to do things. With the advent of computers and their integration into many aspects of the design, construction, and operation of oil and gas structures, software errors are of particular concern because the "computer is the ultimate fool".

Software errors in which incorrect and inaccurate algorithms were coded into computer programs have been at the root cause of several recent failures of engineered system. Guidelines have been developed to address the quality of computer software for the performance of finite element analyses. Extensive software testing is

¹⁴ <https://drive.google.com/open?id=1g2kSMaQYgw80uqKTuMqYMELc5xhMI27->

required to assure that the software performs as it should and that the documentation is sufficient. Of particular importance is the provision of independent checking procedures that can be used to validate the results from analyses. High quality procedures need to be verifiable based on first principles, results from testing, and field experience.

Given the rapid pace at which significant industrial and technical developments have been taking place, there has been a tendency to make design guidelines, construction specifications, and operating manuals more and more complex. Such a tendency can be seen in many current guidelines used for design of engineered systems. In many cases, poor organization and documentation of software and procedures has exacerbated the tendencies for humans to make errors. Simplicity, clarity, completeness, accuracy, and good organization are desirable attributes in procedures developed for the design, construction, maintenance, and operation of engineered systems.

Environmental influences that can promote malfunctions

Environmental influences can have important effects on the quality and reliability of engineered systems. Environmental influences that can promote malfunctions include: 1) external (e.g. wind, temperature, rain, fog, time of day), 2) internal (lighting, ventilation, noise, motions), and 3) sociological and cultural factors (e.g. values, beliefs, morals). Sociological factors proved to be of critical importance in many of the failures that were studied during this work. Sociological factors result in a very wide variety of important human cognitive 'Biases'. These environmental influences can have extremely important effects on human, operating team, and organizational malfunctions, and on the structures and hardware.

Well Control Regulations Revisions

One of the key goals of the BSEE's post-Macondo Well Control Regulations was to implement multiple 'safeguards' so that the foregoing Human and Organizational Factors (HOF) in Well Control Systems could be better prevented and mitigated. These HOF were primarily responsible for causation of the Deepwater Horizon Macondo Well disaster (e.g. the Negative Pressure Test mis-interpretation).¹⁵

Of particular importance in the WCR HOF prevention and mitigation is 'Real-Time Monitoring' (RTM).⁵ RTM implemented processes very similar to those successfully implemented in U.S. commercial aviation in the form of Air Traffic Control and Ground Traffic Control. The primary goal of RTM in Well Control is to have a 'second set' of highly qualified drilling and completions 'experts' observing particular drilling and completion operations to help assure the best possible decisions and actions are being properly implemented to help prevent and mitigate well MAE 'blowouts'.¹⁶ If such a RTM system was operational and functional during BP's drilling of the Macondo well, it is very likely that the Deepwater Horizon blowout would not have occurred.

Of similar importance in the WCR are the measures that specifically address the operational capabilities, redundancy, and robustness (damage and defect tolerance) of Blowout Preventers. Improvements in these capabilities were extensively addressed by the National Academy of Engineering in the 2012 report on the Macondo Well Deepwater Well Blowout: Lessons for Improving the Offshore Drilling Safety.¹⁷ The majority of

¹⁵ <https://drive.google.com/open?id=1sBuFGR30E8PyrbvsqQnburadwqMs9UaG>
https://drive.google.com/open?id=0B0_jjqbhy5meNINhZVJxQ2JiTDg

¹⁶ <https://drive.google.com/open?id=1ibet0dTEFEvvdqNhyNJBBrw3BCeT6PoI>

¹⁷ https://drive.google.com/open?id=1OqOApcakLcm_OJ2cCSDFJuvybWC_sbIj

the WCR revisions proposed by BSEE will degrade and reduce the operational capabilities, redundancy and robustness characteristics of this important ‘last line of defense’ in helping prevent and mitigate uncontrolled blowouts.

Before BSEE removes prescriptive RTM processes from the WCR, and implements the proposed revisions in the Blowout Preventer requirements, as mandated in Section 21(b) of the Outer Continental Shelf Lands Act, BSEE must be required to demonstrate and document validated Quantitative Risk Assessments that these WCR revisions will not result in unnecessarily reducing ‘Safety’ and ‘Reliability’ particularly for High Risk drilling operations (e.g. those involving High Pressure, High Temperature, High Productivity) oil and gas wells. As previously discussed, this demonstration will require proper application of validated Quantitative Risk Assessments (QRA) to achieve well drilling and completion operations with ALARP MAE Risks.

System Risk Assessment & Management

In the section of this commentary that addressed ‘Safety’, it was noted that System Risk Assessment & Management (SRAM) has been successfully implemented by several other countries in their offshore oil and gas resources development regulatory and industrial ‘Higher Risk’ Environments (e.g. United Kingdom, Norway, Australia).¹⁸ In addition, the International Standards Association has issued Standards and Guidelines for Risk Management (ISO 31000).¹⁹

In the U.S., SRAM has been addressed during previous work performed by the Chemical Safety Board (CSB) and the Center for Chemical Process Safety (CCPS) for oil and gas refineries.²⁰ Very useful guidelines have been issued by the CCPS that address the System, HOF, and Life-Cycle Proactive, Reactive, and Interactive SRAM processes. The CSB has very successfully applied these Reactive SRAM processes in their ‘Root Causes Investigations’ of previous MAEs in oil and gas refineries.

Even though the U.S. CSB has repeatedly proposed that these Process Safety Guidelines be implemented in both Government and Industry regulations and operations, the Industry has successfully lobbied to not allow such implementation due to their ‘unnecessary burdens’ on refinery operations. Thus, the U.S.’s traditional ‘Prescriptive’ Safety processes have been continued as the Best Available and Safest Technology (BAST)²¹. Consequently, the ‘Goal Based’ ‘Safety Case’ processes have not been implemented in U.S. oil and gas industry regulations and operations.

¹⁸ <https://drive.google.com/open?id=1YxA3JjQSz2om1h9hdpK6x-iu5ldbwJVq>
<https://drive.google.com/open?id=1J4VMNepzhs2EUBveVVvBUyvJTy3RTmYb>
https://drive.google.com/open?id=1M7kww_kZDhEVaP9w7TKw6vAK_DiwwLbI
<https://drive.google.com/open?id=1z7zeVwcSCQeKE6E1uyyaLUDTM6TrHL-w>
https://drive.google.com/open?id=19gSjUkPEdf4yT8_r3PZZYdzjPElzw7I2

¹⁹ <https://drive.google.com/open?id=1IbrazzXgZ4n9SkF-3FxzCnQnx6kAfBhW>

²⁰ <https://www.csb.gov/>
<https://www.aiche.org/ccps/topics/elements-process-safety/commitment-process-safety/process-safety-culture>

²¹ https://drive.google.com/open?id=1PUeBRYHHbBcfGMvqoirtNz_UPgWArX4G

What is a Safety Case?

Objective based (or goal setting) regimes, including the Safety Case Regime, **are based on the principle that the legislation sets the broad safety goals to be attained and the operator of the facility develops the most appropriate methods of achieving those goals.** A basic tenet is the premise that the ongoing management of safety is the responsibility of the operator and not the regulator.

A safety case is a document produced by the operator of a facility which:

- _Identifies the hazards, uncertainties (natural, analytical, task performance, knowledge development and utilization), and Risks (Likelihoods and Consequences of MAEs),
- _Describes how the risks are controlled, and
- _Describes the safety management systems in place to ensure the controls are effectively and consistently applied.

Safety Cases must be produced by the operator of a facility

- _The principle is that those who create the risk must manage it. It is the operators' job to assess their processes, procedures and systems to identify and evaluate risks and implement the appropriate controls, because the operator has the greatest in-depth knowledge of their installation.

The Safety Case must identify the safety critical aspects of the facility, both technical and managerial.

- _Analysis of disasters almost always show a combination of technical and managerial flaws which have led to the event occurring.

Appropriate performance standards must be defined for the operation of the safety critical aspects.

- _A 'performance standard' is a standard, established by the operator, of the performance required of a system, item of equipment, person or procedure which is used as a basis for managing the risk of a major accident event.

The workforce must be involved.

- _Workforce involvement is necessary so they know what happens in practice and why. This makes it more likely that they do the right thing because they know why, rather than relying on a 'rules-based' culture.

The Safety Case is produced in the knowledge that it will be scrutinised by a competent and independent regulator.

- _The Regulator assesses Safety Cases and 'accepts' a Safety Case if it is satisfied that the arrangements set out in the document demonstrate that the risks will be reduced to as low as is reasonably practicable. Once 'accepted' the Regulator visits facilities to monitor the application of the Safety Cases in practice.

System Safety Prevention & Mitigation 'Barriers'

'Goal Based' regulations and guidelines are intended to develop ALARP MAE Risks during the entire Life-Cycle of a given oil and gas industry System using SRAM processes. SRAM requires appropriate "Barriers" be developed and maintained to prevent, control, and/or mitigate the Likelihoods and Consequences of MAE risks. Prevention and mitigation response barriers (Figure 8) include Proactive (performed before activities), Interactive (performed during activities), and Reactive (performed after activities) approaches to identify, manage, and control system MAE failure Likelihoods and Consequences. Such barriers are intended to be fully integrated and implemented throughout the entire life (from concept development through decommissioning) of an engineered System.

BSEE has proposed several oil and gas exploration and production activities in which the Interactive Risk Management processes would be either eliminated or dramatically reduced, e.g. the Safe Drilling Margins, and replacing BSEE-Approved Verification Organizations (AVOs) with Independent Third Parties. Experience in other offshore oil and gas exploration and production areas (e.g. offshore U.K., Norway, Australia) and my personal experience as a former U.S. Minerals Management Service Certified Verification Agent (1976 – 1989)

have amply demonstrated that all Independent Third Parties do not have the required knowledge, experience, incentives, and cultures to assure proper and effective BAST operations and processes. **BSEE has critically important responsibilities to assure that Safe Drilling Margins are defined and achieved that have ALARP Risks and properly employ BAST requirements. This means that Approved Verification Organizations (AVOs) are an important requirement that must be maintained and further developed and that BSEE has a responsibility to assure that these AVOs properly perform their required responsibilities.**

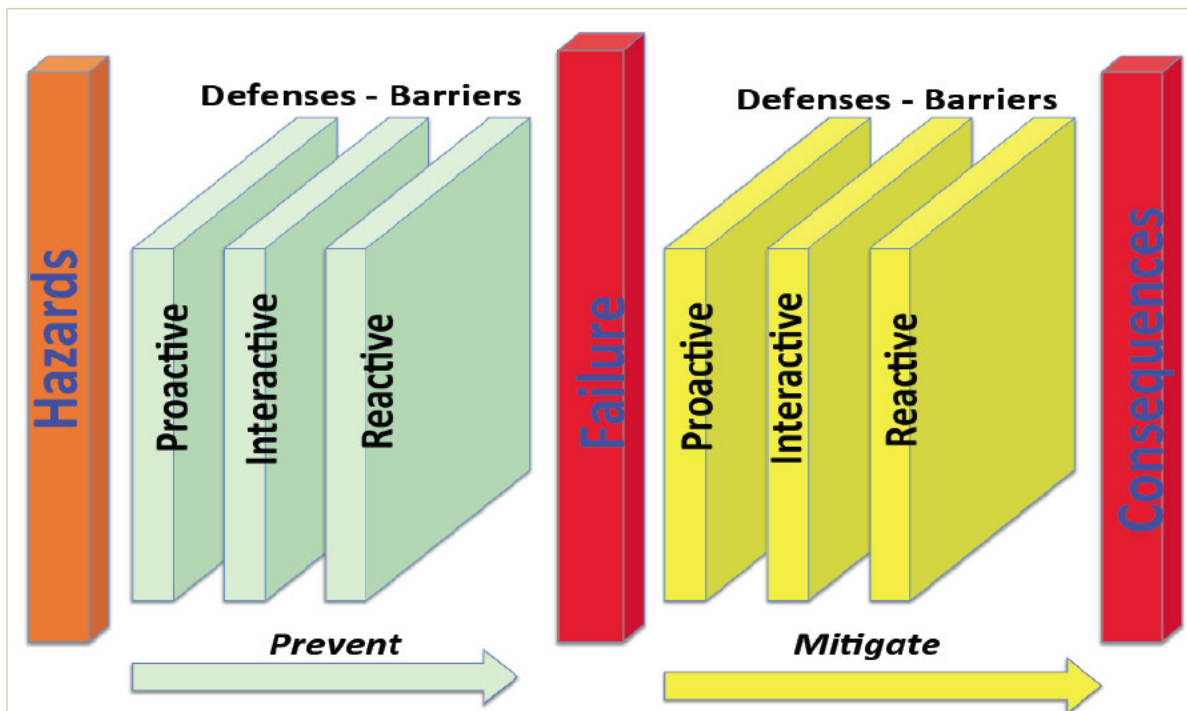


Figure 8: SRAM MAE prevention barriers and consequence mitigation barriers.

The role of SRAM MAE prevention and mitigation barriers during operations of an Engineered System is illustrated by the “Swiss Cheese Model” (Figure 9).²² The barriers are intended to stop hazardous activities from developing disaster causation “spears” that can penetrate or defeat the prevention and mitigation barriers. The barrier “holes” (defects and deficiencies in SRAM) are created by “active activities,” such as unsafe operator acts, and by “latent activities,” such as defects embedded in the system during activities. Active holes are developed by the system “operators” who work at the “sharp end” of the disaster spear. Latent holes are developed by the system’s responsible organization’s “management” (commercial and regulatory) components distributed along the “shaft” (blunt end) of the disaster spear.

²² Process Safety Performance Indicators for the Refining and Petrochemical Industries, ANSI/API Recommended Practice RP-754, First Edition, April 2010, pp. 2, Figure 1.

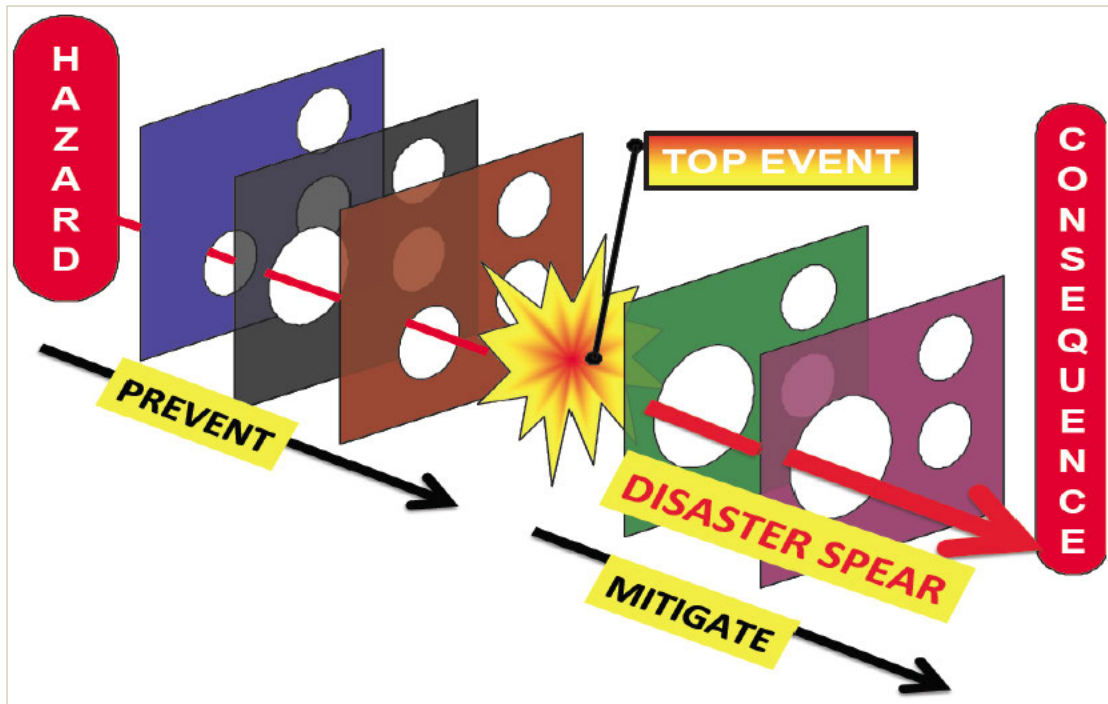


Figure 9: Defective prevention and mitigation barriers allow disaster spear penetration to cause MAEs.

The numbers, sizes, and alignment of SRAM barrier holes are determined primarily by organizational management latent activities. The energy required for the disaster spear to penetrate the aligned barrier defects is provided by the system’s responsible organizational management (i.e., systemic dysfunction in the management organization or its culture). Latent activities encompass lack of sufficient organizational management SRAM cognizance of or attention to major system accident risks, lack of commitment and capabilities to properly assess and manage major accident risks, dysfunctional safety cultures providing inadequate protection for production and long term costs and benefits, and absence of counting (providing valid and validated assessments of risks and short and long term costs and benefits).

The “top event” (sometimes referred to as the initiating event or failure event) is shown in Figure 4 as having barriers on both sides. Prevention barriers are important because they can identify major risks before they occur and thus allow an engineered system to adapt or cease operations in order to reduce risk and consequence levels to tolerable levels. For instance, leading SRAM indicators and a robust and dynamic risk assessment can alert management to the risk of an engineered system on an ongoing and current basis. Additionally, training and safety processes that are in place will act to reduce the human and system malfunction factors that can cause a major event.

When prevention barriers fail, it is a SRAM essential to have barriers in place that will counteract and control or mitigate the failure. These counter measures address aspects of vital importance in responding to the top event in an effective manner. For example, mitigation barrier considerations address the system’s vulnerability to escalation from a loss of containment event and seek to harden the system’s tolerance to such events, such as increasing structural or thermal robustness by providing redundancy, resilience, and similar means of increased capacity to counter failure consequences. The mitigation barriers must be fit-for-purpose.

Perhaps, the best evidence that justifies effective adoption and application of Safety Case Regime SRAM processes are the results from ‘in-the-field’ operations in the U.S. (traditional experience based Prescriptive regulations) and North Sea (Safety Case Regime Goal Based regulations). Almost 2 decades of experience in both offshore drilling and production well drilling have resulted in actual rates of occurrence of uncontrolled blowouts that are 10 to 100 times greater in U.S. offshore drilling operations

than in the Safety Case Regimes in the North Sea.²³ This evidence has clearly demonstrated that strong and capable industry with ‘Safe’ operations requires equally strong and capable System Risk Assessment and Management governance.

BSEE and the offshore oil and gas industry should do what is ‘right’ (not ‘expedient’) to effectively develop the capabilities to effectively implement Safety Case Regime regulations in future U.S. oil and gas drilling and production operations. Long-term (10+ years) studies of 7 U.S. organizations that have been successful and unsuccessful in development and maintenance (Implementation) of SRAM approaches and strategies that result in High Reliability Systems have shown that “5 Cs” are needed to enable success:²⁴

- **Cognizance:** clear and continuous recognition of the threats and hazards that confront a system’s abilities to realize acceptable performance and reliability (risk ‘creep’);
- **Capabilities:** organizations – industrial and regulatory - that have the shared knowledge, rules, skills, and other necessary resources to address all of the components that comprise a system during its life-cycle with particular emphasis on the “human” and “organizational” aspects;
- **Commitment:** top-down and bottom-up unwavering devotion of management, leadership, and follower-ship (teamwork) to a continuous program of improvement in the performance and reliability of the system;
- **Culture:** shared beliefs, attitudes, values, feelings, and resource allocation processes that bring into balance pressures of system Productivity and Protection thereby enabling realization of acceptable performance and reliability during the life of the system²⁵; and
- **Counting:** realistic quantitative analyses of system MAE risks coupled with effective financial (monetary costs and benefits) and social incentives (positive and negative) and validated metrics to encourage development and maintenance of Systems that have ALARP Risks of MAEs.

The organizations that were not successful unintentionally developed defects or deficiencies in one or more of the “5 Cs.” Success in implementation was only realized if *all* of the “5 Cs” were properly developed and maintained all of the time. Strong and capable regulatory ‘governance’ was one of the most important elements that was essential in development and maintenance of the “5 Cs”.

One of the most important of these “5 Cs” is Counting. Counting includes explicit up-front analyses of the “costs and benefits” associated with implementation of SRAM processes and procedures. Development and maintenance of effective SRAM processes and procedures cost substantial amounts of money and other important organizational resources. However, if the SRAM processes and procedures are effective, there are no (or vastly reduced numbers of) future major engineered system failures. There is a natural tension between “Production” (i.e., measured growth and profitability that are sensitive to costs) and “Protection” (resources invested to prevent failures – that do not happen – and that are difficult to “measure” until they happen). If this tension is not properly addressed, then experience has clearly demonstrated that organizations can expect to develop undesirable over-emphasis on engineered system Production (readily measured) and under-emphasis on engineered system Protection (not readily measured), with the attendant and undesirable consequence of major engineered system failures.

²³ https://drive.google.com/open?id=169f23h-KKdKk_zmOz2BLV-fKUIOOQ_Vv
https://drive.google.com/open?id=1iulq67KjT_came5iP5HUMGN2GAZZtXb5
https://drive.google.com/open?id=1rsyk40oDLKS6iY6_SOA8cA5trFZwaarI

²⁴ https://drive.google.com/open?id=1_5tKLZ3ISXzywut7f2iLVq-OAiJRp2Hg

²⁵ <https://drive.google.com/open?id=125cwVXbBfsPizuK5UDvoNaNi7rGv5vHh>

During the past 30 years, I have served as a principal investigator charged with helping determine the ‘Root Causes’ of major system failures and disasters. These failures include the Piper Alpha oil and gas production platform in the North Sea, the grounding of the Exxon Valdez tankship, the crash of the NASA Columbia shuttle, the flooding of the Greater New Orleans Area following Hurricanes Katrina and Rita, the San Bruno, California gas pipeline explosion, the BP Deepwater Horizon Macondo well blowout offshore the coast of Louisiana, and the California Oroville Dam Gated Spillway failures.

I make an important distinction in my work as a primary investigator of major failures (total of more than 30) and in my work to study – perform research on such failures (total of more than 600). My work as a primary investigator has involved extensive ‘boots on the ground’ long-term exposure to the complex systems that were involved in major failures – disasters. These investigations consumed thousands of hours and involved personal discussions with many of those people who were involved in development of the failures. This ‘boots on the ground’ investigation experience consistently has provided ‘deeper’ insights into how and why these disasters happen.

The primary motivation for my work as an investigator has been to learn why the extensive body of knowledge - experience and knowledge about how to prevent major failures was not utilized or if it was utilized, why the technology was not effective at preventing MAEs. **I have summarized what I learned from these MAE investigations as a simple mathematical expression: $A + B = C$.**

- **A** are the important hazard and threat environments in which complex Systems exist.
- **B** are human and organizational deficiencies and defects including hubris, arrogance, complacency, corruption, greed, ignorance, incompetence, and indolence that can degrade the acceptable performance of complex Systems.
- **C** are major System MAEs, failures and disasters that happen sooner or later.

The $A + B = C$ equation makes it clear the primary obstacles to develop and maintain HRO with HRM and HRS are human and organizational defects and deficiencies – the ‘B Factors’. If these defects and deficiencies can be effectively controlled and ameliorated, then there is a high likelihood of developing and maintaining systems that are able to operate successfully in a world that is ambiguous, hazardous, and unforgiving of the effects of the ‘B Factors’.²⁶

Another, and perhaps more helpful way to summarize what has been learned from investigations of major System MAEs, failures and disasters is recognition that all of these failures and disasters resulted when there were important defects and deficiencies in one or more of the 5 Cs. Most of the time, there were important defects and deficiencies in ALL 5 of the Cs. This helps explain why recoveries from MAE System disasters are so difficult. It takes a lot of time and other resources (human, monetary, technology) to be able to achieve and maintain success in effectively dealing with uncertainties to prevent and mitigate MAE System disasters. Experience of those organizations that effectively develop the 5Cs has repeatedly shown investment of these resources can and will pay rich dividends by avoiding the costs of MAEs: **“an Ounce of Prevention is worth a Ton of Cure.”**

²⁶ <https://drive.google.com/open?id=1V9tN84taACaK78ZMuJwBeTXz9BReH4M9>

My last ‘frame of reference’ for the necessity of the ‘5Cs’ regards the causation of the BP Deepwater Horizon Macondo well disaster. In this instance, a primary ‘Root Cause’ of that disaster was BP ‘America’ Management’s drives to save current costs and increase profitability and ‘efficiency’.²⁷ Those drives unintentionally caused a sequence of decisions and actions that resulted in a cost of that disaster that was approximately \$100 U.S. billions (2010).

One of the major motivators for the current proposed BSEE WCR is to reduce ‘unnecessary burdens and costs’ on industry. Like BP America before the Macondo disaster, BSEE management ‘believes’ that the WCR will not adversely affect the ‘Safety’ of future oil and gas offshore exploration and production operations. Beliefs, like hope, do not provide a sufficient basis to achieve the Safety of these operations. **It is critically important that BSEE avoids the ‘B Factors’ in the $A + B = C$ Equation for Disasters.**



Robert G. Bea
Emeritus Professor
College of Engineering
Center for Catastrophic Risk Management
University of California, Berkeley

²⁷ https://drive.google.com/open?id=1OqOApcakLcm_OJ2cCSDFJuvybWC_sbIj
https://drive.google.com/open?id=1nv9r2bOZQBnavfm0QmW_ZDscXACYL4Yx
<https://drive.google.com/open?id=1sBuFGR30E8PyrbvsqQnburadwqMs9UaG>
https://drive.google.com/open?id=1tG4AihE7_nkjbZa6ehM4L7GUGVvfZO6R
https://drive.google.com/open?id=1Svss7VCs2UokTi_nWdT9vzGezvPuqSHj