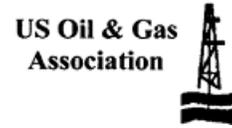




AMERICAN PETROLEUM INSTITUTE



May 23, 2016

The Honorable Howard Shelanski
Administrator
Office of Information and Regulatory Affairs
Office of Management and Budget
725 17th Street, NW
Washington, DC 20503

Re: BSEE Oil and Gas Production Safety Systems Rule

Via email

Dear Administrator Shelanski:

The American Petroleum Institute, the International Association of Drilling Contractors (IADC), the Independent Petroleum Association of America (IPAA), the National Ocean Industries Association (NOIA), the Offshore Operators Committee (OOC), and the US Oil and Gas Association, urge the Office of Information and Regulatory Affairs (OIRA) to exercise its discretion to review the draft final regulations in the Bureau of Safety and Environmental Enforcement's (BSEE) rulemaking proposed as "Oil and Gas and Sulphur Operations on the Outer Continental Shelf—Oil and Gas Production Safety Systems," 78 Fed. Reg. 52,240 (Aug. 22, 2013). This rulemaking would not only make significant changes to the requirements related to offshore oil and gas production safety systems but also, critically, to the regulations related to Best Available and Safety Technology (BAST).

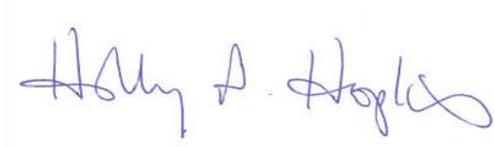
The proposed rule indicated that OIRA and BSEE determined that these regulations are not "significant" under Executive Order 12866. As explained in Attachment A to the attached comment letter, submitted to BSEE when these regulations were proposed, we strongly disagree with that determination. Executive Order 12866 requires that agencies consider all costs associated with a rule, but BSEE has not considered all of the costs and benefits associated with these regulations. Specifically, BSEE did not consider the estimated costs from the proposed revisions to the BAST rule, which would be significant and interject significant uncertainty into the operations and decision-making of regulated entities. In addition, it would contradict the mandate in Executive Order 12866, as reaffirmed in Executive Order 13563, that agencies must minimize the potential for uncertainty. To

ensure that all costs are considered and that uncertainty is minimized, OIRA should review these regulations before they are finalized.

We also have concerns that BSEE has not met its obligations to consider costs under a number of statutes. As explained in Attachment A to the attached comment letter, we are concerned that BSEE has not met its obligations to consider costs under the Regulatory Flexibility Act, the Small Business Regulatory Enforcement Fairness Act, and the Paperwork Reduction Act. Under each of these statutes, BSEE has failed to adequately consider the significant effect that the BAST rule will have on regulated entities, including small entities. OIRA should review these regulations before they are finalized to ensure that BSEE appropriately considers the costs that the regulations will impose.

Once finalized, this regulation will significantly affect development of our nation's resources on the Outer Continental Shelf and, accordingly, the economy as a whole. The BAST rule in particular will create significant uncertainty and impose a variety of new costs on the regulated community. As these important regulations have significant cost and uncertainty implications, we urge OIRA to carefully review them before they are finalized.

Sincerely,



Holly Hopkins, API



Alan Spackman, IADC



Daniel Naatz, IPAA



Randall Luthi, NOIA



Alby Modiano, US Oil and Gas Association

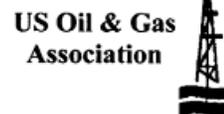


Evan Zimmerman, OOC

Attachment



AMERICAN PETROLEUM INSTITUTE



October 16, 2013

Brian Salerno
Director, Bureau of Safety and Environmental Enforcement
U.S. Department of the Interior
1849 C Street, N.W.
Washington, D.C. 20240

Subject: Oil and Gas and Sulphur Operations on the Outer Continental Shelf—Oil and Gas Production Safety Systems, 1014-AA10

Director Salerno,

The American Petroleum Institute (API), The International Association of Drilling Contractors (IADC), the Independent Petroleum Association of America (IPAA), the National Ocean Industries Association (NOIA), the Offshore Operators Committee (OOC), and the US Oil and Gas Association respectfully submit the following comments on the proposed regulatory changes to the Best Available and Safest Technology (hereinafter “BAST”) requirements in 30 C.F.R. § 250.107. The Bureau of Safety and Environmental Enforcement (“BSEE”) announced these proposed changes on August 22, 2013 in a notice of proposed rulemaking entitled “Oil and Gas and Sulphur Operations on the Outer Continental Shelf – Oil and Gas Production Safety Systems.”

These trade associations represent oil and gas producers who conduct essentially all of the OCS oil and gas exploration and production activities in the Gulf of Mexico. Additionally, many of our members are involved in drilling, construction and support services for the offshore oil and gas industry and will be significantly impacted by this BSEE rulemaking. We respectfully request BSEE to withdraw the proposed changes to the BAST regulations at 30 C.F.R. § 250.107 as soon as possible in order to maintain confidence and certainty in the offshore regulatory

process. The proposed changes to the regulations are premature, unnecessary, and will only lead to uncertainty given BSEE's ongoing efforts to review the process for assessing whether new technologies should be considered to be BAST by the agency.

The proposed changes are premature because BSEE is currently reviewing the process for determining whether new technologies or performance levels should qualify as BAST. This review includes a pending review of a report on "Options for Implementing the Requirement of Best Available and Safest Technologies for Offshore Oil and Gas Operations" by the National Academies and a pending BSEE BAST Technology Transfer Forum on the topic. Given ongoing discussions related to possible changes to the process for assessing new technologies and BAST, it is clearly premature for BSEE to propose changes to the BAST regulatory requirements. The industry stands ready to continue to work with BSEE in its review of the process for determining whether new technology should qualify as BAST. Industry expertise in the application of technologies to offshore operations is crucial to this process.

Furthermore, from the outset, BSEE and its predecessor organizations have developed and implemented an effective system for ensuring the use of BAST in OCS operations. While originally developed and implemented by the U.S. Geological Survey ("USGS"), BSEE today continues to implement an effective BAST program through the combination of regulations, industry standards, plan and permit approvals, alternative compliance approvals, departure approvals, platform verification, inspection and enforcement, training, and the safety alert program. Each of these elements is a component of the overall BAST program and allows the program to evolve over time to address and incorporate advanced and new technologies. The Bureau of Ocean Energy Management and BSEE also review and approve exploration plans, development plans, deepwater operations plans, and permit applications. Operators must now have safety and environmental management systems in place and audited by independent third parties. The robust nature of the BSEE regulations and comprehensive regulatory process provide ample support for the current regulatory provision that states "In general, we consider your compliance with [BSEE] regulations to be the use of BAST."

The proposed changes to the regulations are not necessary in order for BSEE to consider changes to the current process for evaluating new technologies for use as BAST. To the contrary, the proposed changes have the potential to inject significant, disruptive uncertainty into the established system.

Please find attached to this letter Attachment A for our full set of substantive comments, Attachment B for a description of the legislative and regulatory history of the Department of the Interior's BAST program, and Attachment C for a copy of the BAST program as initially created and implemented by the USGS.

Safety is a core value for the oil and natural gas industry. The industry believes that the existing regulations provide a constructive framework for encouraging innovation, the advancement of existing technologies, and the development of new technologies. The industry appreciates the opportunity it has been afforded thus far to provide input to the ongoing review of the process for making BAST determinations, and we look forward to continued engagement on the topic.

These trades and our members are available for further discussions at your convenience. Please feel free to contact us with any questions.

Sincerely,



Erik Milito, API



Alan Spackman, IADC



Daniel Naatz, IPAA



Randall Luthi, NOIA



Allen Verret, OOC



Alby Modiano, US Oil and Gas Association

Attachments

cc: Regulations Development Branch
Assistant Secretary, Land and Minerals, U.S. Department of the Interior

Attachment A
Comments of API, IADC, IPAA, NOIA, OOC and US Oil and Gas
Proposed Revisions to BAST Requirements
Oil and Gas Production Safety Systems Proposed Rulemaking, 1014-AA10
October 16, 2013

API, IADC, IPAA, NOIA, OOC and the US Oil and Gas Association respectfully submit the following comments on the proposed regulatory changes to the BAST requirements in 30 C.F.R. § 250.107, announced on August 22, 2013 in a notice of proposed rulemaking entitled “Oil and Gas and Sulphur Operations on the Outer Continental Shelf – Oil and Gas Production Safety Systems.” 78 Fed. Reg. 52,240.

While the proposed rulemaking is generally intended to address changes to the requirements related to oil and gas production safety systems under Subpart H of Part 250, it also includes amendments to the general requirements under Subpart A, which includes the proposed changes to regulatory language related to BAST. Given the significance of the proposed changes to BAST, we are filing this document to comment solely on those proposed changes, and will provide comments on the proposed changes to Subpart H at a later date.

These national trade associations represent member companies involved in all aspects of the oil and natural gas industry. Our members include producers, refiners, suppliers, pipeline operators, and marine transporters, as well as service and supply companies that support all segments of the industry. Our members include companies engaged at all levels of operations on the Outer Continental Shelf, including operators, drilling contractors, equipment manufacturers, and service supply companies. Our members are dedicated to safety and environmental protection in operations on the Outer Continental Shelf, as demonstrated through the development of API and industry standards and programs that effectively enhance and promote safe operations.

API is also the worldwide leading standards-making body for the oil and natural gas industry. Accredited by the American National Standards Institute (“ANSI”), API has issued approximately 600 consensus standards governing all segments of the oil and gas industry. These include more than 80 standards and recommended practices incorporated or referenced in numerous BSEE regulations.

For the reasons set forth below and in the accompanying documents, we respectfully request that BSEE immediately withdraw the proposed changes to the BAST regulations.

I. The Proposed Regulatory Changes Are Premature Given the Current Efforts of BSEE to Review the Current Process for Determining Whether New Technologies Should be Considered BAST

BSEE is currently awaiting a report that it has requested from the National Academies on “Options for Implementing the Requirement of Best Available and Safest Technologies for Offshore Oil and Gas Operations”. BSEE is also in the process of scheduling a BAST Technology Transfer Forum on the assessment of technologies for BAST determinations in 2014. Given the fact that the National Academies report has yet to be released and the fact that BSEE has yet to hold the BAST forum, it is premature for BSEE to propose changes to the

regulations. BSEE should withhold any changes to the regulatory text of 30 C.F.R. § 250.107 until it gathers the information associated with the National Academies report and the BAST Forum, and until it decides whether any changes will be made to the process for assessing new technologies in relation to BAST.

Indeed, BSEE is currently considering different options for implementing the requirement for BAST in offshore operations. The BAST Technology Transfer Forum is expected to include discussions on various questions related to BAST determinations, such as the types of test procedures, test protocols, and testing methodologies that should be used in making a BAST determination. While BSEE's focus appears to be on whether a new or emerging technology should be considered the best available and safest technology, there remains a great deal of uncertainty about how this may ultimately be resolved. There remain significant questions related to, among other things:

1. The potential scope of the effort;
2. The types of equipment, practices, and systems that may be considered as part of the effort;
3. The potential triggering mechanism for evaluating a new technology;
4. The potential process or processes that may be used by BSEE for BAST determinations;
5. The methods for considering practicability, economic feasibility, and cost/benefit ratios; and
6. The potential impact on the overall regulatory scheme.

These are just a few of the questions that have yet to be sorted out with regard to BSEE's current efforts to consider new options for implementing the BAST requirement. Without answers to these and other questions, BSEE should not be moving forward with changes to the underlying regulations that govern BAST in the offshore. Furthermore, without answers to these questions, BSEE is not in a position to accurately consider the costs and benefits of the regulatory changes. In addition, BSEE is not in a position to determine whether it is meeting its obligations, as described in the latter sections of this document, under the Regulatory Flexibility Act, Executive Order 12866, the Small Business Regulatory Enforcement Fairness Act, and the Paperwork Reduction Act.

The preamble to the proposed rule does not even mention the fact that BSEE is now beginning to consider potential options for assessing new technologies for use as BAST. Any potential new process or changes to the process for determining BAST for new equipment will certainly be considered in the context of the regulatory requirements for BAST by both BSEE and the industry. Therefore, any changes to the regulatory text should be suspended until BSEE completes the process it now has in place to review potential options for determining BAST. In the meantime, the current regulations should be retained and the proposed changes should be withdrawn.

II. The Proposed Regulatory Changes to the BAST Requirements Are Not Warranted or Justified, and Will Only Lead to Uncertainty

Consistent with the statutory mandate, *see* 43 U.S.C. § 1347(b); *infra* Attachment B, the current BAST program is a demonstrated and effective process for ensuring that offshore drilling and production operations use the best available and safest technology, *see infra* Attachments B, C. While originally developed and implemented by the USGS, BSEE today continues to implement an effective BAST program through the combination of regulations, industry standards, plan and permit approvals, alternative compliance approvals, departure approvals, platform verification, inspection and enforcement, training, and the safety alert program. Each of these elements is a key component of the BAST program and allows the program to evolve over time to address and incorporate advanced and new technologies.

While the BSEE regulations are widely recognized as prescriptive in nature, they also include performance standards, safety and environmental management system provisions, and requirements for Deepwater Operations Plans. True to their detailed nature, the BSEE regulations contain requirements outlining the specific equipment, practices and systems that must be used in many offshore operations. Furthermore, the BSEE regulations incorporate by reference more than 80 API specifications, recommended practices, and standards. The development of API standards documents typically involves participation and/or observation by BSEE staff. API standards are based upon proven and sound engineering practices, and are reviewed on a five-year cycle (sometimes at a faster rate). Any change to regulation involves the notice and comment process and thereby includes the opportunity for open public engagement. Furthermore, the Bureau of Ocean Energy Management and BSEE review and approve exploration plans, development plans, deepwater operations plans, and permit applications. Operators must also ensure that safety and environmental management systems are in place and audited by independent third parties. The robust nature of the BSEE regulations and comprehensive regulatory process provide ample support for the current regulatory provision that states “In general, we consider your compliance with [BSEE] regulations to be the use of BAST.” 30 C.F.R. § 250.107(c).

But the regulations do not stop there. The regulations then state that “The Director may require additional measures to ensure the use of BAST.” 30 C.F.R. § 250.107(d). This allows BSEE to utilize the planning and permitting process to confirm that BAST is in use. Other programs such as platform verification, inspection and enforcement, training and the safety alerts program support the BAST objectives.

The BAST program goes beyond the documentation and application components. BSEE also analyzes data and information to evaluate potential improvements in the use of BAST. BSEE gathers information on an ongoing basis through its reporting requirements, including data on fatalities, injuries, fires, explosions, collisions, spills, and loss of well control, among other things. The collection of these safety performance indicators provides BSEE with important information for considering potential emerging issues related to BAST.

BSEE has utilized assessment and research programs in order to assist in the implementation of an overall BAST program. The Deepwater Horizon Study Group (Study Group) issued a working paper in January 2011 that outlined the use of the TAR program as one part of the overall BAST program:

“As the BOEMRE [Bureau of Ocean Energy Management, Regulation and Enforcement – the predecessor agency to BSEE] is continually seeking to determine the best available and safest technologies, the bureau has implemented a Technology Assessment and Research (TA&R) Program as part of their safety program in which universities, private firms, and government laboratories are awarded contracts to perform such research. According to BOEMRE: ‘the TA&R Program was established in the 1970’s to ensure that industry operations on the Outer Continental Shelf incorporated the use of Best Available and Safest Technologies (BAST) subsequently required through the 1978 OCSLA amendments.’”

Khorsandi, *Summary of Various Risk-Mitigating Regulations and Practices applied to Offshore Operations*, p. 14. And there are additional programs and regional technology assessment groups that BSEE utilizes from a research standpoint.

The Study Group paper recognizes that a BAST program is currently in place: “‘Best available and safest technologies’ (BAST) is a term used to describe a program or system to be implemented into drilling and production operations in the OCS, in order to ensure operations which are safe and environmentally conscious. Rather than providing an exact meaning, the term is used to encourage a program which constantly evolves and takes advantage of the advancements in technology.” *Id.* at 13. The Study Group noted that “the BAST program was developed under the authority of the USGS....” *Id.*

From the time the OCSLA was amended to include the BAST requirement, *see infra* Attachments B, C, the Department of the Interior has had an effective program in place to ensure the use of BAST. The proposed regulation does not appear to account for the existence and strength of the current BAST program. Whereas the current regulation interprets the statute by describing how the use of BAST is applied through the regulatory regime, the proposed language simply attempts to restate the statute. Under the proposed language, the BAST rule would read:

(c)(1) Wherever failure of equipment may have a significant effect on safety, health, or the environment, you must use the best available and safest technology (BAST) that BSEE determines to be economically feasible on:

(i) All new drilling and production operations and

(ii) Wherever practicable, on existing operations.

(2) You may request an exception by demonstrating to BSEE that the incremental benefits of using BAST are clearly insufficient to justify the incremental costs of utilizing such technologies.

78 Fed. Reg. at 52,261 (proposed amendment to 30 C.F.R. § 250.107).

The existing regulatory text carries out BSEE’s statutory duty to require BAST “***which the Secretary determines to be economically feasible . . .***” 43 U.S.C. § 1347(b) (emphasis added) by defining and identifying BAST in terms of BSEE’s regulations, and by requiring additional

measures as determined to be necessary by the Director. *See supra* p. 3. In contrast, the proposed regulation does not answer the question of how BSEE will ensure the application of BAST.

Adding to the uncertainty, the proposed text appears to require the operator to demonstrate that the incremental benefits of using BAST are insufficient to justify the costs. This would improperly shift a burden the statute squarely places on BSEE. *See id.* (stating that BAST need not be required “where the Secretary determines that the incremental benefits are clearly insufficient to justify the incremental costs of utilizing such technologies”). At a minimum, there is ambiguity surrounding this “exception” process and every effort should be made to create certainty and prevent delay in the process.

Furthermore, the proposed changes to the regulations are not necessary in order for BSEE to consider changes to the current process for evaluating new technologies for use as BAST. The statute and existing regulations allow the process itself to change, as long as that process includes a mechanism by which BSEE imposes only those BAST requirements it has determined to be economically feasible. For these reasons, we respectfully request BSEE to withdraw this proposal to amend the existing regulations.¹

III. BSEE Has Not Met Its Obligations Under the Regulatory Flexibility Act in Considering the BAST Rule

Under the Regulatory Flexibility Act (“RFA”), 5 U.S.C. § 601, *et seq.*, an agency “promulgating a rule that will have a ‘significant impact’ on ‘small entities’ [is] required to ‘prepare and make available for public comment an initial regulatory flexibility analysis . . . [that] describe[s] the impact of the proposed rule’ on those entities, and to publish a ‘final regulatory analysis’ with the final rule.” *Cement Kiln Recycling Coal. v. Env’tl. Protection Agency*, 255 F.3d 855, 868 (D.C. Cir. 2001) (quoting 5 U.S.C. §§ 603, 604, 605) (first alteration added). The RFA prescribes specific factors that must be considered and disclosed by an initial regulatory flexibility analysis, *see* 5 U.S.C. § 603(b)(1)–(5), (c), and by a final regulatory flexibility analysis, *see id.* § 604(a)(1)–(6). “This procedure is intended to evoke commentary from small businesses about the effect of the rule on their activities, and to require agencies to consider the effect of a regulation on those entities.” *Cement Kiln*, 255 F.3d at 868.

While “[a]n agency may dispense with the regulatory [flexibility] analysis if it certifies ‘that the rule will not, if promulgated, have a significant economic impact on a substantial number of small entities,’” *Cement Kiln*, 255 F.3d at 868 (quoting 5 U.S.C. § 605(b)), that certification must be based upon a full consideration of the impacts of the proposed rule on directly regulated entities, *see Aeronautical Repair Station Ass’n v. Fed. Aviation Admin.*, 494 F.3d 161, 175–78 (D.C. Cir. 2007).

In its Notice of Proposed Rulemaking (“NPRM”), BSEE concluded that “this rule is not likely to have a significant economic impact and, therefore, an initial regulatory flexibility analysis is not required by the RFA.” 78 Fed. Reg. at 52,254. BSEE thus “certifie[d] that this proposed rule

¹ To the extent that the existing regulations are inconsistent with the statute as it pertains to the use of the term “wherever practicable,” We agree that the regulations could be amended to clarify that this term applies only to the use of BAST on existing operations.

would not have a significant economic effect on a substantial number of small entities,” *id.* at 52,253, but, “in the interest of transparency,” provided a contractor-prepared Initial Regulatory Flexibility Analysis in support of the certification, *see id.* at 52,254. *See also* AA-10 Subpart H Production Safety Systems Regulatory Flexibility Analysis (“Initial Regulatory Flexibility Analysis”). In light of the NPRM and Initial Regulatory Flexibility Analysis, however, this certification is inadequate to discharge BSEE’s obligations under the RFA.

Here, both the NPRM and Initial Regulatory Flexibility Analysis consider only the estimated impacts of proposed revisions to “Subpart H, Oil and Gas Production Safety Systems,” Initial Regulatory Flexibility Analysis at 27; *see also* 78 Fed. Reg. at 52,254–55, and, in particular, the estimated costs of seven provisions of Subpart H, *see* Initial Regulatory Flexibility Analysis at 28–33; *see also* 78 Fed. Reg. at 52,254–55. The analysis—and, by extension, the resulting certification of no significant impact—omits any consideration of estimated impacts from BSEE’s proposed revision to the BAST rule in Subpart A.²

Yet, as described above, by eliminating the longstanding general equivalence of regulatory compliance with BAST, BSEE’s proposed revisions to the BAST rule will have significant impacts upon regulated entities. *See supra* pp. 3-5. *See also infra* Attachment B. In brief, BSEE’s proposal creates uncertainty for regulated entities as it relates to whether their planned and ongoing operations meet BAST—even where those operations are permitted and otherwise in compliance with BSEE regulations. BSEE does not appear to have considered the impacts to regulated entities associated with this uncertainty. By excluding potential impacts arising from the proposed BAST rule, BSEE has not met its obligations under the RFA, *See Aeronautical Repair Station Ass’n*, 494 F.3d at 176–78 (holding agency in violation of RFA where consideration of economic impacts was incomplete due to exclusion of impacts on certain classes of directly regulated entities)³ and issuance of a final rule without consideration of such impacts would constitute arbitrary and capricious agency action in violation of the Administrative Procedure Act, *see Allied Local & Regional Mfrs. Caucus v. U.S. Env’tl. Protection Agency*, 215 F.3d 61, 79 (D.C. Cir. 2000) (noting “we may consider [arguments that agency violated RFA] in determining whether [agency] complied with the overall requirement that an agency’s decision making be neither arbitrary nor capricious”).

IV. BSEE Has Not Considered All Costs and Benefits Under Executive Order 12866

Executive Order 12866 announces a national policy that, “[i]n deciding whether and how to regulate, agencies should assess *all* costs and benefits of available regulatory alternatives, including the alternative of not regulating,” and “should select those approaches that maximize net benefits” Exec. Order 12866, § 1(a), 58 Fed. Reg. 51,735 (Sept. 30, 1993) (emphasis

² BSEE candidly concedes that “the proposed rule would affect a substantial number of small entities,” which BSEE calculates comprise approximately “69 percent . . . of the companies operating on the OCS” 78 Fed. Reg. at 52,254.

³ In addition to the absence of analysis regarding estimated costs to small entities, the Initial Regulatory Flexibility Analysis’s and NPRM’s failure to consider the BAST rule’s implications under the RFA indicates that BSEE has also not “descri[bed] . . . any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant impact . . . on small entities.” 5 U.S.C. § 603(c). *See also id.* § 604(6). As explained above, *see supra* pp. 3–5, the existing BAST rule more consistently implements the BAST obligations imposed upon BSEE by the OCSLA, and does not impose new costs of uncertainty upon regulated entities.

added). *See also R.J. Reynolds Tobacco Co. v. Food & Drug Admin.*, 696 F.3d 1205, 1220 n.14 (D.C. Cir. 2012). Executive Order 12866 therefore directs each agency to, among other things, “propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs,” Exec Order 12866, § 1(b)(6), “tailor its regulations to impose the least burden on society,” *id.*, § 1(b)(11), and “minimiz[e] the potential for uncertainty . . .,” *id.*, § 1(b)(12). The Executive Order thus imposes a direct obligation upon a promulgating agency to conduct an economic analysis of proposed regulations.

For “significant regulatory actions,” the Office of Information and Regulatory Affairs (“OIRA”) further reviews the anticipated costs and benefits of an agency’s proposed regulation. *See* Exec. Order 12866, § 6(a), (b). Such significant regulatory action is, among other things,

[A]ny regulatory action that is likely to result in a rule that may:

(1) Have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local or tribal governments or communities”

Id., § 3(f)(1). “Absent a material change,” a proposed regulation “will not be subject to review” by OIRA if the promulgating agency indicates to OIRA that “it believes” the proposed regulation is not a significant regulatory action, unless OIRA notifies the agency—within 10 days of receiving a list of all of the agency’s planned regulatory actions—that the proposed regulation is significant within the meaning of Executive Order 12866. *See id.*, § 6(a)(3)(A); *id.*, § 6(b)(1). The Executive Order thus imposes a separate procedural obligation upon a promulgating agency.

The NPRM and its supporting documentation indicate that both BSEE and “[t]he OIRA determined that [] this rule is not a significant rulemaking under [Exec. Order] 12866.” 78 Fed. Reg. at 52,252. *See also* AA-10 Subpart H Production Safety Systems Economic Analysis (“Economic Analysis”), at 4 (noting BSEE’s determination that proposal is not significant). The NPRM also explains that “BSEE had an outside contractor prepare an economic analysis to assess the anticipated costs and potential benefits of the proposed rulemaking.” 78 Fed. Reg. at 52,252. However, both the NPRM and Economic Analysis consider only the potential costs and benefits of the proposed regulation’s provisions “amend[ing] and updat[ing] the 30 CFR Subpart H, Oil and Gas Production Safety Systems” Economic Analysis at 4. *See also id.* at 5, 8–19 (describing costs of eight proposed changes to Subpart H). Again, the analysis—and, by extension, the resulting determination that the proposed regulation is not significant—omits any consideration of estimated impacts from BSEE’s proposed revision to the BAST rule in Subpart A.

By excluding the potential costs arising from the proposed BAST rule, BSEE has not met its substantive or procedural obligations under Executive Order 12866. Substantively, Executive Order 12866 directs an agency to consider “all costs” associated with its proposed regulation and alternatives. Exec. Order 12866, § 1(a). Yet BSEE has omitted the costs arising from the significant uncertainty the BAST rule interjects into the operations and decision making of regulated entities that have long depended upon BSEE’s regulations and regulatory process for

implementing BAST in their offshore planning. *See supra* pp. 3–5; *see also infra* Attachments B, C. Moreover, the uncertainty caused by the proposed BAST rule directly contradicts Executive Order 12866’s command to “minimiz[e] the potential for uncertainty” in regulations. *Id.*, § 1(b)(12). *See also* Exec. Order 13563, § 1(a), 76 Fed. Reg. 3,821 (Jan. 18, 2011) (reaffirming Executive Order 12866’s goal to “promote predictability and reduce uncertainty” in regulations). Rather, the proposed BAST rule’s failure to identify BAST compounds the uncertainties faced by the oil and gas industry, which BSEE acknowledges “has shown interest in employing new technologies” as “production on the OCS has moved into deeper waters.” 78 Fed. Reg. at 52,252.

Procedurally, the failure to consider the potential costs of uncertainty caused by the proposed BAST rule undermines the determinations by BSEE and OIRA that the proposed regulation is not a “significant regulatory action” subject to OIRA review. Indeed, neither agency appears to have considered the potential for a material “adverse[] affect . . . [on] the economy, a sector of the economy, [or] productivity,” Exec. Order 12866, § 3(f)(1), resulting from the significant uncertainties caused by the proposed BAST rule, *see supra* pp. 3–5. BSEE’s and OIRA’s present determinations therefore lack adequate support in the record.

V. BSEE Must Consider the Effects of the Proposed BAST Rule In Order to Meet Its Obligations Under the Small Business Regulatory Enforcement Fairness Act

The Small Business Regulatory Enforcement Fairness Act, 5 U.S.C. § 801, *et seq.*, provides that, “[b]efore a rule can take effect, the Federal agency promulgating such rule shall submit to each House of the Congress” a report on the proposed rule and “submit to the Comptroller General . . . the agency’s actions relevant to [the RFA]” 5 U.S.C. § 801(a)(1)(A)–(B). For a “major rule,” the congressional review is more searching because the “Comptroller General shall provide a report . . . to the committees of jurisdiction in each House of the Congress” that “shall include an assessment of the agency’s compliance with procedural steps required by,” *inter alia*, the RFA, *id.* § 801(a)(2)(A), thereby providing the Congress with additional information to consider, among other things, passing a joint resolution of disapproval relating to the rule prior to the rule’s effective date, *see id.* §§ 801(a)(2)–(3), 801(b); *see also id.* § 802.

A “major rule” is

[A]ny rule that the Administrator of the Office of Information and Regulatory Affairs of the Office of Management and Budgets finds has resulted in or is likely to result in —

(A) an annual effect on the economy of \$100,000,000 or more;

(B) a major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions; or

(C) significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises in domestic and export markets.

Id. § 804(2). In the NPRM, BSEE concluded that the proposed rule does not meet these criteria, and therefore “[t]he proposed rule is not a major rule.” 78 Fed. Reg. at 52,255. Accordingly, BSEE will not submit to the Comptroller General the additional reports that form the basis of the more searching congressional review reserved for a “major rule.” *See* 5 U.S.C. § 801(a)(2)(A).

BSEE’s decision, however, lacks adequate support in the record. Indeed, the agency’s “major rule” determination expressly incorporates the small entity compliance costs calculated by the Initial Regulatory Flexibility Analysis that considered only the proposed revisions to “the requirements for oil and gas production safety systems.” *See* 78 Fed. Reg. at 52,255. BSEE therefore has not considered the potential for “significant adverse effects on,” among other things, “investment [or] productivity” resulting from the significant uncertainties caused by the proposed BAST rule. *See supra* pp. 3–5. Because BSEE’s conclusion rests, in large part, upon its flawed RFA analysis, the NPRM’s determination that the proposed rule is not a “major rule” lacks adequate support.

VI. BSEE’s Consideration of the BAST Rule Has Not Met Its Obligations Under the Paperwork Reduction Act

Under the Paperwork Reduction Act (“PRA”), 44 U.S.C. § 3501, *et seq.*, “[a]n agency shall not conduct or sponsor the collection of information unless in advance of the adoption . . . of the collection of information” the agency has, among other things, (1) reviewed the need for the collection, (2) solicited and evaluated public comments on “whether the proposed collection of information is necessary for the proper performance of the functions of the agency” and on “the accuracy of the agency’s estimate of the burden” of the collection, (3) submitted the proposed collection to the Office of Management and Budget (“OMB”) for review, and (4) obtained OMB’s approval for the collection. *See* 44 U.S.C. § 3507(a); *id.* § 3506(c)(2). For purposes of the PRA, a collection of information includes “recordkeeping requirements.” *See id.* § 3502(3); *Darrell Andrews Trucking, Inc. v. Fed. Motor Carrier Safety Admin.*, 296 F.3d 1120, 1133 (D.C. Cir. 2002).

The NPRM acknowledges that “[t]his proposed rule contains a collection of information,” which “will be submitted to the [OMB] for review and approval” 78 Fed. Reg. at 52,255. Indeed, BSEE recognized that the proposed BAST rule “would impose a new [information collection] requirement,” *id.*, in proposed 30 C.F.R. § 250.107(c)(2)’s new provision permitting a regulated entity to request an exception from the BAST requirement “by demonstrating to BSEE that the incremental benefits of using BAST are clearly insufficient to justify the incremental costs of utilizing such technologies,” *id.* at 52,261. BSEE determined that this new requirement would impose an additional 10 hours of collection burden over the existing regulations. *See id.* at 52,256. BSEE estimated that a regulated entity would average two responses each year, with each response imposing a 5-hour burden. *See id.*

For all of the new collection requirements, BSEE “specifically solicit[ed] comments” on whether, among other things, “the [information collection] [is] necessary or useful for us to perform properly,” and “the proposed burden [is] accurate.” *Id.* at 52,260.⁴

⁴ On August 26, 2013, OMB issued a Notice indicating that (1) approval of BSEE’s existing regulations remains in effect, (2) “OMB is withholding approval [of the proposed rule] at this time,” and (3) prior to publication

The proposed BAST rule’s information collection is not “necessary for the proper performance of the functions” of BSEE. 44 U.S.C. § 3506(c)(2)(A)(i). Rather, the proposed BAST rule eliminates the longstanding provisions equating BAST with compliance with BSEE’s regulations, and thus creates significant uncertainty as to the standards regulated entities must meet to satisfy BAST, and the circumstances under which regulated entities must seek an exception from BAST requirements pursuant to the information collection provisions of 30 C.F.R. § 250.107(c)(2). *See supra* pp. 3–5; *see also infra* Attachment B. In taking a step backward from the existing regulation, BSEE has not indicated how it intends to determine BAST as required by statute.

Nor is “the agency’s estimate of the burden of the proposed collection of information” accurate. 44 U.S.C. § 3506(c)(2)(A)(ii). Because the proposed BAST rule creates significant uncertainty as to the meaning of BAST, *see supra* pp. 3–5, that uncertainty is likely to force regulated entities to request exceptions from BAST under 30 C.F.R. § 250.107(c)(2) in order to ensure approval of their specific operations. In light of the need for regulated parties to confirm their compliance with the proposed BAST rule despite its significant uncertainty in the meaning of BAST, BSEE’s PRA burden analysis—which estimates an average of only two 30 C.F.R. § 250.107(c)(2) collections per year—likely underestimates the information collection burden.⁵

VII. Conclusion

We respectfully request that BSEE withdraw the proposed changes to the BAST regulations at 30 C.F.R. § 250.107 as soon as possible in order to maintain confidence and certainty in the offshore regulatory process. Changes to the regulations are premature, unnecessary, and will only lead to uncertainty given BSEE’s ongoing efforts to review the process for assessing whether new technologies should be considered to be BAST by the agency. Furthermore, BSEE has not met its obligations under the Regulatory Flexibility Act, Executive Order 12866, the Small Business Regulatory Enforcement Fairness Act or the Paperwork Reduction Act in considering the proposed changes.

of the final rule, BSEE “must submit to OMB a summary of all comments related to the information collection contained in the proposed rule and the agency response.” ICR Reference Number 201206-1014-002, Notice of Office of Management and Budget Action, *available at* <http://www.reginfo.gov/public/do/DownloadNOA?requestID=243977>. Ultimately, OMB “can approve, disapprove, or ‘instruct the agency to make substantive or material change’” to a proposed collection of information. *CTIA-The Wireless Ass’n v. Fed. Communications Comm’n*, 530 F.3d 984, 987 (D.C. Cir. 2008) (quoting 44 U.S.C. § 3507(e)(1)).

⁵ By requiring regulated entities to use BAST, while at the same time failing to identify BAST, *see* 30 C.F.R. § 250.107(c)(1); *supra* pp. 3–5; *compare* Attachment B, the proposed BAST rule also arguably imposes a new recordkeeping requirement to “retain” records, 44 U.S.C. § 3502(13), justifying the use of the technologies employed in the regulated entity’s operations. *Cf. Saco River Cellular, Inc. v. Fed. Communications Comm’n*, 133 F.3d 25, 32–33 (D.C. Cir. 1998) (finding that new substantive requirement also imposed a collection requirement because regulated entity “must provide the [agency] with evidence of the [substantive compliance]” through an amended application). The NPRM, however, does not consider such burden.

Attachment B
History of the Department of the Interior’s BAST Program
Comments of the American Petroleum Institute
Proposed Revisions to BAST Requirements
Oil and Gas Production Safety Systems Proposed Rulemaking, 1014-AA10
October 16, 2013

I. The Legislative History of BAST

The Outer Continental Shelf Lands Act (“OCSLA”) provides, in relevant part, 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.

43 U.S.C. § 1347(b) (emphasis added). Congress enacted this provision requiring BAST as part of its comprehensive amendments to OCSLA in 1978 (“1978 Amendments”). See Outer Continental Shelf Lands Act Amendments of 1978, Pub. L. 95-372, 92 Stat. 629, at § 208.

Although both the House (H.R. 1614) and Senate (S.9) included provisions regarding BAST as part of a new requirement for worker safety and environmental regulation of offshore operations, the provisions differed sufficiently to require submission to the Conference Committee that created the final version of the 1978 Amendments. See, e.g., H.R. Conf. Rep. 95-1474, at 108–09, 1978 U.S.C.C.A.N. at 1707–08 (Aug. 10, 1978). As the Conference Report explains, while “[t]he House amendment requires use of best available and safest ‘technologies,’” the Senate “bill . . . provides of use of the best available and safest ‘technology.’” *Id.* at 109, 1708. Ultimately, “[t]he Conference Report is the same as the House amendment, in order to emphasize that more than one technology may be applicable as the best way to achieve a particular objective or do a particular job.” *Id.*

In practice, moreover, the conferees “expect[ed]” the Secretary to make his or her determinations of BAST—for example, as to feasibility, and the incremental costs and benefits of particular technology—“on an industry-wide basis or with respect to classes or categories of operations, rather than on an installation-by-installation, company-by-company, or lessee-by-lessee basis.” *Id.* According to the Conference Report, its purpose was “to assure uniformity of requirements for industry compliance . . .” *Id.*

While the Conference Report offers no further discussion of the meaning or purpose of the BAST requirement, the House had previously convened an Ad Hoc Select Committee on the Outer Continental Shelf, which was charged with considering the H.R. 1614 bill that the Conference Report largely adopted. See H.R. Rep. 95-590, 1978 U.S.C.C.A.N. 1450 (Aug. 29

1977). In recommending passage of H.R. 1614 by the House, the Ad Hoc Select Committee identified the purpose of the H.R. 1614's new safety and environmental protections—and, specifically, the BAST requirement—to protect offshore workers and the environment. *See, e.g., id.* at 1459. Indeed, the Ad Hoc Select Committee described the BAST requirement as one of the 1978 Amendments' "important provisions." *Id.* at 1462.

With respect to the meaning of BAST, the Ad Hoc Select Committee explained that "[t]he Committee, during its visits to off-shore facilities, *was impressed by the continuing ability of industry* and others to develop newer and safer equipment." *Id.* at 1565 (emphasis added). As a result, H.R. 1614 "mandates that regulations under this section are to require, if practicable, such updated equipment" through the requirement for BAST. *Id.* ("Therefore, on all new drilling and production operations, the [BAST] economically achievable is to be required. Because of the impracticability of requiring the newest equipment on existing facilities, the [BAST] is to be required on existing operations wherever practicable."). Moreover, because "the Committee is aware that there may be several technologies as to a particular activity[,] [i]n applying the [BAST] standard, *the regulator is to evaluate* several options, and more than one might be appropriate." *Id.* (emphasis added); *see also id.* ("['Best and safest,' in other words, apply to technology and may include several alternative techniques, pieces of equipment or practices—any of which might be acceptable.").

Notably, the Ad Hoc Select Committee's minority opposing House adoption of H.R. 1614 questioned the practicality of a "best available and safest" determination. *See id.* at 1659. In the minority's view, the BAST requirement would force "the Secretary of the Interior . . . to pick the 'best' and 'safest' way to do things which are now done well and safely in any one of several, modern ways" by, for example "examin[ing] all blow-out preventers on the market [to] determine which excelled all others in its ability to protect the safety and health of workers and preserve the environment." *Id.* The minority opposed this "delay-causing" provision and preferred "[t]he far more commonly used and sound approach . . . to set standards which must be equaled or exceeded before a product is found acceptable for use." *Id.* at 1659–60.

II. History of the Department of the Interior's BAST Program

Implementing the BAST requirement in 43 U.S.C. § 1347(b), BSEE's regulations provide, in relevant part, that:

You must use the best available and safest technology (BAST) whenever practicable on all exploration, development, and production operations. In general, we consider your compliance with BSEE regulations to be the use of BAST.

30 C.F.R. § 250.107(c). Moreover, BSEE "may require additional measures to ensure the use of BAST: (1) To avoid the failure of equipment that would have a significant effect on safety, health, or the environment; (2) If it is economically feasible; and (3) If the benefits outweigh the costs." *Id.* § 250.107(d).

The Department of the Interior first prescribed the use of BAST through regulations promulgated in 1979 to conform to the provisions of the 1978 Amendments to OCSLA. *See, e.g.,* 44 Fed.

Reg. 13,527 (Mar. 12, 1979) (proposed rule); 44 Fed. Reg. 61,886 (Oct. 26, 1979). The originally promulgated regulation provided:

The lessee shall use, on all new drilling and production operations and, whenever practicable, on existing operations, the best available and safest technologies that *the Director determines* to be economically feasible, wherever failure of equipment would have a significant effect on safety, health, or the environment, unless *the Director determines* that the incremental benefits are clearly insufficient to justify the incremental costs of utilizing such technologies.

44 Fed. Reg. at 61,899 (emphases added). *See also* 30 C.F.R. § 250.30(c) (1980). Neither the proposed rule nor the final rule explained further the meaning or purpose of BAST (and no commenter appears to have made comment upon the provision). *See* 44 Fed. Reg. at 13,535; 44 Fed. Reg. at 61,886–92, 61,899.⁶ This regulatory text was put in place shortly after the BAST amendments were made into law, and the regulations then evolved as the government’s BAST program was defined and applied into operations.

Shortly after Interior promulgated this rule, the USGS, which was responsible for regulating offshore operations at that time, created the original BAST program for the offshore that has endured and in most respects remains intact today. In April 1980, the “U.S. Geological Survey Best Available and Safest Technology Program” released the document entitled *The Use of Best Available and Safest Technologies (BAST) During Oil and Gas Drilling and Producing Operations on the Outer Continental Shelf: Program for Implementing Section 21(B) OCS Lands Act Amendments of 1978*.⁷ This document provided definitions for the various terms and phrases appearing in Section 21(b) of the OCSLA, including definitions for “best,” “available,” “safest,” and “technology.” More importantly, this document clearly defined the elements of the government’s BAST program:

- i. The BAST requirement is documented through OCS regulations, OCS orders, and standards.
- ii. BAST is applied to OCS Operations Through:
 1. Exploration and Development and Production Plan Approval
 2. Platform Verification
 3. Quality Assurance
 4. Inspection and Enforcement
 5. Training
 6. Safety Alert Program
- iii. Information for BAST Determinations is Developed Through:
 1. Failure and Inventory Reporting System (FIRS)
 2. Accident Investigation and Reporting

⁶ The original regulations included a parallel provision describing the functions of the Director—stating the Director shall “[r]equire on all new and, whenever practicable, existing drilling and production operations . . . the use of the best available and safest technologies . . .,” 30 C.F.R. § 250.11(a)(2) (1984)—that likewise sparked no relevant discussion or comment.

⁷ *See* Attachment C.

3. Research and Development
4. Outside Solicitation
- iv. The BAST Program was Organized to Provide Structure and Staffing.

While regulations and operations have certainly evolved, the core of this program remains today and is evident in BSEE's regulations, industry standards incorporated by reference, exploration plan approval, development and production plan approval, deepwater operation plan approval, application for permit to drill approval, and other program elements.

The regulations themselves continued to evolve to incorporate and take into account the system established by the USGS in 1980. In 1986, the Minerals Management Service ("MMS") proposed a new set of offshore regulations to "consolidate into one document the currently multitiered rules of the Offshore program . . . that govern oil and gas operations in the Outer Continental Shelf (OCS)." 51 Fed. Reg. 9,315 (Mar. 19, 1986). The "reform [was] directed toward reducing the burden on industry resulting from the regulations while maintaining or increasing the level of safety and protection provided for the environment." *Id.* at 9,316. To that end, the proposed rules set more clear "performance standards"—"intended to identify the purpose of [later] detailed requirements and provide a basis for alternative achievement of such purpose"—and "performance requirements"—that "would clarify that specific detailed requirements of the regulations would not preclude the use of new or alternative techniques" if approved by MMS—for lessees. *See id.*

As the preamble to the proposed rule explained, moreover, "[t]he current offshore rules are contained in regulations, OCS Orders, standards, NTLs, conditions of approval, and related documents." *Id.* at 9,320. In particular, MMS identified the sources of "[s]tandards [which] are documents incorporated by reference into the Orders," and "include statements of recommended practices adopted by industry and trade associations, such as API, or professional standards organizations, such as ANSI, *as well as those drafted within MMS itself.*" *Id.* (emphasis added). The proposed rule intended to streamline these different sources of standards and "eliminate any inconsistency and redundancy . . ." *Id.* *See also* 53 Fed. Reg. 10,596 (April 1, 1988) (final rule) (describing consolidation). For example, with respect to BAST, the 1986 rule changes "proposed to incorporate the requirements of Paragraph 1, Use of Best Available and Safest Technologies (BAST), of current OCS Order No. 5 where applicable to all appropriate operations." 51 Fed. Reg. at 9,331.⁸

The 1986 proposed rule also re-ordered the offshore regulations, and proposed a significant revision to the BAST provision that included the first provision equating compliance with agency regulations with BAST:

- (a) As research and product improvement result in increased effectiveness of existing procedures, safety equipment, or the development of new equipment systems, such procedures or equipment may be used and, if such technologies provide a

⁸ OCS Orders were promulgated and amended through publication in the Federal Register. *See, e.g.*, 48 Fed. Reg. 33,757 (July 25, 1983) (amendment to OCS Order No. 5, Use of BAST, to remove redundant reference to API specifications).

significant cost-effective incremental benefit to safety, health, or the environment, shall be required to be used *if determined to be* best available and safest technologies (BAST).

(b) *Conformance to the standards, codes, and practices referenced in this part will be considered to be the application of BAST.* Specific equipment and procedures or systems not covered by standards, codes, or practices will be analyzed to determine if the failure of such would have a significant effect on safety, health, or the environment. If such are identified and until specific performance standards are developed by MMS and as directed by the Regional Supervisor on a case-by-case basis, the lessee shall submit such information necessary to indicate the use of BAST, the alternatives considered to the specific equipment or procedures, and the rationale as to why one alternative technology was considered in place of another. This analysis shall include a discussion of the costs involved in the use of such technology and the incremental benefits gained.

Id. at 9,351 (revised 30 C.F.R. § 250.22) (emphases added). Notably, this version of the BAST rule provided that compliance with regulations unequivocally “will be considered” BAST.

In promulgating the final rule in 1988, the MMS addressed several comments relating to the BAST provision. One commenter “stated that ‘No systematic analysis has been undertaken to show that these standards and practices [those in Part 250] indeed are BAST.’” 53 Fed. Reg. at 10,608. MMS responded that “as a practical matter, MMS does systematically *monitor and identify BAST*, taking the economic feasibility and cost-effectiveness into account. This is largely accomplished through multidisciplinary groups such as Regional Operations Technology Assessment Committees and Regional Technical Working Groups.” *Id.* (emphasis added).

Other commenters requested changes to the BAST provision in which “technologies involved must be demonstrated by OCS lessees and approved by the Regional Supervisor” because they “believe that the rule should clarify who determines what is significant and cost-effective and that industry should have a significant role in doing so.” *Id.* MMS responded that “[t]he change is not needed. All BAST requirements *will be adopted through rulemaking* in which lessees, the public, and other interested parties will have full opportunity to participate.” *Id.* (emphasis added).⁹ Still, in specific instances, the final rule recognized that BAST may be “reflected by recommended safe industry practice” that is incorporated by regulation. *See id.* at 10,663 (describing piping system requirements and incorporating ANSI Code by reference).

⁹ *See also id.* at 10,617 (in subsequently discussing wellbore requirements, the agency further noted that “MMS has had standing committees and organization units which address offshore technological assessment for more than 8 years. The function of these groups is to identify, evaluate, and report on the use of BAST on a continuous basis. Literature on BAST is researched; continuous observations of field practices are made; meetings are held with industry representatives and vendors of oil field equipment and services for this purpose; and meetings are conducted routinely with MMS personnel and others to disseminate and utilize BAST information.”).

The final rule ultimately altered the proposed rule’s BAST language in part (to better mirror the statutory language):

(a) The Director shall require on all new drilling and production operations and, wherever practicable, on existing operations, the use of the BAST, which the Director determines to be economically feasible, where ever failure of equipment would have a significant effect on safety, health, or the environment, except where the Director determines that the incremental benefits are clearly insufficient to justify the incremental costs of utilizing such technologies.

(b) *Conformance to the standards, codes, and practices referenced in this part will be considered to be the application of BAST.* Specific equipment and procedures or systems not covered by standards, codes, or practices will be analyzed to determine if the failure of such would have a significant effect on safety, health, or the environment. If such are identified and until specific performance standards are developed by MMS and as directed by the Regional Supervisor on a case-by-case basis, the lessee shall submit such information necessary to indicate the use of BAST, the alternatives considered to the specific equipment or procedures, and the rationale as to why one alternative technology was considered in place of another. This analysis shall include a discussion of the costs involved in the use of such technology and the incremental benefits to be gained.

Id. at 10,703 (emphases added). *See also* 30 C.F.R. § 250.22 (1988). Again, this version of the BAST rule provided that compliance with regulations unequivocally “will be considered” BAST. This version of the BAST requirement—aside from a re-numbering of the provision in 1998—endured for over a decade.

In 1998, MMS issued a notice of proposed rulemaking to again “update and clarify MMS regulations concerning postlease operations” in “an effort to streamline and organize the various topics that apply in a general sense” to offshore operations. 63 Fed. Reg. 7,335 (Feb. 13, 1998). Through that proposed rulemaking, the BAST provision obtained its current format (but not yet current language or numbering):

§250.8 When must I use best available and safest technologies (BAST)?

(a) You must use BAST on all new exploration, development, and production operations.

(b) You must use BAST on existing operations to avoid failure of equipment that would have a significant effect on safety, health, or the environment if the Director determines that:

- (1) Using BAST is economically feasible; and
- (2) The benefits of using BAST outweigh the costs.

(c) *If you comply with the requirements of this part, MMS will consider you to be using BAST.*

(d) MMS will analyze specific equipment and procedures or systems not covered by standards, codes, or practices to determine if their failure would have a significant effect on safety, health, or the environment. If MMS identifies significant effects on safety, health, and the environment, the Regional Supervisor may direct you to submit on a case-by-case basis the following analysis:

- (1) Information necessary to indicate the use of BAST;
- (2) Alternatives you are considering to the specific equipment or procedures;
- (3) The rationale as to why you chose one safe alternative technology instead of another; and
- (4) A discussion of the costs involved in the use of alternate technologies and the incremental benefits to be gained.

Id. at 7,343 (emphasis added). Again, this version of the BAST rule provided that compliance with regulations unequivocally “will [be] consider[ed]” BAST.

In promulgating the final rule, MMS addressed only one comment—from API—on the BAST provisions. With respect to the relative authority over BAST within MMS, API noted that:

The Regional Director and the Regional Staff customarily analyze what equipment is best suited to protect safety, health, and the environment. The Regional Offices consult with Headquarters Staff when necessary in cases that require additional input.

Id. at 72,760.

MMS then issued the final BAST regulation in, essentially, its current form, language,¹⁰ and numbering:

§250.107 What must I do to protect health, safety, property, and the environment?

(a) You must protect health, safety, property, and the environment by:

¹⁰ The provision would again be slightly altered to replace “MMS” with “BSEE” when the latter agency succeeded MMS.

(1) Performing all operations in a safe and workmanlike manner;
and

(2) Maintaining all equipment in a safe condition.

(b) You must immediately control, remove, or otherwise correct any hazardous oil and gas accumulation or other health, safety, or fire hazard.

(c) You must use the best available and safest *technology* (BAST) whenever practical on all exploration, development, and production operations. *In general*, we consider your compliance with MMS regulations to be the use of BAST.

(d) The Director may require additional measures to ensure the use of BAST:

(1) To avoid the failure of equipment that would have a significant effect on safety, health, or the environment;

(2) If it is economically feasible; and

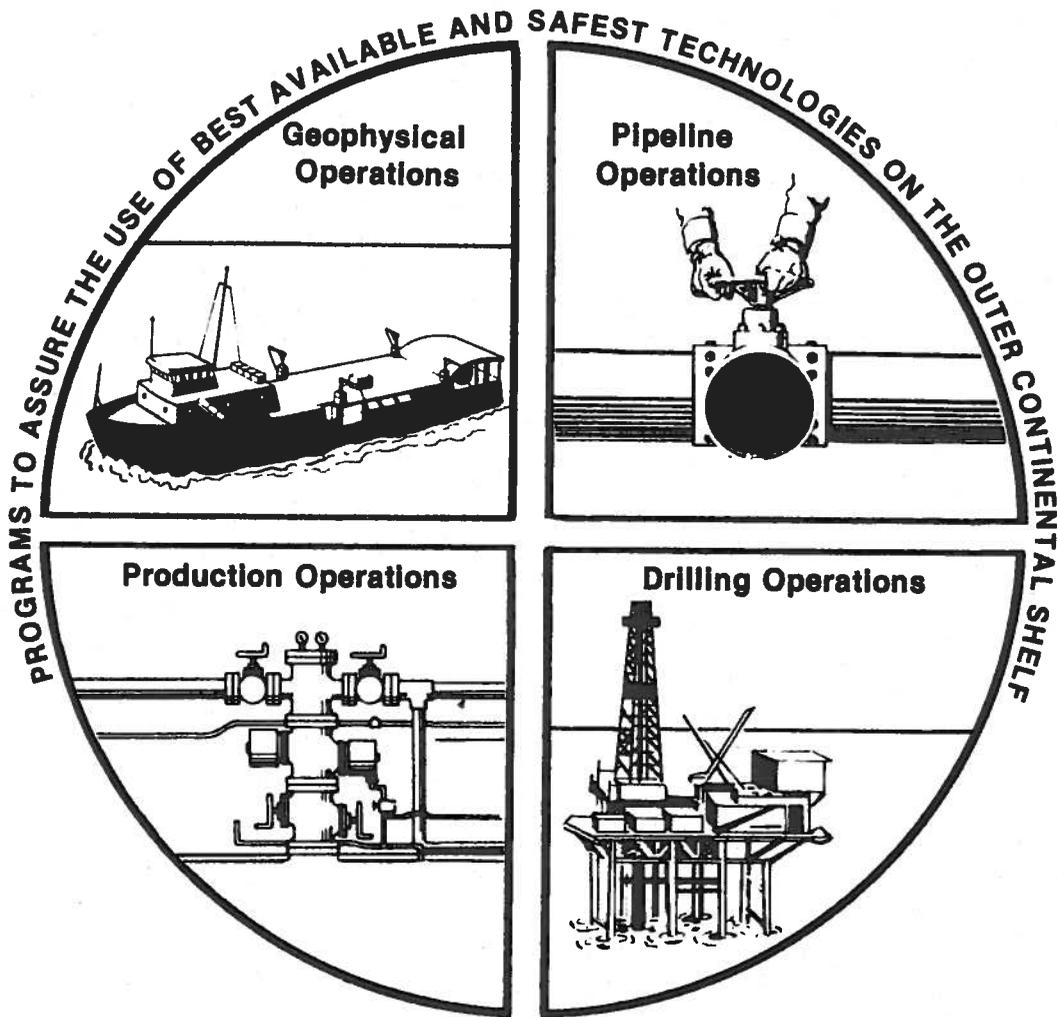
(3) If the benefits outweigh the costs.

Id. at 72,780 (emphasis added). *See also* 30 C.F.R. § 250.107 (2000).

The regulatory history, as described above, demonstrates that BSEE and its predecessors intended that the regulatory scheme would create an effective system for ensuring the use of BAST, and that compliance would mean that operators were using BAST in operations.

THE UNITED STATES GEOLOGICAL SURVEY BAST PROGRAM

THE USE OF BEST AVAILABLE AND SAFEST TECHNOLOGIES (BAST) DURING OIL AND GAS DRILLING AND PRODUCING OPERATIONS ON THE OUTER CONTINENTAL SHELF



**THE USE OF BEST AVAILABLE AND
SAFEST TECHNOLOGIES (BAST)
DURING OIL AND GAS DRILLING
AND PRODUCING OPERATIONS OF
THE OUTER CONTINENTAL SHELF (OCS)**

**PROGRAM FOR IMPLEMENTING SECTION 21(B)
OCS LANDS ACT AMENDMENTS OF 1978**

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April 1980

U.S. GEOLOGICAL SURVEY BEST AVAILABLE AND SAFEST TECHNOLOGY PROGRAM

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U.S. GEOLOGICAL SURVEY BEST AVAILABLE AND SAFEST TECHNOLOGY PROGRAM

INTRODUCTION

The oil industry has been drilling for and producing oil and gas from federally leased lands offshore the United States since 1954 and from lands leased by coastal States for many years before that. Since passage of the Outer Continental Shelf (OCS) Lands Act in 1953, the U.S. Geological Survey (USGS) has had the responsibility of developing, administering, and enforcing a regulatory program to insure that drilling and production operations are conducted in a safe and environmentally sound fashion.

The existing USGS program is the product of a long, evolutionary process. Even before the passage of the OCS Lands Act, the USGS had over 30 years of experience in regulating onshore oil and gas exploration and development activities. After detailed and lengthy preparation by the USGS, the OCS regulations were published in May 1954. By 1957, following successful OCS lease sales, numerous offshore oil and gas field discoveries, and increasing production, it became readily apparent that more effective and prompt regulation and supervision could be accomplished by more detailed development of certain provisions of the operating regulations (30 CFR Part 250). The greater precision was accomplished through the issuance of OCS Orders. This approach was deemed better than a full-fledged amendment to the OCS regulations because the problems at that time were localized in the Gulf of Mexico offshore Louisiana and Texas while the OCS regulations applied to the entire OCS of the United States. OCS Orders thus provided the needed element of flexibility in supervision of OCS operations by permitting adjustments to the conditions in a particular region. Between 1957 and 1969, OCS Orders Nos. 1 through 10 were developed for both the Gulf of Mexico and the California OCS.

In response to the blowout at Union Oil's Platform A in the Santa Barbara Channel in January 1969, the USGS undertook a fundamental reassessment of its offshore regulatory regime. Although the Santa Barbara incident was the first significant oil pollution experience resulting from the drilling of nearly 8,000 wells on the OCS between 1953 and 1969, this incident provided a sufficient reason for prompt and sweeping action. Within 2 months, the OCS Orders were revised to impose more stringent requirements for drilling and operating procedures off the California coast. By August 1969, the USGS's more general oil and gas regulations for all OCS areas had been thoroughly revised to strengthen the safety and pollution-control requirements imposed on lessees. By June 1971, a new set of Regional OCS Orders, specifically tailored to address the unique operating conditions encountered in the Pacific, were issued. Since 1971, Regional Orders have also been developed and published which address the specific operating conditions in the Gulf of Alaska and the North, South, and Mid-Atlantic.

During 1970 and 1971, following the Santa Barbara incident and during the period when OCS regulations, Orders, and procedures were undergoing review and revision, three significant incidents occurred in the Gulf of Mexico. The accumulation of incidents led the USGS to undertake a full-scale review of the OCS regulatory program to determine if major changes were needed. During this period, several studies were initiated in the early 1970's. Studies conducted by USGS systems analysts, personnel from the National

Aeronautics and Space Administration, the National Academy of Engineering, the University of Oklahoma, and the President's Council on Environmental Quality produced recommendations for program improvement. As a part of the overall activities, in 1971 the Director of the Geological Survey formed a Work Group on safety and pollution control in OCS oil and gas operations to review these studies and to insure that Division programs reflected the results of the studies. The Work Group published 3 reports in 1973 and 1974 which contained 19 recommendations aimed toward improving the OCS oil and gas regulatory program. Implementation of these recommendations was undertaken immediately by the Conservation Division, USGS. Additionally, at the request of the USGS, the Marine Board of the National Research Council convened a Committee on Safety of Outer Continental Shelf Petroleum Operations which provided continuing program oversight. The Committee published four reports between March 1974 and August 1975 setting forth additional recommendations which were incorporated into the regulatory program.

Implementation of the Director's Work Group recommendations, plus continuing revisions of the OCS Orders and a growing and increasingly refined onsite USGS inspection program, have clearly increased the safety of OCS operations. Since 1971, there have been no significant pollution events as a result of OCS oil and gas operations. As of December 31, 1979, more than 100 wells had been drilled in frontier areas without a significant pollution incident. This figure is particularly important as it reflects activities in some of the most difficult operating areas on the United States OCS, including the Gulf of Alaska, Cook Inlet, and the Mid- and South Atlantic.

Following the oil embargo of 1973, the Congress undertook an extensive review of the OCS Lands Act of 1953 in response to a Presidential proposal to increase OCS leasing. The Act and the regulatory program it established were reviewed to determine their adequacy in addressing the increasingly complex technological, environmental, and political problems associated with OCS oil and gas operations, particularly in frontier areas. After years of debate, this effort culminated in the enactment of the OCS Lands Act Amendments on September 18, 1978.

Provisions of these Amendments enhanced the USGS' regulatory authority to assure that oil and gas exploration, development, and production activities on the OCS are conducted in a safe and pollution-free manner. One distinctive provision of the legislation was the emphasis it placed on the need for a program to insure that OCS technologies be continuously and systematically reviewed to insure that the best available and safest technologies (BAST) are applied to OCS operations. The BAST requirement is stated in section 21(b) of the Act which provides:

“ * * * the Secretary (of the Interior) and the Secretary of the Department in which the Coast Guard is operating 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.”

This mandate was coupled with a study requirement (in section 21(a)) that:

“ * * * the Secretary (of the Interior) and the Secretary of the Department in which the Coast Guard is operating shall, in consultation with each other, and as appropriate, with the heads of other Federal Departments and Agencies, promptly commence a joint study of the adequacy of existing safety and health regulations

and of the technology, equipment, and techniques available for the exploration, development, and production of the minerals of the Outer Continental Shelf. The results of such study shall be submitted to the President who shall submit a plan to the Congress of his proposals to promote safety and health in the exploration, development, and production of the minerals of the Outer Continental Shelf."

The BAST provision is indicative of Congress' firm desire to insure "expedited exploration and development of the Outer Continental Shelf in order to achieve national economic and energy policy goals, assure national security, reduce dependence on foreign sources, and maintain favorable balance of payments in world trade." The twin objectives of safe and expedited development are set forth in the Act in a number of places:

"* * * to preserve, protect, and develop oil and natural gas resources in the Outer Continental Shelf in a manner which is consistent with the need * * * to balance orderly energy resource development with protection of the human, marine, and coastal environments * * *;

"* * * to encourage development of new and improved technology for energy resource production which will eliminate or minimize risk of damage to human, marine, and coastal environments * * *."

Elsewhere in the Act, Congress expressed its confidence that:

"* * * technology is or can be made available which will allow significantly increased domestic production of oil and gas without undue harm or damage to the environment * * *."

Congress also acknowledged in section 101 of the Act that:

"* * * there presently exists a variety of technological, economic, environmental, administrative, and legal problems which tend to retard the development of the oil and natural gas reserves of the Outer Continental Shelf;"

and that:

"* * * environmental and safety regulations relating to activities on the Outer Continental Shelf should be reviewed in light of current technology and information; * * *"

Thus, the law indicates that there are technological issues related to OCS operations, some of which could retard OCS development, and that it is the Government's role to encourage new and improved technology through a program that insures the use of best available and safest technologies.

These far-reaching Amendments necessitated another thorough review and revision of the USGS' OCS oil and gas regulations. Along with the mandate to require the use of BAST, the Secretary of the Interior was granted increased enforcement powers and penalties. For the first time, the Secretary of the Interior was given the authority to cancel a lease for environmental reasons. These provisions, and many others have been incorporated into a comprehensively revised set of USGS regulations.

As part of the review and revision of the regulatory program, the USGS published a Notice in the February 8, 1979, *Federal Register* requesting public comment on the nature, scope, and content of a BAST program. Following the close of the comment period on April 9, 1979, the USGS turned to the National Research Council for assistance in reviewing the comments and recommending alternative programmatic approaches. The Council, in turn, established a BAST Panel under the Marine Board in the

Assembly of Engineering to recommend guidelines for carrying out the requirements of section 21(b) of the OCS Lands Act Amendments.

The Panel was composed of seven members representing Government, the oil industry, academia, the States, and public interest groups. It also included a consulting engineer and an attorney. It convened on April 25, 1979, and met three times. During its deliberations, it sponsored a public meeting to discuss the comments received as a result of the *Federal Register* Notice and to hear other views expressed by the public. In September 1979, the Panel published its report entitled "Implementing Best Available and Safest Technologies for Offshore Oil and Gas."

The Panel's report recognized the complexity of the BAST system required by Congress and recommended that the implementation of BAST be built upon the USGS's program which has evolved over the past 25 years.

The Panel developed three alternative BAST approaches, each representing successively more detailed involvement of Government regulatory Agencies. Although no single approach was recommended, the Panel indicated that when all three are viewed together a comprehensive, evolutionary program emerges. The USGS has accepted the general approach recommended by the Panel. The remainder of this paper discusses the components of the BAST approach and program to be applied by the USGS.

BAST: WHAT DOES IT MEAN?

BAST is a broad concept and like all broad concepts requires careful consideration before specific applications. The modifiers "best," "available," and "safest" are imprecise, especially when they are combined in the phrase "best available and safest." In addition, the other considerations specified in section 21(b)—"economically feasible," "significant effect," and "incremental costs v. incremental benefits"—further complicate interpretation of the requirement. The Marine Board Panel, in attempting to bring specificity to the meaning of these broad general terms, reviewed the legislative history and the experience the Environmental Protection Agency has had in interpreting technology mandates under the Water Pollution Control Act and developed broad parameters for how these terms might be applied to OCS oil and gas operations. That discussion is abstracted in the following sections:

"Best"

There may be more than one "best" way to achieve a particular objective or do a particular job. It may be expected that "best" means that which would most completely fulfill the composite purpose of the legislation not necessarily the most expensive or sophisticated.

"Available"

The House Committee was impressed with the technological advances made by the industry on its own and indicated its desire to have those advances (as actually used on at least some operation) applied universally. The Committee also wanted to encourage the development of new and improved technology to minimize risks to the environment. Discussion concerning the term "available control technology" found in the Federal Water Pollution Control Act Amendments of 1977 indicates that the technology does not have to be in actual use somewhere, but the technology must be available at a cost and at a time which the Administrator determines to be reasonable.

"Safest"

The foregoing comments about the term "best" also apply to the term "safest." The legislative record indicates only that it means something more than "safe" and the exact meaning would be left to administrative discretion.

"Technology" (and "Technologies")

In contrast, the meaning of "technology" (and "technologies") was extensively debated. It was emphasized that more than one technology may be applicable as the best way to achieve a particular objective or to do a particular job. Hence, the word "technologies" was inserted. There was substantial concern about the anticompetitive and innovation-stifling impacts of designating a single technology, technique, or product as "best" and banning the use of any other.

"Existing"

BAST is required for all new operations, but is required for existing operations only where practicable. It is clear that "existing" is at the time of the introduction of better or safer technologies and not at the time of the passage of the Act.

"Economically Feasible"

BAST is not required if not economically feasible; if failure of equipment would not significantly affect safety, health, or environment; or if the incremental benefits are clearly insufficient to justify the incremental costs. The choice of language was patterned after the terminology in existing environmental laws.

"Significant Effect on Safety, Health, or the Environment"

There is little in the legislative history to provide enlightenment as to the definition of this phrase. The implementing Agency will have to exercise its discretion in its interpretation.

"Incremental Benefits v. Incremental Costs"

Congress provided little guidance as to when "the incremental benefits are clearly insufficient to justify the incremental costs of utilizing" BAST. The Secretary of the Interior urged that language be incorporated into the law that would prevent standards being imposed that were so costly as to prohibit the extraction of oil and gas. While not specifically adopting the approach recommended by the Secretary, the Conference Report states that "the language provides for economic feasibility to be a balance of costs against benefits."

"Application of BAST"

Testimony and questioning at relevant hearings indicated that small, individual elements of an OCS operation were not the object of a BAST specification. BAST was not to be applied installation-by-installation, company-by-company, or lessee-by-lessee. Instead, Agencies were to implement the requirement in a reasonable, discreet manner on an industrywide basis or with respect to classes or categories of operation. By requiring the use of BAST, Congress sought to assure the "highest degree" of safety in OCS operations using an economic balancing process to prevent the possibility of unreasonable application.

The OCS Lands Act Amendments clearly intend that existing technologies be

reviewed and the best available be applied when practicable. The Amendments could also be interpreted to mean that new technologies should be developed if the existing technologies are proven to be inadequate. The BAST requirement is limited to technologies and is not designed to mitigate human errors.

The Panel's findings lead to certain general principles:

- Technologies used during OCS drilling and producing activities should provide the safest and most reliable cost-effective operations.
- The BAST requirements should be applied in an efficient manner that recognizes the availability of the specific technology and the consequences of requiring or not requiring its use. The BAST program must encourage continuing improvement of the technological capability of the petroleum industry.
- Technologies in question are limited to equipment.
- When a gap in technology is discovered, the Government should take the lead in seeing that new technologies are developed.
- The BAST Program should provide for public participation in the development of requirements.

THE BAST PROGRAM

The BAST program provides a systematic approach toward the incorporation of various program elements (described below) into an overall OCS regulatory scheme. Recognizing the evolutionary nature of the BAST program, as improvements, additions, and advances are made in safety concepts and technology, changes will be made to the existing body of regulations, Orders, and standards which govern the extraction of minerals from OCS leased lands. Although many BAST standards are applicable to the entire OCS, it is recognized that the application of BAST must be tailored to each Region's geological and environmental condition, and its application must also be suited to the type of operation. The elements which implement the BAST program are shown in Figure 1.

The BAST program consists of four principal components:

- 1) Documentation of the BAST requirement.
- 2) Application of BAST to OCS operations.
- 3) Development of information for BAST determinations.
- 4) Organization and procedures for the BAST program.

DOCUMENTATION OF THE BAST REQUIREMENT

The requirement for the use of BAST is stated specifically in certain regulations and OCS Orders, and its use implied in other Orders, standards, Notices to Lessees and Operators, Field Drilling Rules, and informal instructions which prescribe certain things to be done and certain criteria to be met by lessees in their operations.

OCS regulations are a system of broad general rules applicable to all operations everywhere on the OCS and are formally incorporated into Chapter 30, Parts 250, 251, and 252 of the Code of Federal Regulations. OCS Orders are keyed to the regulations and provide more detailed guidance on the regulatory requirements, and are directed to lessees operating in a particular Region, such as the Gulf of Mexico, offshore Alaska, the eastern seaboard, or southern California.

Standards prescribe certain parameters to be observed in the use of safety and pollution-control equipment, in hazardous operations, and in personnel training and qualification.

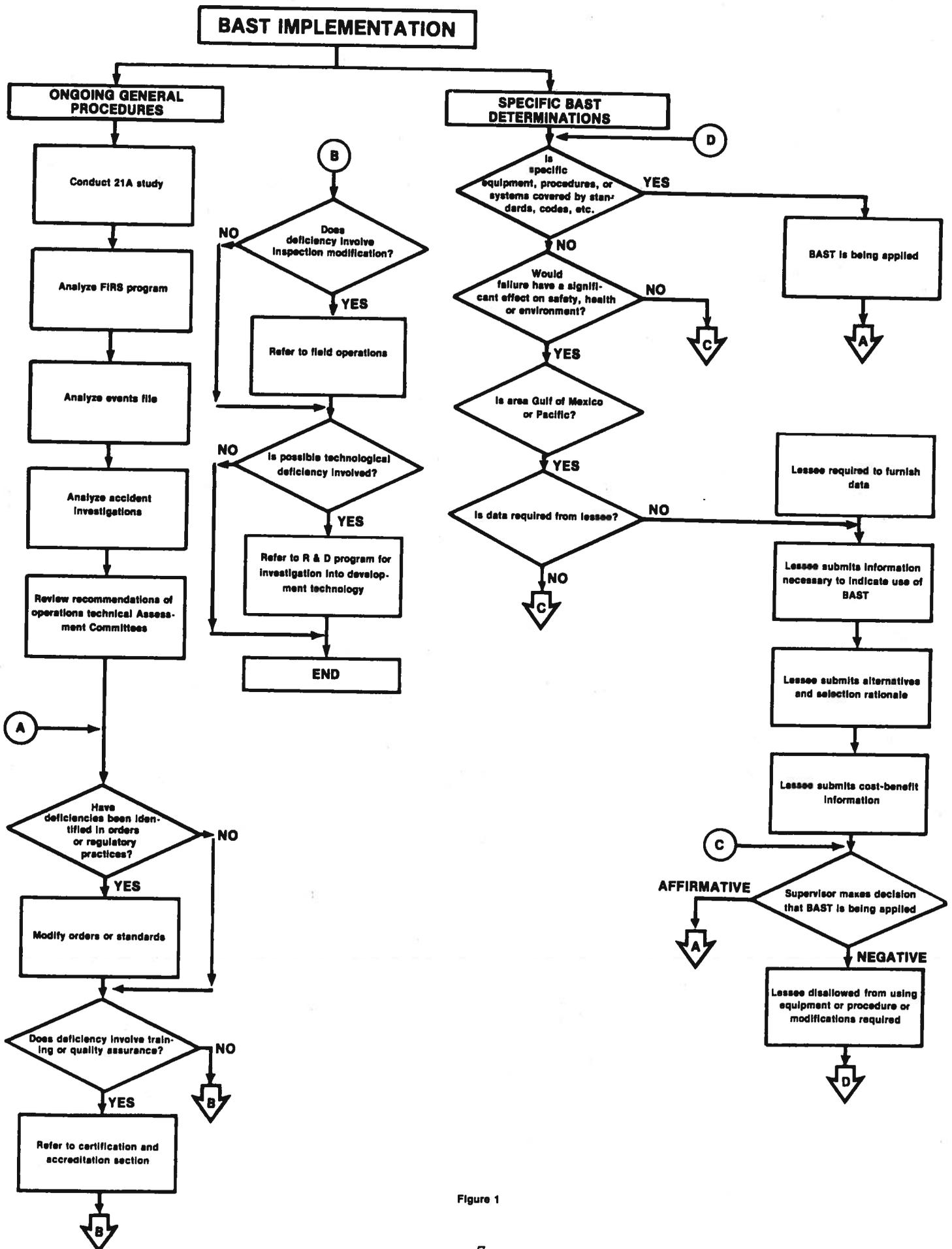


Figure 1

The standards are made effective by reference in the appropriate OCS Orders. More definitive instructions to operators within a particular Region are communicated through Notices to Lessees and Operators, Field Drilling Rules, and other directives, either written or oral.

A number of regulations, Orders, and standards are applicable to the BAST Program, and these have been revised to bring them into conformance with the OCS Lands Act Amendments of 1978 and to facilitate the BAST Program which it mandates. The more pertinent provisions are summarized in the following sections:

OCS REGULATIONS

- **30 CFR 250.11(a)(2)** – This subsection contains the requirement stated in section 21(b) of the OCS Lands Act Amendments of 1978 that BAST be applied to “all new drilling and production operations and wherever practicable, on existing operations * * *” and vests the Secretary’s authority over such matters in the Director of the USGS.
- **30 CFR 250.18(a)(3) and (b)(4)** – These references require the use of BAST in the lessee’s exercise of all grants of rights of use and easements necessary to the construction and maintenance of all oil and gas production facilities attached to the seafloor as well as pipelines that carry oil and gas.
- **30 CFR 250.30(c)** – This provision specifically directs lessees to use BAST on “all new drilling and production operations * * *.”
- **30 CFR 251.3-5(c)** – Requires that any person conducting shallow test drilling or deep stratigraphic test drilling geological activities under a permit for mineral exploration or scientific research under Part 251 must utilize BAST which the Director determines to be economically feasible.
- **30 CFR 250.34(a)(1) and 30 CFR 250.34-2(a)(1)(ii), (v), and (vi)** – These paragraphs require that special attention be directed to safety and pollution-prevention and control features, including oilspill cleanup and containment provisions, in all exploration plans, and in all development and production plans. They also describe the safety standards and features and environmental safeguards that will be employed during development and production operations.
- **30 CFR 250.36(b)(1) and (c)** – The first of these references, governing Applications for Permit to Drill, requires the lessee to submit detailed data on well location, depth, and casing and blowout-prevention equipment as well as data on the platform; water depth; and plans for coring, logging, and drilling other wells from the same location. The second reference applies to applications to deepen or plug back an existing hole, and specifies that the application must provide data on present well status, depth, productive zones and capability, and certain other information requested on the application form.
- **30 CFR 250.38(a)** – This section directs the lessees to keep accurate and complete well records conveniently available to a USGS representative including a description of any unusual malfunction, condition, or problem.
- **30 CFR 250.39(a)** – This section requires the lessees to make adequate tests or surveys, in a manner acceptable to the Director and without cost to the Government, to determine reservoir energy and content; the amount and direction of deviation of any well from the vertical; and formation, casing, tubing, and other pressures.
- **30 CFR 250.41(a)(1) through (4) and (b)** – These references deal with well control and specify extensive measures to be taken to assure against the possibility of blowouts.

- **30 CFR 250.44** – This section specifies that the lessee shall promptly plug and abandon any well determined by the Director to be no longer useful. The manner and method of plugging must be approved or prescribed by the Director, and drilling equipment must not be removed from any suspended drilling operation without taking adequate measures, as approved or prescribed by the Director, to protect life (including fish and other aquatic life); property; any mineral deposits; and the marine, coastal, or human environments.
- **30 CFR 250.46(a) and (b)** – These references require lessees to perform all operations in a safe and workmanlike manner and to maintain all equipment in a safe condition “for protection of the lease and associated facilities, for the health and safety of all persons, and for the preservation and conservation of property and the environment.” Lessees are further required to take all necessary precautions to control, remove, and otherwise correct any hazardous oil and gas accumulations, or other health, safety, or fire hazards.
- **30 CFR 250.57** – This section sets forth a regulatory program to control air emissions from activities authorized under the Act which significantly affect onshore air quality. This program will require the use of best available control technology (BACT), or more stringent controls, if necessary, when air emissions significantly affect the onshore air quality of a State.

OCS ORDERS

- **Order No. 2** – This Order requires that “the lessee shall utilize appropriate drilling technology and state-of-the-art methods, such as drilling rate evaluation, shale-density analysis, or other appropriate methods in order to enhance the evaluation of conditions of abnormal pressure, and to minimize the potential for the well to flow or kick.” With the Application for Permit to Drill, the operator must submit engineering and geologic data used to substantiate proposed conductor and surface casing setting depths. Pressure tests of the exposed formation must be taken during drilling to determine setting depth of intermediate casing strings. Detailed requirements concern the installation and testing of blowout-prevention equipment and the monitoring of drilling mud. Company and drilling-contractor personnel must be trained in present-day well control techniques, and blowout-prevention drills must be conducted. Before drilling begins, an operator must file a contingency plan in the event that the presence of hydrogen sulfide may be suspected.
- **Order No. 5** – This Order, covering production safety systems, specifically addresses BAST as follows:

“As research and product improvement result in increased effectiveness of existing safety equipment or the development of new equipment systems, such equipment may be used and, if such technologies provide a significant cost effective incremental benefit to safety, health, or the environment, shall be required to be used if determined to be BAST. Conformance to the standards, codes, and practices referenced in this Order will be considered to be the application of BAST. Specific equipment and procedures or systems not covered by standards, codes, or practices will be analyzed to determine if the failure of such would have a significant effect on safety, health, or the environment. If such are identified and until specific performance standards are developed or endorsed by the USGS, the lessee shall submit such information necessary to indicate the use of BAST, the alternatives considered to the specific equipment or procedures, and the rationale why one alternative technology was considered in place of another. This analysis shall include a discussion of the cost involved in the use of such technology and the incremental benefits gained.”

This Order provides the basis for safety system requirements on production platforms. These requirements include the use of specified safety devices on wells, flowlines, and production equipment to provide secondary and tertiary well shut-down capability in the event of malfunctions.

Surface- and subsurface-safety valves are currently the best technology available to protect against a blowout following well completion. These valves must be manufactured to specific standards and must be installed in every well.

Other safety requirements in this Order are:

- Operators must inventory all safety devices located on the production facility and report any failure.
- Oil platform safety devices must be tested on a prescribed schedule. Platform safety and antipollution systems must be designed, analyzed, and installed in accordance with American Petroleum Institute RP 14C, which is a comprehensive safety analysis document.
- Pressure vessels must conform to applicable American Society of Mechanical Engineers codes, which undergo continuous updating.
- Electrical equipment must meet recognized codes and standards.
- Training is required for new employees, persons working with safety devices, and crane operators; and the operator must have a program which emphasizes employee motivation concerning safety and pollution prevention.
- The operator must submit, for USGS review and approval, a contingency plan for conducting other operational activities during production and a plan for safe practices and procedures for welding and burning.

The BAST requirements found in Order No. 5 are also applicable to all drilling operations on the OCS.

- **Order No. 6** - This Order covers the completion of oil and gas wells.
 - All completed wells must be equipped with casingheads, wellhead fittings, valves, and connections with a rated working pressure equal to or greater than the surface shut-in pressures.
 - Connections and valves must be designed and installed to permit fluid to be pumped between any two strings of casing.
 - Requirements are specified for the installation and pressure ratings of master valves, as well as testing of the assembled wellhead connections.
 - Certain testing must be conducted in the event of sustained pressure on the casinghead, or leaking gas or oil between the production casing and the next larger casing string.
 - Downhole safety devices are required as described in Order No. 5.
 - Certain procedures relative to multiple or tubingless completions must be followed in the repair of intercommunicated zones, and the placement and cementing of tubing strings.
- **Order No. 7** - The operator must maintain and annually reassess a USGS-approved oilspill contingency plan. Standby pollution-control equipment must be maintained and inspected monthly to assure its readiness for use.

- **Order No. 8**—All new fixed or bottom-founded platforms or other structures (e.g., single pile caissons, ice islands, and gravel islands) must be designed, fabricated, and installed in accordance with the applicable requirements of the document entitled "Requirements for Verifying the Structural Integrity of OCS Platforms." This document is the basis of a Platform Verification Program which is discussed later in this paper.

STANDARDS

Generally, standards are the criteria used to measure the adequacy of a piece of equipment or a process. They may take the form of specifications, required practices, or, where there is more than one way to satisfactorily accomplish the objective, guidelines.

Standards may be developed on a case-by-case basis as the need arises, or they can be developed to encompass a broad class of operations. The OCS Orders provide that any standard that is to be required must receive USGS approval prior to its use. In verifying the adequacy of a standard, or an applicable portion thereof, the USGS must first determine what is intended to be accomplished by the standard. The standard is then subjected to a technical review by USGS engineers and scientists to see if it meets the test. The standard may then be referenced in whole or in part and may include modifications to the requirements as a result of the technical review.

A continual review of the OCS Orders and standards is made through the various elements of the BAST Program described below. When a deficiency is noted in a standard, revisions are made through (1) changes to the standard itself if the standard is a USGS standard, (2) by coordination of the USGS with the originating organization, or (3) modification of the OCS Orders which are the implementing documents.

This was exemplified in a standard which required certain manufacturing specifications for surface- and subsurface-safety valves. After determining that there should be a quality control requirement for the manufacture of these devices, arrangements were made with the American National Standard Institute for development of a generic quality control standard which could encompass these safety devices. Utilizing the American Society of Mechanical Engineers (ASME) as the Secretariat, a committee composed of Government, public, industry, and manufacturing representatives was formed, and this group developed the desired standard which is now referenced in the OCS Orders.

Topics that warrant establishment of standards are identified through evaluation and analysis of oil and gas operational data and procedures, or through studies by industry, technical associations, academia, professional organizations, or interested parties. When the need for a standard has been identified, its development follows a set procedure:

- A "Notice of Intention" to develop a particular standard is published in the *Federal Register* soliciting comments by interested parties on the content of the Notice.
- A determination is made as to the most effective way to develop the standard, taking into account the comments received from the *Federal Register* solicitation. The standard is developed by USGS technical personnel or by standard-writing committees which have public membership such as those sponsored by the American National Standards Institute (ANSI).
- After a draft of the standard has been prepared and reviewed by appropriate USGS personnel, it is published in the *Federal Register* for comment by interested parties.
- The comments from the *Federal Register* solicitation are reviewed and the standard is modified as appropriate. The rationale for accepting or rejecting particular comments is explained.

- The final standard is published in the *Federal Register* with accompanying explanations of changes made in the draft version.
- New or revised OCS Orders are issued to implement the requirements set forth in the new standard.

Appendix 1 to this paper lists the standards and specifications currently referenced in the OCS Orders and summarizes their purpose.

APPLICATION OF BAST TO OCS OPERATIONS

The USGS has a number of activities and programs to assure that the numerous safety-related regulations, Orders, and other directives to OCS lessees are effectively carried out. These are designed to identify and report equipment hazards and problems, assure that all safety and pollution-prevention equipment used on the OCS is as effective and reliable as possible, insure that workers are adequately trained and qualified for their jobs, monitor and encourage research and development in safety and environmental protection, and provide for rigorous inspection of operator facilities and enforcement of all applicable directives. There are several programs currently in effect or soon to be implemented by the USGS which will assist the USGS in determining what is BAST or if BAST is being applied.

EXPLORATION AND DEVELOPMENT AND PRODUCTION PLAN APPROVAL

One of the primary elements of the program is the process for reviewing a plan submitted for approval and an inspection system to insure the approved plan is carried out. This is conducted as a part of the approval system that precedes issuance of permits or authorities to conduct leasehold operations. Upon receipt of an Exploration Plan or a Development or Production Plan, the Supervisor initiates the review process. There are several elements that make up this process and include:

- Consultation with Federal, State, and local Agencies.
- Making the Plan and Environmental Report (if required) to the public and receiving comments from the public.
- Evaluation of the potential impacts of the activities called for in the Plan on the marine, coastal, and human environment.
- Evaluation and technical review of the activities described in the Plan to assure on all new drilling and production operations that BAST is used.

As work is commenced under an approved Plan, lessees are required to obtain approval or permits for specific projects. The approval process for these applications includes a technical review to assure that specific pieces of equipment meet the BAST standards.

To aid in all review, lessees are required to provide that information necessary to assure that BAST is being proposed.

PLATFORM VERIFICATION

The USGS has instituted a more detailed review of OCS oil and gas platforms through an OCS Platform Structural Verification Program. The Program is designed to provide assurance that fixed or bottom-founded platforms directly associated with the production of oil and gas and located on leased areas of the United States OCS have a high probability of surviving the environmental conditions to which they are likely to be exposed. The Platform Structural Verification Program requires these platforms to be subjected

to a comprehensive verification of their structural integrity. The objectives of the Verification Program are:

- To provide maximum assurance of the structural integrity of fixed or bottom-founded oil and gas platforms on the OCS.
- To assure that new technology and engineering achievements are encouraged and accommodated in platform design, fabrication, and installation activities.

The major emphasis of the program is on platforms located in frontier areas of the OCS; those subject to unusual or extreme environmental conditions; and those incorporating unusual or innovative features. The verification process encompasses the design, fabrication, and installation phases.

The main elements of the Platform Verification Program are:

- Knowledgeable and professional in-house staff.
- Detailed technical expertise.
- Technical standards.
- Engineering information.

An important portion of this program is that lessees utilize independent third-party technical organizations to insure that BAST and good engineering judgment are used in the design, fabrication, and installation of new platforms. The USGS-developed document, entitled "Requirements for Verifying the Structural Integrity of OCS Platforms," forms the basis of this program and the technical standards.

QUALITY ASSURANCE

The USGS Quality Assurance Program focuses upon the design and manufacture of safety and pollution-prevention equipment (SPPE) under generic quality-assurance standards developed in conjunction with the ASME. These standards set forth the criteria that must be satisfied in the manufacture and testing of SPPE for the products to receive OCS equipment certification. Equipment manufacturers are surveyed by ASME representatives accompanied by USGS quality assurance personnel, and are audited for compliance with the USGS generic quality assurance standards. For example, beginning February 1, 1980, surface- and subsurface-safety valves used on the OCS had to meet OCS generic quality standards. This is a primary program for assurance of BAST. To date, surface- and subsurface-safety valves are covered under the program. If deficiencies are noted in other safety devices or systems, the generic requirements of this standard can be applied.

Three other aspects of the USGS OCS regulatory effort not directly related to BAST determination and application are important in assuring that operations are carried out safely. These are:

INSPECTION AND ENFORCEMENT

To insure compliance with the regulations, Orders, and an approval plan, a detailed inspection program has been established. Lessees and operators are required to periodically inspect and test certain equipment and facilities and certify that such inspections were carried out and appropriate corrective measures taken. Compliance inspections by USGS personnel are supplemental to these required inspections and are performed by one USGS representative or by a team, depending upon the nature and complexity of the facilities or operations to be inspected. As with the other monitoring activities, these in-

Inspections are necessary to assure that operators are in compliance with outstanding Orders and regulations, including those which contain the BAST requirements. Results of the inspections are analyzed to determine if there are patterns of equipment failure or malfunction which should lead to investigation into improved technology.

Enforcement actions are taken to ensure that an operator corrects all incidents of non-compliance. Enforcement actions consist of (1) written warnings, or (2) shut-in of platform, zone (well), equipment, or pipeline, depending upon the enforcement action specified.

TRAINING

Most accidents in OCS operations result from human error, and although the BAST Program is concerned with technology hardware, improvements in the quality and amount of training given to personnel in safety and environmental protection obviously support the program's objectives. Lessees must verify that key operational personnel have completed instructional programs in critical areas related to their job performance, and they must periodically attend refresher courses.

SAFETY ALERT PROGRAM

The Safety Alert Program notifies lessees and operators of practices and conditions which have resulted in accidents. They are advised to review their own operations to insure that similar situations do not occur. Safety Alert Notices are written and disseminated to all lessees and operators and other interested parties and organizations. Operator personnel closely associated with field operations receive copies.

This program provides OCS lessees and other interested parties with an indication of specific problems. OCS operators are put on alert as to potential problems which may require the application of BAST. Subsequent review will determine whether modification of existing requirements in the regulations or OCS Orders is necessary.

DEVELOPMENT OF INFORMATION FOR BAST DETERMINATIONS

In order to determine areas where there are problems or deficiencies, specific program elements have been instituted. These identify problems on both a National and Regional basis. For example, problems involved with the development of ice prone areas like the Chukchi or Beaufort Sea will require different technologies in some areas than do the same operations in the Gulf of Mexico.

These programs are described below:

FAILURE AND INVENTORY REPORTING SYSTEM (FIRS)

FIRS is a reporting system designed to provide the USGS with information relative to the performance and operational problems encountered with safety and pollution-prevention equipment on the OCS. The FIRS program consists of two elements: (1) The Safety Device Inventory Reporting Program, designed to provide data on all safety and pollution-prevention devices by type, manufacturer, and model which are in service on offshore production platforms located on the OCS and (2) the Safety Device Failure Reporting Program, which is designed to provide data on failures in such devices including: cause, corrective action, device type, model and manufacturer, and frequency of failure. The information acquired from these two separate but interrelated programs provides benefits to the USGS, the offshore oil industry, and equipment manufacturers by pinpointing any devices showing recurring failures, and by minimizing the period of

time required to identify problem areas. This program provides a system for determining when additional efforts are needed to assure BAST is being used. This is a major portion of the program to detect where technological gaps exist. Upon discovery of a gap, investigations are conducted as to the need for additional standards using the procedures described earlier.

ACCIDENT INVESTIGATION AND REPORTING

The provisions of 30 CFR 250.45 require lessees to immediately notify the appropriate USGS Supervisor of serious accidents and all fires on the lease and submit a full written report on each incident within 10 days. Lessees must notify the Supervisor within 24 hours of other accidents or unusual conditions.

The USGS independently investigates accidents but cooperates with other Agencies sharing jurisdiction in such matters. The U.S. Coast Guard (USCG) enforces regulations relating to personnel safety and investigates all accidents involving fatalities, or exceeding certain minimum injury or damage levels. In the event of an accident involving fatalities or an explosion, fire, or major pollution on an OCS facility, the USGS and the USCG may conduct a joint investigation.

Upon completing the investigation of an accident, the investigating team prepares an OCS Accident Investigation and Analysis Report, summarizing its findings, evaluating the lease operator's report of the accident, and recommending corrective measures to minimize the chances of recurrence.

These investigations reveal whether accidents result from lack of the use of BAST, from a lack of conformance with outstanding requirements, or from equipment malfunction. This provides another indication of areas to be investigated for technological improvement.

Completed reports are distributed to appropriate USGS personnel, and the non-proprietary information is made available in the Public Records Offices. A determination is then made in the Regional Office whether a Safety Alert Notice should be incorporated into OCS Orders which specify requirements that would minimize the chances for a recurrence of the incident. To monitor these requirements, investigations of accidents on the OCS are necessary.

RESEARCH AND DEVELOPMENT

An important element of the BAST program is the capability for conducting or contracting for appropriate Research and Development (R&D). Such a program has been established within the USGS and is concerned with the technologies involved in OCS oil and gas drilling and production activities. This program supplements programs maintained by the industrial and academic sectors and concentrates on matters directly related to safety and pollution. The program continually assesses research in this field by industry, academia, and other Government institutions.

The main functions of the R&D program are:

- Stimulate R&D where considered essential by USGS.
- Interact with the R&D community and direct those resources toward the solution of problems.
- Independently monitor and assess the status of offshore technologies and identify operational practices and technologies where additional R&D offers promise.

- Provide a central point for focusing the resources of the scientific and technological community on the identified problems of the offshore industry.

The classes of problems addressed by the R&D program are:

- The application of new technologies to the solution of existing problems.
- The application of advanced technology to problem situations encountered by industry as it migrates into more hostile environments.
- The application of advanced technology to anticipated regulatory responsibilities.

Improvements resulting from industry, academic, or Government efforts, or any combination of efforts by these groups, may be incorporated into the requirements of OCS Orders or standards. This is accomplished through normal procedures used to revise the regulatory documents.

OUTSIDE SOLICITATION

New ideas or concepts that might be considered for advancing technology are solicited. This procedure is described in the next section.

ORGANIZATION AND PROCEDURES FOR THE BAST PROGRAM

In implementing the BAST program, the U.S. Geological Survey has established three new organizational units:

- An Operations Technology Assessment Committee (OTAC) established in each OCS Region.
- A BAST unit established in the USGS National Headquarters to provide staffing for program overview.
- A National OTAC composed of senior Conservation Division engineers and scientists.

The Regional committees meet monthly and are composed of technical personnel from the Regional Area and District Offices. They will review FIRS reports, results of accident investigations, inspection reports, and other materials as requested by the Conservation Managers.

Additionally, the committees examine new technologies and concepts for advancing technology and reviewing R&D proposals. They provide a review geared to the Regional aspects of the programs as envisioned in legislative history of the OCS Lands Act Amendments as well as general technical assessments.

The Regional committees will be considering new operating environments and the environmental problems that might be encountered in the new areas.

The proposed agenda for each OTAC meeting is sent to National Headquarters and the other Regional offices 2 weeks before the scheduled meeting.

Personnel from other offices may attend the meetings depending on the National interest in the agenda. Reports of all OTAC meetings are sent to the BAST Unit at National Headquarters and other Regional Offices, as well as any recommendations concerning additional R&D efforts and the use of new technologies.

The BAST Unit is located in the Branch of Offshore Operations, an organizational element of the Office of the Deputy Division Chief, Offshore Minerals Regulation. This Unit is composed of engineers, scientists, and other technical personnel and provides the staff

capability to insure an ongoing, consistent BAST Program. Scheduled meetings are held monthly between personnel from the BAST Unit and personnel from other Headquarters units to review the regionally submitted OTAC reports. The BAST Unit conducts independent studies on matters pertaining to safety and pollution prevention on the OCS and many take recommendations to the Regional OTAC personnel as to subjects that may be appropriate for including in their agenda. It is the responsibility of the BAST Unit to assure that USGS personnel are aware of the state-of-the-art as described in technical journals and conferences.

The various organizational units and how they function are shown in Figure 2.

Periodically, the USGS will solicit public comments on new concepts by publishing in the *Federal Register* a Notice inviting interested parties to submit their comments and ideas concerning advancing technology and its application to OCS drilling and producing operations. Comments received from these solicitations will be sent to the field offices for a technical assessment at the OTAC meetings. An analysis of these assessments will be included in the OTAC report submitted to the BAST Unit. The purpose of these solicitations is for the USGS to become aware of new ideas and improvements in technology that might not otherwise be discovered. It is not intended through this portion of the program that the USGS will endorse specific manufacturers or pieces of equipment, but this will provide encouragement for the development of those concepts that indicate technical feasibility as well as supplying another method for determining the state-of-the-art. Concepts that develop into equipment specifications may be incorporated into performance standards, as appropriate.

On a semiannual basis, the BAST Unit prepares a compilation of the results of the various Regional OTAC meetings, Headquarters meetings, *Federal Register* solicitations, and other technology assessments. These will be presented at a National OTAC meeting. A report on the last 6 months' activities will be presented as well as recommendations for programmatic changes, revisions to OCS Orders, standards development, and additional research and development. Discussions will also concern those ideas or concepts received as a result of the *Federal Register* solicitations and, after analysis, appear to have a technical feasibility. Reports of those meetings will include recommendations to be made to Division and Bureau management and to the Secretary of the Interior when appropriate. These reports will be published and public comments solicited. Recommendations adopted will be implemented by the Conservation Division and will be included in the regulatory program.

As implementation of such recommendations is one of the primary purposes of the BAST Program, oversight will be maintained with an objective analysis solicited on a continuing basis from the Marine Board of the Assembly of Engineering, National Research Council.

The enforcement of the BAST standard is at the field level through review and approval of lessee-submitted applications to conduct operational programs and inspection of lessee operations. The BAST Unit, however, performs an oversight function to insure consistency in the application of BAST. Internal audits performed under the aegis of the BAST Unit documents program implementation.

The Marine Board of the Assembly of Engineering, National Research Council, has been contracted by the USGS in conjunction with the USGS and is studying the adequacy of safety technology and regulations for OCS drilling and producing operations. The results of this study will provide a basis for a report to the President prepared by the USGS and the USCG required by section 21(a) of the OCS Lands Act Amendments. Revisions to the general regulatory regime and the BAST Program may be an outcome of this study.

BAST PROCEDURES FLOW

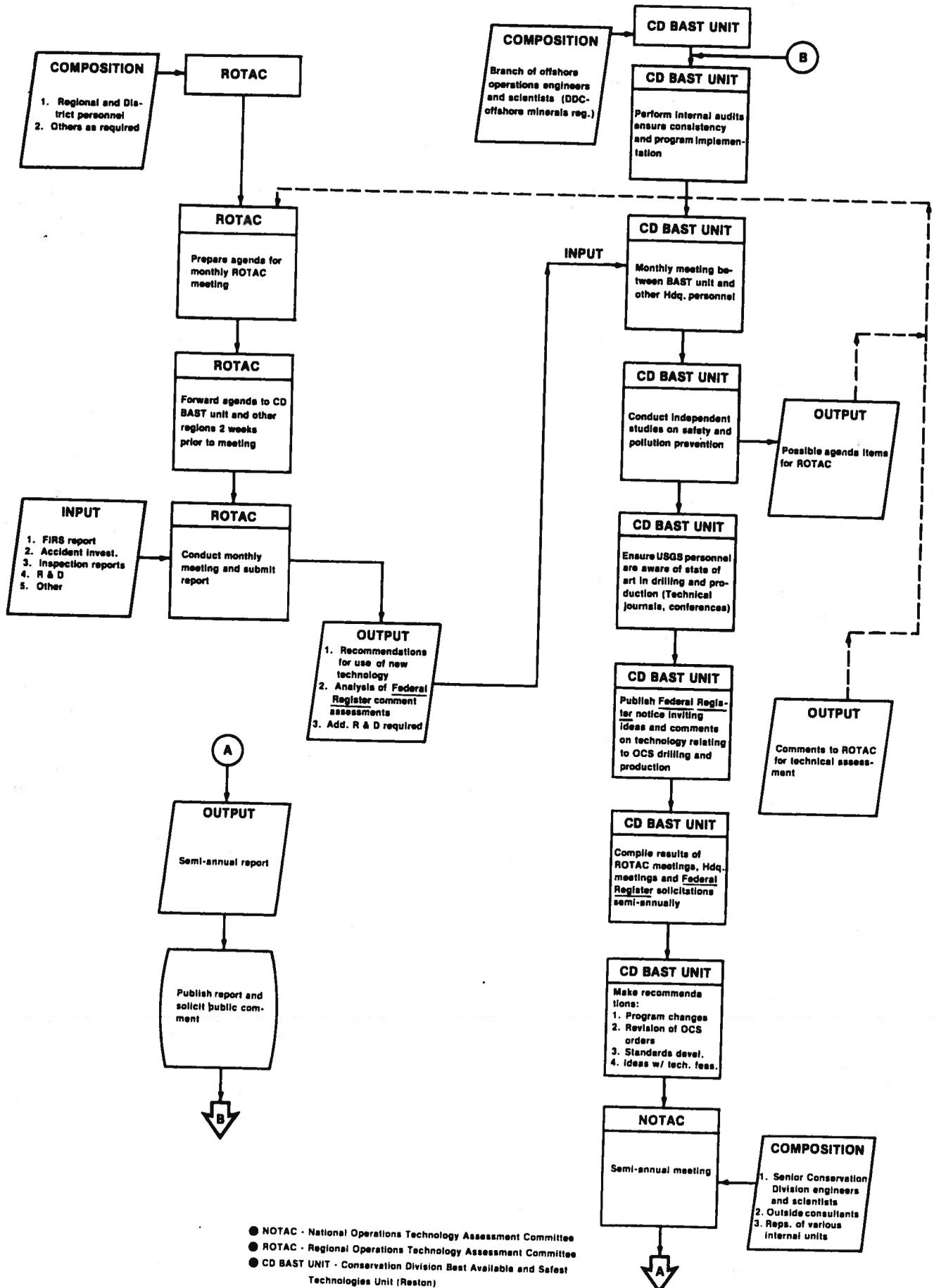


FIGURE 2

In summary, this new system for BAST Program review and monitoring, combined with revised operating regulations and existing programs, provides the mechanism for determining what is BAST, for detecting deficiencies in equipment that impinge on BAST, for developing additional BAST requirements, and for monitoring the use of BAST.

APPENDIX I

LIST OF STANDARDS AND SPECIFICATIONS

REFERRED TO

IN

OCS ORDERS

AND

PLATFORM VERIFICATION PROGRAM DOCUMENTS

OCS ORDERS

OCS Order No. 2 – Drilling Operations.

American Petroleum Institute Standards for new pipe (no specific call out). This is the only "general reference" to API Standards.

"API Recommended Practice for Blowout Prevention Equipment Systems," API RP 53, First Edition, February 1976, reissued February 1978.

USGS OCS Standard "Training and Qualifications of Personnel in Well-Control Equipment and Techniques for Drilling on Offshore Locations," No. T 1 (GSS-OCS-T 1), First Edition, December 1977.

"API Recommended Practice for Standard Procedure for Testing Drilling Fluids," API RP 13B, Seventh Edition, April 1978.

USGS OCS Standard "Safety Requirements for Drilling Operations in a Hydrogen Sulfide Environment," No. 1 (GSS-OCS-1), First Edition, February 1976. This Standard references the following:

– API RP 49, "Recommended Practices for Safe Drilling of Wells Containing Hydrogen Sulfide," First Edition, September 1974.

– API RP 7G, "Recommended Practices for Drill Stem Design and Operating Limits" (Section 8, "Drill Stem Corrosion and Sulfide Stress Cracking"), Seventh Edition, April 1976.

ANSI Standard Z 88.2-1969, "Respiratory Protection."

ANSI Standard Z 48.1-1954 (R 1971), "Method of Marking Portable Compressed Gas Containers to Identify the Material Contained."

Compressed Gas Association, "Commodity Specification for Air (Grade D)," G-7.1-1973, August 1973.

OCS Order No. 5 – Production Safety Systems.

ANSI/ASME "Quality Assurance and Certification of Safety and Pollution Prevention Equipment Used in Offshore Oil and Gas Operations," ANSI/ASME SPPE-1-1977, December 1977 (formerly ANSI/ASME-OCS-1-1977).

ANSI/ASME "Accreditation of Testing Laboratories for Safety and Pollution Prevention Equipment Used in Offshore Oil and Gas Operations," ANSI/ASME SPPE-2-1977, December 1977 (formerly ANSI/ASME-OCS-2-1977).

"API Specification for Subsurface-Safety Valves," API Spec 14A, Fourth Edition, November 1979.

"API Recommended Practice for Analysis, Design, Installation, and Testing of Basic Surface-Safety Systems on Offshore Production Platforms," API RP 14C, Second Edition, January 1978.

"API Specification for Wellhead Surface Safety Valves for Offshore Service," API Spec 14D, Second Edition, November 1977.

"API Recommended Practice for Design and Installation of Offshore Production Platform Piping Systems," API RP 14E, First Edition, August 1975.

National Electrical Code, 1978 Edition.

"API Recommended Practice for Classification of Areas for Electrical Installations at

Drilling Rigs and Production Facilities on Lands and on Marine Fixed and Mobile Platforms," API RP 500B, Second Edition, July 1973.

ASME Boiler and Pressure Vessel Code July 1, 1977 Edition, Sections, I, IV, and VIII.

"API Recommended Practice for Fire Prevention and Control on Open Type Offshore Production Platforms," API RP 14G, First Edition, September 1978.

"API Recommended Practice for Design and Installation of Electrical Systems for Offshore Production Platforms," API RP 14F, First Edition, July 1978.

Institute of Electrical and Electronic Engineers (IEEE) "Recommended Practice for Electric Installation on Shipboard," IEEE Std. 45-1977.

National Fire Protection Association Bulletin "Cutting and Welding Processes," No. 51B, 1976.

"API Recommended Practice for Qualification Programs for Offshore Production Personnel Who Work With Anti-Pollution Safety Devices," API RP T-2, revised October 1975.

"API Recommended Practice for Operation and Maintenance of Offshore Cranes," API RP 2D, October 1972.

"API Recommended Practice Orientation Program for Personnel Going Offshore for the First Time," API RP T-1, January 1974.

"API Specification for Offshore Cranes," API Specification 2C, February 1972.

"API Employee Motivation Programs for Safety and Prevention of Pollution in Offshore Operations," API Bulletin T-5, September 1974.

OCS Order No. 8 – Platforms and Structures.

USGS document entitled "Requirements for Verifying the Structural Integrity of OCS Platforms."

OCS Order No. 13 – Production Measurement and Commingling.

API Standard 2544 and ASTM Designation D287-67, Standard Method of Test for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method), 1967.

API Standard 2542 and ASTM Designation D96-68, Standard Methods of Test for Water and Sediment in Crude Oils (1968).

API Standard 2543 and ASTM Designation D1086-64, American Standard Method of Measuring the Temperature of Petroleum and Petroleum Products (1964).

API Standard 2531, USA Standard for Mechanical-Displacement Meter Provers, Table II (1963).

API Standard 2540 and STM-D1250, Table 6, "Reduction of Volume to 60° F against API gravity at 60° F" (1952).

API Standard 2541 and ASTM Designation D1750-62, "Standard Tables for Positive Displacement Meter Prover Tank" (1966).

API Standard 2550 and ASTM Designation D1220-65, "Measurement and Calibration of Upright Cylindrical Tanks" (1966).

API Standard 2545, and ASTM Designation D1085-65, "USA Standard Method of Gauging Petroleum and Petroleum Products" (1965).

API Standard 2546 and ASTM Designation D270-65, "Standard Method of Sampling Petroleum and Petroleum Products" (1965).

API Standard 2540 and ASTM Designation D1250, Table 6, "Reduction of Volume to 60° F" (1952).

American Gas Association publication, "Orifice Metering of Natural Gas, Gas Measurement Committee Report No. 3," including the appendix, September 1969.

PLATFORM VERIFICATION PROGRAM

MISCELLANEOUS

- American Welding Society (AWS) publication, "Structural Welding Code," AWS D1.1, latest edition.
- American Welding Society (AWS) publication, "Reinforcing Steel Welding Code," AWS D12.1.
- American Institute of Steel Construction publication, "Specification for the Design, Fabrication, and Erection of Structural Steel for Building," latest edition.
- API RP2A, "Recommended Practice for Planning, Designing, and Constructing Fixed Offshore Platforms," 10th edition.
- National Association of Corrosion Engineers Standard (NACE), "Control of Corrosion on Steel Fixed Offshore Platforms Associated with Petroleum Production," RP01.
- Federation Internationale de la Precontrainte, "Recommendations for the Design and Construction of Concrete Sea Structures," 3rd edition, Slough, 1977.
- American Bureau of Shipping, "Rules for Building and Classing Steel Vessels," 1978.
- The American Association of State Highway and Transportation Officials (AASHTO), "Standard Specifications for Highway Bridges," 12th edition, 1977; amended in 1978.
- AASHTO, "Standard Specifications for Transportation Materials and Methods of Sampling and Testing," 12th edition, 1978.
- Prestressed Concrete Institute, Committee on Post-Tensioning, "Recommended Practice for Grouting of Post-Tensioned Prestressed Concrete," *Journal of Prestressed Concrete Institute*, vol. 17, No. 6, p. 18-25, Nov-Dec 1972.

AMERICAN CONCRETE INSTITUTE (ACI) DOCUMENTS

- ACI Committee 201, "Guide to Durable Concrete," *ACI Journal*, December 1977, p. 573-609.
- ACI Committee 211.1, "Recommended Practice for Selecting Preparations for Normal and Heavy Weight Concrete."
- ACI Committee 304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete," (ACI 304-73), American Concrete Institute-1973.
- ACI Committee 305, "Hot Weather Concreting."
- ACI Committee 306, "Cold Weather Concreting."
- ACI Committee 308, "Recommended Practice for Curing of Concrete," (ACI 308-71), American Concrete Institute, 1971.

- ACI Committee 309, "Recommended Practice for Consolidation of Concrete," (ACI 309-72), American Concrete Institute, 1972.
- ACI, "Commentary on Building Code Requirements for Reinforced Concrete," ACI 318-77, Commentary, Detroit, 1977.
- ACI Committee 350, "Concrete Sanitary Engineering Structures," (ACI) 350-71, American Concrete Institute, 1971.
- ACI Committee 357, "Guide for the Design and Construction of Fixed Offshore Concrete Structures."
- ACI Committee 359, "Code for Concrete Reactor Vessels and Containments."
- ACI Manual of Concrete Inspection, American Concrete Institute, Detroit, 1975.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

- ASTM A673, "Specification for Sampling Procedure for Impact Testing of Structural Steel."
- ASTM C31, "Making and Curing Concrete Test Specimens in the Field."
- ASTM C33, "Specification for Concrete Aggregates."
- ASTM C42, "Specification for Seamless Copper Pipe, Standard Sizes."
- ASTM C94, "Specification for Ready-Mixed Concrete."
- ASTM C109, "Tests for Compressive Strength of Hydraulic Cement Mortars."
- ASTM C138, "Specification for Manganese Bronze Rod, Bar, and Shapes."
- ASTM C143, "Test for Slump of Portland Cement Concrete."
- ASTM C150, "Specification of Portland Cement."
- ASTM C172, "Sampling Fresh Concrete."
- ASTM C173, "Specification for Rope-Lay-Standard Copper Conductors Having Concentric Standard Members for Electrical Conductors."
- ASTM C231, "Specification for Concentric-Lay-Standard Aluminum Alloy Conductors."
- ASTM C260, "Specification for Air-Entraining Admixtures for Concrete," latest edition.
- ASTM C330, "Specification for Lightweight Aggregates for Structural Concrete."
- ASTM C360, "Test for Ball Penetration in Fresh Portland Cement."
- ASTM C494, "Specification for Chemical Admixtures for Concrete," latest edition.
- ASTM C595, "Specification for Blended Hydraulic Cements."
- ASTM C618, "Specifications for Fly Ash and Raw or Calcined Natural Pozzolans for Use as Mineral Admixture in Portland Cement Concrete," latest edition.