

Methane Gas Detection

BAST Technology Assessment

This document serves to announce BSEE’s intention to evaluate gas detection technology as part of the Best Available and Safest Technology (BAST) Program. Use of cost-effective BAST is required by the Outer Continental Shelf Lands Act (OCSLA) to address significant safety issues on the Outer Continental Shelf (OCS). BSEE believes that this assessment is needed to determine if use of BAST involving gas detection and mitigation can reduce the likelihood of the adverse consequences of methane gas ingestion events during OCS operations.

BACKGROUND

On August 26, 2014, the National Transportation Safety Board (NTSB) issued five Safety Recommendations addressing “occurrences of total or partial loss of engine power on turbine-powered helicopters operating on offshore oil platforms in the Gulf of Mexico, likely due to inadvertent ingestion of methane gas that was being vented in the vicinity.” Two of those recommendations were issued to BSEE¹, one of which was to “In collaboration with the US Coast Guard, identify and develop comprehensive systems and procedures to mitigate the risk of ingestion of raw gas discharges, such as methane, by helicopters operating in the vicinity of offshore oil platforms.”.

The primary safety incidents addressed by the NTSB included two incidents (2011 and 2013) that resulted in helicopters ditching into the ocean because of methane gas being vented from a facility and ingested into the turboshaft engines of the helicopters during takeoff.

Near miss events involving the ingestion of vented gas into turboshaft engines have also been reported by other regulators in the International Regulator Forum. A review of OEM and industry standards indicates that safety concerns related to methane ingestion in helicopters are well known and wide spread. UK CAP-437, Standards for Offshore Helicopter Landing Areas (2013) and NORSOK C-004, Helicopter Decks on Offshore Installations (2013) both contain methane emission limitations. Rolls-Royce Allison, an engine builder, also has methane limitation recommendation for its turboshaft engines. As a result, BSEE believes that this issue has international significance.

In response to the NTSB report, BSEE funded a study (No. 733) under the BSEE Technology Assessment Program (TAP), titled “*Aviation Safety Support Services for the Bureau of Safety and Environmental Enforcement*”. The contractor, Price Waterhouse Coopers, LLP, found during the course of the study that relatively low levels of methane “have the potential to cause helicopter engines to surge and/or flameout with the consequent risk to the helicopter and its passengers”² and recommended that BSEE explore the use of methane gas detection devices as a

¹ NTSB Safety Recommendation A-14-67-68, August 26, 2014, page 5: <https://www.nts.gov/safety/safety-recs/reclatters/A-14-067-068.pdf>

² Aviation Safety Support Services for the Bureau of Safety and Environmental Enforcement (BSEE), Task 5: Study on Effects of Combustible Gas on Helicopter Operations, Price Waterhouse Coopers, LLP, September 28, 2015, page 5-29: <https://www.bsee.gov/sites/bsee.gov/files/tap-technical-assessment-program/study-of-effects-of-combustible-gas-on-helicopter-operations.pdf>

way to provide early warning to helicopter pilots and facility personnel. This study was peer-reviewed and also presented to the Helicopter Safety Advisory Conference (HSAC) in October 2015. The HSAC consists of operators, drilling contractors, service companies, and helicopter manufacturers who operate in the Gulf of Mexico.

In recognition of these findings, the Chief of the Office of Regulatory Programs (OORP) was requested to determine whether there were cost effective, commercially available technologies that could reduce the risks of methane gas ingestion through early gas detection and warning.

The process that BSEE utilizes for making this type of evaluation is the BAST Determination Process (BAST DP³) under BSEE's BAST Program (<https://www.bsee.gov/bast/>). This process, developed with input from stakeholders, allows this technical evaluation to proceed in a logical sequence with input from the industry and subject matter experts. The ultimate goal is to develop performance based criteria centered on a review of existing equipment. At several stages during the evaluation, the process may be terminated if BSEE determines that a technical solution is not feasible or if there are other alternative approaches.

The first four steps of the BAST DP have been completed by BSEE and the objective now is to begin the process of engaging the industry and interested parties in this assessment and review process. To provide the reader with background on the assessment, the four steps completed thus far and the next step planned, are listed below.

I. BAST STEP 1.1: SAFETY ISSUE

Based on data from the aforementioned sources, BSEE initiated Step 1.1 of the BAST DP and as a result, determined that sufficient evidence supports BSEE's earlier findings that a potential safety issue exists on the OCS.

II. BAST STEP 1.2: ASSESSMENT AND FINDINGS

BSEE initiated Step 1.2 – Assessment of the BAST DP to determine whether technology solutions exist that could mitigate the safety issue identified from Step 1.1 above. BSEE met with a variety of stakeholders, including operators and Original Equipment Manufacturers (OEMs) of gas detection equipment, to evaluate systems on the open market with applicability to OCS operations that can be installed at/near the point of methane gas release or at/near the helideck to provide early warning to helicopter pilots. From these discussions BSEE determined that various MGD systems were commercially available to mitigate the inherent danger of the release of gas to approaching or departing helicopters.

³ BSEE's BAST Determination Process, November 16, 2015: <https://www.bsee.gov/sites/bsee.gov/files/fact-sheet/bsee-bast-determination-process-final-november-2015.pdf>

III. BAST STEP 1.3: BAST FEASIBILITY ANALYSIS

BSEE initiated Step 1.3 – Feasibility Analysis of the BAST DP to determine the anticipated cost to industry to adopt commercially available technologies necessary to significantly reduce or eliminate the safety issue. BSEE’s analysis concluded that it is likely that there are cost-effective technologies that will allow the potential safety issues to be mitigated.

IV. BAST STEP 1.4: TECHNOLOGY IMPROVEMENT OBJECTIVE

In accordance with Step 1.4 of the BSEE BAST DP the agency has developed the following Technology Improvement Objective (TIO) which has the potential to improve safety, health or environmental protection associated with the ingestion of methane gas into helicopter turbine engines during landing and departure from OCS platforms.

Based on an evaluation of commercially available technology, what is the lowest level of methane (at or above the LFL⁴) that can be detected in a cost effective and feasible manner in the vicinity of the helidecks?

V. BAST STEP 1.5: PUBLIC NOTICE

In accordance with Step 1.5 of the BAST DP, this TIO is being published for public review on www.BSEE.gov. The agency plans on holding a Public Forum to further explain the BAST DP and allow OCS stakeholders to hold discussions with the agency on the TIO, BSEE’s rationale for initiating the BAST DP, and the next steps. BSEE welcomes your feedback on the TIO in advance and in preparation of the Forum (date and venue to be announced @ www.BSEE.gov). Send your comment(s) to bastweb@bsee.gov and enter the words “MGD TIO Comment” in the subject line.

⁴ Lower Flammability Limit