# National Transportation Safety Board

Washington, DC 20594

## Safety Recommendation

**Date:** August 26, 2014

**In reply refer to:** A-14-71

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The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant accidents in other modes of transportation—railroad, highway, marine, and pipeline. The NTSB determines the probable cause of the accidents and issues safety recommendations aimed at preventing future accidents. In addition, the NTSB carries out special studies concerning transportation safety and coordinates the resources of the federal government and other organizations to provide assistance to victims and their family members affected by major transportation disasters. The NTSB urges the American Petroleum Institute (API) to take action on the safety recommendation issued in this letter.

This recommendation addresses 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.[1] As a result of the NTSB's investigation of these events, we have issued five safety recommendations, one of which is addressed to API. Information supporting this recommendation is discussed below.

On March 24, 2011, about 1655 central daylight time, a Bell 206-L3 helicopter operated by PHI, Inc.,[2] N32041, experienced a partial loss of power to its Allison 250-C30 turboshaft engine shortly after takeoff from an offshore oil production platform (MP61A) in the Gulf of Mexico. The commercial pilot initiated an autorotation and activated the helicopter's float

[1] For safety reasons, offshore oil platforms are equipped with booms to perform a controlled release of unburned gases, predominately methane, into the atmosphere (known as venting) or to perform a controlled burn of gas that is a byproduct of routine oil and gas production (known as flaring). Although this letter discusses accidents involving vented methane gas, discharges of other raw gases can also lead to turbine engine failure.

[2] The operator changed its name from Petroleum Bell Helicopters, Inc. to PHI, Inc. in 2006.

system; the helicopter impacted the water and rolled inverted. The pilot and two passengers received minor injuries, and the helicopter was substantially damaged.[3]

The pilot and passengers reported hearing a loud bang just after the helicopter departed the platform, toward the northwest into the wind. After hearing the bang, the pilot observed a high indication on the torque gauge but did not note any other gauge readings before initiating the autorotation. He stated that when the bang sounded, the helicopter was above and just beyond an "exhaust pipe" on the platform but that he did not know what it vented or whether it was venting when he took off. The production foreman on the platform later reported that the flare boom was venting methane gas throughout the day, including at the time of the helicopter's departure. The platform was not equipped to provide any visual indication to pilots when gas was venting. Review of data from the helicopter's engine data monitoring system revealed a slight increase in the engine torque and turbine outlet temperature readings. The NTSB determined the probable cause of this accident was "the loss of engine power due to an engine compressor stall as a result of ingesting methane gas during takeoff."

On August 13, 2013, a Bell 407 helicopter, N53LP, operated by Panther Helicopters, Inc., experienced a total loss of power to its Rolls-Royce 250-C47B turboshaft engine shortly after takeoff from an offshore oil platform (SS208H) in the Gulf of Mexico. The pilot reported hearing a loud bang and attempted to increase the helicopter's forward airspeed but was unable. He then took mitigating actions once impact with the water was imminent. The pilot and two passengers sustained minor injuries, and the helicopter was substantially damaged.[4]

The NTSB's investigation of the 2013 accident is ongoing. Preliminary analysis of data from the helicopter's full authority digital electronic control system indicated an engine surge condition just after takeoff. After about 1 second of the abnormally high engine operating condition, engine power dropped and an engine flameout occurred. Power to the rotor system was regained about 4 seconds later, but there was not sufficient altitude available for the pilot to recover.

The pilot later reported that before departure, he brought the helicopter into a stationary hover in the middle of the helideck and made a "left pedal turn into the wind and in a direction to avoid the flare boom." The pilot was not aware before departing that methane gas was being vented. While a wind sock is located on the platform to assist pilots in determining the prevailing wind direction, as recommended in industry guidance, the platform does not have a system visible to pilots indicating when gas is venting; such a system is particularly helpful since methane gas is colorless and odorless and pilots are not able to discern its presence. According to a monthly gas flaring and venting volume summary provided by the platform operator, the volume of methane gas vented on the day of the accident was the highest of the month and about 20 times the volume of the second highest day. The following figure shows SS208H with its helideck and flare boom.

[3] More information about this accident, NTSB case number CEN11LA252, is available at http://www.ntsb.gov/aviationquery/index.aspx.

[4] Additional preliminary information about this accident, NTSB case number CEN13FA491, is available at http://www.ntsb.gov/aviationquery/index.aspx.

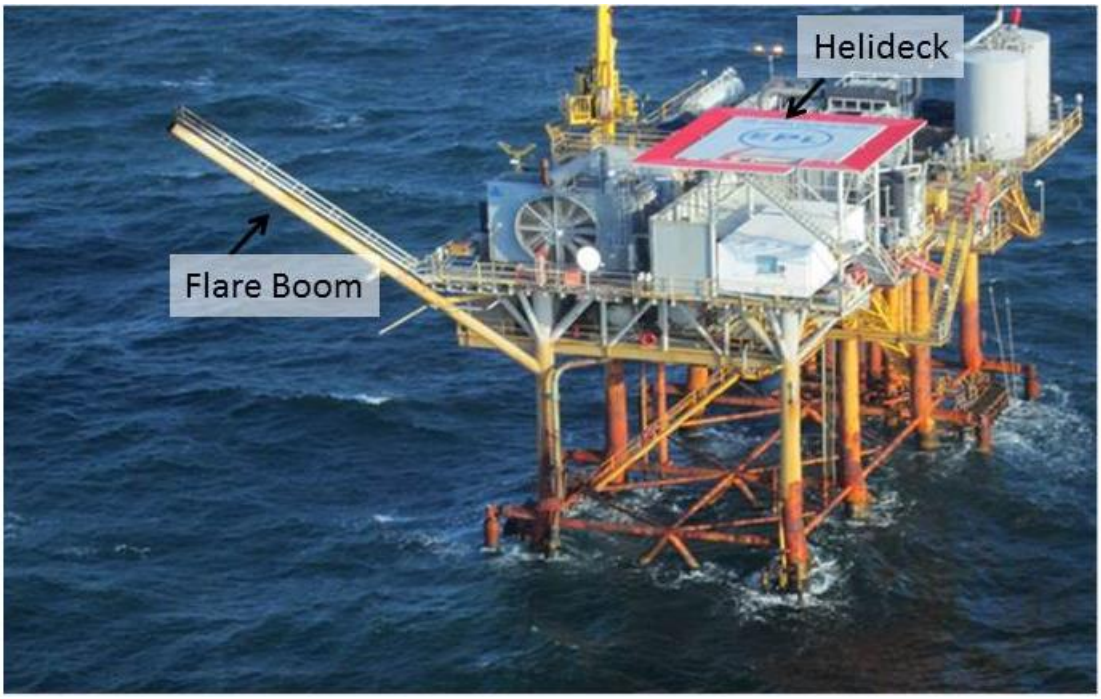


**Figure.** SS208H showing the helideck and flare boom.

A brief prepared by the Helicopter Safety Advisory Conference (HSAC) indicates that single-engine, turbine helicopters operating in the Gulf of Mexico primarily service platforms that often have helidecks that were built near flare booms, thereby potentially exposing arriving and departing helicopters to gas discharges.[5] A sufficiently large concentration of vented combustible gas ingested by a nearby helicopter turbine engine can cause surging, a compressor stall, or flameout.[6] Safety guidance materials produced by stakeholders in the Gulf of Mexico energy industry widely acknowledge this particular risk as a significant safety hazard.[7] However, API's guidance for planning and constructing heliports on offshore platforms (Recommended Practice 2L, *Recommended Practice for Planning, Designing, and Constructing Heliports for Fixed Offshore Platforms*, dated June 1, 1996) currently contains no mention of gas venting and its associated hazards.

[5] HSAC was formed in 1978 to promote improved communication and safe practices within the Gulf offshore community. HSAC consists of representatives from major petroleum oil companies; drilling companies; helicopter operators; oil industry service companies; helicopter manufacturers; all branches of the Armed Forces; and several federal agencies, including the Federal Aviation Administration, the Department of the Interior, and the Customs Service.

[6] The Civil Aviation Authority, which has oversight of offshore platform operation in the United Kingdom, estimates that concentrations above 10% lower flammable limit (LFL) pose a risk. LFL is the lower end of the concentration range over which a flammable mixture of gas or vapor in air can ignite at a given temperature and pressure.

[7] For example, about 2 months after the March 2011 accident, PHI issued a safety alert to its pilots advising of the hazards associated with turbine engine ingestion of venting gas when operating to or from offshore oil platforms. The alert specifically noted that compressor stalls can result and, among other guidance, advised pilots to "avoid the area downwind of the vent…don't start, takeoff or land if downwind of a venting flare boom."

The NTSB is aware that API is in the process of revising Recommended Practice 2L to explicitly indicate that helidecks and sources of raw gas discharges should be separated as much as practicable and that detection devices should be provided to indicate a visual alert when discharges occur. The NTSB believes that completing and issuing the proposed revisions to API's guidance will play an important part in helping reduce the exposure of turbine-powered helicopters to releases of gases such as methane when operating near fixed offshore oil platforms. In a separate letter, the NTSB has recommended that the US Department of the Interior, Bureau of Safety and Environmental Enforcement (BSEE), in collaboration with the US Coast Guard, 1) identify and develop comprehensive systems and procedures to mitigate the risk of ingestion of raw gas discharges, such as methane, by helicopter turbine engines operating in the vicinity of offshore oil platforms and 2) once developed, to require offshore oil platform operators to implement these systems and procedures. Having API's revised guidance to reference should aid BSEE in taking the recommended action for fixed offshore oil platforms.

Therefore, the National Transportation Safety Board makes the following safety recommendation to the American Petroleum Institute:

> Finalize revisions to API Recommended Practice 2L, *Recommended Practice for Planning, Designing, and Constructing Heliports for Fixed Offshore Platforms*, to address the venting of raw gases, such as methane, as a risk to turbine-powered helicopters operating in the vicinity of fixed offshore oil platforms. (A-14-71)

Acting Chairman HART and Members SUMWALT, ROSEKIND, and WEENER concurred in this recommendation.

The NTSB is vitally interested in this recommendation because it is designed to prevent accidents and save lives. We would appreciate receiving a response from you within 90 days detailing the actions you have taken or intend to take to implement it. When replying, please refer to the safety recommendation by number. We encourage you to submit your response electronically to correspondence@ntsb.gov. If your response exceeds 10 megabytes, including attachments, please e-mail us at the same address for instructions. Please do not submit both an electronic copy and a hard copy of the same response.

[Original Signed]

By: Christopher A. Hart,
Acting Chairman