DISCUSSION

Role of Naturally Occurring Gas Hydrates in Sediment Transport: Discussion

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The following comments are directed to the final section of McIver (1982), under the heading "Other effects of eruptive release of gas from beneath hydrate." The statement is made, "If the gas escape were rapid and localized enough, the effect on the surface would be identical with that of a blowout caused by marine drilling operations (i.e., there would be a patch of highly agitated frothy water of very low relative density). Any vessel accidentally encountering this patch would lose buoyancy and sink very quickly. If the gas flow were large, a plume of free gas would rise above the ocean surface. Any low-flying aircraft passing through the concentrated gas would experience engine failure and might crash."

I will demonstrate that both conclusions are wrong and why.

In early November 1976, a blowout occurred about 90 mi (145 km) off the Texas coast in the High Island area. A platform and drilling rig were lost in a crater 1,700 ft (520 m) in diameter and 350 ft (110 m) deep. The gas continued to blow for well over a month. When I arrived at the site in mid-December, the blowing gas at the surface caused a boiling, turbulent inner core about 100 ft (30 m) in diameter which was the main core of the blowing gas, and an outer ring of disturbance 250 to 300 ft (75 to 90 m) in diameter. As described in McIver (1982), the inner core was a patch of highly agitated, frothy water of apparently very low relative density.

My assignment at the time was to investigate the blowout. Using a 95-ft work boat, we sailed to the edge of the blowout. I managed to convince the captain, if not the rest of the crew, that we would in fact not lose buoyancy and very rapidly sink if we sailed into the blowout. Proceeding cautiously, the captain sailed into the boiling core, and, lo and behold, he reported a strange phenomenon. The fathometer indicated that not only were we not sinking into the less dense water, but we had actually moved upward a short distance relative to the bottom.

The explanation is relatively simple. The upward driving force of the escaping gas and its entrained water mass was more than enough to compensate for any loss of buoyancy which might have occurred. At the surface the upwelling water flowed out radially from the center to the outer ring of disturbance. Headway had to be maintained to hold the ship within the center of the boil.

Because the gas is continuously in motion upward and venting to the atmosphere, it is impossible to maintain a static volume of low density water in open marine conditions.

It has been reported that a drilling ship was lost somewhere because of a blowout. It was reported to have sunk because of loss of buoyancy. I suggest that this vessel probably capsized and sank. The original force from a blowout can be tremendous. In the case just mentioned, evacuated personnel reported gas and water blowing as high as the heliport just before the platform capsized. Drilling ships are usually moored by four to six anchors. A blowout of the magnitude described or greater would certainly cause a drill ship to heave, pitch, and roll violently. If one or more anchor cables were to break under these violent motions the ship would certainly capsize and sink.

The second conclusion concerning low-flying aircraft is also wrong. As noted in the article and confirmed by my observations, the rising gas breaks up into smaller bubbles when it comes to the surface, regardless of the size of the flow. Therefore any gas "plume" would be mixed with some amount of air. The only reason an aircraft engine would fail upon ingesting a highly flammable gas would be because of oxygen starvation. Any gas plume which would form from the surfacing gas bubbles would have a certain amount of air mixed in with it. The plume would certainly become more dilute as it ascended. Also, it would probably be rapidly dispersed by whatever wind was blowing at the time.

I have personally visited two large blowouts in the Gulf of Mexico and hovered over them in a helicopter for extended periods of time at very low altitudes; there were no indications of engine malfunction. It is highly improbable that a single aircraft has ever been lost because of engine malfunction caused by a gas hydrate or any other type of blowout.

REFERENCE CITED