



MAP CODE: P5

Gas Hydrate Samples

Reference: Shipley, T.H., and Didyk, B.M., 1982, Occurrence of methane hydrates offshore southern Mexico: Initial Reports, Deep Sea Drilling Project, v. 66, p. 547-555.

Geographic/Geologic Location:

Pacific Ocean

Middle America Trench, an active convergent margin

Offshore from Mexico, continental slope

DSDP Leg 66, Site 490, 491, 492

Core/Sample Count:

Site 490, 4 samples

Site 491, 3 samples

Site 492, 2 samples

Latitude/Longitude:

Site 490, 16°09.6'N/99°03.4'W

Site 491, 16°01.7'N/98°58.3'W

Site 492, 16°04.7'N/98°56.7'W

Water Depth:

Site 490, 1761 m

Site 491, 2883 m

Site 492, 1935 m

Sediment Depth:

Site 490, 139-364 meters below sea floor (mbsf)

Site 491, 89-168 mbsf

Site 492, 141 and 170 mbsf

Description of Gas Hydrate: Two types of gas-hydrate occurrences were observed on DSDP Leg 66, "ice inclusions" and "frozen sediments." The first type, comprising samples from Site 490 (139 mbsf), and Site 491 (89 and 168 mbsf), "consist of frozen materials which were impure ice, up to 2 cm in diameter in voids or in expansion zones of unconsolidated mud. The ice inclusions bubbled releasing gas and upon melting were found to consist basically of seawater with minor amounts of sediments.... The more common occurrence[s] of gas-releasing materials in Leg 66 samples are frozen sediments containing predominantly porous volcanic ash and fine sands. Frozen sediments were observed in six cases, always in unlithified sediments. Perfectly preserved structures, such as a color-



banded frozen volcanic ash... were common. On equilibration to room temperature, these frozen sediments lost rigidity, structures were destroyed, and the samples ended up as swirled, structureless lumps of wet sediment.”

Analytical Results: The “ice” in the sample from Site 490 (139 mbsf) “released 0.91 ml gas/ml of ice (a gas-generating ratio [GGR] of 0.91). The gases consisted of 76.8% methane and 23.2% CO₂. Similar gas-releasing ice inclusions were observed in Hole 491, Samples 5 (89 mbsf) and 7 (168 mbsf) with gas-generating ratios of 7.22 and 0.02, respectively.” A gas-releasing laminated ash section about 10 cm-long was observed during splitting of a core from Hole 492 (141 mbsf). This sample “was found to release 3.26 ml of gas/ml of frozen sediment and consist of 99.5% methane, 0.22% CO₂, 0.18% ethane, and traces of propane and butane (50 and 47 ppm, respectively).... Similar gas-releasing frozen sediment inclusions were observed in Hole 490, Sample 2 (145 mbsf), 3 (166 mbsf), and 4 (364 mbsf); Hole 491, Sample 6 (163 mbsf); and Hole 492, Sample 9 (169 mbsf). Similarly the gases consisted mainly of methane ≥97%, with minor amounts of CO₂, ethane, and traces of higher hydrocarbons propane to pentane.”

“The amount of gas released by the frozen samples after removal from the split cores varied by two orders of magnitude, ranging from 0.02 to 9.40 ml gas/ml frozen material. In the ice inclusions the highest observed gas content was 7.22 ml gas/ml ice, which consisted predominantly of ice >90% with minor amounts of included sediments. The frozen sediments generally show lower gas contents. The highest observed value was 3.26 ml gas/ml frozen material.... If the amount of gas in this sample is corrected for porosity (about 46% and assuming that no gas is adsorbed on the volcanic ash), as gas content of 7.18 ml gas/ml can be estimated for the associated interstitial water. One large sample from Hole 492, Core 19 core catcher, at a sub-bottom depth of 169.5 meters, was trimmed and placed in a sealed pressure vessel. During sublimation, 9.4 ml of gas/ml of sediment was released. With the porosity correction (46%), the GGR of the interstitial water is about 20. This is the highest value obtained for any Leg 66 samples.”

Inferred Evidence for Gas Hydrate: Seismic reflection evidence suggested the “presence of gas hydrates along the Mexican margin, because high amplitude reflections, crossing other reflections and generally sub-parallel to the seafloor (the bottom-simulating reflector [BSR]) are observed here....” The reflection coefficient for the gas hydrate in this region was calculated to be -0.08 ± 0.03 .