



**MAP CODE: P4b**

### **Gas Hydrate Samples**

**Reference:** Kvenvolden, K.A., and McDonald, T.J., 1985, Gas hydrates of the Middle America Trench, Deep Sea Drilling Project Leg 84: Initial Reports, Deep Sea Drilling Project, v. 84, p. 667-682.

### **Geographic/Geologic Location:**

Pacific Ocean

Middle America Trench, and active convergent margin

Offshore from Guatemala, continental slope

### **Core/Sample Count:**

Site 568, 1 sample

Site 570, 7 samples

### **Latitude/Longitude:**

Site 568, 13°04.3'N/90°48.0'W

Site 570, 13°17.1'N/91°23.6'W

### **Water Depth:**

Site 568, 2010 m

Site 570, 1698 m

### **Sediment Depth:**

Site 568, 404 meters below sea floor (mbsf)

Site 570, 192-338 mbsf

**Description of Gas Hydrate:** “Gas hydrates were expected to be found at Site 568 because of observations of a BSR [bottom-simulating reflector] in a seismic record for this area. However, direct evidence for gas hydrate was not obtained until 404 m sub-bottom. At this depth white pieces of gas hydrate were recovered from fractures in a tuffaceous mudstone.... At Site 570 at least seven examples of gas hydrates were noted between 192 and 338 m sub-bottom. The first evidence of gas hydrate at this site was in the form of ash laminated with gas hydrate.... A piece of white gas hydrate was next found at 246 m. The most spectacular occurrence of gas hydrate was found at 249 m sub-bottom where a 1.05 m core of massive gas hydrate was recovered. This gas hydrate was associated with fractured dolomite at its bottom and was apparently located at the contact between upper Miocene and Pliocene sediments.” Below the massive gas hydrate, other examples of gas hydrate were noted at 259-268 m, 273 m, and down to a sub-bottom depth of 338 m.



**Analytical Results:** Two different samples of gas hydrate from Site 568 (404 mbsf) were allowed to dissociate in a pressure vessel. The first sample released 30 volumes of methane per volume of fluid. The second sample, which had partially decomposed in the laboratory while pressure measurements were being made on the first sample, only released 7 volumes of methane per volume of fluid. The chlorinity of water resulting from each dissociation experiment measured about 3‰. The methane/ethane ratio of the gas was 530; gas expelled from the core at 440 mbsf had a ratio of 970. At 192 mbsf the first recovered gas hydrate from Site 570 outgassed 4 volumes of methane per volume of fluid. The released gas had a methane/ethane ratio of 1100 compared to 5000 for gas expelled from the core at 193 mbsf. A samples of massive gas hydrate (249 mbsf) released about 29 volumes of methane per volume of water which had a chlorinity of 0.65‰. An average methane/ethane ratio of about 330 contrasts with a ratio of 400 for gas expelled from the core at 246 mbsf. “Downhole logging showed that this massive gas hydrate was 3-4 m thick at this location. The log provides the first *in situ* measurements of the physical properties of gas hydrate: sonic velocity = 3.3-3.8 km/s; density = 1.1024-1.045 gm/cm<sup>3</sup>; resistivity = ~200 ohm-m.”

**Inferred Evidence for Gas Hydrate:** BSR on a seismic record was discovered near Site 568. “A common feature of Sites 565, 568, 569, and 570 is the decrease in chlorinity over the entire interval at each hole. This decreasing chlorinity of pore water with depth was observed previously at Sites 496 and 497 of Leg 67.” Decreasing chlorinity profiles are a common feature of sections containing gas hydrate.