

***Jason Dive J2-212, August 6-7, 2006 (GMT)***

**08:00 Off Deck**

**09:20 On Bottom: 3° 43.71'S, 151° 40.35'E, 1670 mbsl**

**23:43 Off Bottom: 3° 43.71'S, 151° 40.21'E, 1708 mbsl**

**01:30 On Deck**

**Aim:**

The target of the dive is the site of the 353°C fluid venting (aka Fenway field) in about 1630 m water depth. It is planned to sample two solid / fluid sample pairs, one at the site of active venting of 353°C fluids at Big Papi, just south of Marker 7. The other bottle trio should be shot at a site of gray or clear venting in the area. There are plenty of those at the top of mound and around the base of the mound. Besides sampling chimneys at Fenway, we should make a stronger effort to sample altered rock from exposed footwall/stockwork.

The extent and characteristics of hydrothermal activity in the area will be examined and documented. An integral part of this will be a high-resolution SM2000 survey of the larger Fenway area.

Following sampling and surveying at Fenway, we will explore the area to the north and northeast with possible targets being knolls SE of Snowcap

**Co-ords for the landing site:**

- **Lat/long:**     **-3°43.72' S, 151°40.38'E, 1720 m**
- **UTM:**           **352635, 9587753 (WGS84 Zone 56S)**

**Summary**

Vanko watch: Picking Eh anomalies starting 11 m off bottom, down to Eh=59. Landing 40 m WNW of Fenway in a sedimented area with Fe-oxide crusts and biota (crabs, snails and mussels). While setting up for the high-resolution sonar survey, we come across the chimney field that was sampled during dive 210, and spot a gray smoker at x2492, y 2368, z 1727 (vvan# 29931).

Bach watch: Starting the sonar survey at 09:54. Starting to move west at x2518, y2382, move 15 m south at 2406, y2382, then move 112 m east, turn 15 m south, etc. The survey continues until 12:35. At 12:50, we are back at the Big Papi chimney complex to attempt fluid sampling. The orifice at which a temperature of 353°C was measured two days ago, is vigorously venting black smoke, to the extent that fluid sampling is difficult. We sample a sulfide structure that is bathed in black smoke, but is likely not an active vent itself (sample J2-212-1-R1, x2465, y2350, z1706; vvan# 30412). T-probe measurements give temperatures up to 352°C, but an attempt at pulling an IGT bottle sample fails, because the transistors of the sampler heat up too much. We continue to look for an orifice that is more suitable for fluid sampling.

Tivey watch: Sitting in front of a steep wall of the main sulfide structure that has a very vigorous "bubbling" black smoker coming out of a crack in the wall. The entire wall has streams of black smoke making visibility difficult. Shrimp are all over the edifice wall along with crabs. We are sitting with Marker-7 off to our right out of view. Jason tries to get a gastight bottle temperature at the vigorous smoker but can't get snorkel in on the

angle of the crack. We are facing approx. west (259). After several tries we abandon this and move to find another smoker. As we move to the left (south) we see a lazy white smoker in front of the main edifice. Find another spot to attempt a black smoker sample. We are successful here in getting 2 gas tight samples (J2-212-2-W1-IGT8 and J2-212-2-W1-IGT5 x2465 y2349 z1707) and then get a major water bottle sample as well (J2-212-2-W3-M4). Max temp is about 340°C. We then get a small piece of sulfide from the orifice (2-R1) which crumbles mostly. The ambient temperature outside of the vent wall was about 20°C. Another piece of slightly bigger sulfide is obtained and (2-R2) stowed. We now move (15:14) to the white smoker for a different type of water sample. Doppler drops out and is reset. We seemed to retrace our tracks back to the vicinity of marker #7 and see the white smoker again. It is connected to the main edifice but has no nicely defined orifice. Gray to white smoke is coming out with low velocity. Max temperature is about 142°C but it is decided not to sample this. Try for a piece of the chimney however and get a small piece (3-R1 x2473 y2356 z1708). Get a larger piece (3-R2) as well. Now we move to our left to look for altered host rock. We see oxide coatings just below the sulfides on the debris apron surrounding the structure. We sit for bit waiting for Medea near an oxide coated mound of fine sand like debris apron. We see large pieces of anhydrite on these slopes. We descend to 1712 m to see if we can see the host rock while circumnavigating the whole sulfide mound/edifice in a clockwise fashion. We sample some talus at the base of a sulfide edifice (4-R1 x2458 y2353 z1712) which turns out to be massive sulfide. We continue to move around the structure at this deeper level and see native sulfur on the sand-like sulfide debris apron along with anhydrite. Marker-7 comes back into view. We descend here again to 1715 m depth and stop near a rock outcrop with more talus. We get a piece of talus again looking for altered host lava (5-R1) which again turns out to be massive sulfide with a copper-green atacamite stain on it. We move back up the debris apron crossing white oxide coating on the sulfide sand and anhydrite as slabs and talus blocks. We come back to the white smoker and then approach the main black smoker sulfide edifice again. We move to the top of the structure at 1706 m and see a very vigorous black smoker. We take 2 gas-tight water samples from here (J2-212-6-W1-IGT2, J2-212-6-W2-IGT1 x2464 y2354 z1706), max temp is 355°C. We also get a major water sample here.

Vanko watch: Although the chimney material at this IGT sampling site is very friable, we took a small sample as close to the orifice as possible (212-6-R1; vvan 31200) and another from massive sulfide wall to the left of the orifice (212-6-R2; vvan 31224). We moved south to an active group of chimneys to the south, slightly off the main feature. These were stained white, were gently giving off shimmering water, and seemed perched atop a large mound of decaying anhydrite (vvan 31258). We sought and collected a piece of anhydrite that is coated with sulfide (212-7-R1; vvan 31348).

Slightly down slope there is a white low-relief mound about 2-3 m in diameter. The surface is anhydrite sand (can see the reflecting crystals), so we probed the mound with the temperature probe (42°C when inserted to the hilt, and 17.6°C at the surface). The anhydrite surface is only millimeters thick, and is underlain by dark brown fine sediment. There are also small pieces of Fe-oxide or sulfide crust scattered on the surface, so we sampled the whole shebang with a scoop bag (212-8-R1; vvan 31386 and 31426).

Returning up the slope to the chimneys perched atop the anhydrite (the location of sample 7-R1) and collected a little piece of an inactive chimney (212-9-R1; vvan 31474). Then

we moved to an active chimney with clear fluid and measured its temperature at 241°C, and collected sample 212-9-R2 from the top (vvan 31530). We tried for some more active black smoker chimney up on the main edifice, without luck. Then we headed east to a mound-like feature in the ABE bathymetry that also showed some sharp features in last night's SM2000 survey. This was a group of short chimneys (most 2-3 meters), including one that was very fat and old, inactive, and with numerous white cracks in it (vvan 31726). We sampled an unusual reddish-colored feature shaped like a toadstool (it just turned out to be sulfide, 212-10-R1, vvan 31770), and then probed some shimmering water coming out of a white patch (T up to 60°C). Before leaving this area, a short SM2000 E-to-W line was set up to collect high-resolution data to stitch in to last night's survey.

Bach watch: Payload was reached, so no further sampling was possible. We hence decided to return to Big Papi to see if the apparent luminescence near some orifices are real. The chimneys that showed most "flames" were covered in thick black smoke. A small orifice that was occasionally flashing did not appear to emit light, when Jason's lights were turned off. We realized, however, that we had moved when Jason's light were turned back on again.

We head ENE to examine the nature of the terrain between Fenway and Snowcap, marked by two prominent mounds leading into the SE flank of the Snowcap dome. The floor between Fenway and the first mound was unsedimented and appear to be littered with volcanic rock talus. There is rich biota (crabs, mussels, vestimentiferans, limpets, anemones) here (x2443, y2553, z1714; vvan# 32065) and all the way up the slope of the mound to the west. Slope shows rare outcrops of fresh massive volcanic rock, patchy staining (microbial mats?) and diffuse venting. It is likely a fault surface. The top of the mound is covered with platy Fe-Mn oxide crust, with patches of white mats (e.g., vvan# 32116). The western slope of the first mound and the entire second mound are heavily sedimented. Going up the slope bounding the Snowcap dome to the SE, we observe moderate sediment cover with outcrops of massive volcanic rock and occasional talus rubble. Encrusted, oxide and sulfur(?) rich sedimented seafloor on top of snowcap mound, reminiscent to the areas of Snowcap visited during previous dives.

End of dive