

Jason Dive J2-216, August 10-11, 2006 (GMT)

09:00 Off Deck

10:12 On Bottom: 3° 43.72'S, 151° 40.30'E, 1668 mbsl

23:55 Off Bottom: 3° 42.72'S, 151° 41.33'E, 1703 mbsl

01:05 On Deck

Aim:

The goal of the dive is collecting solids and fluids from Fenway, specifically

(1) Sample gray and clear fluids at Big Papi. If no suitable vents can be located at Big Papi, collect fluids at Fenway east.

(2) collect sulfide chimneys, active (highest priority are pairs to go with fluid samples -- pick orifices for fluid sampling that allow chimney sampling) and inactive. Look for cpy linings.

(3) collect samples from outcrops of basement around Big Papi. We already have two anhydrite samples. More of those from other locations would be useful. Also, look for rare outcrops of altered volcanics at Fenway. We should try and sample those.

(4) Scoop up samples from debris mounds at WP2. Measure temperatures there as well.

(5) Make detailed observations in the larger Fenway area (using the SM2k map). Is there anything deeper, at the base of scarp at 1740m? Also a bump at x2390 y2270 should be checked out.

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

Bach: We landed on a mound NW of Fenway in a sedimented area with white patched and oxide staining. Moving down the sedimented slope of that mound, we continued to see patches of presumed microbial mats, until we got to the bottom of the slope, which is littered with talus and shows abundant biota associated with widespread venting of shimmering water. Due to the dominance of crustaceans, we call the area "crabby flats" (x2446, y2354, z1714; vvan# 38971). After we arrived at the Fenway central mound, we picked up an anhydrite/sulfide sample (J2-216-1-R1) just short of reaching the first tier of the mound (x2461, y2357, z1713; vvan# 39042). We passed Marker 7 and settled down in front of a gray smoker that is immediately above the anhydrite sample we just broke off (vvan# 39062). T-probe measurements gave 264°C before and 279°C after a chimney sample was recovered from that structure (x2461, y2355, z1713; vvan# 39103). The temperature on the outside of the chimney wall was 7 to 10°C. Two IGT bottles and a major bottle were filled at this site. The IGT T-probes read 283 to 284°C. Working our way clockwise around what appears to be a tier in the mound with Big Papi lingering above and sedimented slopes (mainly anhydrite sand and chimney and massive anhydrite debris) below, we next moved to an outcrop of shimmering water issuing from a crevice in the sedimented slope (vvan#39250). We took temperature measurements here and got readings between 62 and 83°C. Decided to leave a Marker here (No. 10) to return for possible fluid sampling. We moved a few meters east and spotted black smoke issuing

from holes and cracks in slope sediments. A temperature measurement there (x2469, y2354, z1712; vvan# 39377) yielded 280 to 284°C. There is friable, platy, white material forming around the vent sites that we try to sample with the scoop (J2-216-4R-1, vvan# 39447). We return to Marker 10 to sample clear vent fluids there. We had just taken the first IGT bottle (T=76°C J2-216-5-W1-IGT4, x2464 y2358 z1709), when the Tivey watch came on.

Tivey: Stayed at same position and continued with fluid sample series. Fired gastight #3 (J2-216-5-W2-IGT3) and major water sampler (J2-216-5-W3-M4). Then we sampled the ledge just at the crack. Looks like anhydrite (J2-216-5-R1). Move forward to the right (East) up a small valley and notice shimmering water on the northern slope. We stop and temperature probe that. We get a temp. of 113C max for 2 inch penetration (vvan#39719). We push the probe all the way in and get 114C (vvan#39724). Now we get a scoop of the shimmering crack material (J2-216-6-R1, x2464 y2355, z1710, vvan#39750, Doppler was reset to this point...). Now drive up slope to south and towards the south along a ridge that drops off sharply to west. Cross over degraded sulfides and a couple extinct chimneys before coming to a promontory with a distinctive old sulfide chimney lying sideways. We descend the promontory slope adjacent to the sulfide from 1709 to 1723 m depth facing the slope with Jason (heading 308). We look for outcrop of host rock, very orange looking outcrop here at the base. At the base we try to sample host rock hoping it is altered lava and break off a piece (J2-216-7-R1, x2475 y2332 z1723). This turns out to be massive sulfide. We move back up the steep scarp of this promontory. Get another rock sample below the top at 1716 m depth (J2-216-8-R1, x2475 y2340 z1716). This also turns out to be massive sulfide. We continue back to the top of this cliff and see the tipped over sulfide chimney again. Drive back over top of hill almost retracing our track. Cross over old degraded sulfide, look around for lava outcrop but none to be had. Possibly some at x2464, y2350 We stop at a broad meter-sized knob which has crabs all over it and sample it (J2-216-9-R1, x2467 y2348 z1712 vvan# 40150) which turns out to be massive sulfide again. We go back down steep scarp at promontory again. Pass by earlier sample sites, continue to pass down through a rubble talus zone and into a massive outcrop section at 1735 m depth. See sedimented lava and more lava-like outcrops.

Vanko: Jason gets underway toward a sharp bump in the SM2000 survey data that noone is sure is really there, at x2478 y 2328 (just a few meters away). We can't find anything, and even turn SM2000 on and spin around at 16-m altitude to look for it, SSE of Fenway. It is not there, apparently. So we go back to the bottom, 40-50 m S of Fenway, and see very old-looking seafloor talus. We creep to the NE and see lava rocks, Fe-stained sediment, and a piece of anhydrite rock. The rivers of talus seen streaking downslope could even be debris flow deposits. We fire the Niskin bottles down here at 1735 m. The Medea camera soon shows smoke and we are at the south edge of Fenway with lots of sulfide rubble. Moving NE instead of climbing up Fenway, we sample light gray, altered(?) volcanic rock jutting out of the sulfide talus slope (Sample 216-10-R1; vvan 40395, 40408). Nearby we stop to probe some white-stained sediment – it is soft and dusty but not particularly hot (2.7°C, where ambient is 2.3°C). Continuing north we notice a slope with several pieces of white rock reminiscent of stockwork, as well as

some fresh lava pieces. The lava is falling from a fairly fresh flow up above, and we speculate that the white, if stockwork, is from beneath that flow. First we pick up a large piece of stockwork to confirm that it is a hard stockwork rock and not soft clay or anhydrite (vvan 40465). Then we sample the lava rock (216-11-R1, vvan 40480), and a piece of stockwork (216-11-R2; x2493 y2398 z1726; vvan 404089). We ascend northward up over the lip of the lava front and see no more stockwork. Instead there is ponded sediment with white microbial floc, and a temperature measurement shows 23.7°C with the T probe inserted to the hilt. Another lava front is encountered a bit farther north, then we reach some inactive sulfide chimneys (vvan 40356, x2488 y2369) and then active chimneys (the same ones sampled a few dives ago, vvan 40541, x2485 y2372).

Now we drive around the north side of Fenway, keeping fairly deep, and see the anhydrite rock that was sampled previously. We cross the low point in the bathymetry and begin ascending the hill NNW of Fenway, and move up into fresh lava with some shimmering water (x2467 y2396 z1716). Farther north we reach an old dead sulfide chimney complex, fairly large (10s of meters across, at x2448 y2384 (vvan 40653, x2448 y2384 z1716).

Turning back toward Fenway we descend and take an anhydrite rock sample which seems to be on the slope leading up away from Fenway to the N (in other words, perhaps distinct plumbing from the Fenway system; Sample 216-12-R1; vvan 40678; x2450 y2366 z1726).

Next we drove south across “crabby flats” on the west slope of Fenway, seeing lots of anhydrite rock debris and Fe-stained sediment. The slope up to the west is lava rock with crabs, mussels and little clams. We decide to explore the deep knobs south of this hill, and get underway on a heading of 220° for about 85 m. See smoke in Medea’s camera. We transit over very old terrane with 95% sediment and 5% sedimented lava rocks. Rounding the hill to the west, in the valley between this and the next westernmost hill, there is abundant talus. This whole area seems volcanically, hydrothermally and biologically dead. We ascend to the saddle between the two hills west of Fenway and hand the watch over to Herr Bach.

Bach: We headed to the area north of a small chimney field in the NW of the Fenway field to establish the northern extent of hydrothermal activity in the area. After crossing the thickly sedimented slopes between two mounds NW of Fenway we entered talus fields in the Fenway “bowl” and immediately encountered hydrothermal activity in the form of white and red patches of presumed microbial origin. About 6 m into the talus field, we spotted a rock that appeared hydrothermally altered and collected it (sample J2-216-13-R1, x2460, y2411, z1705; vvan# 40864). Hydrothermal activity increases to feature shimmering water and mussel beds as we continue North up a slope bounding the Fenway area (vvan# 40878). Continuing to the north, we found a razor-sharp boundary between the hydrothermally active field and inactive sediment flat at top (x2463, y2422, z1703, vvan# 40884). The boundaries of vent biota patches are usually rather sharp in the area, possibly indicating fault controlled ascent of fluids, rather than pervasive upwelling through rubbly volcanic basement. Following the contours of the slope to the SE, we find similar patterns of talus with shimmering water and biota, versus apparently unhabitated sedimented areas all the way down to area E of Fenway. We continue on to

sample active chimneys at Fenway, as we had so far recovered mainly “sooty anhydrite” from the active structures sampled for fluids.

We pick up another anhydrite/sulfide piece with beautiful rhythmic veining from the base of the eastward facing slope at x2481, y2359, z1717, vvan# 41017) before we reach Big Papi and set up SSE of Marker 7 at x2464, y2355, z1705 for sampling. Thanks to Buddah’s incredible touch, we were able to collect fragile sulfide chimneys from black smokers (J2-216-15-R1; vvan# 41101) and (another sample with beautiful cpy linings sample (J2-216-16R-1) from 1 m NW of sample 15 (vvan# 41128). There was no time left to measure temperature, but these are the smokers that had temperatures between 330 to 340°C when we unsuccessfully tried to sample fluids during dive 212.