HAWAI'I UNDERSEA RESEARCH LABORATORY

QUICK LOOK REPORT (QLR) for *Pisces* and *RCV-150*

DIVE: ___P4-160_____

(*Extend length of sections as needed/appropriate*)

MISSION STATUS

Location: _____Loihi_____

Latitude: __N18° 54.45_____ **Longitude:** _W155° 15.75_

Mission Date: 7 October 2006_____ **Duration:** _09_ hours _16_ mins

Maximum Depth: _____1326_____ meters

Project Title: Loihi's volcaniclastic deposits: interpreting explosive submarine eruptions and their effects

Principal Investigator: ___Bruce Houghton_____

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Observer 1: James White_____ **Observer 2:** _____

Address: Geology Department__ **Address:** _____

University of Otago___ _____

Dunedin, NZ_____ _____

Pilot 1: Terry Kirby__ **Pilot 2:** Colin Wollerman_____

Scientific Data Acquired: Prepare an abstract outlining your objectives, techniques, findings, etc.

Objectives:

Our program aims to obtain samples of fresh volcaniclastic samples that contain significant numbers of clasts in the 5-20 cm size range, suitable for study of particle density, vesicularity structure, and microlite characteristics that will allow evaluation of the style(s) of eruption that produced the clasts. Subaerial "Hawaiian" and "Strombolian"

eruption styles have been studied using these techniques, and we will test the hypothesis that similar eruptions on Loihi's summit platform are responsible for the volcaniclastic deposits there.

This dive aimed to re-visit Pele's pit, and then to traverse onto deposits of layered volcaniclastic deposits to the east. Our objectives were to re-examine the Pele's pit outcrops and hydrothermal systems, and to locate and sample deposits of volcaniclastic material that may be primary deposits of explosive seafloor eruptions.

We used two techniques to obtain samples; 1) valve scoops, which allowed collection of ~ 1 litre volumes of sediment in a sealed container, and 2) sediment scoops, which are obtained by using the manipulators to drive a plexiglass tube into loose sediment, then decant the contents of the tube into the "bio box" in which 15 ~ 1 litre containers are housed. In addition, we tried on one occasion to sample sediment with a tube corer, but this was effectively unsuccessful.

Observations, findings, etc:

There has been little change in features or hydrothermal activity since previous visits. Most activity now appears to be taking place in the "boiling pot" area, producing a field of pencil-sized pale tubes emerging from sandy yellowy-altered field of sand-cobble grade debris. Terry excavated a partly buried marker (#31) at this site.

Sampled site at 1111 m, N 18˚ 54.390' W 155˚ 15.075', along small scarp just east of East Pit. Tried push core, but it wouldn't penetrate more than a few cm. Used sediment scoop to gather black lapilli-ash grade material in an area of bacterial mats.. Orion manipulator twice dumped sample with uncommanded ~full-circle wrist rotations. On third try sample was successfully transferred from open scoop into jar in bio box. This is an effective way of sampling large amounts of clastic debris so long as the manipulator is not playing up.

Two other samples taken in this vicinity, with Terry exposing fresh deposits by dragging the sample rack downslope prior to sampling. Later samples taken with valve scoops, which work perfectly.

Final sampling site (#6) inside East Pit (1292 m; N 18˚ 54.632' W 155˚ 14.864'), where we took 2 valve-scoop samples of black lapilli-grit zones associated with a coarser lapilli layer in exposure revealing about 50 cm of weakly layered deposit below a crust.

Observed Species list: *No idea.*

MISSION EVALUATION:

Limitations, failures, or operational problems noted:

The only limitation noted was with operation of the Orion manipulator, which mostly performed properly, but is apparently sensitive to certain movements that result in the operator temporarily losing control of the arm. This was manifest in collection of the first

samples when the arm executed full-circle rotations that emptied the sample vessel, rather than the minor rotations intended by Terry.

Recommendations for corrective action or improvement:

None – the operators are aware of the issue, which may be a control-software glitch, and attempting to correct it.

In your opinion, did the mission essentially achieve its purpose? Compare actual work accomplished with the work that was expected to be accomplished:

Mission was successful, with sampling achieved for all sampling targets. We got *more* sampling done than expected, given that this was primarily a pilot-training dive and began with re-visitation of Pele's Pit.

List specimens or samples collected on the mission:

Samples are numbered P4-160-1 through P4-160-6. Each number indicates dive number and sample site. Where multiple samples are collected from a site, they are indicated by a letter (e.g. P4-160-6-B).

Site #1, 1111 m, N 18˚ 54.390' W 155˚ 15.075', along small scarp just east of East Pit
Site #2, about 10 metres away from Site #1: samples combined under P4-160-1
Site #3, 1100 m, N 18˚ 54.413' W 155˚ 14.907'. Top of a large (10's of m?) slope; surface debris scraped off by dragging sample rack down slope; strong current. Single sample collected in valve scoop.
Site #4, 1114 m, N 18˚ 54.423' W 155˚ 14.907'. Steep slope, covered in slope wash; strip surface by dragging sample rack down slope. Single sample collected in valve scoop.
Site #5, 1179 m, N 18˚ 54.486' W 155˚ 14.853'. Steep, stepped slope may be set of scars from retrogressive slope failure. Sample from meters-wide minor swale exposing black, somewhat shiny gravelly material (probably is current-worked slope wash). Orion manipulator spun out during sample insertion into bio box; most material in one jar, but spinout distributed some other material across 6 other bins.
Site #6, inside East Pit (1292 m; N 18˚ 54.632' W 155˚ 14.864'), where we took 2 valve-scoop samples of black lapilli-grit

DATA RELEASE

Data may be retained by the project leader for up to 2 years after the mission date with the following exception. NOAA may request to use photos for publication or publicity purposes at any time.

Fill in the appropriate statement below and sign this form.

I hereby release the data archived by HURL for public consumption following mission (Project title):

Loihi's volcaniclastic deposits: interpreting explosive submarine eruptions and their effects

Held on _____ (date) in the following way:

a. CTD data by _____ (date)

b. Video and images by _____ (date)

c. Other _____(date)

d. I will give my written consent to individuals wishing to use these data prior to the above dates depending on the nature of the request(s).

_____

Principal Investigator