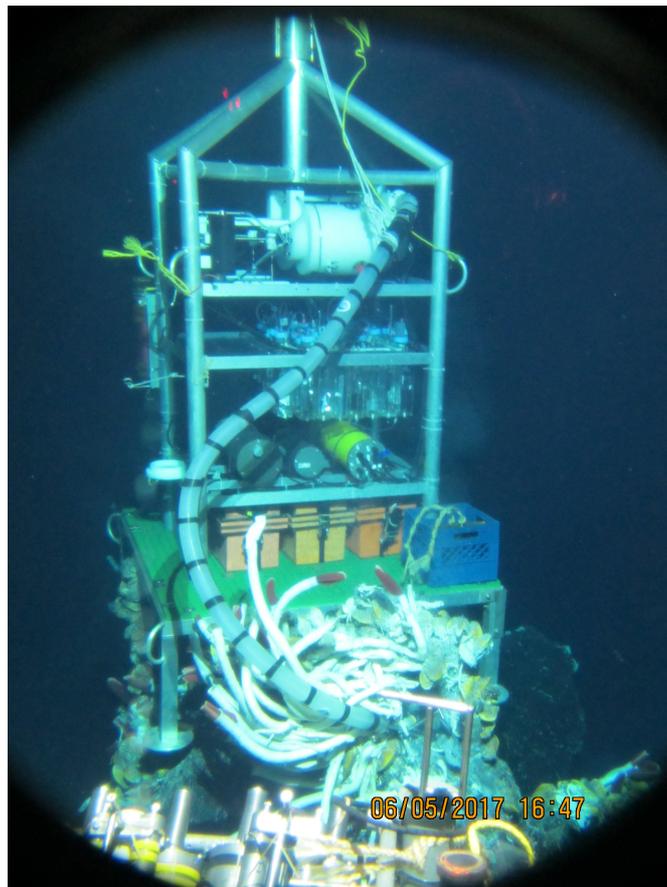


# Collaborative Research: Environmental Drivers of Chemoautotrophic Carbon Production at Deep-Sea Hydrothermal Vents – Comparative Roles of Oxygen and Nitrate



## **Voyage AT37-12**

*R/V Atlantis and HOV Alvin*

April 24, 2017 – May 14, 2017

Manzanillo, Mexico – Puntarenas, Costa Rica

*Stefan M. Sievert, Chief Scientist*

*Research funded by National Science Foundation grants  
OCE-1559198, 1559042*

# Cruise Report AT37-12

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## 1. Cruise Objectives

Deep-sea hydrothermal vents, first discovered in 1977, are exemplary ecosystems where microbial chemosynthesis rather than photosynthesis is the primary source of organic carbon. Yet, knowledge of the *in-situ* metabolism of microorganisms carrying out CO<sub>2</sub>-fixation at deep-sea hydrothermal vents is very limited. Particularly lacking are studies measuring rates of autotrophic carbon fixation *in situ*, which is a measurement ultimately needed to constrain production in these ecosystems. Although recent data suggests that nitrate reduction either to N<sub>2</sub> (denitrification) or to NH<sub>4</sub><sup>+</sup> (dissimilatory reduction of nitrate to ammonium, DNRA) might be responsible for a significant fraction of chemoautotrophic production, NO<sub>3</sub><sup>-</sup>-reduction rates have never been measured *in situ* at hydrothermal vents. We hypothesize that chemoautotrophic growth is strongly coupled to nitrate respiration in vent microbial communities. As part of this cruise, we used a recently developed robotic micro-laboratory (Vent-Submersible Incubation Device, Vent-SID) to measure rates of chemoautotrophic production and to determine the relative importance of oxygen and nitrate in driving chemosynthesis at hydrothermal vents at both *in situ* pressures and temperatures and to tackle the following currently unresolved science objectives: 1) obtain *in situ* rates of chemoautotrophic carbon fixation, 2) obtain *in situ* nitrate reduction rate measurements, and 3) directly correlate the measurement of these processes with the expression of key genes involved in carbon and energy metabolism.

This is an interdisciplinary project funded by NSF Grants '**Collaborative Research: Environmental Drivers of Chemoautotrophic Carbon Production at Deep-Sea Hydrothermal Vents – Comparative Roles of Oxygen and Nitrate**' awarded to Stefan Sievert and Craig Taylor (WHOI) and Jeremy Rich (University of Maine). We additionally invited collaborators from labs in the US (Babbin, MIT; Felbeck, SIO; Perez-Rodriguez, UPenn; Tepolt, WHOI; Vetriani, Rutgers;), Germany (Schweder, UGreifswald), and France (Thomas, Roscoff).

## 2. Summary of Activities

The research expedition with *R/V Atlantis* and *HOV Alvin* was funded by NSF Grant '**Collaborative Research: Environmental Drivers of Chemoautotrophic Carbon Production at Deep-Sea Hydrothermal Vents – Comparative Roles of Oxygen and Nitrate**'. *R/V Atlantis* left Manzanillo, Mexico on April 24, 2017 and arrived in Puntarenas, Costa Rica on May 14, 2017. The field site was located at the deep-sea hydrothermal vent field at 9° 50' N on the East Pacific Rise. We collected samples from a number of sites, but our main activities took place at a diffuse-flow vent site named 'Crab Spa'. An extensive research program was carried out that included the following:

- a) Deployment of Vent-SID for *in-situ* incubations. We had a total of 3 deployments at Crab Spa, which unfortunately were not successful as components of the instrument failed. In the end, we performed a set of successful on-deck incubations using the Vent-SID with Crab Spa fluids collected with major water samplers (MJ).
- b) A total of 46 water samples were taken with MJ, 37 low-T samples and 9 high-T samples. 26 low-T samples were used for microbial incubation experiments, including 6 for the on-deck Vent-SID incubations.

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- c) MJ were also used to perform incubations on board the ship, on one hand for experiments aimed at assessing the trophic transfer of carbon (20 MJ) and for on deck incubations with the Vent-SID (5 MJ)
- d) Filtration of hydrothermal vent fluids with a Large Volume Pump (LVP) to collect biomass for subsequent 'omic' analyses (metagenomic, metatranscriptomic, metaproteomic) and lipid analyses. In total, we had 5 LVP deployments, of which 2 were at 'Crab Spa'.
- e) Collection of chimney samples for microbial community analyses and cultivation. Samples were provided to collaborators Drs. Costa Vetriani and Ileana Perez-Rodriguez.
- f) Tube worms and mussels were collected by Dr. Horst Felbeck and Tjorven Hinzke to perform analyses of their endosymbionts (work by collaborator Dr. Thomas Schweder, Greifswald, Germany).
- g) Crabs and fishes were collected by collaborator Dr. Carolyn Tepolt.
- h) Samples were taken by collaborator Dr. François Thomas from different vent sites and from tubes of *Riftia* differing in their physiological status, i.e., healthy, suboptimal, dead, and empty tubes to investigate the microbial degradation of chitin.
- i) Deployment and recovery of microbial colonizers to study microbial biofilm formation and colonization. This work was done by the group of collaborator Dr. Costa Vetriani at Rutgers.
- j) A total of 10 CTD casts were performed by collaborator Dr. Andrew Babbin.
- k) Collecting and deploying colonizing devices for collaborator Dr. Lauren Mullineaux to maintain time series monitoring colonization after the eruption in 2006.
- l) We had a blog site (Dark Life II; <https://web.who.edu/darklife/>), providing various information about the cruise, including reports by first-time divers in *Alvin* (11 total). Sievert worked with teacher Lisa Troy on an Engineering Design Challenge related to the Vent-SID for a 6<sup>th</sup> grade class at The Sage School in Foxboro, MA. Students designed incubation chambers and had a chance to visit WHOI and see the Vent-SID prior to the cruise. Sievert had a live feed to the class during the cruise allowing the students to witness the launch of *Alvin*. Dr. Andrew Babbin was also blogging about the cruise on his blog site.

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**Table 1 Summary of Dive Program**

Dive #	Date	Hours at Seafloor	Deployments	
			Vent-SID	LVP
AD4893	2017/04/26	5 hours 45 min		
AD4894	2017/04/27	4 hours 23 min		
AD4895	2017/04/28	4 hours 47 min		
AD4896	2017/04/29	5 hours 42 min		1 (CS)
AD4897	2017/04/30	4 hours 10 min		
AD4898	2017/05/01	4 hours 29 min		1 (TB)
AD4899	2017/05/02	6 hours 10 min	1 (CS)	
AD4900	2017/05/03	5 hours 58 min		1 (CS)
AD4901	2017/05/04	4 hours 13 min	1 (CS)	
AD4902	2017/05/05	6 hours 11 min		1 (TB)
AD4903	2017/05/06	5 hours 48 min	1 (CS)	
AD4904	2017/05/07	4 hours 11 min		
AD4905	2017/05/08	6 hours 37 min		1 (TB)
<b>Total</b>	13	68 hours 24 min	3	5

**Table 2 Main vent sites visited during cruise**

	Longitude (W)	Latitude (N)	Depth
P vent	104 17.47	9 50.28	2506
Mk L-O (sandwiches)	104 17.46	9 50.27	2507
Bio 9	104 17.30	9 50.30	2503
Crab Spa (Tica)	104 17.48	9 50.39	2503
Alvinella mound (Tica)	104 17.49	9 50.39	2511
Teddy Bear	104 17.51	9 50.50	2514
M vent	104 17.53	9 50.97	2500
Flea vent	104 17.60	9 50.81	2519
Bio vent	104 17.61	9 50.95	2499

**Abbreviations of instruments mentioned in report**

Vent-SID – Vent-Submersible Incubation Device

LVP – Large volume pump

MJ – Major water sampler

CS – Crab Spa

TB – Teddy Bear

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## 3. Science Participants



Name	Affiliation	Status
Stefan Sievert, Chief Scientist	WHOI	Scientist
Craig Taylor	WHOI	Scientist
Ed Hobart	WHOI	Scientist
Kevin Becker	WHOI	Post-Doc
Chawalit Charoenpong	WHOI	Grad Student
Carolyn Tepolt	WHOI	Scientist
Jeremy Rich	UMaine	Scientist
Sean O'Neill	UMaine	Technician
François Thomas	Station Biologique de Roscoff, France	Scientist
Diana Vasquez-Cardenas	Free University of Brussels, Belgium	Post-Doc
Andrew Babbitt	MIT	Scientist
Ryan Woosley	RSMAS Miami	Technician
Horst Felbeck	SIO	Scientist
Tjorven Hinzke	UGreifswald, Germany	Grad Student
Ileana Perez Rodriguez	UPenn	Scientist
Ashley Grosche	Rutgers	Grad Student
Sushmita Patwardhan	Rutgers	Grad Student

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### 5. Summaries of research groups

**A. Vent-SID research team: Dr. Stefan Sievert, Dr. Craig Taylor, Dr. Jeremy Rich, Mr. Ed Hobart, Mr. Sean O'Neill, Dr. Diana Vasquez-Cardena, Dr. Kevin Becker, Dr. Andrew Babbitt, Dr. Ryan Woosley, Mr. Chawalit (Net) Charoenpong**

#### **Vent-SID**

In total, we had 3 Vent-SID deployments, all at Crab Spa. The deployment and recovery of the Vent-SID went very well and no issues were encountered. However, unfortunately we did not have a successful incubation at the seafloor due to different components of the instrument failing on each deployment. In the end, we had one successful set of on-deck incubations using Crab Spa vent fluids collected by MJ.

#### Vent-SID seafloor deployments:

1. May 1, 2017 - Vent-SID was lowered to the seafloor. May 2, 2017 - the Vent-SID was positioned at Crab Spa. We could not communicate with the Vent-SID over the ICL, so experiment was aborted and Vent-SID sent to the surface.

2. May 3, 2017 - Vent-SID was lowered to the seafloor. May 4, 2017 - the Vent-SID was positioned at Crab Spa, preprogrammed to begin its incubation at 2pm local time. May 5, 2017 - the Vent-SID was sent to the surface from the seafloor. The experiment failed, and no incubations were conducted. The Vent-SID log indicated that the incubation was aborted 40 minutes into its program due to jamming chamber 1. The chamber only filled to about 30 mL and then became stuck. The chamber failed during the filling and flush cycles. All of the bags were empty when the Vent-SID came back on deck of the ship.

3. May 5, 2017 - Vent-SID was lowered to seafloor. May 6, 2017 (Dive 4903), Vent-SID was positioned at Crab Spa, preprogrammed to begin its incubations at 11:30am local time. Alvin came back to the Vent-SID 3 hours into its first incubation and observed that the piston of Chamber 1 was not out, and that the tracer bag was not emptied, indicating that the Vent-SID had not started its incubations. May 7, 2017 – The observations on the previous dive were confirmed and the Vent-SID was sent to the surface. The chamber was not able to fill or flush at all in this deployment. The Vent-SID log indicated that a background sample was taken.

#### Vent-SID on-deck incubation:

During Alvin Dive 4905, May 8, 2017, 5 MJ were collected at Crab Spa. The fluid from these samplers was used in an on-deck Vent-SID incubation. The purpose of the incubation was to simulate a sea-floor incubation of the Vent-SID. Upon arrival of majors on the ship, we transferred fluid from the majors into N<sub>2</sub> flushed 1L Restek bags. The bags were stored at 4°C and taken out as needed for setting up a new Vent-SID incubation. We measured NO<sub>3</sub><sup>-</sup> concentration on the major samples. Samples. We conducted six incubations, all at 25(+/- 2)°C in Chamber 1 of the Vent-SID. The tracer treatment was the variable that we varied in different incubations, as follows, final concentrations inside the chamber:

1. 10 μM <sup>15</sup>NO<sub>3</sub><sup>-</sup>, 1 μM <sup>14</sup>NO<sub>2</sub><sup>-</sup>, and 0.7 mM H<sup>13</sup>CO<sub>3</sub><sup>-</sup> (N<sub>2</sub> purged solution)

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2. Same as incubation 1
3.  $10\ \mu\text{M}\ ^{15}\text{NO}_3^-$ ,  $1\ \mu\text{M}\ ^{14}\text{NO}_2^-$ , and  $0.7\ \text{mM}\ \text{H}^{13}\text{CO}_3^-$  (**O<sub>2</sub> purged solution**)
4.  $10\ \mu\text{M}\ ^{14}\text{NO}_3^-$ ,  $1\ \mu\text{M}\ ^{15}\text{NO}_2^-$ , and  $0.7\ \text{mM}\ \text{H}^{13}\text{CO}_3^-$  (N<sub>2</sub> purged solution)
5. Same as incubation 4
6. Same as incubation 3

Samples were taken for total cell numbers, measurement of the concentration of  $\Sigma\text{H}_2\text{S}$ , the abundance and isotopic composition of dissolved nitrogen species, the incorporation of  $^{13}\text{C}$ -DIC into biomass, and for transcriptomic analysis. Samples were also preserved for subsequent analysis using a combination of CARD-FISH and NanoSIMS to identify microbes and to determine the amount of inorganic carbon being fixed by the cells.

### Major Water Samplers

A total of 46 water samples were taken with major water samplers (MJ), 37 low-T samples and 9 high-T samples (see table 3). Twenty MJ were used to determine the chemistry of diffuse-flow and black-smoker fluids, while the remainder were used for microbial incubation experiments (see below). Dissolved  $\Sigma\text{H}_2\text{S}$  (only low-T),  $\Sigma\text{NH}_3$ , and pH (25°C) were measured at sea. Microbial abundance was also determined on board the ship by acridine orange direct counts. Upon return to the laboratory at WHOI, further analysis will be conducted, such as the abundance of major cations and anions,  $\Sigma\text{H}_2\text{S}$  of high-T fluids, and the abundance and isotopic composition of dissolved nitrogen species in both high temperature and diffuse fluids.

### Large Volume Pump

Filtration of hydrothermal vent fluids with a Large Volume Pump (LVP) to collect biomass for subsequent 'omic' analyses (metagenomic, metatranscriptomic, metaproteomic) and lipid analyses. In total, we had 5 LVP deployments, of which 2 were at 'Crab Spa'. Due to technical issues with the pump, only one successful deployment at Crab Spa was achieved.

### Incubation experiments

Stable isotope probing experiments with  $^{13}\text{C}$ -labeled bicarbonate were conducted to assess chemosynthetic microbial activity and trophic interactions. Incubations were set up with fluids collected from either Crab Spa or Teddy Bear that were either filtered through a  $2.7\ \mu\text{m}$  filter or left unaltered. Both the filtered and unfiltered incubations were carried out with and without the addition of electron acceptors (nitrate) and donors (hydrogen sulfide). Incubations lasted for a total of 24 hours. During the incubations, the microbial abundance was monitored on board the ship by acridine orange direct counts. In addition, size-fractionation experiments were performed by filtration of natural vent fluids to analyze the microbial community composition and sources of biomarkers associated with different size classes ( $>10\ \mu\text{m}$ ,  $10\text{-}2.7\ \mu\text{m}$ ,  $2.7\text{-}0.7\ \mu\text{m}$ ,  $0.7\text{-}0.2\ \mu\text{m}$ ). All samples were preserved during the cruise for subsequent DNA and lipid extractions to monitor the effect of the experimental conditions on the microbial community composition and to assess the transfer of chemosynthetic carbon by using biomarkers in combination with stable isotope analysis.

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**Table 3 Summary of Major Water Samples**

Dive #	Date	Location	Number of Samples	Temperature [°C]
AD4893	2017/04/26	Crab Spa	2	~24
		Site near Teddy Bear	1	~11
AD4894	2017/04/27	Crab Spa	5	~19.5 – 23°C
AD4895	2017/04/28	Alvinella Mound (Tica)	1	190
		Bio9	1	358
AD4896	2017/04/29	Crab Spa	1	24
		Alvinella Mound (Tica)	1	300
		Pvent	1	350
AD4897	2017/04/30	Crab Spa	5	~24
AD4898	2017/05/01	Teddy Bear	1	12.4
		Qvent	1	135
		Mvent	1	27
		Alvinella Mound (Tica)	1	196
		Bio9	1	366
AD4899	2017/05/02	-	-	-
AD4900	2017/05/03	Teddy Bear	5	~12
AD4901	2017/05/04	Crab Spa	2	~24
		BioVent	2	~318
AD4902	2017/05/05	Crab Spa	1	26
		Small Alvinella Mound (Tica)	2	26-39
AD4903	2017/05/06	Teddy Bear	5	~12
AD4904	2017/05/07	-	-	-
AD4905	2017/05/08	Crab Spa	6	~24
<b>Total</b>			<b>46</b>	

### **B. Enrichment and isolation of microorganisms able to extract Si or Fe from asbestos minerals: Dr. Ileana Perez-Rodriguez**

**Specific Aims:** To enrich and isolate microorganisms from deep-sea hydrothermal vents (9°50'N at the East Pacific Rise) potentially capable of extracting either Si or Fe from chrysotile, actinolite and/or crocidolite (asbestos minerals). My participation onboard of the R/V *Atlantis* allowed me to use the DSV *Alvin* for sample collection (e.g., basalts, vent chimney material, tubeworm material) for both culture enrichments and physicochemical descriptions of natural deep-sea vent microbial biofilms.

- (i) Enrichments and isolations will be performed for novel H<sub>2</sub>-oxidizing and NO<sub>3</sub><sup>-</sup> reducing microorganisms from deep-sea hydrothermal vents at the EPR growing in the presence of chrysotile, actinolite and crocidolite. We will monitor the potential incorporation of Si into biofilm material during growth.
- (ii) Microaerobic and anaerobic (NO<sub>3</sub><sup>-</sup> reducing) Fe(II) oxidizers from the EPR will also be enriched with chrysotile, actinolite and crocidolite as the sole source of Fe<sup>2+</sup>.

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- (iii) Similarly, novel H<sub>2</sub>-oxidizing, Fe(III)-reducing microorganisms from the EPR will be enriched with crocidolite as the sole source of Fe<sup>3+</sup>

### C. Rutgers research team: Ms. Ashley Grosche, Ms. Sushmita

**Principle Investigator: Costantino Vetriani**

**Scientists Onboard: Ashley Grosche, Patwardhan**

The work done onboard cruise AT37-12 was done to investigate biofilm formation at deep-sea hydrothermal vents, which fits into the overarching theme of understanding the role of microorganisms in biogeochemical cycling at these environments. Biofilms were collected from the surfaces of vent fauna (*e.g.*, *Alvinella*, *Riftia*, mussels, etc.) and abiotic surfaces including basalts and sulfide structures. Newly-formed biofilms were collected via experimental microbial colonizers constructed of stainless-steel mesh and PVC pipe placed in areas of active venting. Subsamples were preserved for future community analyses (*e.g.*, community composition, gene expression patterns, etc.). Concurrently, subsamples were also used inocula in pursuit of representative isolates from the native environment.

### D. Riftia and mussel group: Dr. Horst Felbeck and Ms. Tjorven Hinzke

#### Riftia

##### **Objectives**

##### 1. Investigation of the physiological basis of the *Riftia pachyptila* symbiosis:

Characterization of symbiosis-specific pathways and host-symbiont interaction by comparison of symbiont-free and symbiont-containing tissues as well as analysis of soluble host proteins and blood; examining the symbiosis' response towards different environmental conditions (i.e. high vs low sulfur availability, as reflected in a light or dark trophosome color, respectively)

Samples obtained: blood (coelomic, vesicular) and tissue (body wall, trophosome, plume, vestimentum) of 12 specimens with light and 10 specimens with dark trophosome, trophosome homogenate and soluble host proteins of 7 specimens with light and 11 specimens with dark trophosome

##### 2. Comparison of cell cycle stages of the chemoautotrophic symbiont:

Differential proteomics of small and large cell cycle stages of the *Riftia* symbiont to find differences in the expression of seemingly opposed or redundant metabolic pathways (*e.g.* rTCA and Calvin cycle, glucose degradation and gluconeogenesis) under conditions of high vs. low sulfur availability

Samples obtained: trophosome homogenate fractions from differential pelleting, putatively enriched in small vs. large symbiont cells of 7 specimens with light and 11 specimens with dark trophosome (same specimens as for sampling of trophosome homogenate and soluble host proteins, see above)

#### Bathymodiolus

##### **Objectives**

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Characterization of the colonization of *Bathymodiolus* gills by symbionts via microscopic and proteomic comparisons of the uncolonized gill budding zone with colonized middle and anterior gill parts

Samples for Proteomics: 5

Samples for electron microscopy: 3

Samples for HCR-FISH and CARD-FISH analyses: 11

### **E. Microbial chitin degradation: Dr. François Thomas**

The objective during the cruise was to gain a better understanding of microbial degradation of chitin at deep-sea vents. Indeed, although this natural polysaccharide is abundant in the tubes of vestimentiferan tubeworms (eg. *Riftia pachyptila*), as well as the shells of crabs and shrimps, very little is known on its consumption and recycling. Therefore, I collected scrapings of chitin-containing biological material (tubes of *Riftia* and *Tevnia*, shells of the crab *Bathygrea*) and hydrothermal vent fluids that were used as inoculum for minimum growth media containing only chitin as a carbon and energy source. Cultures where growth was observed were preserved as frozen glycerol stock for further isolation and analysis on shore. In parallel, samples were preserved for microbial diversity analysis using 16S rRNA or functional gene sequencing. A total of 132 samples were collected.

### **F. Crab and Fish collection: Dr. Carolyn Tepolt**

Research goals: There is currently funding in place for the construction of a multi-tissue transcriptome for *Bythograea thermydron*; this will be compared to the transcriptomes of related coastal crabs to identify genetic patterns of adaptation to deep-sea vent environments. Additional goals, with an eye to future work, are to collect samples to explore patterns of diversity and adaptation across diverse vent environments in *B. thermydron* and its associated symbiotic/microbial community.

#### Target samples taken:

50 *Bythograea thermydron*

1 *Cyanograea praedator*

1 *Munidopsis subsquamosa*

+ crab-associated symbionts *Ovicides* sp. and *Amphisamytha* sp.

#### Samples of opportunity taken:

3 *Thermarces* sp. (trap bycatch)

Assorted polychaetes, limpets, and other small mesofauna collected incidentally  
(e.g. found in bioboxes after sampling *Riftia* or rock samples)

#### Objectives & outcomes:

Obj1: Collect tissue-specific samples from at least 1 *B. thermydron* of each sex for the construction of a multiple-tissue transcriptome.

Out1: Collected 1 male and 1 female *B. thermydron*, and preserved multiple tissue types for planned future transcriptome sequencing.

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Obj2: Collect high-quality sample of unfertilized eggs of *B. therydron* for potential future genome sequencing.

Out2: Collected genome-quality egg samples from 8 *B. therydron*.

Obj3: Collect multiple *B. therydron* from each of multiple sites to facilitate future population genomic work.

Out3: Collected 1-20 *B. therydron* from each of 4 sites in the 9N EPR area, including 5+ samples at each of Crab Spa, Teddy Bear, and Biovent.

Obj4: Examine multiple *B. therydron* for parasites and symbionts, and preserve anything found for future genetic / genomic work.

Out4: Did thorough dissections on 43 *B. therydron*; identified and preserved two parasitic/symbiotic species (likely both undescribed species in known genera).

Obj5: Collect tissue samples from *B. therydron* for potential future microbial barcoding.

Out5: Collected gill, gut, and hepatopancreas samples from 4 *B. therydron* at each of 3 different sites for microbial diversity characterization.

Obj5: Collect samples from additional crustacean species for potential comparative transcriptome sequencing.

Out5: Collected tissue-specific samples from *C. praedator* and *M. subsquamosa*.

### G. Water column processes – Dr. Andrew Babbín, Dr. Ryan Woosely

A total of 10 CTD casts were performed focusing on sampling the waters of the oxygen deficient zone of the Eastern Tropical North Pacific (ETNP) (Table 4). Cast 7 could not be completed due to problems with the wire. See Appendix for more info on water depth and sampling depths of individual Niskin bottles.

**Table 4 Overview of CTD program**

Number	Date	Latitude (degN)	Longitude (degW)	Max. Sampling Depth (m)
1	04-25-2017	14.03048333	-104.3462	1,500
2	04-27-2017	9.840416667	-104.2929167	2,503
3	04-28-2017	9.341416667	-104.2941333	2,894
4	04-29-2017	9.840533333	-104.2922	635
5	04-30-2017	10.50705	-104.2967667	3,078
6	05-10-2017	9.833366667	-99.99941667	3,234
8	05-12-2017	9.820216667	-92.718	2,500
9	05-12-2017	9.832566667	-91.33496667	1,000
10	05-13-2017	9.83405	-89.99955	2,001

### H. Collection and deployment of colonization devices for Dr. Mullineaux (WHOI)

During AT37-12, we deployed and collected colonization devices for Dr. Lauren Mullineaux to continue the time series to monitor colonization and succession at 9N after the eruption in 2006. During dive AD4896, we deployed 4 colonization 'sandwiches' in an active Riftia/mussel field at Tica and 4 colonization 'sandwiches' at the long-term site Marker L-O near Pvent. We also picked up 8 colonization 'sandwiches' from the Marker L-O site near Pvent.



**Dr. Stefan M. Sievert**, *Associate Scientist w/ Tenure, Biology Department*  
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To: Captain A. D. Colburn, Expedition Leader Pat Hickey, the Crew of the *Atlantis* and *Alvin*, as well as Alison Heater and Catie Graver (SSSG)

From: The Science Party of the *Dark Life II* Expedition (AT37-12)

Re: Kudos

On behalf of the Science Party of AT37-12, I would like to express our heartfelt gratitude for all the hard work and dedication that you put into helping us to obtain the samples we need for our research and for making us feel home for the last three weeks. You go above and beyond your call of duty, and we are very appreciative of that. Whenever there is a need for help, there is always someone ready to provide it and to lend a helping hand. Everyone on this ship excels in what they are doing. You're the best!

I always look forward to come aboard the *Atlantis*. The ship is the epitome of efficiency and I am always impressed by everyone's enthusiasm and professionalism in whatever they are doing. Thank you to the Captain for always having an eye out for science when opportunities arise. Thanks to the Bosun and his crew and the SSSG for the skillful deployments and recoveries of our instruments and the CTD. We also appreciate their patience with us, when we were delayed due to unforeseen problems. Thanks also to the Chief and his engineering crew for all their outstanding work in the background, allowing the ship to run smoothly. Thanks to the expeditious repair of the broken leg of the Vent-SID and in particular of the starboard thruster control unit towards the end of the dive series, allowing us to get the 13<sup>th</sup> dive, which provided critical samples for our project.

I would like to thank the Alvin Group for a very smooth and professional operation and their skillfulness in taking samples and in deploying and recovering instruments and experiments. Thanks also for providing advice and suggestions which helped us take better samples. Each dive started well on time, in many cases even earlier, and the bottom time was more than sufficient to fulfill all our science objectives.

I also would like to give a special thanks to Alison Heater and Catie Graver for all their help on this cruise. They worked endlessly and were always there when help or advice was needed, without ever losing their patience with us. I am not sure there is another job that requires that many skills to be combined in one person. They are an essential part of what makes *Atlantis* and the science operation click. And, of course many thanks to the Steward and his galley crew. The food was excellent! I am not sure there is anyone working harder on the ship than you guys.

As always, it has been a great pleasure working with everyone! This cruise has been very successful and with your help we obtained many samples for exciting research to be done and to be published, allowing us to write competitive proposals. We all would love the opportunity to sail with you all again. Thanks a lot for yet another wonderful cruise.

With best wishes,



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Dr. Stefan M. Sievert  
Chief Scientist, R/V *Atlantis*, Expedition AT37-12

Dive Plan 4893– April 26, 2017

**Port:** Stefan Sievert    **Starboard:** François Thomas    **Pilot:** Jefferson Grau

**On Bottom Target:** Sandwich site near Pvent    9 50.271N; 104 17.288 W; 2508 m

Objectives: Survey area from Pvent to Teddy Bear, survey Lauren Mullineaux sandwich site, deploy colonizer at Bio9, collect chimney w/ Alvinella at Bio9, survey Tica and Crab Spa, take Riftia and majors at Crab Spa, survey Teddy Bear, deploy colonizer, take majors at Teddy Bear

**Basket List**

1. Large biobox w/ Crab Traps (6 lbs)
2. Small biobox w/ 2 colonizers (3 lbs)
3. Small biobox for collecting chimney w/ Alvinella
4. 5 Majors
5. T probe
6. Niskin bottle

<u>Locations:</u>	Lat	Long	m	x	y
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Sandwich site</b>	9 50.271	104 17.288	2508	4641	77916
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		

1. On bottom, transit to the Mullineaux sandwich site
2. Take photos and video
3. Make select T-measurements
4. Proceed to Bio9 and survey area for suitable collection sites for collecting chimney w/ Alvinella and deployment of colonizers
5. Proceed with deploying colonizer in Alvinella colony.
6. Measure T on top of mesh
7. Collect chimney with Alvinella and put in small biobox
8. Proceed north to Tica area and scout area
9. Proceed to 'Crab Spa' (Mk F)

10. Deploy Crab Traps somewhere near Crab Spa
11. Take major within Riftia colony
12. Before collecting Riftia, proceed with following:
  - a. Measure T at base of Riftia clump,
  - b. Make a T measurements at plume level
13. Proceed with collection and put worms in large biobox. Make sure worms fit into biobox and nothing sticks out.
14. Take major after collecting Riftias
15. Scout area to determine best way to deploy Vent-SID on next dive
16. Proceed to north to Teddy Bear
17. Scout area, talking video and photos
18. Identify previous LVP deployment site (look for weights)
19. Take 3 majors at warmest spot
20. Deploy colonizer
21. Go off axis and before ascending fire Niskin to get bottom seawater

**Alvin Dive 4761 – AT37-12**  
**APR 26, 2017**

**Pilot: Jefferson Grau**

**Port Observer: Stefan Sievert**

**Starboard Observer: François Thomas**

**Notes are combination of François Thomas's and Stefan Sievert's notes.**

<b>GMT</b>	<b>Comments</b>
14:10	Descending
15:45	On Bottom, neutrally buoyant above seafloor
16:15	At Pvent, found Lauren Mullineaux's sandwich site, added a map marker "Sandwich site" (x4628, y77907, d 2508). Mostly mussels
16:49	At Bio9 (x4620, y77959, d 2506)
16:58	Found potential site for deployment of colonizer
17:07	Temperature measurement with ICL probe at potential site for colonizer deployment: ~20°C
17:23	Deploying colonizer CV2-2017 at Bio9 (x4611, y77965, Hdg342, D 2508), on chimney with Alvinella. Temperature on top of mesh is 10°C
17:37	Obtain 2 chimney pieces from Bio9 with Alvinella (x4610, y77964, Hdg339, d 2508, temperature: 180°C
18:05	At Crab Spa (x4588, y78145, d2506)
18:11	Deployment of Crab Trap at the base of the Riftia pile at Crab Spa (x4588, y78145, hdg283, D 2508). It fell down later so this is not final location
18:34	Firing white major within Riftia colony (x4583, y78142, hdg356, d2506, Temp 24°C)
18:45	Temperature measurement at plume level of Riftia: 8-10°C
18:48	Collecting 15 Riftia from Crab Spa into the biobox (x4585, y78141, hdg355, d2506)
19:23	Firing green major at Crab Spa after clearing Riftia (x4585, y78141, hdg345, d2506, temp 24.6°C)
19:48	Green major on the basket
20:00	Re-deploying Crab Trap at a new location (flat shelf near Riftia colony) after it fell down (x4584, y78150, hdg189, d 2508)
20:10-21:00	Trying to locate Teddy Bear
21:05	Found another spot with "furry" rocks and diffuse flow, white cloud coming out and Riftia (x4535, y78388, d2519, hdg194, temp 8-10°C)
21:17	Firing yellow major at this spot (x4585, y78387, hdg194, d2519, temp 11-12°C)
21:24	Deploying colonizer CV1-2017 where yellow major was fired (x4535, y78387, hdg195, d2519)
21:25	Getting of axis, starting ascent
21:29	Trigger 5 Niskins total to obtain bottom sea water
21:30	End of a great dive, leaving bottom

## AT 37-12 Sample Sheet

Alvin Dive# 4893 Date 26 APR 2017 Logged by FRANÇOIS THOMAS  
 Port Obs. Stefan Sierant Starboard Obs. François Thomas Pilot Jefferson Grau

## FLUID SAMPLES

Major# White Time 18:34 Temp ICL 24°C Vent Grab Spa  
 X 4583 Y 78142 Hdg 356 Depth 2506 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments Before removal of Riftia

Major# ~~Yellow~~ Green Time 19:18 Temp ICL 24.6°C Vent Grab Spa  
 X 4585 Y 78141 Hdg 345 Depth 2506 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments After cleaning of Riftias

Major# Yellow Time 21:17 Temp ICL 11°C-12°C Vent \_\_\_\_\_  
 X 4535 Y 78387 Hdg 194 Depth 2519 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

## BIOLOGICAL SAMPLES

**Take photos before collection, in the claw (if possible), and after collection.**  
**If needed, make sketches with scales.**

Sample # 1 Time 17:37:03 Temp ≈ 180°C (max recorded 182°C) Vent Bio 9  
 X 4610 Y 77964 Hdg 339 Depth 2508 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type 2 big pieces of chimney with Alvinella  
 Basket location Front small bio box  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # 1 (type) \_\_\_\_\_

Description of associated fauna &amp;/or type of venting \_\_\_\_\_

Sample # 2 Time 18:48 Temp 24-8°C Vent Crab Spa  
 X 4585 Y 78141 Hdg 355 Depth 2506 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type Riftia, at least 10  
 Basket location Large bio-box  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_

Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

## ROCK SAMPLES

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

## EXPERIMENT DEPLOYMENTS/RECOVERIES

**Take photos before and after deployment or recovery. Make sketches with scales.**

Expt ID/# CV2-2017 Time 17:23:16 Temp 10°C Vent Bco 9  
 X 4611 Y 77965 Hdg 342 Depth 2508 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting Alvinellids + 1 crab  
 Additional assoc. samples: type/ID       
 Additional descriptive comments     

Expt ID/# Trap 1 Time 18:11 Temp      Vent Crab Spa  
 X 4588 Y 78165 Hdg 283 Depth 2508 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting       
 Additional assoc. samples: type/ID       
 Additional descriptive comments Fell down, put back at new location

Expt ID/# Trap 1 Time 20:00 Temp      Vent Crab Spa  
 X 4584 Y 78150 Hdg 189 Depth 2508 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting       
 Additional assoc. samples: type/ID       
 Additional descriptive comments on a flat shelf below Crab Spa near Riftia

Expt ID/# CV1-2017 Time 21:26 Temp 10-12°C Vent       
 X 4535 Y 78387 Hdg 195 Depth 2519 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting       
 Additional assoc. samples: type/ID       
 Additional descriptive comments Where major yellow was fired

Expt ID/#      Time      Temp      Vent       
 X      Y      Hdg      Depth      Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting       
 Additional assoc. samples: type/ID       
 Additional descriptive comments

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

Start: 14:10  
At seafloor ~~15:45~~  
15:45

AT 37-12 Sample Sheet

Alvin Dive# 4893 Date April 26 2011 Logged by Sievert  
Port Obs. Sievert Starboard Obs. Thomas Pilot Grau

FLUID SAMPLES

Major# white Time 18:37 Temp ICL 24°C Vent Crab Spa  
X 4583 Y 7814 Hdg 355 Depth 2506 Alt \_\_\_\_\_ Marker 7 (type/#)  
Comments prior to removal of Riftia

Major# green Time 23-19:46 Temp ICL 24.6, 25.2 Vent Crab Spa  
X 4583 Y 7814 Hdg 345 Depth 2506 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments after removal of Riftia; light spring may be slowly

Major# yellow Time 21:18 Temp ICL 11 Vent \_\_\_\_\_  
X 4535 Y 7838 Hdg 194 Depth 2519 Alt \_\_\_\_\_ Marker Old 11 (type/#)  
Comments Riftia, diffuse flow

Nishin  
Major# 1-5 Time 21:28 Temp ICL \_\_\_\_\_ Vent /  
X 4575 Y 7838 Hdg \_\_\_\_\_ Depth 2501 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments off axis

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.  
If needed, make sketches with scales.

Sample # 1 Time 17:37 Temp 18.0°C Vent Bio 9  
X 4610 Y 7796 Hdg 339 Depth 2508 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type chimney with Alvinella  
Basket location Frat small biobox  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # 2 Time 18:48 Temp 10°C Vent Cal Spa  
X 4584 Y 7814 Hdg 355 Depth 2506 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type Rifted

Basket location by bookbox

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting T at 4 waves plus levels:  
\*24 8°C, 8°C, 10°C, 6°C, 10°C

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**ROCK SAMPLES**

***Take photos before collection and in the claw. If needed, make sketches w/ scales.***

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
**Sample type** \_\_\_\_\_ **Basket location** \_\_\_\_\_  
**Assoc. water sample #** \_\_\_\_\_ **Assoc. biol. sample #** \_\_\_\_\_ (type) \_\_\_\_\_  
**Descriptive comments** \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
**Sample type** \_\_\_\_\_ **Basket location** \_\_\_\_\_  
**Assoc. water sample #** \_\_\_\_\_ **Assoc. biol. sample #** \_\_\_\_\_ (type) \_\_\_\_\_  
**Descriptive comments** \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
**Sample type** \_\_\_\_\_ **Basket location** \_\_\_\_\_  
**Assoc. water sample #** \_\_\_\_\_ **Assoc. biol. sample #** \_\_\_\_\_ (type) \_\_\_\_\_  
**Descriptive comments** \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
**Sample type** \_\_\_\_\_ **Basket location** \_\_\_\_\_  
**Assoc. water sample #** \_\_\_\_\_ **Assoc. biol. sample #** \_\_\_\_\_ (type) \_\_\_\_\_  
**Descriptive comments** \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
**Sample type** \_\_\_\_\_ **Basket location** \_\_\_\_\_  
**Assoc. water sample #** \_\_\_\_\_ **Assoc. biol. sample #** \_\_\_\_\_ (type) \_\_\_\_\_  
**Descriptive comments** \_\_\_\_\_

## EXPERIMENT DEPLOYMENTS/RECOVERIES

**Take photos before and after deployment or recovery. Make sketches with scales.**

Expt ID/# Sandwich Time 16:19 Temp \_\_\_\_\_ Vent Pret  
 X 4619 Y 7791 Hdg 87 Depth 2510 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

CV2  
 Expt ID/# Colonizer Time 17:03 Temp ~20°C Vent Bio 9 out top of Alvinella S  
 X 4611 Y 7796 Hdg 392 Depth 2508 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Alvinella colony

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

10°C on top of mesh

Expt ID/# Crab Trap Time 18:30 Temp \_\_\_\_\_ Vent Crab Spa  
 X 4588 Y 7814 Hdg 283 Depth 2506 Alt \_\_\_\_\_ Marker F (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

diffuse flow

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

fell down in crevice

Expt ID/# Crab Trap Time 20:00 Temp \_\_\_\_\_ Vent near Crab Spa  
 X 4584 Y 7815 Hdg 189.6 Depth 2508 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

placed on flat rock next to Riftia colony

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

Redeployment

Expt ID/# CV1 Time 21:25 Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X 4585 Y 7838 Hdg 194 Depth 2519 Alt \_\_\_\_\_ Marker Old Mk (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Riftia, diffuse flow

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

Dive Plan 4894– April 27, 2017

**Port:** Jeremy Rich    **Starboard:** Sean O’Neill    **Pilot:** Phil Forte

**On Bottom Target:** Crab Spa, 9 50.396 104 17.489 2505, x 4583, y 7814, hdg 355

Objectives: Deploy Vent-SID at Crab Spa, take majors, pick up Crab Trap, collect Riftia

Basket List

1. Large biobox w/ Crab Trap
2. 5 Majors
3. T probe

<u>Locations:</u>	Lat	Long	m	x	y
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		

1. On bottom, transit to Crab Spa
2. At Crab Spa, take 4 majors at warmest spot, should be around 23-25°C, there is an opening to access to the fluids that we cleared today
3. Check on Crab Trap (x4584, y7814, z 2508m).
4. Swap Trap with new one in the biobox regardless if crabs are inside
5. Move to Riftia site near Crab Spa, there is chimney forming just below Crab Spa.
6. Measure T and take major at hottest spot
7. Collect Riftia in colony around chimney
8. Before collecting Riftia, proceed with following:
  - a. Measure T at base of Riftia clump,
  - b. Make a T measurements at plume level
9. Proceed with collection and put worms in large biobox. Make sure worms fit into biobox and nothing sticks out. Don’t fold them!
10. If time permits, move north to find Teddy Bear.

**Alvin Dive 4894 – AT37-12**  
**APR 27, 2017**

**Pilot: Phil Forte**

**Port Observer: Jeremy Rich**

**Starboard Observer: Sean O'Neill**

**Notes are from Jeremy Rich and Sean O'Neill**

<b>GMT</b>	<b>Comments</b>
14:00	Descending
15:30	At sea floor
15:35	Surveying microbial biofilm site (x4600 y78143 d2505) near Crab Spa
15:40	Taking temperature in small chimney with riftia and mussels at biofilm site; T=14-15°C
15:45	Continuing to survey biofilm site.
15:57	At Crab spa for major sampling; Initial temperatures were reading 20°C with basket probe. This probe was underestimating temperature by 4-5°C. Used ICL temperature probe, and it was reading 23-24°C
16:25	First major (blue) at Crab Spa; ICL T=22°C
16:33	Second major (green) at Crab Spa; ICL T=25°C
16:44	Third major (red) at Crab Spa; ICL T bad thermocouple
16:49	Fourth major (white) at Crab Spa; ICL T=23°C, second chamber did not fill, appeared jammed.
16:55	Fifth major (black) at Crab Spa; ICL T reading 15°C in ambient seawater, bad readings
17:05	Just below Crab Spa, exchanging crab trap with crab in it with empty crab trap.
17:15	Measuring temperature at Alvinella mound (x4572 y78130 d2512) near Crab Spa. T=150°C in mound; T=30-45°C in alvinella.
17:40	Sampling riftia (x4568 y78137 d2515); T=0°C at top of riftia, T=24°C at riftia base (T measured with basket probe, which was underestimating T by 4-5°C).
18:09	Heading to Teddy Bear Site
18:19	Starting to survey area south of Teddy Bear
19:13	Teddy Bear site located based on sighting of large volume pump weights
19:26	Taking T at riftia patch near Teddy Bear (x4541 y7835 d2516) using ICL probe, T=7-11°C
19:37	Taking T at riftia crack at Teddy Bear (x4545 y7836 d2516) using ICL probe, T=5-10°C
19:50	Going off axis to drop weights
19:53	Ascending
21:00	At surface

## AT 37-12 Sample Sheet

Alvin Dive# 4894 Date 4/27/17 Logged by Jeremy Rich  
 Start: 14 00 GMT At Seafloor 1530 End 2100  
 Port Obs. Jeremy Rich Starboard Obs. Sean O'Neill Pilot Phil Forte  
 et

## FLUID SAMPLES

Major# ± Blue Time 1625 Temp ICL 22.0 Vent Crab Spa  
 X 4590 Y 78128 Hdg 5 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# Green Time 1633 Temp ICL 22.7 Vent Crab Spa  
 X 4590 Y 78127 Hdg 5 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments later in fill temp. 25.0

Major# Red Time 1644 Temp ICL NA Vent Crab Spa  
 X 4586 Y 78125 Hdg 6 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments bad thermocouple

Major# white Time 1649 Temp ICL 19.5 Vent Crab Spa  
 X 4586 Y 78124 Hdg 5 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments right side not sampling; temp observed up to 23.1  
blc of jam

Major# Black Time 1655 Temp ICL NA Vent Crab Spa  
 X 4583 Y 78123 Hdg 6 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments readings approx 15C in seawater; bad temp readings

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

## BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.

If needed, make sketches with scales.

Sample # 1 Time 1740 Temp top 2°C, base (24°C) Vent Tica  
 X 4569 Y 7813 Hdg 61 Depth 2515 Alt ∅ Marker \_\_\_\_\_ (type/#)  
 Sample type Riftia  
 Basket location Biobox

Temp taken with basket probe, which is under estimating temp by 2-3°C

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

## ROCK SAMPLES

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Crab  
Expt ID/# trap 1 Time 1705 Temp \_\_\_\_\_ Vent Base of Crab Spa  
X 4578 Y 78127 Hdg 89.614 Depth 2508 Alt 8.5 Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting There was 1 crab in the trap. This trap was  
~~Additional assoc. samples: type/ID \_\_\_\_\_~~ collected and new trap deployed  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

## MARKERS DEPLOYED

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

## ADDITIONAL NOTES:

1610 → Basket @ 20° ± 2 to 3° offset from window  
 & basket; basket 3° cooler

1615 → utilizing 2<sup>nd</sup> temp probe → 23.5

Alt plan

All 5 majors @ Crab Spa  
 Temp @ higher temp vent

Alvinella Pillar near Tika

1718, 4572x 78130y, 2512dep, a=0

h = 95, Temp = 150 C approx

1727 → Temp @ 30-45C in alvinella  
 stbd PATZ

(see one more page)

4/27/17 Dive 4894 Exploring sites

9:30 am x 4607 y 78151 - south of crab spa  
1530 diffuse flow microbial mats

T 14°C, - top stack with rittia +  
15°C mussels

Difficult  
terrain for  
vent sid

- ~~70~~ 20 m east of Tica  
20 m north east of crab spa

---

1926 x 4541 y = 7835 d = 2516 a = 0 h = 174  
Near teddy bear site, rittia patch  
ICL probe:  
7°C, 10°C, 11°C Good for vent sid

~~1934~~

1937 x 4545 y 7836 d 2516 h = 263 a = 0  
Rittia crack next to LVP weights

5 - 10°C

Good flat terrain for vent - SPD

Dive Plan 4895– April 28, 2017

**Port:** Horst Felbeck      **Starboard:** Carolyn Tepolt      **Pilot:** Pat Hickey

**On Bottom Target:** Crab Spa 9 50.396 104 17.489 2505

Objectives: Deploy Vent-SID at Crab Spa, take majors, pick up Crab Trap, collect Riftia

**Basket List**

1. Large biobox w/ Crab Trap
2. 3 Majors
3. 2 Small Bioboxes (one with 2 colonizers)
4. T probe
5. Niskin

<b><u>Locations:</u></b>	<b>Lat</b>	<b>Long</b>	<b>m</b>	<b>x</b>	<b>y</b>
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		

1. On bottom, transit to Crab Spa
2. Swap Trap with new one in the biobox regardless if crabs are inside
3. Move to site just below Crab Spa, there is chimney forming
4. Measure T and take major at hottest spot
5. Take sample of Alvinella with sulfide and put in small empty biobox, measure T afterwards
6. Deploy colonizer at structure, ideally in 40°C flow
7. Measure T after deployment on top of mesh to make sure flow is going through it
8. Move to site with microbial mats identified today, near Crab Spa
9. Put out colonizer in area with microbial mat
10. Measure T after deployment on top of mesh to make sure flow is going through it

11. Sample rocks with microbial mats and put in small biobox that previously had colonizers
12. Move to Bio9
13. Check on colonizer CV2. Take video.
14. Find black smoker emitting highT fluids, previously we measured 350-370°C
15. Take major
16. Close to Pvent, there is a huge Riftia mount. Good spot for collecting Riftia
17. Before collecting Riftia, proceed with following:
  - a. Measure T at base of Riftia clump,
  - b. Make a T measurements at plume level
18. Proceed with collection and put worms in large biobox. Make sure worms fit into biobox and nothing sticks out. Don't fold them!
19. Proceed to Pvent
20. Find black smoker emitting highT fluids, previously measured 325°C
21. Take major
22. Go off axis and before ascending fire Niskin to get bottom seawater

**Alvin Dive 4894 – AT37-12**  
**APR 28, 2017**

**Pilot: Pat Hickey**  
**Port Observer: Horst Felbeck**  
**Starboard Observer: Carolyn Tepolt**  
**Notes are a mix from both observers**

<b>GMT</b>	<b>comments</b>
13:50	in the water
15:10	at the bottom
15:28	deploy first crab trap on a clump of Riftia (x4593, y: 78172, depth 2506, h 159)
15:37	crushed mussel, put into biobox, facilitating entry of crabs into biobox using sub arm, current status "trap 1, Pat 5 crabs")
15:46	retrieved crab trap from "dining table", no crabs inside
15:50	arrived at crab spa
15:53	green major sample in effluent of big diffuser, (only one spring #1 triggered), ICL 110, basket Temp: 190, x:4581 y 78170, h: 83, depth 2512, temp varies within 60 and 190 within very close distances)
16:09	broke off chunks of tube accumulations containing Alvinella, put in small biobox (temp. 18-20, x:4580 y:78170, h 81, d 2511)
16:26	deploy colonizer on protrusion of large diffuser, difficult because the diffuser slopes are very steep (temp 12 on top of colonizer, fluctuated between 10-40 within short distances, x4582 y78168, h 35, d 2512)
16:42	arrive at microbial mat area, large area of hairiness), few areas with some flow, anemone at 16:45
16:58	colonizer deployed (03-2017), x4600 y78180, h90,d2505, temp above colonizer 14C)
17:10	furry rock collected, top of small hairy tower, into biobox (x4604 y 78185, h181,d2505)
17:14	arrive at Bio9
17:23	video of previously deployed colonizer (CV 2), white and hairy growth
17:35	starboard temp probe malfunctioning while in black smoker, port probe shows 291 (far too low, i.e. also malfunctioning)
17:46	second black smoker (temp probes still malfunctioning), white major malfunctions, blue major (temp 358, x4606 y 78005, h12, d2511)
18:04	at P-vent, temp. probe still malfunction, no sample since no major, Pat states P=vent good for sampling with caution), riftia too big for science use, great animal shape
18:35	collect Riftia at Tika, temp. 5.2 head, 28 bottom)
18:10	Carolyn drives the sub off axis
19:07	Niskin bottle fired (x4666 y78558, h264, d2507)
19:20	arrive at M-vent, vent on top is dead, observe fish inside a hole at the bottom of the mound. Marker on adjacent venting area stating "M-vent" is at the wrong place according to Pat, it is on "flea vent")
19:37	release weights

## AT 37-12 Sample Sheet

Alvin Dive# 4895 Date 28 Apr. 2017 Logged by C. Tepolt  
 Port Obs. Harst Felbeck Starboard Obs. Carlynn Tepolt Pilot Pat Hickey  
 Descend: 13:50 At Seafloor: 15:10:30 Ascend: 19:37

## FLUID SAMPLES

Major# green Time 15:53 Temp ICL 190+2 Vent Tica/chimney below crab spa  
 X 4581 Y 78170 Hdg 83 Depth 2512 Alt 0 Marker \_\_\_\_\_ (type/#)

Comments temp varied b/n 60-190 depending on probe position  
Rspng working, R not blue NO green #2

Major# white Time 17:49 Temp ICL 366 Vent Bio 9  
 X 4606 Y 78005 Hdg 12 Depth 2511 Alt 0 Marker \_\_\_\_\_ (type/#)

Comments Black smoker  
NEITHER chamber fired for white! Dred for blue

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y 78005 Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt 0 Marker \_\_\_\_\_ (type/#)

Comments \_\_\_\_\_

Major# N/A Time 18:14 Temp 290°C\* Vent P-vent  
 X 4666 Y 77954 Hdg 358 Depth 2511 Alt 0 Marker \_\_\_\_\_ (type/#)

Comments P-vent black smoker \*probe prob. reading v. low (as it  
did @ Bio 9) - Pat has measured @ 360°C in pit.

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments \_\_\_\_\_

## BIOLOGICAL SAMPLES

**Take photos before collection, in the claw (if possible), and after collection.**

**If needed, make sketches with scales.**

Alvirella+  
 Sample # chimney Time 16:09 Temp 18-20°C Vent Tica / new chimney  
 X 4580 Y 78170 Hdg 81 Depth 2511 Alt 0 Marker \_\_\_\_\_ (type/#)

Sample type Sulfide chimney piece

Basket location small bio box nearest Alvin

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # Microbial mat rock Time 1710 Temp \_\_\_\_\_ Vent Crab Spona micro. mat field  
X 4604 Y 78185 Hdg 181 Depth 2505 Alt 0 Marker \_\_\_\_\_ (type/#)

Sample type Rock w/ microbial mat

Basket location small biobox furthest from Alvin

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting Micro. mat, sparse worms, Rifa, mussels, crabs, squat lobsters

Sample # Riftia Time 1835 Temp 5°C @ plume; 2.8 @ base Vent Tica  
X 4562 Y 78171 Hdg 353 Depth 2514 Alt 0 Marker \_\_\_\_\_ (type/#)

Sample type live Riftia

Basket location large biobox

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting Riftia w/ mussels, worms, crusts, Gsh

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

## ROCK SAMPLES

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

- 15:15:30 nice shrimp  
 15:17:20 mudiopsis, crabs  
 15:32 crusty mussels to low crabs into biobox  
 16:51 Mudiopsis swims by corner of screen / amphipod swarm  
 17:13 head to Bio9  
 18:23 video of CV2 colonizer  
 17:33<sup>ish</sup> Stbd temp probe malfunctioned - read 'no data' in smoker  
 ↳ switched to port temp probe. ↓ No, it's too low  
 ↳ possible issue of port probe as well - No, it's OK!

1<sup>st</sup> smoker waxed out @ 290°C, looking for a diff. one

- 15:47 diff smoker, sure high temp.  
 Pat ~~sa~~ has surveyed this smoker several times, says it  
 has always been > 300°C. Will check if major ICL.  
 ↳ Major ICL reads ≈ 370°C, temp probe is off.  
 18:04 @ P-vent, Pat checked smoker for stability. says  
 it looks OK.

19:07 Niskins shot 46666, 78558 d=2507 h=264

End of dive - went to M-vent area, found Flea Vent or  
 Robin's Roost (labeled M-vent by prev. cruise - Pat says  
 they labeled the wrong vent since we were in the ASC +  
 M-vent is at the top)

EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Expt ID/# Crab Trap #3 deploy Time 15:29:45 Temp \_\_\_\_\_ Vent Tica / crab spa  
 X 4593 Y 78172 Hdg \_\_\_\_\_ Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting trap on top of Riftia bed - 1 end free, 1 end on Riftia  
 Additional assoc. samples: type/ID Riftia, Munidopsis, Bythograea, fish  
 Additional descriptive comments Trap on top of Riftia - new location

Expt ID/# Crab Trap Recovered Time 15:46 Temp \_\_\_\_\_ Vent Tica / crab spa / dining table  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting Saw Munidopsis in trap originally, but gone when returned  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments "Dining table"

Expt ID/# Colonizer 1 Time 16:30 Temp 12 Vent Tica / new chimney  
 X 4582 Y 78168 Hdg 35 Depth 2512 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting On Alvinella chimney sulfide, side of chimney  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments A few good places for colonizer - put it in only flat-ish place - depth fluctuated based on result as it position (how close by)

Expt ID/# Colonizer 2 Time 16:58 Temp 17-18 Vent Tica / microbial mat  
 X 4600 Y 78180 Hdg 90 Depth 2505 Alt 0 Marker 03-2017 ? (type/#)  
 Description of associated fauna &/or type of venting Microbial mat area, some crustaceans, mussels, worms <sup>alvinellid?</sup> ~~Riftia~~, anemones - but sparse  
 Additional assoc. samples: type/ID visible microbial mat  
 Additional descriptive comments 14% coming out of top

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

AT 37-12 Sample Sheet

Alvin Dive# 4895 Date 7/28/17 Logged by HORST FELBERG  
 Port Obs. HF Starboard Obs. CAROLYN Pilot PAT HICKEY  
 Descend: 13:50 GMT At Seafloor: 15:10 Ascend: 19:38

FLUID SAMPLES

Major# green pair Time 16:00 Temp ICL 190 Vent large diffuses Tika

X 4581 Y 4097 Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments right corner up (green #1); green #2 does not fire

Major# \_\_\_\_\_ Time 17:40 Temp ICL 295 Vent Bio 9

X 4895 Y 7801 Hdg 75 Depth 2509 Alt 5-1 Marker \_\_\_\_\_ (type/#)

Comments \_\_\_\_\_

Major# double blue Time 17:45 Temp ICL 358(w) Vent Bio 9

X 4606 Y 7800 Hdg 12 Depth 2511 Alt 3-1 Marker \_\_\_\_\_ (type/#)

Comments did not fire (double white)

Major# \_\_\_\_\_ Time 18:06 Temp ICL 290(?) Vent Bio 9 P-vent

X 4616 Y 7795 Hdg 348 Depth 2511 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.

If needed, make sketches with scales.

Sample # 1 Time 16:10 Temp see above Vent Tika

X 4581 Y 7817 Hdg 77 Depth 2512 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type Alvinellid

Basket location diffuse flow Tika

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time 18-35 Temp 41.53° beach base Vent Taken  
 X 4562 Y 7817 Hdg 353 Depth 25TY Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type Puffin small-medium  
 Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

## ROCK SAMPLES

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_



EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Expt ID/# \_\_\_\_\_ Time 15:30 Temp \_\_\_\_\_ Vent TURK  
 X 4593 Y 7817 Hdg 159 Depth 2506 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting crab tray deployed  
Replica etc.  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments crushed some mussels, put in Liobone  
6 mussels in Liobone immediately

coloniser  
Alvinella  
pallid  
large

Expt ID/# 2 Time 16:24 Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X 4582 Y 7816 Hdg 35 Depth 2512 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
12°C going through after deploy  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments only Alvinella in Rockat

no

Expt ID/# 3 Time 16:42 Temp 17-19 Vent microbial mat  
 X 4602 Y 7817 Hdg 39 Depth 2504 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments f

sea  
anemone  
hole

Expt ID/# 4 Time 16:45 Temp 11 Vent micro mat  
 X 4603 Y 7818 Hdg 174 Depth 2505 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments flow visible; temp at  
17:00  
micro mat

Expt ID/# 5 Time 17:02 Temp 17-18 Vent \_\_\_\_\_  
 X 4600 Y 7818 Hdg 90 Depth 2505 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
mussels (→ removed); top removed  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments coloniser deployed 17:05  
14°C after deploy above

## MARKERS DEPLOYED

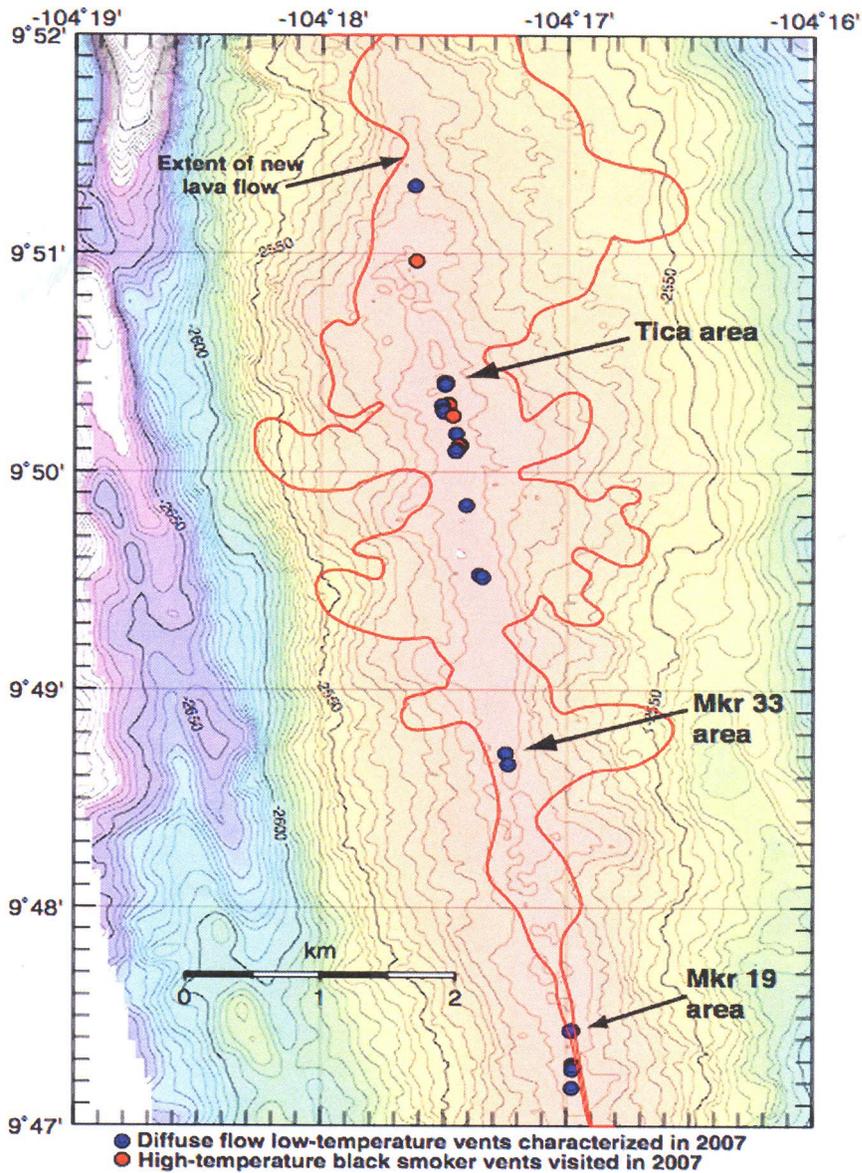
Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

## ADDITIONAL NOTES:

15:25 deploy water trap  
 15:50 arrived at big diffuser  
 temp probe reads 2°C below window  
 17:14 to Bio 9  
 17:28 <sup>24-26</sup> sides of coloniser  
 17:28 Bio 9 black smelter  
 went to 14-vent → fish in spa  
 saw pla-vent w. marker  
 active



1 1/2 mags  
 ~4-6 crabs  
 ~8 pifia  
 Minella crab  
 deployed 2 colonizers  
 video of crust. colonizers  
 MISKIN  
 1 funny rock from mat area

Dive Plan 4896– April 29, 2017

**Port:** Stefan Sievert      **Starboard:** Tjorven Hinzke      **Pilot:** Jefferson Grau

**On Bottom Target:** LVP landing site: 9°N 50.425 104W 17.575

Objectives: Deploy LVP at Crab Spa, take majors, deploy and pick up sandwiches, deploy CV

Basket List

1. Biobox w/ sandwich inserts
2. 3 Majors
3. 2 Small Bioboxes (one with 2 colonizers)
4. T probe

<u>Locations:</u>	<b>Lat</b>	<b>Long</b>	<b>m</b>	<b>x</b>	<b>y</b>
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		

1. On bottom, transit to LVP location and pick up instrument
2. Move to Crab Spa and position instrument, previously we put in crevice just next to Crab Spa, there are many weight stacks from previous deployments
3. Take 1 major at Crab Spa
4. Remove hose from LVP
  - a. Insert wand
  - b. Stabilize wand
  - c. Measure T at tip of wand with Alvin T probe, should be around 24°C
5. Move to Alvinella mound, just below Crab Spa
6. Measure T and take major at hottest spot
7. Deploy CV colonizer in 40°C fluid
8. Measure T on mesh to ensure flow through mesh
9. Deploy 4 sandwiches in Riftia colony nearby in ~10°C diffuse flow w/ Riftia and mussels

10. Measure T around sandwiches
11. Go to Bio9 to pick up CV2
12. Place it in back biobox.
13. Deploy new CV colonizer at same spot
14. Go to Pvent sandwich site to deploy and collect sandwiches at Marker L and O site
15. Follow detailed protocol provided by Mullineaux lab
16. Proceed to Pvent
17. Find black smoker emitting highT fluids, previously measured 325°C
18. Pick up mussels and put in front small biobox

**Alvin Dive 4896 – AT37-12**  
**APRIL 29, 2017**

**Pilot: Jefferson Grau**  
**Port Observer: Stefan Sievert**  
**Starboard Observer: Tjorven Hinzke**

<b>GMT</b>	<b>Comments</b>
14:10	Descend
15:48	On bottom, neutrally buoyant above seafloor
15:55	off axis, take large volume pump (x4454, y78199, d2505)
16:26	place LVP on Crab Spa on top of old LVP weights (x4605, y78142, d2512)
16:34	fire yellow major at Crab Spa (x4604, y78148, d2506, temp. 24-25 °C; temp with Alvin probe: 23.8 °C)
17:40	place intake nozzle of LVP in Crab Spa opening (x4604, y78142, d2513, temp with Alvin probe: 24.8 °C, checked that no kinks are in hose)
18:10	deploy sandwiches #70, 71, 72, 75 in Riftia and mussel field (d4580, y78138, d2515, temp. 7 °C, ~20 °C in Riftia field, temp at sandwiches: 70: 5-7 °C, 71:7-10 °C, 72: 3.3-4.5 °C, 75: 8-10°C)
18:52	fire black major at Alvinella mound (x4586, y78138, d2512, temp probe of major seems to read 26 °C less (-26 °C offset), reads about 300 °C, Alvin temp probe reads 322 °C)
19:20	deploy colonizer CV6-2017 at Alvinella mound (x4581, y78133, d2517, temp above mesh 20 °C)
20:42	collect sandwiches at P-Vent (sandwich #180-#187, x4613, y77993, d2510, temp ~2 °C (ambient temp))
20:46	deploy 4 new sandwiches at same site (sandwiches #80, 81, 127, 128)
21:00	fire red major at P-Vent black smoker (x4611, y77997, d2511, temp 350)
21:10-	collect old colonizer (CV 2-2017) and deploy new one (CV 5-2017) at Bio9
21:18	(x4629, y77994, d2507, temp 7-10 °C)
21:30	end of dive, leave bottom

AT 37-12 Sample Sheet

Alvin Dive# 4896 Date 04-29-77 Logged by Sievert  
Port Obs. Sievert Starboard Obs. Hinzke Pilot Grau  
Descend 14:03 At seafloor 15:45 Ascend 21:30

FLUID SAMPLES

Major# yellow Time 16:37 Temp ICL 24°C Vent Crab Spa  
X 4603 Y 7814 Hdg 11 Depth 2506 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments T stayed stable

Major# black Time 18:50 Temp ICL ~~23°C~~ 300°C Vent Alvinella Mound near Crab Spa  
X 4586 Y 7813 Hdg 152 Depth 2512 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments -26°C initially T probe confirmation 322  
-left chamber spring came up late

Major# red Time 20:59 Temp ICL 350°C Vent P vent  
X 4611 Y 7799 Hdg 7 Depth 2511 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

**Take photos before collection, in the claw (if possible), and after collection.**  
**If needed, make sketches with scales.**

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

ROCK SAMPLES

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Note: Found CVP at 15:48

x 4455 y 7819

d 2505 m

Stat monij: 16:01

## EXPERIMENT DEPLOYMENTS/RECOVERIES

**Take photos before and after deployment or recovery. Make sketches with scales.**

Expt ID/# CVP #1 Time 17:41 Temp 29°C Vent Crab Spa  
 X 4603 Y 7814 Hdg 16 Depth 2506 Alt      Marker F (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

Expt ID/# CV6-2017 Time 19:22 Temp 35°C Vent Alvinella Mound near Crab Spa  
 X 4583 Y 7813 Hdg 55 Depth 2513 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments mesh T a mesh ~ 20°C

Expt ID/# CV2-2017 Time 21:10 Temp      Vent Pvent  
 X 4629 Y 7799 Hdg 355 Depth 2508 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Recovery into small biobox

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

Expt ID/# CV5-2017 Time 21:18 Temp 10°C <sup>on mesh</sup> Vent pvent  
 X 4629 Y 7799 Hdg 355 Depth 2508 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

Expt ID/# Sandwiches Time 18:15-18:21 Temp 4.5-10°C Vent Riftia/mussel colony near Crab Spa  
 X 4580 Y 7813 Hdg 29 Depth 2516 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Deployed numbers 70-75

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

## EXPERIMENT DEPLOYMENTS/RECOVERIES

**Take photos before and after deployment or recovery. Make sketches with scales.**

Expt ID/# Sandwiches Time 20:43 Temp ambient Vent L-O Mk near Pvent  
 X 4614 Y 7799 Hdg 103 Depth 2510 Alt      Marker L-O (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
recovered sandwiches # 180-187; deployed sandwiches  
 Additional assoc. samples: type/ID \_\_\_\_\_ # 80, 81, 127, 128  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

4896

AT 37-12 Sample Sheet

Alvin Dive# 4896 Date 29.04.17 Logged by Tjoeven Hinkel  
Port Obs. Siefan Sievert Starboard Obs. Tjoeven Hinkel Pilot Felimon Bolen  
Descend: 14:03 At Seafloor: 15:48 Ascend: 21:30

FLUID SAMPLES

Major# 1(yellow) Time 16:34 Temp ICL 24-25 Vent Grab Spa  
X 4604 Y 78 MB Hdg \_\_\_\_\_ Depth 2505 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

Major# black Time 18:45 Temp ICL \_\_\_\_\_ Vent Arvinella mount  
X 4586 Y 78/138 Hdg \_\_\_\_\_ Depth 2512 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments temp probe seems to have offset -> reads 26°C less (?)  
Readings of major were very slowly in beginning, then

Major# red Time 21:00 Temp ICL 35.0 Vent black smother filter  
X 4611 Y 78/138 Hdg \_\_\_\_\_ Depth 2511 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments works well

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

**Take photos before collection, in the claw (if possible), and after collection.**  
**If needed, make sketches with scales.**

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Temp into Alvin temp. probe: 322

EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

X 4605  
Y 78142  
d 2512

Expt ID/# 1 Time 15:52 Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X 4454 Y 78193 Hdg \_\_\_\_\_ Depth 2505 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Description of associated fauna &/or type of venting off axis → grab CVP (grabbed 15:55) → haul over to Crab Spa → 16:26 placed @ Crab Spa on top of old weights  
Additional assoc. samples: type/ID ↳ 17:40? mussel in vent opening  
Additional descriptive comments (Temp probe: 24.8 °C, had pink in hose)

Expt ID/# 2 Time 16:34 Temp 24.25 Vent Crab Spa  
X 4604 Y 78142 Hdg \_\_\_\_\_ Depth 2506 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Description of associated fauna &/or type of venting Major @ Crab Spa (yellow)  
Additional assoc. samples: type/ID temp. comparison  
Additional descriptive comments \_\_\_\_\_

Expt ID/# 3 Time 18:10 Temp 6-10 Vent \_\_\_\_\_  
X 4580 Y 78138 Hdg \_\_\_\_\_ Depth 2515 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Description of associated fauna &/or type of venting temp measurement for packing sandwiches  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# 4 Time 18:18 Temp 7 Vent \_\_\_\_\_  
X 4580 Y 78138 Hdg \_\_\_\_\_ Depth 2515 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Description of associated fauna &/or type of venting deploy sandwich # 7.0 (Rift + mussel field) 71, 72, 75  
Additional assoc. samples: type/ID sandwich 7.0, 71, 72, 75  
Additional descriptive comments temp measurements: 72-3.3, 4 °C, 4.5 °C, 71-6.7-10 °C, 70-7 °C-5 °C, 16 °C-7 °C, 75-10, 8-9 °C

Expt ID/# 5 Time 19:20 Temp ~35 Vent Alvinella mound  
X 4581 Y 78133 Hdg \_\_\_\_\_ Depth 2517 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Description of associated fauna &/or type of venting deploy colonizer CV6-2012  
Additional assoc. samples: type/ID 2A  
Additional descriptive comments \_\_\_\_\_

X above mesh: ~ 20 °C

Temp @ black smoker (P vent)  
X: 4611 Y 77957 d 2511 20:52  
~ 330 °C

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

picking up sandwiches at P-Point:  
~~put sandwiches~~

187 - 1.85°C

184 - 1.98°C

186 - ambient

~~185~~

183 - ambient

other labels: not readable  
 ↳ measure temp ground, => all ambient

185 23°C

X 4613

Y 7753

depth = 2510

20:42 done

↳ 180-187 in inserts in box

deploy new ~~coordinates~~ (same coordinates, sandwiches)  
 20:46) - 80, 128, 127, 81



Dive Plan 4897– April 30, 2017

**Port:** Horst Felbeck    **Starboard:** Phil Forte    **Pilot:** Danik Forsman

**On Bottom Target:** Crab Spa

Objectives: Release LVP at Crab Spa, take majors, pick up Crab Trap, collect Riftia

Basket List

1. Large biobox w/ Crab Trap
2. 5 Majors
3. T probe

<u>Locations:</u>	<b>Lat</b>	<b>Long</b>	<b>m</b>	<b>x</b>	<b>y</b>
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		

1. On bottom, transit to Crab Spa
2. Release LVP
3. Take 5 majors at warmest spot, should be around 23-25°C, look for spot in right, back corner of Crab Spa
4. Swap Trap with new one in the biobox
5. Collect Riftia around Alvinella mound
6. Before collecting Riftia, proceed with following:
  - a. Measure T at base of Riftia clump
  - b. Make a T measurements at various spots at plume level
7. Proceed with collection and put worms in large biobox. Make sure worms fit into biobox and nothing sticks out. Don't fold them!

**Alvin Dive 4894 – AT37-12**  
**APR 30, 2017**

**Pilot: Danik Forsman (PIT)**  
**Port Observer: Horst Felbeck**  
**Starboard Observer: Phil Forte**

<b>GMT</b>	<b>comments</b>
14:05	in the water
15:40	at the bottom
15:53	found LVP, intake in place inside crab spa, video. Temp. at intake measured with basket temp. probe 18.5 C
16:40	wand in quiver
16:51	release LVP
17:14	start taking majors inside Crab Spa, blue: 23.7 C
17:22	yellow 31.3C
17:31	green 22.5C
17:42	black 21.4C
17:52	red 21.8C
18:14	collect old crab trap, about 7 crabs and 3 fish inside
18:15	deploy new crab trap at the same spot, entry towards the Riftia bundle
18:40	collect Riftia at the bottom of the large Alvinella mound below crab spa, temp. measure with basket probe is 3.2C deep inside the Riftia clump where collection was made. About 10 midsize Riftia collected
17:26	continue PIT training
19:50	at the surface

AT 37-12 Sample Sheet

Alvin Dive# 4897 Date 4/30/17 Logged by HORST FELBECK  
 Port Obs. HF Starboard Obs. PHIL Pilot DAMIK  
 Descend: 18:05 At Seafloor: 15:40 Ascend: 19:50

FLUID SAMPLES crab spa T before major basket pole 24°C  
 Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# blue Time 17:14 Temp ICL 23.7 Vent crab spa  
 X 4588 Y 78147 Hdg 8 Depth 2505 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# yellow Time 17:22 Temp ICL 31.3 Vent crab spa  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments see above

Major# green Time 17:31 Temp ICL 22.5 Vent crab spa  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments see above

Major# black Time 17:42 Temp ICL 21.4 Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# red Time 17:52 Temp ICL 21.8 Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.  
 If needed, make sketches with scales.

Sample # 1 Time 6 Temp below <sup>3.3</sup> plume 2 Vent bottom of large chamber mound  
 X 4577 Y 78153 Hdg 62 Depth 2514 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_

Dive Plan 4897– April 30, 2017

**Port:** Horst Felbeck    **Starboard:** Phil Forte    **Pilot:** Danik Forsman

**On Bottom Target:** Crab Spa

Objectives: Release LVP at Crab Spa, take majors, pick up Crab Trap, collect Riftia

**Basket List**

1. Large biobox w/ Crab Trap
2. 5 Majors
3. T probe

**Locations:**

	Lat	Long	m	x	y
Pvent	9 50.276	104 17.474	2511	4628	77926
Bio9	9 50.296	104 17.476	2514	4624	77962
Crab Spa MkF	9 50.396	104 17.489	2505	4600	78147
Tica	9 50.406	104 17.490	2505	4598	78165
Teddy Bear	9 50.50	104 17.51	2514		

- 15:40 wand on quiver 16:40 1. On bottom, transit to Crab Spa <sup>15:53</sup> found LVP - viclo
2. Release LVP <sup>Temp - of wand</sup> 16:51 <sup>Temp pole lower at temp 2.2C</sup> 16:24-27 18.5C <sup>insert No - wand</sup>
3. Take 5 majors at warmest spot, should be around 23-25°C, look for spot in right, back corner of Crab Spa
4. Swap Trap with new one in the biobox <sup>18:14 old ~~biobox~~ crab trap in bio.</sup> <sup>18:15 new crab trap deployed</sup>
5. Collect Riftia around Alvinella mound
6. Before collecting Riftia, proceed with following:
  - a. Measure T at base of Riftia clump
  - b. Make a T measurements at various spots at plume level
7. Proceed with collection and put worms in large biobox. Make sure worms fit into biobox and nothing sticks out. Don't fold them!

Dive Plan 4898– May 1, 2017

**Port:** Stefan Sievert      **Starboard:** Kevin Becker      **Pilot:** Pat Hickey

**On Bottom Target:** LVP landing site: 9°N 50.425 104W 17.575

Objectives: Deploy LVP at Teddy Bear, take majors, pick up Riftia, swap Crab Trap

Basket List

1. Biobox w/ Crab Trap
2. 5 Majors
3. T probe

<u>Locations:</u>	Lat	Long	m	x	y
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		
<b>Flea Vent</b>	9 50.81	104 17.60	2519	(Jason 2104)	
<b>Mvent</b>	9 50.97	104 17.53	2500	(Jason 2014)	

1. On bottom, transit to LVP location and pick up instrument
2. Move to Teddy Bear and position instrument, close to crack with Riftia
3. Use T probe to find warmest spot
4. Take 1 major at same spot
5. Remove hose from LVP
  - a. Insert wand
  - b. Stabilize wand
  - c. Measure T at tip of wand with Alvin T probe
6. Go to Mvent and check for flow on top of structure, previously we were able to measure and sample fluids of around 40°C
7. If flow present, take one major
8. Go to Qvent and obtain one major

9. Go to Flea Vent and obtain major
10. Move to Crab Spa
11. Swap Crab Trap
12. Move to Alvinella mound, just below Crab Spa
13. Measure T and take major at hottest spot
14. Check on colonizers on Alvinella mound
15. Take Riftia around Alvinella mound
16. Before collecting Riftia, proceed with following:
  - a. Measure T at base of Riftia clump,
  - b. Make a T measurements at plume level
17. Proceed with collection and put worms in large biobox. Make sure worms fit into biobox and nothing sticks out. Don't fold them!

**Alvin Dive 4898 – AT37-12**  
**May 01, 2017**

**Pilot: Pat Hickey**

**Port Observer: Stefan Sievert**

**Starboard Observer: Kevin Becker**

<b>GMT</b>	<b>Comments</b>
13:50	Descending.
15:11	At seafloor.
15:20	Off-axis (x: 4447 y: 78202, hdg: 35, d: 2505) to pick up LVP.
15:40	At Teddy Bear (x: 4559, y: 78370, hdg: 12, d: 2515).
15:45	Positioning LVP at Teddy Bear.
15:59	Measuring T with probe (12.5°C) and firing green major at Teddy Bear (T ICL: 12.4°C).
16:25	Deployment of Crab Trap (x: 4650, y: 78372, hdg: 28, d: 2515). Close to Teddy Bear.
16:40	At Q Vent (x:4450, y: 78788, hdg: 18, d: 2509). Measuring T with probe: 208°C.
16:41	Firing black major (T ICL 155°C). Lower temperatures compared to probe likely because nozzle was not as deep in vent as T probe.
17:00	At M Vent.
17:09	Firing blue major (x: 4410, y: 78896, hdg: 288, d: 2501, ICL T: 27°C).
17:25	At Flea Vent (x: 4381, y: 78920, hdg: 76, d: 2522). No samples collected. Collecting marker from Flea Vent to move it to M Vent. During dive 4894 it has been found that marker "M-vent" is at the wrong place.
17:32	Placing marker at M Vent (x: 4408, y: 78899, hdg: 57, d: 2500).
18:00	Checking Colonizers near Tica (x: 4616, y: 78180, hdg: 181, d: 2503). White growth. Ready to be collected during next dive.
18:06	Collecting crab trap (x: 4604, y: 78167, hdg: 139, d: 2505). One crab inside the trap and two on the outside → three crabs collected in large biobox.
18:14	At Crab Spa (x: 4803, y: 78166, hdg: 19, d: 2505). Collecting two rock samples (basalt with biofilm).
18:20	At Alvinella mound (x: 4592, y: 78150, hdg: 90, d: 2511). Checking two colonizers. White growth. Ready to be collected during next dive.
18:30	Firing major at Alvinella mound (x: 4595, y: 78170, hdg: 144, d: 2511, T ICL: 196°C).
18:45	Riftia (~12 individuals) collected around Alvinella Mound (x: 4589, y: 78166, hdg: 56, d: 2515, T: ~6°C) and put in large biobox.
19:11	Near Bio9 (x: 4625, y: 77994, hdg 40:, d: 2509). Checking colonizers. T on surface 4°C. Replacing colonizer to nearby spot (1-2 m away from original location). T on surface of colonizer 10°C.
19:24	Measuring T with probe at Bio9 vent (316°C; x: 4620, y: 77999, hdg: 6, d: 2508). Firing red major (T ICL: 366).
19:30	Flowing past P vent.
19:40	End of dive, releasing weights.

## AT 37-12 Sample Sheet

Alvin Dive# 4898 Date 01 May 17 Logged by Kevin Becker  
 Port Obs. Stefan Sievert Starboard Obs. Kevin Becker Pilot Pat Hickey  
 Descend: 1:50 pm GMT At Seafloor: 3:11 pm GMT Ascend: \_\_\_\_\_

## FLUID SAMPLES

Major# green Time 15:59 Temp ICL 12.4°C Vent Teddy Bear  
 X 4559 Y 78370 Hdg 12 Depth 2515 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments was always showing 0 on my screen

Major# black Time 16:45 Temp ICL 13.5°C Vent Q Vent  
 X 4405 Y 78788 Hdg 18 Depth 2509 Alt X Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# blue Time 17:10 Temp ICL 27°C Vent devent  
 X 4410 Y 78896 Hdg 288 Depth 2501 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# yellow Time 18:30 Temp ICL ~~19.5~~ 19.5°C Vent Alvinella Mount  
 X 4595 Y 78170 Hdg 144 Depth 2511 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# red Time 19:20 Temp ICL 366 Vent Bio 9  
 X 4621 Y 78000 Hdg 7 Depth 2509 Alt X Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

## BIOLOGICAL SAMPLES

**Take photos before collection, in the claw (if possible), and after collection.**

**If needed, make sketches with scales.**

Sample # 1 Time 18:45 Temp ~6' Vent Alvinella mount  
 X 4589 Y 78166 Hdg 56 Depth 2515 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Sample type +10 Riffia  
 Basket location Large BioBox

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

**ROCK SAMPLES**

*Take photos before collection and in the claw. If needed, make sketches w/ scales.*

Sample # 1 Time 18:14 Temp ~25°C Vent Crab Spa  
 X 4803 Y 78160 Hdg 19 Depth 2505 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Sample type rock sample Basket location bio box (large)  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments rock sample from Crab Spa vent, basalt with bio film

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_



EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Expt ID/# 1 Time 15:45 Temp 12.5°C Vent Teddy Bear  
X 4561 Y 78870 Hdg 320 Depth 2515m Alt     Marker     (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments Large volume pump, which was deployed the day before, was moved to Teddy Bear and positioned

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments \_\_\_\_\_

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

AT 37-12 Sample Sheet

Alvin Dive# 4898 Date May 1 2017 Logged by Sievert  
Port Obs. Sievert Starboard Obs. Becker Pilot Hickey  
Descend 13:50 At seafloor 15:11 Ascend \_\_\_\_\_

FLUID SAMPLES

Major# Green Time 16:00 Temp ICL 12.6°C, 13°C Vent Teddy Bear  
X 4559 Y 7837 Hdg 11.8 Depth 2515 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments \_\_\_\_\_

Major# Black Time 16:41 Temp ICL 15-130°C Vent Q vent dropped to 70°C tanks and ambient 3°C  
X 4405 Y 7878 Hdg 18.3 Depth 2509 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments Beehive structure w/ Alvinella

T measure at T probe 22°C

Major# Blue Time 17:09 Temp ICL 27°C Vent M vent  
X 5927 Y 7889 Hdg 288 Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments mean T w/ T-probe ~ 30°C

Major# yellow Time 18:30 Temp ICL 19.6°C Vent Alvinella Mound  
X 4595 Y 7817 Hdg 144 Depth 2511 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments T w/ probe ~ 19°C

Major# red Time 19:24 Temp ICL 36.4°C Vent Bio 9  
X 4618 Y 7800 Hdg 61.5 Depth 2508 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.  
If needed, make sketches with scales.

Sample # Riftia Time 18:55 Temp ~ 6°C Vent Alvinella Mound  
X 4590 Y 7816 Hdg 53 Depth 2515 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#) near  
Sample type \_\_\_\_\_ Cub spike  
Basket location Bio box

Plume level: 6°C, 2.3°C  
Deep in: 6.5°C

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

ROCK SAMPLES

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

Sample # 1 Basalt Time \_\_\_\_\_ Temp ~24°C Vent Crabs Sp.  
 X 4603 Y 7816 Hdg 22 Depth 2505 Alt \_\_\_\_\_ Marker F (type/#)  
 Sample type \_\_\_\_\_ Basket location biobox  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments Basalt w/ biofilm

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Expt ID/# VP#2 Time 16:10 Temp 13°C Vent Teddy Bear  
 X 4559 Y 7837 Hdg 118 Depth 2515 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# Crab Trap Time 16:24 Temp      Vent Teddy Bear  
 X 4560 Y 7837 Hdg 28 Depth 2516 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# Manila Clam Time      Temp      Vent       
 X 460 Y      Hdg # Depth      Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# Crab Trap Time 18:07 Temp      Vent Crab Spat Tica  
 X 4604 Y 7816 Hdg 11 Depth 2506 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting 2 crabs in trap, one volunteer  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# CV 5 Time 19:13 Temp ~~11.5~~ Vent Bio 9  
 X      Y      Hdg 41 Depth 2509 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments repositioned, had ~~fallen~~ fallen down

\* 20° underneath  
11.5° on mesh

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

At CVP : 15:11

Transiting by CVP : 15:27

At Teddy Bear : 15:40

Moved Mret MC for Flea vat to Mret, placed  
 on top of structure

Chd on CV-colonies 18:00

Chd colonies at Alucella mound 18:20

CV 6 seed growth on both

CV 4

Dive Plan 4899– May 2, 2017

**Port:** Jeremy Rich    **Starboard:** Ed Hobart

**Pilot:** Jefferson Grau

**On Bottom Target:** Teddy Bear

Objectives: Deploy Vent-SID at Crab Spa, take majors, pick up Crab Trap, collect Riftia

**Basket List**

1. Large biobox w/ Crab Trap
2. 2 small bioboxes, one with colonizers
3. 2 medium bioboxes
4. T probe

**Locations:**

	<b>Lat</b>	<b>Long</b>	<b>m</b>	<b>x</b>	<b>y</b>
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		

1. On bottom, first proceed to Teddy Bear to release LVP:
  - a. Put wand in holster
  - b. Release LVP
2. Transit to Vent-SID landing site
3. Pick up Vent-SID and proceed to Crab Spa
4. At Crab Spa, position instrument
5. Deploy intake nozzle of Vent-SID
  - a. Insert wand into same spot as for LVP wand
  - b. Stabilize wand
  - c. Temperature at intake should read 25°C
  - d. Turn on Vent-SID
6. Pick up both colonizers CV at Alvinella mound. When picking up, move extremely slowly to minimize loss of material
7. Put in right medium biobox
8. Measure T at spot were colonizers were located
9. Deploy new colonizers in hotter fluids of around 80°C

10. Collect CV colonizer at Crab Spa microbial mat area
11. When picking up, move extremely slowly to minimize loss of material
12. Put in front left small biobox
13. Measure T at spot where colonizer was
14. Collect several rocks with microbial mats in the area around CV colonizer
15. Put in medium left biobox
16. Collect Riftia near Alvinella mound
17. Before collecting Riftia, proceed with following:
  - a. Measure T at base of Riftia clump,
  - b. Make a T measurements at plume level
18. Proceed with collection and put worms in large biobox. Make sure worms fit into biobox and nothing sticks out. Don't fold them!
19. Proceed to Bio9
20. Check on colonizer CV
21. Collect piece of chimney with Alvinella and put in front right small biobox
22. Measure T of fluids

**Alvin Dive 4899 – AT37-12**  
**MAY 2, 2017**

**Pilot: Jefferson Grau**

**Port Observer: Jeremy Rich**

**Starboard Observer: Ed Hobart**

**Notes are from Jeremy Rich**

**(NOTE: A copy of framegrabber does not exist for this dive)**

<b>GMT</b>	<b>Comments</b>
14:00	Descending
16:00	At sea floor
16:20	At Teddy Bear taking T at location of large volume pump inlet (x4558 y78350 d2516), T 12.7; The pump was released to the surface.
16:41	Collected crab trap at Teddy Bear (x4563 y78350 d2516). The trap was full of about 30 crabs. We proceeded to Vent-SID landing site.
17:03	Found Vent-SID at landing site.
17:29	Transiting to Crab Spa with Vent-SID
18:05	The Vent-SID was in position at Crab Spa. Attempted communication with Vent-SID via ICL. Communications were noisy and failed. We aborted trying to start the Vent-SID.
19:22	We collected two CV colonizers at the Alvinella mound (“Wedding Cake”; x4595 y78140 d2513). T on marker with long string (east side of mound) was 65°C, marker on west side of mound T 28°C.
19:38	Deployed 2 CV colonizers at Wedding Cake. CV7 was placed but then fell down and was repositioned on subsequent dive 4900. CV8 was placed in T60-100°C at top of Wedding Cake mound.
20:00	Proceeded back to the Vent-SID at Crab Spa. ICL communications not working, no way to start Vent-SID. Placing of Vent-SID inlet into Crab Spa vent fluid was never attempted. Vent-SID was sent back to the surface.
20:39	CV3 colonizer was collected at Fury Rock, near Crab Spa (x4612 y78152 d2505). T 10°C
20:57	Collected 7 small rocks with thick microbial filamentous biofilm at Fury Rock. T 2°C where rocks were collected.
21:30	Collected Riftia in mussel field (x4582 y78167 d2516) near Wedding Cake. 15 Riftia and 4 mussels were collected. At base of Riftia tubes T 13-18°C, at plume of Riftia T 4-5°C.
21:45	Went off axis to park and rest batteries, waiting for Vent-SID to be secured on deck of Atlantis.
22:10	Ascending
23:40	Alvin secured on deck of Atlantis.

AT 37-12 Sample Sheet

Alvin Dive# 4899 Date 5-2-17 Logged by Ed Hobart
Port Obs. Jeremy Rich Starboard Obs. ED Hobart Pilot Jefferson Grau
Descend: 8.00 At Seafloor: Ascend:

FLUID SAMPLES

Major# Time Temp ICL Vent
X Y Hdg Depth Alt Marker (type/#)
Comments

Major# Time Temp ICL Vent
X Y Hdg Depth Alt Marker (type/#)
Comments

Major# Time Temp ICL Vent
X Y Hdg Depth Alt Marker (type/#)
Comments

Major# Time Temp ICL Vent
X Y Hdg Depth Alt Marker (type/#)
Comments

Major# Time Temp ICL Vent
X Y Hdg Depth Alt Marker (type/#)
Comments

Major# Time Temp ICL Vent
X Y Hdg Depth Alt Marker (type/#)
Comments

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.
If needed, make sketches with scales.

Sample # Time Temp Vent
X Y Hdg Depth Alt Marker (type/#)
Sample type
Basket location

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

**ROCK SAMPLES**

***Take photos before collection and in the claw. If needed, make sketches w/ scales.***

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_



EXPERIMENT DEPLOYMENTS/RECOVERIES

**Take photos before and after deployment or recovery. Make sketches with scales.**

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

AT 37-12 Sample Sheet

Alvin Dive# 4899 Date 5/2/17 Logged by Jeremy Rich  
 Port Obs. Jeremy Rich Starboard Obs. Ed Hobbart Pilot Jefferson Grau  
 GMT Descend: 1400 At Seafloor: 1600 Ascend: \_\_\_\_\_

FLUID SAMPLES

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.

If needed, make sketches with scales.

Sample # \_\_\_\_\_ Time 2/30 Temp plume 4m -5°C Vent northwest of tica  
 X 4582 Y 78167 Hdg 45 Depth 25/6 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type riftia + mussels  
 Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

ROCK SAMPLES

Take photos before collection and in the claw. If needed, make sketches w/ scales.

*rock samples*  
Sample # \_\_\_\_\_ Time 2057 Temp 2°C Vent furry rock  
X 4610 Y 78153 Hdg 79 Depth 2507 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments multiple furry rocks

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Y coordinates cut off for 1st two experiments

Expt ID/# Large volume pump Time 16 20 Temp 12.7 Vent Teddy Bear  
X 4558 Y 7835 Hdg 14 Depth 2516 Alt      Marker      (type/#)

Description of associated fauna &/or type of venting wand in ~~crack~~ west side of crack next old weight stack, west of riftia clump

Additional assoc. samples: type/ID       
Additional descriptive comments were released the pump to the surface.

Expt ID/# Crab collection Time 16 41 Temp ambient seawater Vent Teddy Bear  
X 4563 Y 7835 Hdg 290 Depth 2516 Alt      Marker      (type/#)

Description of associated fauna &/or type of venting Collected crab trap, full of crabs and put out new trap.

Additional assoc. samples: type/ID       
Additional descriptive comments     

Expt ID/# 2 collectors colonizers CV Time 19 22 Temp      Vent Alvinella mound  
X 4595 Y 78142 Hdg 46 Depth 2513 Alt      Marker      (type/#)

Description of associated fauna &/or type of venting marker on east side T 65°C ~~at the mound~~

Additional assoc. samples: type/ID marker on west side of mound T 28°C  
Additional descriptive comments     

Expt ID/# Deploying 2 collectors at Alvinella mound Time 19 38 Temp      Vent       
X 4595 Y 78142 Hdg 46 Depth 2513 Alt      Marker      (type/#)

Description of associated fauna &/or type of venting CV 7.2017 placed at hot fluid 50-100°C

Additional assoc. samples: type/ID CV 8.2017 placed in hot fluid at top of mound  
Additional descriptive comments T 60-100°C

Expt ID/# colonizer at furry rock Time 20 39 Temp 10°C Vent furry rock  
X 4612 Y 78152 Hdg 22 Depth 2505 Alt      Marker      (type/#)

Description of associated fauna &/or type of venting     

Additional assoc. samples: type/ID       
Additional descriptive comments

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_(type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_(type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_(type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

Dive Plan 4900– May 3, 2017

**Port:** Stefan Sievert    **Starboard:** Diana Vasquez-Cardenas    **Pilot:** Phil Forte

**On Bottom Target:** LVP landing site: 9°N 50.425 104W 17.575

Objectives: Deploy LVP at Crab Spa, redeploy colonizer at Alvinella mound, deploy Crab Trap at Riftia mound near Bio9, pick up Crab Trap at Teddy Bear, take majors at Teddy Bear, pick Riftia in colony close to Teddy Bear

Basket List

1. Biobox
2. 5 Majors
3. T probe

<u>Locations:</u>	Lat	Long	m	x	y
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		

1. On bottom, transit to LVP location and pick up instrument
2. Move to Crab Spa and position instrument, previously we put in crevice just next to Crab Spa, there are many weight stacks from previous deployments
3. Remove hose from LVP
  - a. Insert wand
  - b. Stabilize wand
  - c. Measure T at tip of wand with Alvin T probe, should be around 24°C
4. Move to Alvinella mound, just below Crab Spa
5. Redeploy CV colonizer that fell down, put in ~80C water
6. Measure T on mesh to ensure flow through mesh
7. Go to Bio9 to deploy Crab Trap at Riftia mound
8. Go to Teddy Bear

9. Pick up Crab Trap

10. Take 5 majors at crack where LVP was deployed

11. Collect Riftia from larger Riftia colony close by

Alvin dive 4900- AT37-12

Pilot: Phil Forte

Port: Stefan Sievert

Starboard: Diana Vasquez-Cardenas

GMT	Comment
14:00	Descent
15:20	At the seafloor, neutral bouyancy – d: 2503 m
15:30	Pick up LVP and start transit to Crab spa
15:55	Set LVP in place at Crab spa
16:22	LVP wand set in place at 24°C
16:54	Arriving at Alvinella mound
17:02	Redeploy CV-7 colonizer that fell down at the top of Alvinella mound, temp at opening 60°C and above the colonizer 30°C (x:4589, y:78158, d: 2512m)
17:24	Arriving at Bio9, observing CV-5 colonizer with abundant microbial mat
17:35	Deploying crab trap next to Riftia mound at Bio9 (x: 4624, y 77972)
18:12	Leaving Bio9
18:39	Collecting crab trap near teddy bear (x:4567, y:78395, d:2516)
19:06	Finding fluid outflow at Teddy Bear and measuring temperature (t: 11-13°C, x: 4567, y: 78365)
19:26	Firing Black major at Teddy bear (t:~12°C). Both majors worked well.
19:34	Firing Yellow major at Teddy bear (t:~12°C) Both majors worked well.
19:40	Firing Blue major at Teddy bear (t:~12°C), One major did not work.
19:45	Firing Red major at Teddy bear (t:~12°C)Both majors worked well.
19:53	Firing Green major at Teddy bear (t:~12°C)Both majors worked well.
20:09	Arriving at Riftia colony near Teady bear. Measuring temperature at base 28C and plume of various Riftias (5-14C) (x:4562, y:78396, d: 2514)
20:15	Collection of Riftia in biobox
20:30	Leaving Teddy bear towards Mvent
20:56	Arrival at Mvent (x: 4401, y: 78890, d: 2501m)
21:18	Starting Ascend

AT 37-12 Sample Sheet

Alvin Dive# 4900 Date 5.3.17 Logged by Diana Vanquet  
 Port Obs. Stefan Starboard Obs. Diana Pilot Phil.  
 Descend: 14:00 At Seafloor: 15:20 Ascend: 21:18 start

FLUID SAMPLES

Major# Black Time 19:26 Temp ICL 12°C Vent teddy bear  
 X 4568 Y 78366 Hdg \_\_\_\_\_ Depth 2515 Alt ∅ Marker \_\_\_\_\_ (type/#)  
 Comments both good.

Major# Yellow Time 19:34 Temp ICL 12.6°C Vent teddy bear  
 X 4568 Y 78366 Hdg \_\_\_\_\_ Depth 2515 Alt ∅ Marker \_\_\_\_\_ (type/#)  
 Comments both good.

Major# blue Time 19:50 Temp ICL 12 Vent teddy bear  
 X 4568 Y 78366 Hdg \_\_\_\_\_ Depth 2515 Alt ∅ Marker \_\_\_\_\_ (type/#)  
 Comments Blue 2 good Blue 1 failed

Major# red. Time 19:45 Temp ICL 12 Vent teddy bear  
 X 4568 Y 78366 Hdg \_\_\_\_\_ Depth 2515 Alt ∅ Marker \_\_\_\_\_ (type/#)  
 Comments both good.

Major# green Time 19:53 Temp ICL 11.5 Vent teddy bear  
 X 4568 Y 78366 Hdg \_\_\_\_\_ Depth 2515 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments both good.

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

LVP deployed at crab spec.

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.  
 If needed, make sketches with scales.

Sample # CV7 Time 17:00 Temp ~30°C Vent Abydos moult  
 X 4589 Y 78158 Hdg \_\_\_\_\_ Depth 2512 Alt \_\_\_\_\_ Marker CV7 (type/#) colonizer.  
 Sample type CV colonizer.  
 Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # trap Time 17:35 Temp \_\_\_\_\_ Vent near Bio9  
 X 4624 Y 77972 Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type crab trap deployed  
 Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time 18:39 Temp \_\_\_\_\_ Vent teddy bear  
 X 4567 Y 78365 Hdg \_\_\_\_\_ Depth 2516 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type crab trap - scraps  
 Basket location bio box

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time 20:09 Temp below 27-28°C / top 5-11°C Vent Riftia colony near teddy bear  
 X 4562 Y 78396 Hdg \_\_\_\_\_ Depth 2514 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type Riftia (perfect size & health)  
 Basket location bio box

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**ROCK SAMPLES**

*Take photos before collection and in the claw. If needed, make sketches w/ scales.*

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_



EXPERIMENT DEPLOYMENTS/RECOVERIES

*Take photos before and after deployment or recovery. Make sketches with scales.*

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

AT 37-12 Sample Sheet

Alvin Dive# 4900 Date 5-3-17 Logged by Sievert  
 Port Obs. Sievert Starboard Obs. Vasquez Pilot Forte  
 Descend 14:00 At seafloor 15:21 Ascend 15:16  
Carbonas

FLUID SAMPLES

Major# Black Time 19:22 Temp ICL 12°C Vent Teddy Bear  
 X 4568 Y 7836 Hdg 320 Depth 2515 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# yellow Time 19:34 Temp ICL 12.6°C Vent Teddy Bear  
 X 4568 Y 7836 Hdg 320 Depth 2515 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# Blue Time 19:38 Temp ICL 12°C Vent TB  
 X 4568 Y 7836 Hdg 320 Depth 2515 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments only one bottle fired, rest were dud not fire

Major# Red Time 19:44 Temp ICL 12.3°C Vent TB  
 X 4568 Y 7836 Hdg 320 Depth 2515 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# Green Time 19:50 Temp ICL 12°C Vent TB  
 X 4568 Y 7836 Hdg 320 Depth 2515 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.  
 If needed, make sketches with scales.

Sample # Puffin Time 20:14 Temp 28°C Vent 1 new TB  
 X 4562 Y 7839 Hdg 356 Depth 2514 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_  
 Basket location CAN 1 AT 15-25

Toward Base: 12°C  
 Deepen in: ~28°C  
 Plane: 14.5°C, 11°C, 8°C, 5°C, 13°C

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**Sample #** \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

**ROCK SAMPLES**

*Take photos before collection and in the claw. If needed, make sketches w/ scales.*

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Expt ID/# CVP#3 Time 16:43 Temp 25.5°C Vent Crab Spa  
 X 4599 Y 7815 Hdg 356 Depth 2506 Alt      Marker F (type/#)  
 Description of associated fauna &/or type of venting diffuse flow w/ Riftia + mussels  
 Additional assoc. samples: type/ID       
 Additional descriptive comments      - 33°C on mesh

Expt ID/# CV 7 Time 17:01 Temp ~60°C Vent Alvinella Mound  
 X 4588 Y 7815 Hdg 99 Depth 2514 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting       
 Additional assoc. samples: type/ID       
 Additional descriptive comments Redeployment, fell down on previous dive

Expt ID/# CV5 Time 17:24 Temp      Vent Bio 9  
 X 4617 Y 7798 Hdg 46 Depth 2510 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting video observation; good growth on it  
 Additional assoc. samples: type/ID       
 Additional descriptive comments     

Deploy. Expt ID/# Crab Trap Time 17:36 Temp 2°C Vent near Bio 9, Riftia Mound  
 X 4623 Y 7797 Hdg 110 Depth 2513 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting diffuse flow with Riftia + mussels  
 Additional assoc. samples: type/ID       
 Additional descriptive comments     

Recovery Expt ID/# Crab Trap Time 18:39 Temp 2°C Vent Teddy Bear  
 X 4567 Y 7836 Hdg 49 Depth      Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting       
 Additional assoc. samples: type/ID       
 Additional descriptive comments ~ 8 crabs

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

At LVP 15:26

Removing drop weight: 15:29

Start moving w/ pump: 15:35

At Crab Spa: 15:50

Measure T of little beehive at Alvirilla Mound:  $\sim 220^{\circ}\text{C}$

Dive Plan 4901– May 4, 2017

**Port:** Jeremy Rich      **Starboard:** Net Charoenpong      **Pilot:** Pat Hickey

**On Bottom Target:** Crab Spa

Objectives: Deploy Vent-SID at Crab Spa, take majors, pick up Crab Trap, collect Riftia

Basket List

1. Large biobox w/ Crab Trap
2. 4 majors
3. T probe

<u>Locations:</u>	Lat	Long	m	x	y
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		

1. On bottom, first proceed to Crab Spa to release LVP:
  - a. Measure T at wand tip
  - b. Take out wand and put in holster
  - c. Release LVP
2. Take one major at same spot where wand was
3. Transit to Vent-SID landing site
4. Pick up Vent-SID and proceed to Crab Spa
5. At Crab Spa, position instrument (needs to be positioned w/ wand inserted by 13:45 local time, 19:45 GMT)
6. Deploy intake nozzle of Vent-SID
  - a. Insert wand into same spot as for LVP wand
  - b. Stabilize wand
  - c. Measure T at wand tip, should read about 25°C
7. Proceed to Bio9
8. Check on colonizer CV5, make video observations only
9. Take major at second structure next to the one where CV5 is located

10. There is a black smoker in the middle of the structure that appears to be very active
11. Measure T and proceed with taking a major
12. Alternatively, take major at black smoker close to Riftia mound
13. Check on Crab Trap at Riftia Mound, but don't pick up
14. Move to Biovent all the way to the North and take 2 majors at black smoker
15. Try to lure crabs into biobox
16. Based on my recollection, there are Riftias at Biovent that can be collected
17. If Riftias are present and of correct size, proceed with Riftia sampling
18. Before collecting Riftia, proceed with following:
  - a. Measure T at base of Riftia clump,
  - b. Make a T measurements at plume level
19. Proceed with collection and put worms in large biobox. Make sure worms fit into biobox and nothing sticks out. Don't fold them!

Alvin Dive# 4901 (May 4, 2017), AT27-12

Pilot: Pat Hickey

Port obs: Jeremy Rich

Starboard obs: Net Charoenpong

Descend: 13:56 GMT            At seafloor: 15:16 GMT

Ascend: 19:29 GMT            At surface: 20:54 GMT

Time    Event

13:56    Descend

15:16    At bottom (x4648 y78128 d2502) and proceed to Crab Spa

15:36    Fire Green Major; T= 25.2°C, Green 1 did not fire and Green 2 might not be sealed

15:49    Fire Yellow Major, T= 23.3°C

15:57    Retrieve the Large Volume Pump (LVP) and proceeded to landing site

16:02    At landing site (x4504 y78183 d2505); release LVP; locate Vent-SID

16:13    Vent-SID found at x4437 y78188 d2506

16:18    Remove the weights from Vent-SID

16:27    Carry Vent-SID to Crab Spa

16:42    At Crab Spa

16:45    Place Vent-SID intake nozzle

16:48    Temp wand reads 21°C

16:53    Photograph the Vent-SID before leaving for Bio9

17:00    At Bio9

17:02    Inspect the colonizer CV5

17:05    Survey the black smoker

17:08    Inspect the deployed crab trap (4 crabs at 7 fishes)

17:12    Survey north side of the structure; unable to locate the smoker on this side

17:20    Leave for Biovent

18:00    At Biovent

18:06    Black smoker found

18:16    Fire Black Major and Red Major (T = 316-320°C)

18:31    Sample Riftia and crabs close to the chimney

18:52    Leave to Hobbit Hole

19:10    At Hobbit Hole and survey the vent field

19:19    Take temp at a diffuse flow (x433 y79909) = 10°C

19:25    Take temp at a diffuse flow (x433 y79909) = 8.2°C

19:29    Ascend (x4382 y79891)

20:54    At surface (x4365 y79900)

AT 37-12 Sample Sheet

Alvin Dive# 4901 Date 5/4/17 Logged by Jeremy Rich  
 Port Obs. Jeremy Rich Starboard Obs. Net Charoenpong Pilot Pat Hickey  
 GMT Descend: 1400 At Seafloor: 1515 Ascend: \_\_\_\_\_

FLUID SAMPLES

Major# green Time 1530 Temp ICL 24.5 Vent Crab Spa  
 X 4579 Y 78146 Hdg 37.4 Depth 2506 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments jammed no sample in either chamber  
Tried 2nd position, one side opening, valve is probably still open

Major# yellow Time 1543 Temp ICL 33.5 Vent Crab spa  
 X 4579 Y 78146 Hdg 37.4 Depth 2506 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments Trying 2nd major at Crab Spa ~~1st~~ first one failed.  
T is +13 too high as both bottles filling.

Major# black Time 1816 Temp ICL 319.5 Vent Biovent  
 X 4358 Y 79192 Hdg 1.4 Depth 2501 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments Pat removed top tip, to get better access to orifice  
of chimney

Major# red Time 1822 Temp ICL 316 Vent Biovent  
 X 4358 Y 79192 Hdg 1.4 Depth 2501 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Comments same location as black major

probe too high

basket 318°C probe

The inlet is not long enough to reach the sweet spot. Bottles too wide to fit down in hole in back of chimney.

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.

If needed, make sketches with scales.

Sample # riffia Time 1830 Temp blume 2.6°C  
base 7.4°C Vent Biovent  
 X 4356 Y 79199 Hdg 133.8 Depth 2504 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type riffia looked poor, moved to another location  
 Basket location biobox on same mound.

→ 3-4 crabs put in biobox at this site

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # riftia Time 1845 Temp blume 6.2°C  
base 27°C Vent biovent

X 11355 Y 79199 Hdg 133.8 Depth 2505.6 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type riftia, 8-9 individuals

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

**ROCK SAMPLES**

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

*top of Biovent black smoker chimney*  
 Sample # \_\_\_\_\_ Time 1810 Temp 318°C Vent Biovent  
 X 4358 Y 79192 Hdg 1.4 Depth 2501 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type chimney rock Basket location front  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments top was

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_



EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Expt ID/# Large volume pump Time 1523 Temp 25°C Vent Crab Spa  
X 4579 Y 78146 Hdg 38 Depth 2506 Alt      Marker      (type/#)  
Description of associated fauna &/or type of venting     

Additional assoc. samples: type/ID     

Additional descriptive comments Releasing pump off axis at 1607

Expt ID/# Deploying vent-sid Time 1650 Temp 21° Vent Crab Spa ← basket probe was as close as we could get it  
X 4579 Y 78146 Hdg      Depth 2506 Alt      Marker      (type/#)

Description of associated fauna &/or type of venting Temp probe 1-2" above and right of vent-SID so likely cooler than vent-sid inlet.

Additional assoc. samples: type/ID Vent-SID inlet looked perfectly placed in 25°C spot.

Additional descriptive comments 1620 at Vent-sid landing site pulling off weights  
1628 Heading to Crab Spa

Expt ID/#      Time      Temp      Vent       
X      Y      Hdg      Depth      Alt      Marker      (type/#)  
Description of associated fauna &/or type of venting     

Additional assoc. samples: type/ID     

Additional descriptive comments     

Expt ID/#      Time      Temp      Vent       
X      Y      Hdg      Depth      Alt      Marker      (type/#)  
Description of associated fauna &/or type of venting     

Additional assoc. samples: type/ID     

Additional descriptive comments     

Expt ID/#      Time      Temp      Vent       
X      Y      Hdg      Depth      Alt      Marker      (type/#)  
Description of associated fauna &/or type of venting     

Additional assoc. samples: type/ID     

Additional descriptive comments

## MARKERS DEPLOYED

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Reason/ assoc. sample(s) \_\_\_\_\_  
 Comments \_\_\_\_\_

## ADDITIONAL NOTES:

1919 Hobbit Hole T in clump of mussells with  
 3 dead rittia, the only sign of rittia at the  
 site T = ~~9.5°C~~ 10°C

x 4333 y 79909 d 2512.4 h 13.9

x 4353 y 79919 d 2513 h 293.1

T 8.2°C

clump of mussells near ledge

AT 37-12 Sample Sheet

Alvin Dive# 4901 Date May 4, 2017 Logged by Net Charoenpong  
 Port Obs. Jeremy Rich Starboard Obs. Net Charoenpong Pilot Pat Hickey  
 Descend: 13:56:26 GMT At Seafloor: 15:16:20 GMT Ascend: 19:29:00 GMT

2502 m X448 Y78128 2500m X4382 Y79891

FLUID SAMPLES

*did not fire* Major# Green Time 15:36:14 Temp ICL 24.5-25.2 Vent Crab Spa Green 1 fired but might not close  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#) ??  
 Comments did not go in deep enough the first time [15:33] → pins jammed

*ok* Major# Yellow Time 15:49:02 Temp ICL ~~23.3~~ 23.3°C Vent Crab Spa  
 X 4579 Y 78147 Hdg 37 Depth 2507 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

*ok* Major# Black Time 18:16:02 Temp ICL 319.5°C Vent Biovent  
 X 4358 Y 79192 Hdg 2 Depth 2501 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments Temp probe = 318.8°C / let the water equalize for a couple of minutes

*ok* Major# Red Time 18:23:00 Temp ICL 316°C Vent Biovent  
 X 4358 Y 79192 Hdg 1 Depth 2501 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.  
 If needed, make sketches with scales.

Sample # 1 Time 1 Temp 7.1°C / 2.6°C Vent Biovent  
 X 4356 Y 79199 Hdg 134 Depth 2504 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Sample type Riftia/Crab (4-6 crabs)  
 Basket location 6-9 (4-6 crabs)

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # 2 Time 18:41 Temp 5.5°-5.6° → 6°C / 27°C [18:42] Vent Biovent

X 4355 Y 79199 Hdg 134 Depth 2506 Alt 0 Marker - (type/#)

Sample type 8-10 RPTA / 3-4 crabs

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

ROCK SAMPLES

*Take photos before collection and in the claw. If needed, make sketches w/ scales.*

oh ✓  
 Sample # 1 Time 15:47 Temp 318.8°C Vent Bio vent  
 X 4379 Y 79192 Hdg 2 Depth 2501 Alt 0 Marker - (type/#)  
 Sample type Chimney rock Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_



EXPERIMENT DEPLOYMENTS/RECOVERIES

**Take photos before and after deployment or recovery. Make sketches with scales.**

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Description of associated fauna &/or type of venting \_\_\_\_\_  
\_\_\_\_\_  
Additional assoc. samples: type/ID \_\_\_\_\_  
Additional descriptive comments \_\_\_\_\_

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

Dive Plan 4902– May 5, 2017

**Port:** Ileana Perez-Rodriguez    **PIT:** Drew Bewley    **Pilot:** Jefferson Grau

**On Bottom Target:** LVP landing site: 9°N 50.425 104W 17.575

Objectives:

- Bring LVP to Teddy Bear and place wand in crack
- Sample dead Riftia in Riftia colony close by
- Pick up CV 7 Alvinella Mound near Crab Spa
- Release Vent-SID at the earliest at 13:15 (19:15 GMT)!!!
- Take major at Crab Spa
- Take major at small Alvinella mound
- Pick up CV5 at Bio9
- Pick up Crab Trap at Riftia mound near Bio9
- Take major at Pvent

Basket List

1. Biobox
2. 3 Majors
3. 2 small bioboxes
4. T probe

<u>Locations:</u>	Lat	Long	m	x	y
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		

1. On bottom, transit to LVP location and pick up instrument
2. Move to Teddy Bear and position instrument near weight stacks of previous deployments
3. Measure T in crack where majors were taken on dive 4900
4. Remove hose from LVP
  - a. Insert wand in same spot
  - b. Stabilize wand
5. Position wand of LVP in same spot

6. Move to Riftia colony ~50 m away to the North that we sampled on dive 4900
7. Look for dead Riftia in area without flow
8. Verify that there is no flow
9. Proceed with sampling dead Riftia and put in big biobox, around 5
10. Proceed to Alvinella mound near Crab Spa and recover CV8
11. For picking up colonizer, move extremely slowly and gently put in 1<sup>st</sup> small biobox
12. Measure T at point where colonizer was
13. Move to Crab Spa to release Vent-SID (**note**: Not before 13:15 (19:15 GMT)!!!!)
14. Take major at Crab Spa
15. Move to small Alvinella mound close by and measure T
16. Take major
17. Proceed to Bio9 to recover CV5
18. For picking up colonizer, move extremely slowly and gently put in 2<sup>nd</sup> small biobox
19. Take major at black smoker close by to the right
20. Recover Crab Trap at Riftia mound close to Bio9

Alvin Dive 4902-AT 37-12  
May 5, 2017

**Pilot:** Jefferson Grau

**Port:** Ileana Pérez-Rodríguez

**PIT:** Drew Bewley

Notes are from Ileana Pérez-Rodríguez

<b>GMT</b>	<b>Comments</b>
14:01	Descending
15:40	At sea floor
16:04	At LVP landing site. Picked up LVP for deployment at 'Teddy Bear'.
16:37	Deployed LVP at 'Teddy Bear'. Measured temperature at seafloor crack (12.12 °C) and proceeded to place LVP wand (at the crack).
17:17	We moved a bit to the left of 'Teddy Bear' (still at the same site) to collect biofilms in basalts next to a small patch of Riftia tubeworms. We measured the temperature (8.5 °C) at the crack where Riftia were growing, and sampled a rock that looked furry and brownish. We placed rock inside of the small 'leaky' biobox. After, we headed north of 'Teddy Bear' to collect dead Riftia tubes.
17:49	Found a patch of Riftia tubeworms, going from healthy (to our left) to dead (to our right). Measured temperature (3.35 °C) at the base of the pile of dead Riftia tubeworms. Collected ~5-10 Riftia tubes and placed them in large biobox. Next, we headed to general 'Crab Spa' area.
18:50	We went to the Alvinella mound ('Wedding cake') where we collected colonizer CV8, and placed it in the small biobox (nearest to the DSV Alvin).
19:15	At 'Crab Spa'. We prepared the Vent-SID for release by arranging wand and sampling hose of Vent-SID inside of the instrument.
19:23	Picked up yellow major for sampling at 'Crab Spa'. ICL registered ambient temperature as 5 °C (a bit off). Both chambers fired (chamber 2 fired more slowly) and fluid samples were taken at temperatures of 26 °C. Next, we moved off-axis to release Vent-SID.
19:56	Released Vent-SID. One of the legs fell off and was placed inside Vent-SID's basket. After, we headed back to the general 'Crab Spa' area.
20:34	Arrived to the small Alvinella mound (or 'Cupcake') next to the 'Wedding Cake'. We picked up the red major for sampling on a sulfide orifice at the top of the small mound and proceeded to collect fluids. Both chambers fired and fluid samples were taken at temperatures of 26-30 °C. However, the red major started moving a bit off from the sampling location during fluid collection.
20:52	Picked up black major to repeat sampling at 'Cupcake'. Both chambers fired and fluid samples were taken at temperatures of 39 °C. After, we moved off-axis where we waited for the LVP to be secured on deck of

R/V Atlantis. Because we ran out of power we could not complete our final task of picking up the crab trap at Bio9.  
Ascended.

21:51

AT 37-12 Sample Sheet

Alvin Dive# 4902 Date 05/05/2017 Logged by Ileana Pérez-Rodríguez  
 Port Obs. Ileana Pérez-Rodríguez Starboard Obs. Jefferson Grau Pilot PIT: Drew Bewley  
 Descend 14:01 GMT At seafloor 15:40 GMT Ascend 21:51 GMT

FLUID SAMPLES

Major# Yellow Time 19:23 GMT Temp ICL 26°C Vent Crab Spa  
 X 4585 Y 7814 Hdg 17 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments • Ambient ICL registered 5°C (usually 2°C)  
• major 2 released slowly

Major# Red Time 20:34 Temp ICL 26°C Vent Small Alvinella mound near Crab Spa  
 X 4576 Y 7816 Hdg 64 Depth 2515 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments • ICL registered 2°C for ambient temperature / 30°C for Major Red 2  
• Major moved during sampling

Major# Black Time 20:52 Temp ICL 39°C Vent Small Alvinella mound near Crab Spa  
 X 4576 Y 7816 Hdg 75 Depth 2515 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments • ICL - registered 2°C for Ambient temperatures

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.

If needed, make sketches with scales.

Sample # 2 Time 17:49 Temp 3.35°C (base of tubeworms) Vent North of near Teddy Bear  
 X 4545 Y 7838 Hdg 10.7 Depth 2514 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Sample type Dead Riftia tubes  
 Basket location collected 5-10 (tried to get hollow ones)

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting patch of Rittia (Aline ones to the left and dead one to the rights)

Sample # 2 Time 18:50 Temp \_\_\_\_\_ Vent Alinella mound (wedding cake)  
X 4572 Y 7814 Hdg 53 Depth 2513 Alt 0 Marker \_\_\_\_\_ (type/#)  
Sample type colonizer CV8  
Basket location front Bio Box (nearest to Alin)-small one

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

## ROCK SAMPLES

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

Sample # 1 Time 17:17 Temp 8.5°C at Ruffia hole Vent Teddy Bear  
 X 4450 Y 7835 Hdg 10.7 Depth 2516 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Sample type Rocks with biofilm Basket location Small bio box (leggy one)  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Expt ID/# AT37-12  
Dive: 4902 Time 16:04 Temp \_\_\_\_\_ Vent Elevator Landing Site  
 X 4427 Y 7819 Hdg \_\_\_\_\_ Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments Moving LVP to Teddy Bear (picked up at  
elevator landing site)

Expt ID/# AT37-12  
Dive: 4902 Time 16:37 Temp 12.12°C Vent Teddy Bear  
 X 4550 Y 7835 Hdg \_\_\_\_\_ Depth 2515 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments Deploying LVP at Teddy Bear

Expt ID/# AT37-12  
Dive: 4902 Time 19:15  
~~19:56~~ Temp \_\_\_\_\_ Vent Crab Spa  
 X 4584 Y 7814 Hdg 17 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID stopped Vent-SID  
 Additional descriptive comments Preparing Vent-SID for release (arranging  
wand of Vent-SID inside the instrument)

Expt ID/# AT37-12  
Dive: 4902 Time 19:56 Temp \_\_\_\_\_ Vent Crab Spa - and off axis  
 X 4632 Y 7820 Hdg 110 Depth 2502 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments Released Vent-SID (one leg inside Basket)

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_

Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_(type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_(type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_(type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

Dive Plan 4903– May 6, 2017

**Port:** Stefan Sievert    **Starboard:** Andrew Babbin    **Pilot:** Phil Forte

**On Bottom Target:** Vent-SID landing site

Objectives: Deploy Vent-SID at Crab Spa, take majors, pick up Crab Trap, collect Riftia and mussels

Basket List

1. Large biobox w/ Crab Trap
2. 5 majors
3. T probe

<u>Locations:</u>	<b>Lat</b>	<b>Long</b>	<b>m</b>	<b>x</b>	<b>y</b>
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		

1. Transit to Vent-SID landing site
2. Pick up Vent-SID and proceed to Crab Spa
3. At Crab Spa, position instrument (needs to be positioned w/ wand inserted by 11:00 local time, 17:00 GMT)
4. Deploy intake nozzle of Vent-SID
  - a. Insert wand
  - b. Stabilize wand
  - c. Measure T at wand tip, should read about 25°C
5. Proceed to Bio9
6. Pick up Crab Trap near Bio9
7. Deploy new Trap further away on rocky substrate
8. Pick up half a dozen mussels
9. Move to Teddy Bear
10. Take out wand of LVP
11. Take 5 majors at same spot
12. Reinsert wand of LVP

13. Collect Riftia in Riftia colony close by
14. Before collecting Riftia, proceed with following:
  - a. Measure T at base of Riftia clump,
  - b. Make a T measurements at plume level
15. Proceed with collection and put worms in large biobox. Make sure worms fit into biobox and nothing sticks out. Don't fold them!

**Alvin Dive 4903 — AT37-12**  
**06 May 2017**

**Pilot: Phil Forte**  
**Port Observer: Stefan Sievert**  
**Starboard Observer: Andrew Babbitt**

<b>GMT</b>	<b>Comments</b>
1354	Descending
1512	On bottom, neutrally buoyant above seafloor
1517	Arrived at Vent-SID landing site, utilize both arms to grab
1530	Began to move Vent-SID to Crab Spa
1600	Arrived at Crab Spa and began positioning Vent-SID so that the instrument was stable and safely away from hot vent fluids while the sampling hose was inserted deep into fissure. Temperature at wand tip was 26°C (x 4448, y 78156, hdg 56, d 2506)
1646	Instrument positioning complete
1657	Departed Crab Spa for Bio9
1715	Picked up crab trap with approximately half a dozen fish and one crab (x 4631, y 77975, hdg 115, d 2512)
1720	Deployed new crab trap on nearby rocky substrate
1722	Picked up 10 or so mussels (x 4631, y 77975, hdg 117, d 2512); Temp = 9°C. Moved to Teddy Bear.
1750	Arrived at Teddy Bear and removed large volume pump's wand from fissure to allow Majors to sample fluid (x 4559, y 78362, hdg 28, d 2516).
1805	Fired Yellow Major. Both chambers fired well. ICL Temperature 18°C but it was high for ambient seawater
1814	Fired Black Major. Both chambers fired well. ICL Temperature 12°C
1824	Fired Green Major. Both chambers fired well. ICL Temperature 12°C
1833	Fired Blue Major. Both chambers fired well. ICL Temperature 11°C
1841	Fired Red Major. Both chambers fired well. ICL Temperature 11.5-12°C
1850	Repositioned large volume pump sampling wand into vent, and used rock to stabilize the wand and minimize entrainment of bottom seawater when pump samples
1900	Proceeded to nearby Riftia colony
1905	Collected 8 healthy Riftia. Temperature at base = 32°C; Temperature above = 17°C (x 4556, y 78394, hdg 358, d 2514)
1925– 1940	Attempted to find CV 1 colonizer deployed on first Alvin dive of cruise; unable to locate
1950	Arrived at Alvinella Mound (Wedding Cake) to check on colonizer (x 4599, y 78164, h 137, d 2512); looked good
1955	Arrived at Crab Spa to check on Vent-SID. Chamber did not look engaged and tracer bags still appeared inflated. Looks like the Vent-SID did not operate as hoped
2025	Arrived at Bio9 to check on colonizer deployed there; looked good.
2030	Proceeded to pillowed lava plains off axis for ascent
2100	Ascending; end to an incredible dive

## AT 37-12 Sample Sheet

Alvin Dive# 4903 Date 6 May 2017 Logged by Andrew Babbain  
 Port Obs. Stefan Sievert Starboard Obs. Andrew Babbain Pilot Phil Forte  
 Descend: 1350 GMT At Seafloor: 1512 Ascend: 2100

## FLUID SAMPLES

Major# Yellow Time 1805 Temp ICL 18°C\* Vent Teddy Bear  
 X 4559 Y 78362 Hdg 28 Depth 2516 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \* ICL had high seawater reading, 11°C

Major# Black Time 1814 Temp ICL 12°C Vent Teddy Bear  
 X 4559 Y 78362 Hdg 28 Depth \_\_\_\_\_ Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments ICL increased from 11°C - 13°C during firing

Major# Green Time 1824 Temp ICL 12°C Vent Teddy Bear  
 X 4559 Y 78362 Hdg 28 Depth \_\_\_\_\_ Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# Blue Time 1833 Temp ICL 11°C Vent Teddy Bear  
 X 4559 Y 78362 Hdg 28 Depth \_\_\_\_\_ Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# Red Time 1841 Temp ICL 11.5-12°C Vent Teddy Bear  
 X 4559 Y 78362 Hdg 32 Depth \_\_\_\_\_ Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

## BIOLOGICAL SAMPLES

**Take photos before collection, in the claw (if possible), and after collection.**

**If needed, make sketches with scales.**

Sample # 1 Time 1715 Temp n/a Vent Bio 9  
 X 4631 Y 77975 Hdg 115 Depth 2512 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Sample type half a dozen fish + 1 crab  
 Basket location large bio box

Assoc. water sample # n/a Assoc. rock sample # n/a (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # 2 Time 1722 Temp 9°C Vent Bio 9

X 4631 Y 77975 Hdg 117 Depth 2512 Alt 0 Marker \_\_\_\_\_ (type/#)

Sample type ~10 mussels

Basket location large bio box

Assoc. water sample # n/a Assoc. rock sample # n/a (type) \_\_\_\_\_

Description of associated fauna &/or type of venting Riftia patch

Sample # 3 Time 1905 Temp base = 32°C, above = 17.8°C Vent Teddy Bear

X 4556 Y 78394 Hdg 358 Depth 2514 Alt 0 Marker \_\_\_\_\_ (type/#)

Sample type 8 Riftia

Basket location large bio box

Assoc. water sample # n/a Assoc. rock sample # n/a (type) \_\_\_\_\_

Description of associated fauna &/or type of venting diffuse, active flow

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

ROCK SAMPLES **NONE.**

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Descriptive comments \_\_\_\_\_



## EXPERIMENT DEPLOYMENTS/RECOVERIES

**Take photos before and after deployment or recovery. Make sketches with scales.**

Expt ID/# Vent-SID Time 1530 Temp n/a Vent landing site  
 X 4448 Y 78201 Hdg 229 Depth 2505 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
moving Vent-SID to Crab Spa.  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# Vent-SID Time 1635 Temp 26°C Vent Crab Spa  
 X 4595 Y 78152 Hdg 56 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
positioned Vent-SID for in situ incubation to start @ 1730 GMT  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# Crab Trap Time 1730 Temp n/a Vent Bio 9  
 X 4633 Y 77969 Hdg 115 Depth 2510 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
deployed new Crab Trap on rocky substrate away from Riftia  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

AT 37-12 Sample Sheet

Alvin Dive# 4903 Date 5-6-17 Logged by Sievert  
 Port Obs. Sievert Starboard Obs. Babbini Pilot Forte  
 Descend 13:54 At seafloor 15:11 Ascend 20:54

FLUID SAMPLES

Major# yellow Time 18:08 Temp ICL 19.0°C\* Vent Teddy Bear  
 X 4554 Y 7836 Hdg 29 Depth 2516 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \* Background read ~ 10°C; T is questionable

Major# Black Time 18:14 Temp ICL 11.5°C<sup>-12°C</sup> Vent TB  
 X 4559 Y 7836 Hdg 29 Depth 2516 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# green Time 18:~~20~~<sup>29</sup> Temp ICL 12.3°C Vent TB  
 X 4559 Y 7836 Hdg 29 Depth 2516 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# Blue Time 18:33 Temp ICL 11.5°C Vent TB  
 X 4559 Y 7836 Hdg 29 Depth 2516 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# Red Time 18:41 Temp ICL 11.8°C Vent TB  
 X 4559 Y 7836 Hdg 29 Depth 2516 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.  
 If needed, make sketches with scales.

Sample # Murels Time 17:20 Temp ~ 9.5°C Vent Bio 9 - Red/ta moul  
 X 4629 Y 7797 Hdg 148 Depth 2513 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type murels  
 Basket location bio box

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # Riftia Time 19:12 Temp 33°C Vent Riftia col.  
X 4556 Y 7839 Hdg 353 Depth 2514 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#) west TB

Plume: 17°C  
13.5°C  
8.3°C  
17.8°C  
Base: 32°C

Sample type Riftia  
Basket location Rio box

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg 356 Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

## ROCK SAMPLES

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Expt ID/# VentSID Time 16:40 Temp 26°C Vent Crab Spa  
 X 4595 Y 7815 Hdg 56 Depth 2506 Alt \_\_\_ Marker F (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# Crab Trap Time 17:12 Temp \_\_\_\_\_ Vent Bio 9 - ~~bio~~ Puffia mound  
 X 4629 Y 7797 Hdg ~~148~~ 148 Depth 2513 Alt \_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
Puffia, mound, diffuse flow  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments 1 crab, 7 fishes

Expt ID/# Crab Trap <sup>Deployment</sup> Time 17:20 Temp \_\_\_\_\_ Vent Bio 9 - Puffia Mound  
 X 4633 Y 7796 Hdg 95 Depth 2510 Alt \_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments deployed on rocky substrates away from Puffia + mounds

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

At Vent-SID : 15:17  
Moving Vent-SID : 15:35  
Vent-SID at Crab Spa : 15:59  
Cleared on Vent-SID ~ 20:10

Dive Plan 4904– May 7, 2017

**Port:** Jeremy Rich     **Starboard:** Ashley Grosche     **Pilot:** Pat Hickey

**On Bottom Target:** Teddy Bear

Objectives:

- Release LVP at Teddy Bear
- Find site where CV1 was deployed and pick up colonizer
- Move to Crab Spa to check on Vent-SID
- Pick up CV8 at 'Wedding Cake'
- Collect piece of 'Wedding Cake' with Alvinella
- Pick up CV5 at Bio9
- Pick up Crab Trap at Riftia mound near Bio9

Basket List

1. Large biobox
2. 2 small bioboxes
3. 2 medium biobox
4. T probe

<u>Locations:</u>	<b>Lat</b>	<b>Long</b>	<b>m</b>	<b>x</b>	<b>y</b>
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		
<b>CV1</b>	x4535, y78387, hdg195, d2519				

1. On bottom, transit to Teddy Bear
2. Take out wand of LVP
3. Measure T in crack
4. Secure wand in holster
5. Release LVP
6. Find site of CV1 deployment near Teddy Bear (x4535, y78387, hdg195, d2519)
7. For picking up colonizer, move extremely slowly and gently put in small biobox

8. Measure T at point where colonizer was
9. Move to Crab Spa to check on Vent-SID
10. When still no sign of activity, release Vent-SID
11. Proceed to Alvinella mound (Wedding Cake) near Crab Spa and recover CV8
12. For picking up colonizer, move extremely slowly and gently put in medium biobox
13. Measure T at point where colonizer was
14. Collect piece of Wedding Cake and put in one of bioboxes not used for colonizers
15. Measure T of fluids emanating from broken off piece
16. Sample Riftia around Tica (not quite dead yet Riftia)
17. Before collecting Riftia, proceed with following:
  - a. Measure T at base of Riftia colony
  - b. Make a T measurements at the level of various plumes
18. Proceed with collection and put worms in large biobox. Make sure worms fit into biobox and nothing sticks out. Don't fold them
19. Move to Bio9 and recover CV5
20. For picking up colonizer, move extremely slowly and gently put in remaining small or medium biobox
21. Measure T at spot where colonizer was
22. Recover Crab Trap at Riftia mound close to Bio9

**Alvin Dive 4904-AT37-12**  
**MAY 7, 2017**

**Pilot: Pat Hickey**

**Port Observer: Jeremy Rich**

**Starboard Observer: Ashley Grosche**

**Notes are a combination of Jeremy Rich's and Ashley Grosche's notes.**

<b>GMT</b>	<b>Comments</b>
14:00	Descending to the seafloor
15:25	At seafloor, transiting to Teddy Bear
15:40	Arrival at Teddy Bear near Large Volume Pump (LVP) (x4546, y78368, Hdg332, d2516, temp at LVP inlet is 12°C)
15:47	Taking LVP off axis
15:50	Releasing LVP to surface
16:08	North of Teddy Bear, collecting colonizer CV1-2017 (x4525, y78405, Hdg4, d2516, temp 12°C)
16:35	At <i>Alvinella</i> Mound (Wedding Cake) collecting colonizer CV7-2017. Metal screen gone, sulfide growing into colonizer (x4577, y78160, Hdg76, d2511, temp 46°C)
16:40	At <i>Alvinella</i> Mound (Wedding Cake) collecting <i>Alvinella</i> worms (x4577, y78160, Hdg76, d2511, temp 40-46°C)
16:45	At Tica collecting 8-10 <i>Riftia</i> from a dying <i>Riftia</i> patch (x4575, y78166, Hdg 138, d2515, temp at base of worm 2°C, temp at plume 3°C)
17:06	At Crab Spa to inspect Vent-SID. It doesn't appear to be working (x4584, y78156, Hdg85, d2505)
17:18	Leaving Crab Spa with Vent-SID to go off axis
17:28	Releasing Vent-SID (x4661, y78139, Hdg41, d2503), heading to Bio9
17:39	At Bio9 collecting colonizer CV5-2017 from white pillar next to black smoker chimney (x4611, y77985, Hdg53, d2510, temp 10.4°C)
17:46	Collecting crab trap (x4622, y77965, Hdg111.5, d2510)
17:49	Near Bio9, collecting 6-8 mussels into biobox (x4622, y77967, Hdg112, d2511)
17:55	At Bio9 attempting to collect large crab with Alvin arm unsuccessfully. Transit to Biovent
18:53	Vent-SID surfaces
19:36	Start ascent to the surface

AT 37-12 Sample Sheet

Alvin Dive# 4904 Date 5/7/17 Logged by Ashley Grosche  
Port Obs. Jeremy Starboard Obs. Ashley Pilot Pat Hickey  
Descend: 14:00 At Seafloor: 15:33 Ascend: 19:36:25

FLUID SAMPLES NO Fluid samples taken

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

LARGE VOLUME PUMP Release  
Major# (LVP) Time 15:43:55 Temp 12°C Vent Teddy Bear  
X 4547 Y 78368 Hdg 334 Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

**Take photos before collection, in the claw (if possible), and after collection.**  
**If needed, make sketches with scales.**

Sample # ① Time 16:29:40 Temp 40-46°C Vent Bio 9  
X 4577 Y 78160 Hdg 76 Depth 2511 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type Alvinella wormst casings  
Basket location star board medium

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # (2) Time 16:46:08 Temp 2°C - 3°C Vent TICA

X 4575 Y 78166 Hdg 139 Depth 2515 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type SICKLY RIFTIA (8-10)

Basket location large bio box

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting RIFTIA, crabs, limpets, mussels

Sample # (3) Time 17:47:39 Temp \_\_\_\_\_ Vent BIO9 RIF mound

X 4622 Y 77965 Hdg 112 Depth 2510 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type CRAB TRAP

Basket location Big bio box

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting Crabs + mussels

Sample # (4) Time 17:50:07 Temp \_\_\_\_\_ Vent Near Bio 9

X 4622 Y 77967 Hdg 113 Depth 2511 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type MUSSELS

Basket location Big bio box

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

X

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

ROCK SAMPLES. *NO Rock Samples Taken*

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

X



EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Expt ID/# CVI-2017 Time 16:13:26 Temp 12°C Vent North of Teddy Bear  
 X 4525 Y 78405 Hdg N Depth 2519 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting limpets, fish, shimmering pluds  
(in canyon) white crabs  
 Additional assoc. samples: type/ID       
 Additional descriptive comments     

Expt ID/# CVI-2017 Time 16:29:40 Temp 40-46° Vent ~~Black~~ TICA  
 X 4577 Y 78160 Hdg 76 Depth 2511 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting Filaments (long + white) on  
columnar + marker, white plud, rapid venting, newly-formed  
 Additional assoc. samples: type/ID brown sulfide on top of chimney  
 Additional descriptive comments on top of alvella mound, mussels far @ the  
base

Final location

Expt ID/# Vent-SID Time 17:10:21 Temp 2°C Vent Crab SPA  
 X 4584 Y 78156 Hdg 85 Depth 2505 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting       
 Additional assoc. samples: type/ID       
 Additional descriptive comments     

Expt ID/# Vent-SID Time 17:28:24 Temp 2°C Vent off axis  
 X 4661 Y 78139 Hdg 41 Depth 2503 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting Release of Vent SID  
(Heading now to Bio9)  
 Additional assoc. samples: type/ID (surface 18:53)  
 Additional descriptive comments     

Expt ID/# CVS-2017 Time 17:41:53 Temp 10.4°C Vent Bio9  
 X 4611 Y 77986 Hdg 61 Depth 2509 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting White pillar very close to  
black smoker chimney. Columnar not different from  
 Additional assoc. samples: type/ID what Pat remembers  
 Additional descriptive comments

**MARKERS DEPLOYED**

*None  
Deployed*

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

AT 37-12 Sample Sheet

Alvin Dive# 4904 Date 5/7/17 Logged by Jeremy Rich  
 Port Obs. Jeremy Rich Starboard Obs. Ashley Grosche Pilot Pat Hickey  
 GMT Descend: 1400 At Seafloor: 1525 Ascend: 1937

FLUID SAMPLES

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

Major# \_\_\_\_\_ Time \_\_\_\_\_ Temp ICL \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Comments \_\_\_\_\_

BIOLOGICAL SAMPLES

*Take photos before collection, in the claw (if possible), and after collection.  
 If needed, make sketches with scales.*

Sample # \_\_\_\_\_ Time 1640 Temp 46°C Vent wedding cake  
 X 4577 Y 78160 Hdg 76 Depth 2511 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type wall of Alvinella mound  
 Basket location Medium starboard

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # Riftia Time 1645 Temp Plume 2°C  
X 4575 Y 78166 Hdg 138 Depth 2515 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
base 3°C Vent Tica area

Sample type 8-10 Riftia were sampled from  
Basket location dying riftia patch

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # Mussels Time 1749 Temp \_\_\_\_\_ Vent near Bio 9  
X 4622 Y 7796 Hdg 112 Depth 2511 Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type 6-8 mussels  
Basket location large bio box

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

*1755 - Attempted to collect large crabs with Alvin arm and were not able to*

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent Catch one.  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#) *at Bio 9*

Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

**ROCK SAMPLES**

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_



## EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Expt ID/# Large volume pump Time 1541 Temp 12°C Vent Teddy Bear  
 X 4546 Y ~~78260~~ Hdg 332 Depth 2516 Alt      Marker      (type/#)  
<sup>78368</sup>  
 Description of associated fauna &/or type of venting Took T at same location  
as LVP inlet  
 Additional assoc. samples: type/ID       
 Additional descriptive comments 1540 at ~~E~~ Teddy Bear, 1547 taking LVP off axis  
1550 Released LVP to surface

Expt ID/# CV1 Time 1608 Temp 12°C Vent north of Teddy Bear  
 X 4525 Y ~~78210~~ Hdg 4 Depth 2519 Alt      Marker      (type/#)  
<sup>78405</sup>  
 Description of associated fauna &/or type of venting Collected colonizer and took  
temp  
 Additional assoc. samples: type/ID       
 Additional descriptive comments     

Expt ID/# CV8 Time ~~1624~~<sup>1635</sup> Temp 46°C Vent Wedding Cake  
 X 4577 Y 78160 Hdg 76 Depth 2511 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting Colonizer on top of wedding  
cake heavily colonized.  
 Additional assoc. samples: type/ID 1629 collecting colonizer. Put in  
 Additional descriptive comments attempting to put marker in box as it is  
heavily colonized as well. Metal screen gone,  
sulphide rock growing into colonizer

Expt ID/# Vent SID Time      Temp      Vent Crab Spa  
 X      Y      Hdg      Depth      Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting 1706 at Crab Spa to inspect  
Vent-SID, It's not working. 1718 leaving Crab Spa with Vent-SID to go off axis  
 Additional assoc. samples: type/ID Inlet was secured in ICL holster.  
 Additional descriptive comments 1728 Vent SID released

Expt ID/# CV5 Time 1739 Temp 10.40C Vent Bio9  
 X 4611 Y 77985 Hdg 53 Depth 2510 Alt      Marker      (type/#)  
 Description of associated fauna &/or type of venting Put in small port side box  
 Additional assoc. samples: type/ID       
 Additional descriptive comments     

Crab trap time 1746 temp near Bio9 — crab trap  
 x 4622 y 77965 Hdg 111.5 d 2510 collected

**MARKERS DEPLOYED**

Time 1745 Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_(type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_(type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_(type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

Dive Plan 4905– May 7, 2017

**Port:** Ileana Perez-Rodriguez **Starboard:** Sushmita Patwardhan **Pilot:** Jefferson Grau

**On Bottom Target:** LVP landing site

Objectives:

- Deploy LVP at Teddy Bear (starts pumping at 10:30/16:30)
- Fire 6 majors at Crab Spa
- Collect dead Riftia between Wedding Cake and Cup Cake
- Release LVP at 14:30 (20:30) at Teddy Bear

Basket List

1. Large biobox
2. 6 majors
3. T probe

**Locations:**

	<b>Lat</b>	<b>Long</b>	<b>m</b>	<b>x</b>	<b>y</b>
<b>Pvent</b>	9 50.276	104 17.474	2511	4628	77926
<b>Bio9</b>	9 50.296	104 17.476	2514	4624	77962
<b>Crab Spa MkF</b>	9 50.396	104 17.489	2505	4600	78147
<b>Tica</b>	9 50.406	104 17.490	2505	4598	78165
<b>Teddy Bear</b>	9 50.50	104 17.51	2514		

1. On bottom, transit to LVP
2. Put in wand of LVP in previously used crack
3. Move to Crab Spa
4. Fire 6 majors at Crab Spa, aim at temperature of 25°C
5. Proceed to area between Wedding Cake and Cup Cake
6. There is a large clump of what appears to be dead Riftia
7. Measure T in Riftia clump
8. Collect about 6 Riftia and put in biobox

9. If time before releasing the LVP, collect small Riftia in Riftia patch near Teddy Bear and put with dead Riftia
10. Move to Teddy Bear to release LVP at 14:30 (20:30)

Alvin Dive 4905-AT 37-12  
May 8, 2017

**Pilot:** Jefferson Grau

**Port:** Ileana Pérez-Rodríguez

**Starboard:** Sushmita Patwardhan

Notes are from Ileana Pérez-Rodríguez

<b>GMT</b>	<b>Comments</b>
13:55	Descending
15:17	At sea floor
15:47	At LVP landing site. Picked up LVP for deployment at 'Teddy Bear'
16:29	Settled LVP next to 'Teddy Bear'. Removed wand from LVP, but the nozzle (wand) fell off. Re-assembled nozzle into sampling hose.
16:48	Placed LVP's wand into crack on 'Teddy Bear'. Temperature at site was 11.7 °C. After, we started our transit into 'Crab Spa'.
17:15	At 'Crab Spa' we started taking fluid samples with green major. Both chambers fired and fluid samples were taken between 24.1 and 25.6 °C.
17:20	Picked up yellow major for sampling. Temperature in ICL read between 19.2 to 21 °C for ambient conditions (not reliable ICL). Access to 'Crab Spa' site was difficult given the reach of major nozzle. Therefore, the pilot proceeded to clear some rocks from the area for better access.
18:11	Picked up blue major for sampling. Both chambers fired and fluid samples were taken at temperatures between 24 and 25.2 °C.
18:27	Picked up red major for sampling. We had a hard time accessing the venting source (likely due to angle in major's nozzle), so we ended up firing both chambers and collecting fluid samples at temperatures between 17 and 19°C.
18:38	Picked up black major for sampling. Both chambers fired and fluid samples were taken at temperatures of 23 °C.
18:44	Picked up white major for sampling. Only the second chamber fired and fluid samples were taken at temperatures of 25 °C. Once the second chamber was full, we re-tried firing the first chamber but efforts were unsuccessful.
19:10	Picked up yellow major for sampling. This time, temperature in ICL read 17 °C for ambient conditions (not reliable ICL). Both chambers fired and fluid samples were taken at temperatures of 35 °C. Once done we moved towards the 'Wedding Cake/Cupcake' area.
19:41	We moved to the bottom of the 'Wedding Cake' Alvinella structure to collect dead Riftia tubes. We measured temperature at base (2.4 °C) and on top (2.6 °C) of what seemed like a dead Riftia patch of tubeworms. We collected ~5-6 tubes and placed them in the biobox of DSV Alvin's basket. Once we finished, we started our transit back to 'Teddy Bear'.

~20:00 Arrived to 'Teddy Bear' where we parked and rested batteries while waiting for the LVP to finish it's sample collection.

20:31 Removed LVP's wand from 'Teddy Bear' and released LVP. Next, we went north of 'Teddy Bear' to pick up some healthy Riftia tubeworms.

20:39 Arrived at Riftia patch. We measured temperature at base (24.5 °C) and on top (8.5 °C) of what seemed like a healthy Riftia patch of tubeworms. We collected ~4-5 tubes and placed them in the biobox of DSV Alvin's basket (together with the dead Riftia tubes). After, we moved off-axis where we waited for the LVP to be secured on deck of R/V Atlantis.

21:54 Ascending

22:55 Alvin surfaced.

AT 37-12 Sample Sheet

Alvin Dive# 4905 Date 05/08/17 Logged by Ileana Peier-Rodriguez  
 Port Obs. Ileana P.R. Starboard Obs. Sushmita Patwardhan Pilot Jefferson Grau  
 Descend 13:55 GMT At seafloor 15:17 GMT Ascend 20:55 GMT  
*arrived to surface*

FLUID SAMPLES

Major# Green Time 17:15 Temp ICL Lowest: 24.1°C to surface Vent Crab Spa  
 X 4593 Y 7816 Hdg 56 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \*Reading ambient temperatures well

Major# Yellow Time 17:20 Temp ICL \_\_\_\_\_ Vent Crab Spa  
 X 4593 Y 7816 Hdg 55 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \* ambient temperature reading between 19.5°C to 21°C  
\* we removed rocks for better access (and didn't fire yellow major at this time)

Major# Blue Time 18:11 Temp ICL 24-25.2°C Vent Crab Spa  
 X 4594 Y 7816 Hdg 41 Depth 2505 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \* ambient reading at 2°C (reading well)

Major# Red Time 18:27 Temp ICL 17-19°C Vent Crab Spa  
 X 4594 Y 7816 Hdg 35 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments \* ambient reading at 2°C (good read)

Major# Black Time 18:38 Temp ICL 23°C Vent Crab Spa  
 X 4595 Y 7816 Hdg 31 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments ambient temperature at 3°C (good read)

Major# White Time 18:44 Temp ICL 25°C Vent Crab Spa  
 X 4595 Y 7816 Hdg 31 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Comments ambient temperature at 2°C (good read)  
\* Major 1 did not fire

MAJOR: Yellow Time: 19:10 Temp. ICL: 35°C Vent: Crab Spa  
 X: 4595 Y: 7816 Hdg: 40 Depth: 2506 AH: 0  
 Comments: ambient temperature reading at 17°C (bad read)

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.  
 If needed, make sketches with scales.

Sample # 1 Time 19:41 Temp 2.4°C (base) Vent Bottom of "Wedding cake"  
2.6°C (top)  
 X 4584 Y 7816 Hdg 61 Depth 2515 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Sample type Dead Riftia tubes  
 Basket location BioBox

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # 2 Time 20:39 Temp Top of short tubeworms: 8.5°C  
Base: 24.5°C Vent North of Teddy Bear  
X 4565 Y 7840 Hdg 316 Depth 2514 Alt 0 Marker \_\_\_\_\_ (type/#)  
Sample type Healthy Riftia tubeworms (~5 tubes)  
Basket location Bio Box together with dead Riftias

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Sample type \_\_\_\_\_  
Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

**ROCK SAMPLES**

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ **Basket location** \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ **Basket location** \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ **Basket location** \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ **Basket location** \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ **Hdg** \_\_\_\_\_ **Depth** \_\_\_\_\_ **Alt** \_\_\_\_\_ **Marker** \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ **Basket location** \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

AT 37-12  
 Expt ID/# Dive 4905 Time 15:47 Temp \_\_\_\_\_ Vent LVP Landings Site  
 X 4441 Y 7821 Hdg 59 Depth 2504 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting Some sea cucumbers in the area  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments Picking up LVP

AT 37-12  
 Expt ID/# Dive 4905 Time 16:29 Temp 11.7°C Vent Teddy Bear  
 X 4557 Y 7837 Hdg 335 Depth 2516 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
Saw octopus and some anemones (and, of course) ~ Riftias  
 Additional assoc. samples: type/ID \_\_\_\_\_

Additional descriptive comments Deploying LVP at Teddy Bear's crack  
 • nozzle fell off and pilot had to put back in. WAND went in crack at 16:48 (about 20 min. later)

AT 37-12  
 Dive 4905

Expt ID/# \_\_\_\_\_ Time 20:31 Temp \_\_\_\_\_ Vent Teddy Bear  
 X 4564 Y 7837 Hdg 0 Depth 2514 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments Removed LVP's wand from Teddy Bear and Released LVP.

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

AT 37-12 Sample Sheet

Alvin Dive# 4905 Date 5/8/17 Logged by Sushmita Patwardhan  
Port Obs. Ileana Perez Rodriguez Starboard Obs. Sushmita Patwardhan Pilot Jefferson Grau  
Descend: 13:55 At Seafloor: 15:35 Ascend: 21:54

FLUID SAMPLES

Major# Green Time 17:14 Temp ICL 25.6 Vent Crab Spa  
X 4592 Y 78166 Hdg 55.6 Depth 2502 Alt 0 Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_

Major# Yellow Time 17:20 Temp ICL 32-35.17 Vent Crab Spa  
X 4591 Y 78160 Hdg 41.2 Depth 2505 Alt 0 Marker \_\_\_\_\_ (type/#)  
Comments Had to take the rock out, once again at 18:06, shimmering increased Ambient T = 19.5 Tried getting 40° for some time Revisited again

Major# Blue Time 18:00 Temp ICL 24-25 Vent Crab Spa  
X 4591 Y 78160 Hdg 41.4 Depth 2505 Alt 0 Marker \_\_\_\_\_ (type/#)  
Comments had to take some more rock out Ambient 20°C

Major# Red Time 18:27 Temp ICL 17-19C Vent Crab Spa  
X 4595 Y 78160 Hdg 34 Depth 2506 Alt 30 Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_ Ambient 20

Major# Black Time 18:38 Temp ICL 22 Vent Crab Spa  
X 4595 Y 78160 Hdg 32 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
Comments \_\_\_\_\_ Ambient 3°C

Major# White Time 18:44 Temp ICL 25.4 Vent Crab Spa  
X 4595 Y 78160 Hdg 32 Depth 2506 Alt 0 Marker \_\_\_\_\_ (type/#)  
Comments only W2 fired Ambient 2°C

BIOLOGICAL SAMPLES

Take photos before collection, in the claw (if possible), and after collection.  
If needed, make sketches with scales.

Sample # Dead Riftia Time 19:42 Temp 2.5 Vent \_\_\_\_\_  
X 4584 Y 78167 Hdg 61 Depth 2515 Alt 0 Marker \_\_\_\_\_ (type/#)  
Sample type 6 Dead Riftia  
Basket location Biobox

Bein wedding cupcake.

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # Healthy Rif Time 20:40 Temp 8.5 Base: 24.5 Vent Near Teddy Bear  
X 4565 Y 78403 Hdg 316 Depth 2514 Alt 0 Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_

Basket location \_\_\_\_\_

Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_

Description of associated fauna &/or type of venting \_\_\_\_\_

Sample # \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_

X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)

Sample type \_\_\_\_\_  
 Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. rock sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Description of associated fauna &/or type of venting \_\_\_\_\_

## ROCK SAMPLES

**Take photos before collection and in the claw. If needed, make sketches w/ scales.**

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_

**Sample #** \_\_\_\_\_ **Time** \_\_\_\_\_ **Temp** \_\_\_\_\_ **Vent** \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Sample type \_\_\_\_\_ Basket location \_\_\_\_\_  
 Assoc. water sample # \_\_\_\_\_ Assoc. biol. sample # \_\_\_\_\_ (type) \_\_\_\_\_  
 Descriptive comments \_\_\_\_\_



EXPERIMENT DEPLOYMENTS/RECOVERIES

Take photos before and after deployment or recovery. Make sketches with scales.

Expt ID/# Located LVP Time 15:47 Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X 4442 Y 7822 Hdg 58 Depth 2504 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
Saw an octopus  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# Deployed LVP w site Time 16:38 Temp 11.7 Vent Teddy Bear  
 X 4556 Y 78370 Hdg 334 Depth 2515 Alt 1.628 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
Saw lots of crabs & 2 octopus mating  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# Released LVP Time 20:30 Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X 4564 Y 78376 Hdg 168 Depth 2514 Alt 0 Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

Expt ID/# \_\_\_\_\_ Time \_\_\_\_\_ Temp \_\_\_\_\_ Vent \_\_\_\_\_  
 X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
 Description of associated fauna &/or type of venting \_\_\_\_\_  
 Additional assoc. samples: type/ID \_\_\_\_\_  
 Additional descriptive comments \_\_\_\_\_

**MARKERS DEPLOYED**

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

Time \_\_\_\_\_ Marker type \_\_\_\_\_ Marker # \_\_\_\_\_  
X \_\_\_\_\_ Y \_\_\_\_\_ Hdg \_\_\_\_\_ Depth \_\_\_\_\_ Alt \_\_\_\_\_ Marker \_\_\_\_\_ (type/#)  
Reason/ assoc. sample(s) \_\_\_\_\_  
Comments \_\_\_\_\_

**ADDITIONAL NOTES:**

Station	Lat (degN)	Lon (degE)	Btm depth (m)	Niskin	Btl Depth (m)
1	14.03048333	-104.3462	3030	1	1500
1	14.03048333	-104.3462	3030	2	1250
1	14.03048333	-104.3462	3030	3	1000
1	14.03048333	-104.3462	3030	4	800
1	14.03048333	-104.3462	3030	5	650
1	14.03048333	-104.3462	3030	6	500
1	14.03048333	-104.3462	3030	7	425
1	14.03048333	-104.3462	3030	8	340
1	14.03048333	-104.3462	3030	9	280
1	14.03048333	-104.3462	3030	10	250
1	14.03048333	-104.3462	3030	11	225
1	14.03048333	-104.3462	3030	12	200
1	14.03048333	-104.3462	3030	13	190
1	14.03048333	-104.3462	3030	14	180
1	14.03048333	-104.3462	3030	15	170
1	14.03048333	-104.3462	3030	16	160
1	14.03048333	-104.3462	3030	17	150
1	14.03048333	-104.3462	3030	18	140
1	14.03048333	-104.3462	3030	19	130
1	14.03048333	-104.3462	3030	20	120
1	14.03048333	-104.3462	3030	21	105
1	14.03048333	-104.3462	3030	22	90
1	14.03048333	-104.3462	3030	23	40
1	14.03048333	-104.3462	3030	24	3
2	9.840416667	-104.2929167	2512	1	2503
2	9.840416667	-104.2929167	2512	2	2000
2	9.840416667	-104.2929167	2512	3	1500
2	9.840416667	-104.2929167	2512	4	1000
2	9.840416667	-104.2929167	2512	5	750
2	9.840416667	-104.2929167	2512	6	640
2	9.840416667	-104.2929167	2512	7	630
2	9.840416667	-104.2929167	2512	8	610
2	9.840416667	-104.2929167	2512	9	590
2	9.840416667	-104.2929167	2512	10	570
2	9.840416667	-104.2929167	2512	11	550
2	9.840416667	-104.2929167	2512	12	530
2	9.840416667	-104.2929167	2512	13	510
2	9.840416667	-104.2929167	2512	14	500
2	9.840416667	-104.2929167	2512	15	490
2	9.840416667	-104.2929167	2512	16	480
2	9.840416667	-104.2929167	2512	17	470

2	9.840416667	-104.2929167	2512	18	450
2	9.840416667	-104.2929167	2512	19	430
2	9.840416667	-104.2929167	2512	20	420
2	9.840416667	-104.2929167	2512	21	260
2	9.840416667	-104.2929167	2512	22	120
2	9.840416667	-104.2929167	2512	23	40
2	9.840416667	-104.2929167	2512	24	3
3	9.341416667	-104.2941333	2904	1	2894
3	9.341416667	-104.2941333	2904	2	2100
3	9.341416667	-104.2941333	2904	3	1300
3	9.341416667	-104.2941333	2904	4	850
3	9.341416667	-104.2941333	2904	5	640
3	9.341416667	-104.2941333	2904	6	610
3	9.341416667	-104.2941333	2904	7	590
3	9.341416667	-104.2941333	2904	8	575
3	9.341416667	-104.2941333	2904	9	560
3	9.341416667	-104.2941333	2904	10	545
3	9.341416667	-104.2941333	2904	11	530
3	9.341416667	-104.2941333	2904	12	515
3	9.341416667	-104.2941333	2904	13	500
3	9.341416667	-104.2941333	2904	14	485
3	9.341416667	-104.2941333	2904	15	470
3	9.341416667	-104.2941333	2904	16	455
3	9.341416667	-104.2941333	2904	17	440
3	9.341416667	-104.2941333	2904	18	425
3	9.341416667	-104.2941333	2904	19	410
3	9.341416667	-104.2941333	2904	20	350
3	9.341416667	-104.2941333	2904	21	200
3	9.341416667	-104.2941333	2904	22	160
3	9.341416667	-104.2941333	2904	23	95
3	9.341416667	-104.2941333	2904	24	20
4	9.840533333	-104.2922	2512	1	635
4	9.840533333	-104.2922	2512	2	625
4	9.840533333	-104.2922	2512	3	615
4	9.840533333	-104.2922	2512	4	605
4	9.840533333	-104.2922	2512	5	595
4	9.840533333	-104.2922	2512	6	585
4	9.840533333	-104.2922	2512	7	575
4	9.840533333	-104.2922	2512	8	565
4	9.840533333	-104.2922	2512	9	555
4	9.840533333	-104.2922	2512	10	545
4	9.840533333	-104.2922	2512	11	535

4	9.840533333	-104.2922	2512	12	525
4	9.840533333	-104.2922	2512	13	515
4	9.840533333	-104.2922	2512	14	505
4	9.840533333	-104.2922	2512	15	495
4	9.840533333	-104.2922	2512	16	485
4	9.840533333	-104.2922	2512	17	475
4	9.840533333	-104.2922	2512	18	465
4	9.840533333	-104.2922	2512	19	455
4	9.840533333	-104.2922	2512	20	445
4	9.840533333	-104.2922	2512	21	435
4	9.840533333	-104.2922	2512	22	425
4	9.840533333	-104.2922	2512	23	415
4	9.840533333	-104.2922	2512	24	405
5	10.50705	-104.2967667	3031	1	3078
5	10.50705	-104.2967667	3031	2	1800
5	10.50705	-104.2967667	3031	3	900
5	10.50705	-104.2967667	3031	4	720
5	10.50705	-104.2967667	3031	5	700
5	10.50705	-104.2967667	3031	6	670
5	10.50705	-104.2967667	3031	7	640
5	10.50705	-104.2967667	3031	8	610
5	10.50705	-104.2967667	3031	9	580
5	10.50705	-104.2967667	3031	10	560
5	10.50705	-104.2967667	3031	11	540
5	10.50705	-104.2967667	3031	12	520
5	10.50705	-104.2967667	3031	13	510
5	10.50705	-104.2967667	3031	14	500
5	10.50705	-104.2967667	3031	15	490
5	10.50705	-104.2967667	3031	16	480
5	10.50705	-104.2967667	3031	17	470
5	10.50705	-104.2967667	3031	18	460
5	10.50705	-104.2967667	3031	19	450
5	10.50705	-104.2967667	3031	20	440
5	10.50705	-104.2967667	3031	21	370
5	10.50705	-104.2967667	3031	22	215
5	10.50705	-104.2967667	3031	23	120
5	10.50705	-104.2967667	3031	24	3
6	9.833366667	-99.99941667	3244	1	3234
6	9.833366667	-99.99941667	3244	2	2750
6	9.833366667	-99.99941667	3244	3	2480
6	9.833366667	-99.99941667	3244	4	1800
6	9.833366667	-99.99941667	3244	5	1200

6	9.833366667	-99.99941667	3244	6	680
6	9.833366667	-99.99941667	3244	7	660
6	9.833366667	-99.99941667	3244	8	640
6	9.833366667	-99.99941667	3244	9	620
6	9.833366667	-99.99941667	3244	10	600
6	9.833366667	-99.99941667	3244	11	580
6	9.833366667	-99.99941667	3244	12	560
6	9.833366667	-99.99941667	3244	13	540
6	9.833366667	-99.99941667	3244	14	520
6	9.833366667	-99.99941667	3244	15	500
6	9.833366667	-99.99941667	3244	16	490
6	9.833366667	-99.99941667	3244	17	480
6	9.833366667	-99.99941667	3244	18	470
6	9.833366667	-99.99941667	3244	19	460
6	9.833366667	-99.99941667	3244	20	450
6	9.833366667	-99.99941667	3244	21	250
6	9.833366667	-99.99941667	3244	22	80
6	9.833366667	-99.99941667	3244	23	45
6	9.833366667	-99.99941667	3244	24	3
8	9.820216667	-92.718	3734	1	2500
8	9.820216667	-92.718	3734	2	2000
8	9.820216667	-92.718	3734	3	1500
8	9.820216667	-92.718	3734	4	1000
8	9.820216667	-92.718	3734	5	700
8	9.820216667	-92.718	3734	6	680
8	9.820216667	-92.718	3734	7	660
8	9.820216667	-92.718	3734	8	630
8	9.820216667	-92.718	3734	9	600
8	9.820216667	-92.718	3734	10	570
8	9.820216667	-92.718	3734	11	540
8	9.820216667	-92.718	3734	12	520
8	9.820216667	-92.718	3734	13	500
8	9.820216667	-92.718	3734	14	490
8	9.820216667	-92.718	3734	15	480
8	9.820216667	-92.718	3734	16	470
8	9.820216667	-92.718	3734	17	460
8	9.820216667	-92.718	3734	18	450
8	9.820216667	-92.718	3734	19	435
8	9.820216667	-92.718	3734	20	425
8	9.820216667	-92.718	3734	21	410
8	9.820216667	-92.718	3734	22	200
8	9.820216667	-92.718	3734	23	50

8	9.820216667	-92.718	3734	24	3
9	9.832566667	-91.33496667	3740	1	1000
9	9.832566667	-91.33496667	3740	2	800
9	9.832566667	-91.33496667	3740	3	620
9	9.832566667	-91.33496667	3740	4	600
9	9.832566667	-91.33496667	3740	5	580
9	9.832566667	-91.33496667	3740	6	560
9	9.832566667	-91.33496667	3740	7	540
9	9.832566667	-91.33496667	3740	8	520
9	9.832566667	-91.33496667	3740	9	500
9	9.832566667	-91.33496667	3740	10	490
9	9.832566667	-91.33496667	3740	11	480
9	9.832566667	-91.33496667	3740	12	470
9	9.832566667	-91.33496667	3740	13	460
9	9.832566667	-91.33496667	3740	14	450
9	9.832566667	-91.33496667	3740	15	440
9	9.832566667	-91.33496667	3740	16	430
9	9.832566667	-91.33496667	3740	17	420
9	9.832566667	-91.33496667	3740	18	410
9	9.832566667	-91.33496667	3740	19	400
9	9.832566667	-91.33496667	3740	20	390
9	9.832566667	-91.33496667	3740	21	370
9	9.832566667	-91.33496667	3740	22	350
9	9.832566667	-91.33496667	3740	23	340
9	9.832566667	-91.33496667	3740	24	3
10	9.83405	-89.99955	3718	1	2001
10	9.83405	-89.99955	3718	2	1600
10	9.83405	-89.99955	3718	3	615
10	9.83405	-89.99955	3718	4	585
10	9.83405	-89.99955	3718	5	560
10	9.83405	-89.99955	3718	6	540
10	9.83405	-89.99955	3718	7	520
10	9.83405	-89.99955	3718	8	500
10	9.83405	-89.99955	3718	9	480
10	9.83405	-89.99955	3718	10	470
10	9.83405	-89.99955	3718	11	460
10	9.83405	-89.99955	3718	12	450
10	9.83405	-89.99955	3718	13	450
10	9.83405	-89.99955	3718	14	450
10	9.83405	-89.99955	3718	15	442
10	9.83405	-89.99955	3718	16	435
10	9.83405	-89.99955	3718	17	428

10	9.83405	-89.99955	3718	18	421
10	9.83405	-89.99955	3718	19	414
10	9.83405	-89.99955	3718	20	407
10	9.83405	-89.99955	3718	21	400
10	9.83405	-89.99955	3718	22	390
10	9.83405	-89.99955	3718	23	375
10	9.83405	-89.99955	3718	24	360