Hydrothermal Deposits in East Blanco Depression--1994 Video Highlights (A92)

Tape 2 of 11 .

00:33	Coarse, blocky pillow talus, vehicle moving downslope,variable steepness, scattered attached organisms.
00:34	Good pillow forms.
00:37	Blocky pillow talus.
00:39	Increased sediment, then **hydrothermal mound(?) with white surfaces**; turning vehicle to work package mode.
00:42:30	**Hydrothermal deposit** in sight again, isolated in small pond of sediment surrounded by talus; low outcrops of altered/mineralized rock are visible in the sediment.
00:43:30	Attempting to sample surface of mound. Surface is mottled, crumbly. Darker patches may be Mn oxide stains. Or oxidized sulfide?
00:47	**Rock sample 4R1**.
00:52:30	**Core sample from sediment** near base of mound: **4C1**.
00:59	**Rock sample 4R2.**
01:05:30 to 01:08 into	Moving dowslope away from mound; **slabs of similar light-colored material are scattered in blocky talus**; sediment has light patches. Then bottom of depression.

Tape 3 of 11 (beginning of tape)

01:47	**Isolated light-colored block i**n view at contact between sediment and volcanic talus. Silted out.
01:52:35	Closeup view, color and black & white.
02:00	Attempt to sample--not successful. Surface is mottled.
03:36:30	**Discolored sediment related to hydrothermal seepage and alteration. Core sample 6C.**

Tape 10 of 11: Active low-temperature mound

23:48	Well formed tubular pillows.
23:51:55	Contact with rubbly , steeper slope, more biology.

00:14	**Hydrothermal mounds, bacterial mats on top of discharge points.**
00:31	Probably seepage through mound with several small pinnacles.
01:17	Return to mound, steep sided.
01:18:30	Good view of mound below vehicle with mound surfaces sloping away.
01:21	More of the same.
01:25	Move forward to higher elevation on mound. Ridgelike construction. Abundant bacterial mat marking discharge areas.
01:36	Trying to sample mound--not successful.
01:39	Temperature measurement.

Tape 11 of 11 (beginning)

01:55	**Core sample 15C.**
02:05	Excellent view of hydrothermal mound area with many pinnacles and ridges.
02:08	**Temperature measurement: 147°F = 63°C.**
02:19	Good view of lava pillows and coalesced mounds.

A91 and A92 Merged Transcript

DIVE #: A91, A92 (ATV# 94-47-91, 94-48-92) Date: September 4, 5, & 6, 1994.

Observers ATV: Dziak, Embley, Bohannen, Koski, Tormanen
Observers Wet lab:
Dive Location: Site 7, East Blanco Depression

	Time (PDT)	Depth (ft)	Alt-itude (ft)	Ship's Latitude (°N)	Ship's Longitude (°W)	ATV Head-ing (°)/ Tur-bidity/ Temper-ature	Observations
	DIVE 91 9/4/94						
L	1642			44°12.43	129°37.84		ATV in water
V	1642			44°12.43	129°37.84		ATV in water
L	1642						Trouble with connecting cable; ATV back on deck
V	1642						Trouble with cable; ATV back on deck
	DIVE 92 9/4/94						
L	1918						ATV in water. Temperature replaces altimeter on video header.
V	1918						In water
L	1935			44°12.56	129°37.95		Begin descent
V	1935			12.563	37.956		Begin descent.
L	2100	8030		12.55	37.94		
V	2100	8030®		12.550	37.9404		
N	2121.57						SOF A91.01
V	2127.40	11106®	24	44°12.55	129°37.939	127	In work package [mode].
V	2132	11028®	98				Stopped at 100' altitude to do checks. See sonar target to south.
L	2137	11090		12.55	37.94	315	
L	2138						On bottom.
V	2139	11121®					In pillow field – they seem to [be] pretty broken up.
P	2139	11121†		44°12.54	129°37.93	low	#1 – bottom
P	2141	11120†		12.54	37.93	low	#2 – rock in manipulator
P	2143	11120†		12.54	37.93	low	#3 – rock in manipulator
V	2146						[Rock sample A91-] 1R1 in bin 7.
L	2146	11110		12.55	37.94	320/ 39.1°F	Rock sample A91-1R1, taken in pillow lavas. Bin 7.
V	2146	11121®		44°12.54	129°37.94	140	Looks like pretty heavy Mn coating.
P	2147	11117†		12.54	37.93	low	#4 – rock in manipulator
P	2149	11117†		12.55	37.93	low	#5 – slope
V	2149	11117®	6	44°12.55	129°37.94		[Rock sample A91-] 1R2 in bin 5. #5 was rock [?] in [illegible]. #4 2R sample.
L	2150	11117*		12.55	37.94	351/ 39.1°F	Sample A91-1R2, taken in pillow lavas. Bin 5.
L	2155						Coming off bottom to switch to transit mode.
V	2155	11101®	23			300	Going to transit mode.
V	2157	11130®	22				Going back to [...]

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	
L	2200	11120		12.55	37.94	332/ 39.1°F	Traversing downslope over pillow lava field. Back to work package mode.
P	2200	11129†		12.54	37.93	low	#6 – slope.
V	2201	11128®	11	12.546	37.938	117	Work package [mode]. Flying 300' on course (in work package). In flattened pillow lavas.
P	2203	11107†		12.55	37.94	low	#7 – pillow.
P	2204	11089†		12.54	37.93	low	#8 – pillow.
P	2205	11081†		12.54	37.93	low	#9 – pillow.
P	2206	11065†		12.55	37.94	low	#10 – flower.
V	2206	11068®	18				Top of small ridge - about 90° to course.
V	2210.20	11081®	29			119	Coming down on other side of ridge.
L	2216	11130		12.55	37.94	301/ 39.0°F	The pillows may be broken; probable pillow talus at base of ridge.
V	2217	11154®	15			118	Going downslope.
V	2219	11173®	14	12.551	37.941	116	In work package [mode]. Going down to flatter area off ridge.
P	2220	11180†		12.54	37.93	low	#11 – pillow.
P	2220	11180†		12.54	37.93	low	#12 – pillow.
P	2221	11178†		12.54	37.94	low	#13 – pillow.
L	2224	11185*	8	12.55	37.94	248/ 39.1°F	Set ATV down in pillow talus field. Collect sample. Unsuccessful at sampling.
P	2224	11178†		12.54	37.94	low	#14 – pillow.
N	2224.19						EOF A91.01
N	2224.40						SOF A91.02
V	2225	11185®	6			062	
N	2227.11						EOF A91.02
N	2227.11						note: no raw WHOI nav data from 2227 to 2356 – started overwriting during the second file.
L	2230	11130		12.55	37.94	300/ 39.1°F	Coming up in water column to get over small ridge.
L	2230			12.59	38.17		ATV position from nav.
V	2230	11146®	35	12.549	37.939	114	Leaving site where we tried to sample – looked like pillow rubble.
P	2232	11179†		12.55	37.94	low	#15 – sea fan.
V	2235	11184®	10			116	Parallelling slope, goes up to left. ATV ~100 m up line from ship position.
V	2237	11190®	14			116	Some in-place pillow on slope.
P	2238	11190†		12.54	37.94	low	#16 – pillow.
V	2238	11190®	10				Frame 16 of sea fan. Also sediment pocket in pillow.
L	2240	11190		12.55	37.93	295/ 39°F	Pillow field – pillows appear to be more attached in place.
V	2240	11195®	12				Ship in same position. Going down slope. See in-place pillows – heavy sediment pockets.
P	2241	11201†		12.54	37.96	low	#17 – pillow.
L	2243						In-place pillows with large sediment pockets between.

	Time (PDT)	Depth (ft)	Alt-itude (ft)	Ship's Latitude (°N)	Ship's Longitude (°W)	ATV Hdg (°)/ Turb./ Temp.	Observations
V	2244	11216®	6			007	Going downslope through pillow field with extensive sediment pockets – lots of sessile organisms.
L	2246	11200		12.55	37.94	295/ 39.0°F	Much sediment present on in-place pillows.
P	2246	11158†		12.56	37.96	low	#18 – rock pillow.
V	2248	11203®				119	Going to move down line 0.2 nm. In talus.
L	2253	11110		12.55	37.95	304/ 39.0°F	Broken pillows on a slight incline - much less sediment.
L	2257	11120		12.56	37.96	300/ 39°F	Pillow in place on slope.
V	2258	11127®	10	12.560	37.971	121	ATV appears to be on line at about 138.0'.
V	2302	11110®	17	12.567	37.958	120	Work package [mode]. Traversing over broken (?) pillows.
L	2305			12.57	38.00		ATV position.
V	2306	11073®	22	12.573	38.002	116	Traversing pile of broken pillows – up to right see an [illegible].
L	2310	11080		12.58	38.02	300/ 39.0°F	Pillows continue (intact).
L	2311	11098*	17				Van depth.
V	2312						Sort of making very slow progress. Waiting for ship to catch up.
L	2315	11080		12.59	38.03	299/ 39.0°F	Intact pillows.
P	2315	11101†		12.59	38.04	low	#19 – rock pillow.
V	2317	11097®					
V	2320	11092®	15	12.59	38.06	116	See slope going down ahead – still in broken pillows.
V	2322	11108®	3				Going down pillow-rubble slope.
L	2323	11110		12.61	38.07	289/ 39°F	Pass by large pillow cliff.
V	2323	11120®	1	12.60	38.075		See scarp looking back on color transit camera – could be [illegible] – truncated pillows, a few freshly broken.
P	2324	11138†		12.62	38.11	low	#20 – rock pillow.
V	2327	11121®		12.61	38.09	192	Turning into slope to try and sample.
P	2328	11138†		12.62	38.11	low	#21 – rock site 2R.
L	2334	11130		12.62	38.12	028/ 39.1°F	Trying to get another sample at pillow lava.
L	2336	11130		12.63	38.12	028/ 39.1°F	Bin 6. A91-2R.
V	2336	11138®		12.627	38.122	208	Bin 6 [rock sample A91] 2R taken in pile of talus. Frame #20 (35 max) of sample 2R site.
V	2342						Move off station 2.
V	2348	11158®	15	12.64	38.16	120/	Traversing over flatter pillows broken up.
L	2350	11130		12.65	38.18	300/ 39.1°F	Pillows become exceptionally elongated.
V	2352	11150®	10	12.65	38.189	122	Broken pillows.
V	2356	11158®	17	12.657	38.205	120	ATV ~60 m ahead of ship along line.
N	2356.08						SOF A91.03

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	
L	2357	11140		12.66	38.21	303/ 39.1°F	Fly down over small cliff.
L		11112	100				
	9/5/94						
V	0000	11166®	13	12.667	38.223	121	Going downslope ~350 m from towed camera target.
L	0002	11160		12.66	38.22	274/ 39.1°F	Another downscarp
V	0004	11175®	8	12.672	38.24	114	Stopped at lip of scarp (?). Sediment looks [illegible - strange?] [drawing]
L	0007	11170		12.66	38.25	293/ 39.1°F	Sediment core A91-3; Core D. Taken at top of scarp with rock sample A91-3R.
V	0007	11175®		12.68	38.259	110	[Core] Sample [A91-] 3C; [Rock sample A91-] 3R in bin 3. Core had about 10 cm of mud in it. Photo with all light #22, #23
P	0011	11175†		12.68	38.26	low	#22 – normal bottom, left off
P	0012	11178†		12.68	38.26	low	#23 – HMI only
V	0013	11173®	12	12.68	38.27	121	Starting to move over lip.
L	0014	11160		12.68	38.28	300/ 39.1°F	Flying down steep slope.
V	0016	11178®	15	12.68	38.29	122	See slope behind us – quite sedimented.
L	0020	11170		12.70	38.30	303/ 39.1°F	Back to broken pillows.
V	0021	11175®	11	12.70	38.30	122	Going parallel to slope [which is] up to left; smaller talus.
V	0023.30	11191®	12	12.70	38.31	122	Going right to bottom slope – broken lava on slope.
V	0027	11234®		12.71	38.33	122	Old slope color camera shows [illegible] talus.
L	0030	11250		12.71	38.33	303/ 39.0°F	Broken talus of pillows.
L	0031.34			12.71	38.42		Good hit for ATV position ✓
V	0033						[ATV] vehicle at 44°12.71, 129°38.42 ✓
L	0033.34			12.71	38.41		Dead reckoning ATV position. ✓
V	0035	11326®	11	12.72	38.36	122	Still going into hole.
L	0040	11340		12.73	38.38	300/ 39.1°F	Stop to examine yellow- and white-stained rock.
V	0040	11353®					Just saw unusual pillow (?) with chunk of yellow
P	0043	11357†		12.73	38.39	low	#24 – mineral rock mound.
L	0044	11350		12.74	38.39	301/ 39.1°F	Sampling yellow and white stained rock.
L	0045	11357*	8				[Time approximate] Core A91-3C. Was lost during movement of manipulator.
V	0045.50	11357®	8	12.74	38.40		Small possible hydrothermal mound [illegible] in midst of pillows. Corer got hooked on starboard arm and fell – lost sample (very small). Bin 8 [Rock samples A91-] 4R1 and 4R2. [Core sample A91-] 4C. Same core as earlier. Several pictures taken.

3,462 m

	Time (PDT)	Depth (ft)	Alt-itude (ft)	Ship's Latitude (°N)	Ship's Longitude (°W)	ATV Hdg (°)/ Turb./ Temp.	Observations
L	0056						Sample A91-4R1 on sulfide mound. Top right of mound. Bin 8. Photos of sampling mound. Zooming in on mound with video.
P	0056	11357†		12.73	38.39	low	#25 – mineral rock mound.
P	0056	11357†		12.73	38.39	low	#26 – mineral rock mound.
P	0057	11357†		12.73	38.39	low	#27 – mineral rock mound (low light).
L	0059	11350		12.77	38.47	168/ 39.1°F	Sample A91-4R2. Bin 8. Top left of mound. Pick up piece at base that fell from top.
L	0059.40			12.75	38.45		Good ATV position.
V	0100	11357®	8	12.76	38.46	300	Sill sampling small mound. [Rock sample A91-] 4R2 taken from top of mound.
V	0101	11357®		12.765	38.46		[ATV] 48 yards ahead on line.
P	0101	11358†		12.75	38.46	low	#28 – mineral rock
N	0101.50						EOF A91.03
N	0102.37						SOF A91.04
L	0104	1134011 357*					Close to vent site. Setting down after taking samples 4R. Trying for more samples at right base of 4R mound. No samples.
L	0105	11340		12.77	38.48	301/ 39.0°F	Moving sediment areas (dark brown) with white sulfide mounds & small deposits between small pillows. Holothurians & stalked organisms. Heading downslope.
L	0110	11330		12.78	38.50	303/ 39.1°F	Going upslope over pillow talus field. No sediment pockets.
V	0111	11311®	15	12.78	38.50	120	
L	0114	11290		12.78	38.52	304/ 39.1°F	Contact with sediment patch. Cobble size lava blocks. Some boulders and pebbles. Stalked organisms.
V	0115	11280®	16	12.79	38.52		Going up slope out of depression. Broken rubbly slope.
L	0116	11240		12.79	38.53	304	Crest of ridge. Starfish/stalked organisms. Large pillow to blocks with in-situ pillows.
L	0117	11230					Large pillow blocks. In-situ pillows. Thinking of turning ATV around and heading back to mound and moving laterally.
L	0124	11230		12.795	38.54		Changing course to return to mound. (304°) Moving back on course 304°.
L	0127	11230					Going down slope.
V	0127	11234®		12.80	38.53	303	On reciprocal course back to chimney.
L	0129	11260		12.79	38.53	121/ 39.0°F	Seeing sulfide dust over pillows. Yellow-brown [in color].
L	0129.40			12.81	38.57		ATV position.
V	0130	11282®	14	12.78	38.51	302	Going down pillow slope.
V	0134	11311®	11	12.78	38.49	301	Vehicle ~50 m behind ship.
L	0137	11330		12.77	38.47	119/ 39.1°F	Bottom of depression. Brown sediment cover; no rocks. Starfish. Photo – going upslope? Stopped.
L	0138.29			12.79	38.48		ATV position.

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	
P	0140	11342†		12.76	38.45	low	#29 – rock/sediment.
L	0141	11330		12.76	38.44	067/ 39.1°F	Going in ditch. A few rocks, branching starfish.
V	0141	11342®					Stopped in heavy sediment area to take a shot of rock.
L	0144	11330					In water column. See bottom with small pillows with patches of sediment.
V	0145						Driving down to left.
L	0146						Tape 2 ends. Tape 3 starts.
L	0147	11360		12.75	38.44	26/ 39.1°F	Back to mound (different one). Cover is white and brown with stalked organism. Sediment is heavy around mound. Similar [to] composition of 4R sample. Dusted out, letting sediment settle.
P	0148	11370†		12.75	38.44	low	#30 – mineral rock.
V	0149	11371®	7	12.757	38.443	190	Stopped at white boulder or small chimney.
P	0150						#31 – no strobe (time approximate).
P	0150						#32 – no strobe (time approximate).
L	0150.30			12.78	38.50		ROV position.
P	0152	11372†		12.75	38.44	low	#33 – mineral rock.
L	0153	11370		12.76	38.44	348/ 39.1°F	Sediment has cleared a bit trying to sample top. Hard! Photo.
V	0154	11371®	6			167	
P	0156	11372†		12.75	38.44	low	#34 – mineral rock.
L	0158						Scratching surface reveals grey material under white cover.
L	0158.31			12.75	38.45		ROV position.
P	0159	11372†		12.75	38.44	low	#35 – mineral rock.
V	0204	11372®	5	12.75	38.44	203	Couldn't sample mound. Too bad – had crust on it but it disintegrated. Going to move SE ~160.
L	0205	11360					Moving on, leaving mound. Change course to SE 160°. In water column.
L	0208	11350		12.76	38.44	211/ 39.0°F	Seeing bottom – pillows and murky.
L	0210						Heavy sediment cover. On steep slope with minor rocks. (pillows.)
V	0210	11337®					Driving 340° work package [mode].
P	0211	11329†		12.75	38.44	med	#36 – sandy/muddy bottom mineral rock.
L	0214	11300		12.76	38.44	163/ 39.0°F	Pillow talus contact. Going upslope.
L	0215	11300		12.75	38.44	266/ 39.1°F	Changing course to go downslope. Pillow talus boulders. Some light sediment cover.
V	0217	11320®		12.755	38.441	072	Going downslope. Seeing a N-S trough on sonar.
V	0220	11327®				015	Going SW down middle of trough.
L	0221	11330		12.76	38.45	183/ 39.1°F	Still pillows talus field. Shrimp in water.
V	0222	11340®		12.756	38.445	007	Vehicle south of ship ~100 m.
V	0227	11388®	23	12.76	38.44	000	Going south into depression.

	Time (PDT)	Depth (ft)	Alt-itude (ft)	Ship's Latitude (°N)	Ship's Longitude (°W)	ATV Hdg (°)/ Turb./ Temp.	Observations
L	0228	11400*		12.75	38.44	185/ 39.1°F	Pillow field continues... slight downslope.
V	0228	11427®	20	12.756	38.44		Turning to head east at bottom of narrow depression. Lots of pillow tubes coming downslope.
L	0229					166	Steeper downslope cliff
L	0233	11430		12.76	38.44	102	Beginning upslope.
L	0234	11440		12.75	38.44	060/ 39.1°F	Base of cliff. Sediment with pillows on slope. Moving around.
V	0236	11450®					
L	0238	11420		12.76	38.44	066/ 39.0°F	Want to head ENE and parallel original line. Change course to 030°.
L	0239	11390					Going upslope broken pillow talus slope.
V	0241	11371®	18			218	Heading NE to go past ship to north. Broken pillow slope.
L	0245	11310		12.76	38.44	032/ 39.1°F	Broken cobble talus with some sediment cover. Base of slope? In-situ pillows tubes oblique to slope!! Patchs of cobble-sized debris.
V	0246	11306®	12	12.75	38.444	220	Going up slope at angle – slope to left. Intact pillow tubes going downslope.
L	0248	11270		12.75	38.44	038/ 39.1°F	Photo of tubes. Sampling lava.
V	0249	11272®	20	12.75	38.44	220	[Rock sample A91-] 5R Bin 10. #38 picture of sample in claw.
L	0249	11260		12.76	38.44	052/ 39.2°F	[Rock sample] A91-5R. On the fly off the slope. Black basalt. Bin 10.
V	0250	11194®	12	12.75	38.44	220	Relieve Bob E. by Bob B.. Last Bob in wet lab.
P	0251	11279†		12.75	38.44	med	#37 – pillow tubes.
L	0252	11230					Small pillows with areas of cobble talus.
P	0254	11221†		12.75	38.44	low	#38 – pillow tubes.
P	0254	11221†		12.75	38.44	low	#39 – pillow tubes.
L	0257	11190		12.76	38.44	037/ 39.1°F	In situ small pillows. Large stalked organisms.
P	0259	11184†		12.75	38.44	low	#40 – pillow tubes.
L	0300	11180		12.76	38.44	037/ 39.1°F	Slope went from left to right. Now right to left. Photo of basalt/fish/organisms.
V	0301	11181®	15	12.75	38.44	218	Photo.
L	0302						Photo of broken talus slope.
V	0302						Photo.
P	0302	11173†		12.75	38.44	low	#41 – pillow tubes.
L	0306	11200		12.76	38.44	041/ 39.0°F	Moving ship to sample site 3 to try and locate sample site & ATV. Going downslope – pillow rubble. Believe we are north of line want to continue back toward line and sample site.
N	0311.53						EOF A91.04
N	0312.27						SOF A91.05

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	
L	0314	11220*		12.77	38.47	324/ 39.1°F	Still driving around trying to find site in water column. Lost!! Nav. comments. ATV is west of ship. WET LAB. Should go down slope south east.
V	0315	11254®	17	12.77	38.48	148	Lost.
L	0319	11250					Change course to 120° downslope. Work package.
V	0319	11248®	31	12.77	38.49	120	Down.
L	0321	11290					Change course to 050°. This depth puts us at the out[er] contour of basin. Bottom & lifting off pillow talus still, going downslope.
V	0322	11330®	13			050	Still lost.
L	0328	11300		12.79	38.53	300/ 39.0°F	Back to sediment-covered rock talus. Seems like back to original area. White patches in sediment on transit mode camera.
L	0332	11330		12.79	38.53	303/ 39.0°F	Coming up to slope with pillow talus.
L	0333						Change of course to return to basin ~ 360°.
L	0334	ship.		12.79	38.53		ATV [is] ~200 yards west according to Spencer [Navy navigator].
V	0335	11322®	20	12.79	38.53	300	Searching depression.
P	0335	11336†		12.78	38.53	low	#42 – white ring sediment
L	0336	11330		12.79	38.54	334/ 39.0°F	Back to sediment/rock contact. White ring on sediment. Stopped. Silted out.
V	0337	11339®					Photo of white ring.
P	0337	11336†		12.78	38.53	low	#43 – white ring sediment.
V	0339						Photo.
L	0342	11320		12.79	38.54	159/ 39.1°F	Same place trying a core. Might be contaminated – dirty core liner.
L	0345	11330		12.79	38.53	204/ 39.1°F	A91-6C. Core B. White sediment. Continue work package mode.
V	0345	11335®	6	12.79	38.53	340	Attempt at core. Core B. [Core sample A91-] 6C
V	0346						[Time approximate] Photo of sampled ring.
P	0347	11336†		12.78	38.53	low	#44 – white ring sediment
L	0356	11330		12.79	38.54	39.0°F	Change course toward way point 3, ~235°
V	0356	11301®	14				Changing course to way point 3.
V	0400	11321®	11	12.79	38.54	045	Rocky bottom.
L	0403						Fish and crinoid on basalt rubble.
V	0403	11321®		12.78	38.56	051	Photo of rocks.
P	0403	11321†		12.78	38.56	low	#45 – rocks
L	0405						Rubble sloping up to right.
L	0407	11301		12.78	38.58	010/ 39.1°F	White stain on rock fragments, could be sediment reflection.
V	0407	11301®	13	12.78	38.57		Sample of white rocks.
P	0411	11288†		12.77	38.59	low	#46 – rocks
L	0412						Talus on slope rising to right.

	Time (PDT)	Depth (ft)	Alt-itude (ft)	Ship's Latitude (°N)	Ship's Longitude (°W)	ATV Hdg (°)/ Turb./ Temp.	Observations
V	0412	11281®					Photo of steep wall.
P	0412	11295†		12.	38.60	high	#47 – rock
V	0413						[Time approximate] Photo.
V	0414	11296®	9	12.77	38.60		Sample basalt. Bin 11, [rock sample A91-] 7R.
L	0415	11295		12.77	38.61	300/ 39.1°F	Sample A91-7R in bin 11.
V	0420	11322®		12.76	38.65		Going upslope.
L	0423					320/ 39.1°F	Continuous basalt rubble.
V	0423	11314®		12.75	38.66	034	Letting ship catch [up].
L	0424						Stop to let ship catch up.
L	0429					330/ 39.1°F	Moving again.
V	0429	11035®	14	12.75	38.70	050	Moving again.
V	0435	11240®	36	12.74	38.74		Top of hill.
L	0440	11240		12.73	38.77	272/ 39.0°F	Basalt talus – many angular blocks-slope goes up to right of ATV.
V	0443	11175®	64	12.72	38.80		Wait for ship.
L	0444	11170		12.72	38.80	210/ 39.1°F	ATV holding in water column for ship to catch up.
V	0448	11211®	25	12.71	38.83		Photo.
P	0448	11205†		12.71	38.60	high	#48 – rock
P	0448	11205†		12.71	38.60	high	#49 – rock
L	0450	11200		12.72	38.84	236/ 39.1°F	Steep scarp on right. Rocks are not all pillows.
N	0454.16						EOF A91.05
N	0454.56						SOF A91.06
L	0455	11190		12.70	39.90	206/ 39.1°F	Collected samples A91-8R1 and A91-8R2. From basalt outcrops. Some pillow lava with radiating fractures.
V	0455	11203®		12.70	38.85		Sample [A91-] 8R1.
V	0456	11186®					Sample [A91-] 8R2.
V	0503						Ship catchup.
L	0514						Going to start driving south.
V	0518						150' off bottom, drving north to get closer to line and ship.
L	0520						Stopping ship to figure out where ATV is. Not seeing bottom.
V	0529						[ATV crew] shift change; still off bottom.
L	0536	11126*	115				Still trying to figure where ATV is relative to ship.
V	0538	11092®	95	12.637	39.12	300	Still trying to locate vehicle, close gap with ship.
V	0550	11190®	23				Transit mode; On bottom again, hovering.
L	0551	11198	10	12.62	39.18	278	Looking back at slope – saw yellow deposits. Think that ATV [is] right below ship. Just saw some extensive yellow staining.
V	0559	11221®	007				Work package, on bottom, vehicle being pulled away.
L	0603						Ship stopped bobbing at interesting slope.

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	
V	0606					250	Off bottom mostly.
L	0607						Tape #5 started
N	0608.48						EOF A91.06
N	0609.30						SOF A91.07
L	0616						Still loitering in same place. No slant range information.
V	0617					250	Off botttom again, released selective weight.
V	0618	11235®	20			260	On bottom again, low slope.
V	0621	11242®	24			250	Moving slowly upslope to east. Bottom is mixture of elongate pillows and fragments.
V	0628						Pulled off bottom again.
P	0631	11272†		12.57	39.36	low	#50 – dust
V	0632						Moving vehicle to NE to reacquire bottom.
L	0633	11331		12.58	39.35	68	Moving ATV NE. Contact with bottom. Sediment with minor pillow. Work package [mode].
V	0634	11325®	76			250	On bottom, abundant sediment.
P	0636	11324†		12.57	39.25	low	#51 – sponge
V	0648						Transit mode; going downslope to go upslope.
L	0649	11418		12.59	39.29		Still trying to get control of ATV. Ship now moving NE along line.
V	0656	11426®	28				Bottom in sight, tube pillows on slope rising away.
P	0657	11438†		12.60	39.25	low	#52 – pillow
V	0702						Pulling up to regroup.
L	0708	11217*	200	12.60	39.26	220	Off bottom. Pulling off to straighten cable with respect to ATV. Hope to be able to move toward ship.
V	0713	11380®	61				Moving 060° in transit [mode].
V	0716	11385®	90	12.60	39.26		Descending, transit mode.
L	0719	11460		12.60	39.25	237/ 39.0°F	On bottom. In-situ pillows covered lightly with sediment - murky water. Change course 060°. Transit mode?
P	0719	11455†		12.60	39.25	med	#53 – pillow lava
L	0721	11480					Want to find 11195 ft. contour. Up hill.
V	0721	11478®	12	12.60	39.25		Back on hill.
L	0726.54			12.61	39.38		Sub position. Tubular pillow and pillow talus.
V	0727	11450®	18				Going up hill.
L	0731	11410		12.60	39.26	062/ 39°F	In transit mode. Same geology – tabular pillows. Only see it occasionally – bounced around.
V	0731	11406®					Steep slope.
L	0737						Photo of pillow
V	0737	11388®	16	12.59	39.25	056	Photo of pillows.
P	0737	11390†		12.59	39.25	med	#54 – pillow lava
L	0738	11393*	16				
V	0744	11394®					Photo of pillows.
P	0744	11394†		12.59	39.25	medlow	#55 – slope

	Time (PDT)	Depth (ft)	Alt-itude (ft)	Ship's Latitude (°N)	Ship's Longitude (°W)	ATV Hdg (°)/ Turb./ Temp.	Observations
L	0746	11350		12.6	39.26		Sub being pulled north. Randy suggested course of 90°
L	0746	11390		12.60	39.26	094	Turning to work package mode. Stopping to look at white staining on pillows. Murky water.
L	0750	11420					Photo of biology on pillow. Still in transit mode. Never made it [to] work package [mode].
L	0751	11410		12.60	39.26		Course 90° for a few yards and then go to way point 4 if nothing is found.
V	0751	11417®		12.60	39.25		Photo.
P	0751	11413†		12.60	39.25	medlow	#56 – pillow
V	0753	11412®					Work package [mode] – uphill.
N	0756.08						EOF A91.07
N	0756.08						Note: ran out of disk space, no raw WHOI nav data from 0756 to 1020.
L	0757	11410		12.60	39.24	090	Stopping ship plotting a line to north, 200 yards. On bottom.
L	0802	11422*	11	12.60	39.23	090	Pillows, large, ship moving north.
L	0807						Tape #6 starts.
L	0809			12.63	39.24	090	Pillows in place.
P	0811	11423†		12.63	39.24	low	#57 – pillow
V	0814	11404®		12.64	39.23		Photo – no movement.
V	0815						[Time approximate] Interval in which the vehicle was lifted to 10,900 ft. to solve problem.
P	0815	11417†		12.64	39.24	low	#58 – pillow
L	0822						Lifting off bottom to 11000 ft to get straightened out. Video off.
L	0847	11368*	15	12.65	39.20	090	Transit mode, well-formed pillows on slope up to left – going downslope.
V	0848	11363®	15	12.65	39.20	090	Transit [mode]. Back on bottom.
V	0849						Photo.
V	0849						Photo.
P	0849	11369†		12.65	39.17	low	#59 – pillow.
P	0849	11369†		12.65	39.17	low	#60 – pillow.
P	0854	11421†		12.65	39.17	low	#61 – pillow.
V	0855						Photo.
L	0900	11480		12.65	39.15	090	Downslope across intact pillows and tubes.
V	0901	11460®	16	12.64	39.13		Going upslope.
L	0902	11450*	17			090	Moving upslope over pillows. More broken, more sediment.
V	0902	11352®		12.65	39.10		Going to work package mode.
V	0903						[Time approximate] Photo lava tubes.
L	0906						Beautiful long downslope pillow tubes.
L	0909					090	Rotate to work package [mode].
P	0910	11367†		12.65	39.09	low	#62 – tube.
V	0911	11363®					Photo of long tubes.
P	0911	11359†		12.65	39.09	low	#63 – tube.
V	0912	11344®		12.65	39.09		Photo.
P	0912	11340†		12.65	39.09	low	#64 – tube.
L	0913	11360		12.65	39.09	096	Long pillows cascading downslope.

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	Observations
V	0914	11340®		12.66	39.07		Photo.
P	0914	11337†		12.65	39.09	low	#65 – tube
P	0915	11333†		12.65	39.09	low	#66 – tube
L	0916	11320		12.66	39.08	061/ 39.0°F	Talus at pillows with some elongated pillows – will attempt to sample.
V	0921	11340®		12.66	39.07		Sample [A91-] 9R, Bin 12.
L	0922	11330		12.66	39.07	106/ 39°F	Sample A91-9R. Taken at pillow basalt talus.
P	0924	11338†		12.68	39.06	low	#67 – manipulator with rock
V	0925						Photo.
P	0925	11310†		12.68	39.04	low	#68 – pillow.
L	0928	11300*	14				Broken pillows.
L	0930	11280		12.70	39.04	081/ 39.0°F	Broken pillows, upslope.
V	0934	11277®	7	12.70	39.01	261	Photo.
P	0934	11274†		12.70	39.02	low	#69 – pillow.
V	0936						Photo or two.
P	0936	11275†		12.71	39.01	low	#70 – pillow.
P	0936	11275†		12.71	39.01	low	#71 – pillow.
V	0937	11275®	11	12.71	39.00	259	Photo.
P	0937	11276†		12.71	39.01	low	#72 – pillow.
L	0938	11270		12.71	39.01	087/ 39.1°F	Elongated–interlocking pillows.
P	0939	11279†		12.71	39.01	low	#73 – pillow.
P	0939	11279†		12.71	39.01	low	#74 – pillow.
P	0941	11273†		12.70	38.99	low	#75 – pillow.
V	0942	11270®	7				Photos.
P	0942	11270†		12.70	38.99	low	#76 – pillow.
P	0942	11270†		12.70	38.99	low	#77 – flower.
L	0943	11250		12.71	38.99	085/ 39.1°F	Continued broken and elongated pillows – pulling ATV 100 ft up to transit to way point 3. Paused video.
P	0945	11257†		12.71	38.98	low	#78 – pillow.
V	0950						Off bottom.
V	0950						Transit to waypoint 3.
N	1020.47						SOF A91.08 [File deleted as useless]
V	1131	11490®	16	12.548	39.443	060	[Work package mode] Resume traverse from waypoint #3 on course 235.
L	1132						Started video
N	1133.59						EOF A91.08 [File deleted as useless – all transit.]
L	1134	11502	18	12.55	39.45	243	On large pillows.
N	1134.52						SOF A91.09
L	1139	11540		12.54	39.48	241	Approaching slope.
P	1141	11520†		12.53	38.38	low	#79 – formations.
P	1141	11520†		12.53	38.38	low	#80 – [no description]
P	1141	11520†		12.53	38.38	low	#81 – [no description]
L	1142	11530	6	12.53	39.45	250	On in-place pillow slope. Trying to sample pillow rind. Pillows are flattened tubes.
V	1143	11530®	6	12.53	39.50		On well-formed elongate pillows.
V	1146	11531®	6				Sampling.

	Time (PDT)	Depth (ft)	Alt-itude (ft)	Ship's Latitude (°N)	Ship's Longitude (°W)	ATV Hdg (°)/ Turb./ Temp.	Observations
L	1149	~11510		12.52	39.51		
L	1152						Nice shot of broken pillows.
V	1153	11505®	14	12.51	39.52	093/ 39.0°F	Still attempting to get sample.
L	1156	11502	7	12.50	39.55		Rock sample A91-10R. Talus piece of broken tube. Bin 5, on top of another sample.
V	1157	11500®		12.51	39.54	093/ 39.0°F	Sample [A91-] 10R – put in as top rock in bin 5.
P	1201	11502†		12.30 (?)	39.52	med	#82 – rock site 10R.
P	1201	11502†		12.30 (?)	39.52	med	#83 – sample A91-10R.
P	1201	11502†		12.30 (?)	39.52	med	#84 – sample A91-10R.
L	1202						Starting to move off station.
L	1206	~11460		12.49	39.58	241	On pillow slope.
P	1208	11498†		12.49	39.58	low	#85 – pillow section.
P	1208	11498†		12.49	39.58	low	#86 – pillow.
P	1208	11498†		12.49	39.58	low	#87 – pillow.
P	1208	11498†		12.49	39.58	low	#88 – pillow.
V	1208	11487®	14	12.49	39.58	064/ 39°F	Elongated pillows cascading downslope.
L	1209	11487		12.49	39.59	254	Going upslope, heavily sedimented.
V	1213	11494®	6	12.47	39.607	130/ 39°F	Sample [A91-] 11R taken from pillow outcrop. Bin #2.
L	1214			12.48	39.60		On small cone (hornito), see lava coming out top.
L	1215						[Time approximate] Tape 6 ended, missed ~5 minutes of video at this cone.
P	1215	11494†		12.47	39.61	med	#89 – pillows.
L	1218~						Tape 7 started.
V	1219	11494®	6	12.47	39.607	130/ 39°F	Sample [A91-] 11R2 also put in bin 2.
L	1220	11487		12.48	39.60		Same site; Rock samples A91-11R1, R2, R3, all in bin 2.
V	1222	11494®	6	12.47	39.607	130/ 39°F	Sample [A91-] 11R3 in bin 2, extra rock fell into bin 5.
L	1226						Same site; waiting for silt cloud to dissipate at site 11. Cone is about 2 meters high and 3 meters across.
P	1230	11484†		12.45	39.67	low	#90 – rock site A91-11R
P	1230	11502†		12.44	39.69	low	#91 – rock/sand separation
P	1230	11502†		12.44	39.69	low	#92 – rock/sand separation
P	1230	11502†		12.44	39.69	low	#93 – rock/sand separation
V	1231	11481®	6	12.448	39.675	180	Begin transiting backup slope.
L	1232						Same site, rotating around mound but silt cloud is pretty bad.
L	1234			12.44	39.68	244	Starting to move on course again.
V	1235	11506®	10	12.44	39.689	053/ 39°F	Reach contact of old pillows with sediment.
L	1236	11502		12.44	39.70	250	
L	1238						Waiting for ship to catch up.
L	1239						Another relatively intact pillow slope.

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	
L	1240	11490		12.43	39.71	243	Picture 94 of flattened pillow slope - intact pillows.
P	1241	11490†		12.43	39.71	low	#94 – pillow.
V	1241	11486®	14	12.43	39.71	060/ 39°F	Elongated pillows mound upslope. Eruptive center.
L	1242			12.42	39.72	237	ATV ~60 yards north of ship?
P	1243	11490†		12.43	39.71	low	#95 – "fan/sea" on rock.
L	1246	11472		12.42	39.74	241	Traversing in-place pillows. Some very flat areas of lobate flows between.
P	1246	11472†		12.42	39.72	low	#96 – rock field.
V	1247	11456®		12.4172	39.74	062/ 39°F	Pillows give way again to sediment.
L	1248						In heavy sedimented area.
P	1250	11532†		12.40	39.78	low	#97 – field rock
L	1252	~11480		12.41	39.76		Going downslope on flattened pillows.
V	1256	11528®				064/ 39°F	Find bottom once again. In work package [mode].
L	1258	11520		12.40	39.79		Pillow mound, very large pillows, circling around and taking pictures (102).
V	1258	11523®		12.4	39.78	064	Back in pillows.
P	1259	11532†		12.40	39.78	low	#98 – field rock.
P	1259	11532†		12.40	39.78	low	#99 – field rock mound.
P	1300	11531†		12.40	39.78	low	#100 – field rock mound.
P	1300	11531†		12.40	39.78	low	#101 – field rock mound.
P	1300	11531†		12.40	39.78	low	#102 – field rock mound.
P	1300	11531†		12.40	39.78	low	#103 – field rock mound.
P	1300	11531†		12.40	39.78	low	#104 – field rock mound.
P	1300	11531†		12.40	39.78	low	#105 – field rock mound.
P	1300	11531†		12.40	39.78	low	#106 – field rock mound.
V	1300	11531®	10	12.3968	39.7916	064/ 39°F	Close to large mound. Surveying mound – small eruptive center of pillows.
L	1304					290	ATV moving on; ship stopped to let ATV catch up. Ship in place until 1333.
L	1306	11523	11	12.40	39.79	242	Old sediment-covered talus slope. Lots of critters.
V	1306	11529®		12.40	39.787	060/ 39°F	(Transit mode) Base of scarp, made mostly at blocky talus and sediment.
P	1307	11530†		12.39	32.78	low	#107 – sand/rock with bios [biota].
L	1311	11510		12.40	39.79	240	Sediment-covered gentle upslope.
V	1315	11506®	11	12.397	39.7872	061/ 39°F	Crossing heavily sedimented low-relief terrain.
P	1317	11472†		12.40	32.78	low	#108 – rock with bios [biota].
P	1321	11446†		12.39	39.78	low	#109 – rock among sand.
P	1321	11446†		12.39	39.78	low	#110 – rock among sand.
L	1322	11440		12.40	39.79	241	Sediment-covered, some rocks with critters attached. 2 pictures.
V	1325	11376®	19	12.398	39.7883	063/ 39°F	Crossing heavily sedimented low-relief terrain.
V	1330	11370®	19	12.3915	39.8037	060/ 39°F	Flat – much sediment.

	Time (PDT)	Depth (ft)	Alt-itude (ft)	Ship's Latitude (°N)	Ship's Longitude (°W)	ATV Hdg (°)/ Turb./ Temp.	Observations
P	1332	11322†		12.38	39.82	med	#111 – [no description]
L	1333	11310		12.38	39.83	240	Ship moves on up line. Sediment-covered slope with some rocks covered with fauna.
L	1337	11250		12.37	39.85	240	Steeper slope with rocks and outcrops with slight to medium sediment cover. Truncated pillow lavas.
V	1338	11230®		12.3637	39.8591	060/ 39°F	Scattered blocks on sedimented ridge.
P	1339	11233†		12.36	39.85	med	#112 – bio [biota]/rock.
P	1339	11233†		12.36	39.85	med	#113 – bio [biota]/rock.
V	1345	11207®	16	12.347	39.906	060/ 39°F	Flat sedimented terrain.
L	1346	11200		12.34	39.91	236	Sediment-covered slope.
L	1353	11160		12.32	39.95	241	Rock with critters.
V	1358	11107®	15	12.3096	39.9762	057/ 39°F	Sediment-covered slope, some rocks, then drop off to a small valley/basin then gentle upslope.
L	1359	11100		12.31	39.98	239	Lip of drop-off; lots of biota.
P	1400	11105†		12.30	39.97	low	#114 – drop off
V	1404	11047®	21	12.2982	40.0056	055/ 39°F	Steeper slope with some rocks and outcrops.
L	1405	11040		12.30	40.01	239	Really steep slope.
L	1408	11035		12.30	40.01	239	Trying to sample; silted out.
L	1412						Trying to drive and sample.
L	1414	~10960		12.20	40.06	237	Continues on - couldn't sample because stirring up mud cloud. Still heavy concentration of stalked organisms on rock.
V	1415	10940®		12.2788	40.0675	058	Moving up slope and trying to sample. Mud keeps obscuring visibility.
L	1416						Tape 8 on.
L	1420	10930		12.27	40.08	237/ 39°F	Continuing up sedimented slope. Slope constitutes the western wall of East Blanco Depression.
V	1420	10948®		12.2654	40.1003	056	Sediment-covered slope, going obliquely uphill.
L	1429	~10870		12.25	40.16	240/ 39.1°F	Heavily sedimented slope. Several boulders covered with sessile organisms.
L	1430						More boulders.
V	1430	10855®	17	12.2433	40.1776	055	Sediment-covered slope, going obliquely uphill, some rocks with fauna.
L	1434	~10770		12.23	40.21	240/ 39°F	Sames
L	1436						ATV is ahead of the ship.
V	1440	10728®	9	12.2166	40.2626	053	Medium slope, sediment covered. No rocks, some fauna.
L	1442	~10710		12.21	40.27		
L	1448	~10670		12.19	40.34	240/ 39.1°F	Still sedimented slope.
V	1450	10668®	17	12.1890	40.3564	053	Sediment-covered slope with some fauna.
L	1451	10640		12.18	40.36	240	Rock outcrop.

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	
P	1452	10626†		12.18	40.37	med	#115 – rocks
L	1458	10560		12.16	40.46	240	Sedimented slope; occasional rock.
V	1500	10570®	11	12.1559	40.4593	038	Relatively steep slope on the left side, sediment covered.
L	1502	10580		12.14	40.48	220	ATV behind ship?
L	1515	10480		12.13	40.55	180/ 39.1°F	ATV in front of ship; ATV up in water column to wait for ship to catch up.
V	1515	10498®	35	12.1268	40.5390	001/ 39°F	Medium slope, heavy sediment. Moving very slowly/holding position.
V	1520	10514®	13	12.1077	40.6045	358	Moving slowly.
L	1530	~10500		12.08	40.68		Starting along bottom on course.
V	1530	10505®	13	12.0849	40.6702	051	Medium slope. Heavy sediment.
N	1532.52						EOF A91.09
V	1533	10487®	7	12.0733	40.711	000	Some rocks at the base or a slightly steeper slope.
N	1533.37						SOF A91.10
L	1534	~10420		12.08	40.70		Approach rock outcrop.
L	1535	10470		12.07	40.72	206/ 39°F	Got a rock in bin 12; rock sample A91-12R on top of 9R.
V	1539	10485®	9	12.0690	40.7253	330	[Rock sample A91-] 12R in bin 12 (on top of [rock sample A91-] 9R).
L	1544	10433		12.07	40.72	240	Sediment core 12C. More outcrop
V	1545	10433®		12.0689	40.7220	053/ 39°F	[Core sample A91-] 12C.
L	1548						Extensive outcrop
P	1549	10369†		12.07	40.72	med	#116 – rocks.
P	1549	10369†		12.07	40.72	med	#117 – rocks.
L	1552						Back in heavy sediment.
V	1552	10322®		12.0661	40.7325	051/ 39°F	Alternating sediment and small rock field.
L	1553	10310		12.06	40.73	236	Extensive sediment-covered rock slope.
L	1555	10240		12.06	40.76		
V	1555	10246®	17	12.0554	40.7675	070/ 39°F	Medium upslope, rock field, smallish rocks.
L	1600	~10240		12.06	40.76	258	
V	1600	10200®	17	12.0489	40.7961	067/ 39°F	Sediment-covered slope [with] some rocks and fauna.
L	1603						End of tape 8; tape 9 begins.
L	1605	~10150		12.03	40.84	256	Rock on steep slope; still pretty heavy sediment.
V	1605	10169®	11	12.0263	40.8550	075/ 39°F	Slope steepening, rock debris, possibly talus.
P	1606	10169†		12.02	40.74	low	#118 – rocks
L	1608			12.02	40.86	243	More outcrop; have been going over small benches with ~1m outcrops.
L	1612	~10100		12.01	40.89	247/ 39.1°F	
P	1612	10112†		12.01	40.89	low	#119 – sea cucumber.
P	1612	10112†		12.01	40.89	low	#120 – sea cucumber.
P	1612	10112†		12.01	40.89	low	#121 – sea cucumber.
P	1612	10112†		12.01	40.89	low	#122 – sea cucumber.
P	1612	10112†		12.01	40.89	low	#123 – sea cucumber.

	Time (PDT)	Depth (ft)	Alt-itude (ft)	Ship's Latitude (°N)	Ship's Longitude (°W)	ATV Hdg (°)/ Turb./ Temp.	Observations
V	1615	10105®	10	12.0024	40.9224	080/ 39°F	Slight slope, heavy sediment.
L	1616	~10080		12.00	40.94	247	See rocky area ahead. Pillow fragments.
V	1618	10080®	15	11.9978	40.9539	054/ 39°F	Small rock field.
L	1619	~10060		12.0	40.96	236	More outcrop.
L	1619	~10060		12.0	40.96	236	More outcrop.
V	1621	9946®		11.99	40.98	048/ 39°F	[Vehicle] up 100 ft., stopping ship.
L	1622			11.98	41.00	213	Coming up in water – going to drive above bottom down hill to northeast (Way point 6 at 44°12.71N, 129°39.91)
L	1622			11.98	41.00	213	Transit – coming up in water- – going to drive above bottom, down hill to northeast.
V	1623	9882®	200	11.98	41.00		To transit mode, flying above to new way point, then down.
V	1628	9757®		11.99	40.99		Flying – should be a couple of hours.
N	1833.37						EOF A91.10
N	1915.26						SOF A91.11
L	1919	10970		12.71	39.91		Arrived at site 44° 12.71, 129° 39.91 to begin survey of base of western scarp, [East] Blanco Depression.
V	1919	10931®		12.70	39.41	044	Descending to seafloor.
V	1921	11015®	62			047	Still descending vehicle ~100 m SW of ship.
V	1923	11078®	15	12.71	39.91		In transit mode. Looks sediment covered.
L	1924	11126	20	12.71	39.91	055/ 39.1°F	Bottom in sight.
V	1926	11126®	10	12.71	39.91		Going downslope to NE.
N	1931.44						EOF A91.11
V	1935	11306®	12	12.71	39.91		Continuing downslope.
L	1936	11310*	16	12.7	39.91	050/ 39.1°F	Sediment, sediment, sediment. Transit mode. Attempting to find pillow mounds at base of this scarp.
V	1938	11336®	28	12.71	39.90		Going down over sediment-covered slope with
N	1939.38						SOF A91.12
V	1940	11350®	20				Sediment-covered slope with a few rocks. Covered with sessile organisms.
L	1944	11373*	40	12.71	39.92	050/ 39.1°F	Few loose jagged rocks but with mostly sediment.
V	1945	11302®	27	12.71	39.9		
V	1947	11450®	25	12.71	39.91		
L	1948	11408*	14				Traversing downslope.
V	1950	11500®	12	12.71	39.91		
L	1955	11540		12.71	39.91	051/ 39.1°F	Passed small outcrop, but mostly sediment.
V	1955	11541®	17	12.71	39.91		
V	1956	11532®	18			090	Passed [illegible] old outcrop.
V	1958	11514®	12				Driving east to go under ship.

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	Observations
V	2000	11486®	25	12.71	39.91		Start steering 088 to vector to mineral [illegible].
L	2002	11510		12.71	39.91	050/ 39.1°F	Outcrops of angular blocks, but mostly sediment.
V	2003	11521®	26			088	More rock [illegible - yares?] in heavy sediment slope.
V	*2004 approx.*						In transit to hydrothermal area.
L	2009	11430		12.71	39.91	050/ 39.1°F	Too much sediment, going to pull ATV up and move to sulfide? mounds. Video paused.
N	2015.07						EOF A91.12
N	2015.07						No raw WHOI nav data, ATV in flight after ~2015
N	2251						SOF A91.13, plug out of pc, no raw WHOI nav data until 0022.
L	2305	11430		12.77	38.5	090	On bottom at vent site. In work package mode. Tube basalts- intact pillows.
V	2305	11465®		12.768	38.499	277	On bottom, work package [mode]. Moving upslope over well-formed bulbous and tube pillows. Numerous photos.
P	2307	11458†		12.76	38.49	low	#124 – pillow tubes.
P	2307	11458†		12.76	38.49	low	#125 – pillow tubes.
P	2309	11446†		12.77	38.49	low	#126 – pillow tubes.
L	2310	11430		12.77	38.49	091/ 39.0°F	"classic" pillows.
P	2310	11429†		12.77	38.49	low	#127 – pillow tubes.
P	2311	11438†		12.77	38.49	low	#128 – pillow tubes.
P	2312	11441†		12.77	38.49	low	#129 – pillow tubes.
P	2313	11428†		12.76	38.49	low	#130 – pillow tubes.
P	2314	11424†		12.76	38.49	low	#131 – pillow tubes.
P	2314	11412†		12.76	38.49	low	#132 – pillow tubes.
P	2314	11407†		12.76	38.49	low	#133 – pillow tubes.
P	2315	11404†		12.76	38.49	low	#134 – pillow tubes.
P	2315	11393†		12.76	38.49	low	#135 – pillow tubes.
L	2316	11370		12.77	38.49	080/ 39.1°F	Heading upslope over pillow field. No sediment cover.
V	2316	11371®				266	Upslope.
P	2318	11364†		12.76	38.49	low	#136 – pillow tubes.
P	2319	11348†		12.76	38.49	low	#137 – pillow tubes.
P	2320	11340†		12.76	38.49	low	#138 – pillow tubes.
P	2320	11339†		12.76	38.49	low	#139 – pillow tubes.
V	2321	11331®				260	[ATV crew] watch change.
P	2323	11324†		12.76	38.49	low	#140 – pillow tubes
P	2323	11322†		12.76	38.49	low	#141 – pillow tubes.
V	2323	11341®	14	12.770	38.495	261	Shallow slope up to left, tubes and pillows.
L	2324	11300		12.77	38.49	085/ 39°F	Moving oliquely up intact pillow field.
P	2326	11290†		12.76	38.49	low	#142 – pillow tubes.
P	2328	11278†		12.77	38.49	low	#143 – pillow tubes.
L	2329	11250		12.77	38.5	080	Ship finally begins to move!

	Time (PDT)	Depth (ft)	Alt-itude (ft)	Ship's Latitude (°N)	Ship's Longitude (°W)	ATV Hdg (°)/ Turb./ Temp.	Observations
P	2330	11251†		12.77	38.49	low	#144 – pillow tube
V	2333	11237®	14	12.772	39.483	260	Pillows and tubes.
P	2334	11229†		12.77	38.47	low	#145 – pillow tub
P	2334	11229†		12.77	38.47	low	#146 – DDD rock
P	2334	11229†		12.77	38.47	low	#147 – DDD rock
P	2334	11229†		12.77	38.47	low	#148 – rock slop
P	2334	11229†		12.77	38.39	low	#149 – broken p
P	2334	11229†		12.77	38.37	low	#150 – polar be
P	2334	11229†		12.77	38.37	low	#151 – end of p
P	2334	11229†		12.77	38.37		#152 – rock field ... Lights off HMI
P	2334	11229†		12.77	38.37	low	#153 – rock field with bios [biota].
P	2334	11229†		12.77	38.37	low	#154 – rock field with bios [biota].
L	2337	11210		12.77	38.46	082	
V	2340	11226®	8				Large tube pillows, downslope.
V	2343	11250®	17			255	Downslope.
L	2345	11260		12.77	38.41	071	Pillows forever, some (very little sediment between pillows)
L	2346						Tape 9 out, Tape 10 in.
L	2347	11290		12.77	38.39	084 wp	Broken lobate flow.
V	2349	11287®	15	12.777	38.380	260 wp	Upslope again on rounded pillows.
L	2352	11260		12.78	38.36	077/ wp 39°F	Contact with talus slope- old, lots & lots of fauna. Slope is steep - fauna is diverse.
V	2353	11261®	15				Sediment and talus slope.
V	2357	11244®				266	Stop to sample sedimented slope.
L	2359	11240		12.78	38.31	086/ 39.2°F to 39.3°F	Trying for sediment core.
	9694						
L	0003	11240		12.78	38.31	091	Sediment core A91-13C. Lost!!
V	0003	11243®		12.782	38.30		[Core] sample [A91-] 13C in holder C. [Rock sample A91-] 13R1 in bin 14, [rock sample A91-] 13R2 in bin 13. Red-brown sediment around. Marker deployed, #3.
L	0004						A91-13R1. Bin 14. Nice orange red, yellow color to outcrop.
L	0008			12.782	38.30		A91-13R2. Bin 13. A91-13R3 on tray?
L	0012	11244*		12.75	38.3350	39.2°F to 39.3°F	ATV position. Marker #3 at this site. Temperature readings, no heading.
L	0015	11230		12.78	38.31	028/ 39.1°F	Sulfide? Mineralized mound. Trying to sample, dusted.
V	0016	11234®		12.780	39.307	184 to 120	Trying to sample hydrothermal deposit. [Core] sample [A91-] 14C in white soft mound.
V	~0017	11214®	14				Vehicle being pulled up during further attempt to sample.
L	0020	11230		12.78	38.31	351/ 39.2°F	Trying for core.
N	0022.54						SOF A91.14

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	
P	0024	11228†		12.78	38.31	low	#155 – hydro mound.
L	0025	11220		12.78	38.31	39.1°F	A91-14C in core C.
L	0030	11220		12.78	38.31	347/ 39.1°F to 39.2	Chimney? Active barite? white barite caps
L	0032	11214*	14	12.78	38.31		Hydrothermal mound.
P	0032	11216†		12.78	38.31	low	#156 – vent mound.
P	0032	11216†		12.78	38.31	low	#157 – vent mound.
P	0032	11216†		12.78	38.31	low	#158 – vent mound.
P	0032	11216†		12.78	38.31	low	#159 – vent mound.
P	0032	11216†		12.78	38.31	low	#160 – vent mound.
P	0032	11216†		12.78	38.31	low	#161 – vent mound.
P	0032	11216†		12.78	38.31	low	#162 – vent mound.
P	0032	11216†		12.78	38.31	low	#163 – vent mound.
L	0034	11200		12.78	38.31	330/ 39.1°F	Large mineralized mounds; aged.
V	0036	11216®	23				Trying to survey area.
L	0039	11220		12.79	38.31	324/ 39.1°F	Trying to find mounds again.
L	0041	11200		12.78	38.50	39.0°F	Ship is interfering.
L	0046						Ship is still interfering. Backing up ship 50 yards.
L	0049	11190		12.78	38.34		Ship backed up, stopped.
V	0049						Off bottom.
V	0055	11156®	32			284	On bottom on pillows, too high, going downslope. Some temperature fluctuations.
L	0058	11160		12.78	38.34		Trying to find mounds again. Too shallow. Ship is stopped.
L	0058						Some broken pillows have oxidized rinds along bottoms.
L	0100						Sonar info shows basin is 60 ft. across.
L	0103						Ship moving again to the northwest (315°).
V	0103	11160®	32			124	Off bottom, moving ship to gain some tether, trying to get down to mounds.
L	0110	11170		12.79	38.36		Can see bottom again. ATV still is work package mode but seeing transit camera.
V	0111						
V	0112	11188®	14	12.78	38.35	135	Saw definite hydrothermal staining on pillows. Holo[thurians?] around interstices.
L	0113	11180		12.79	38.35	306/ 39.0°F	Nice pillows, long tubular ones.
L	0115	11180		12.79	38.35	320/ 39°F	"Getting deeper".
V	0115	11210®		12.79	38.35		See mound again – pillows in [illegible] have hydrothermal staining and material between them.
L	0116	11207*	25	12.79	38.35	310/ 39.0°F	Back at hydrothermal site. Going to move ship 25 yards in same direction.
P	0116	11213†		12.79	38.35	low	#164 – vent area from 20 feet.

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	
P	0116	11213†		12.79	38.35	low	#165 – vent area from 20 feet.
L	0117	11211	20	12.79	38.35	325/ 39.0°F	Looking at mound.
V	0117						
L	0120	11200		12.79	38.36	325/ 39.1°F	Mounds up ahead.
V	0121	11210®				138	Seeing mound ahead.
L	0122	11200		12.79	38.36	317/ 39.1°F	Possibly active area in front of us.
L	0124						Tell nav center to go another 25 (yards?) ahead.
V	0124	11224®					Trying to move forward to possible chimney.
V	0126	11216®					Nice cold [?] [illegible - indep?]
L	0127	11219*		12.80	38.37	322/ 39.0°F	Mounds in front of us.
L	0129	11220		12.80	38.37	330/ 39.2°F	Temperature 39.2°F.
V	0129	11224®					
L	0134	11220		12.81	38.38	39.2°F	Attempting to sampling black and yellow material. Not successful.
V	0138	11222®					Temperature from 39 – 50 – 52° [F] Went to 75.0 [°F]. 78.6, 79.0° [F] highest temperature.
L	0139.30	11220		12.80	38.38	328/ 52.1°F	Temperature probe reading = 11.2° C.
L	0141.10					75.0°F	
L	0142.30	11220		12.81	38.38	79.5°F	Temperature probe reading. = ~26.4° C.
L	0143						Hi 8 tape changed. End of Tape 10, Start Tape 11.
L	0149	11220		12.81	38.38	321/ 41.2°F	Marker (San Diego Chargers - because of the colors.) Deployed 4 ft. polypro tether.
V	0149.08						Marker. San Diego Charger #2. Camera frame 177 next shot.
P	0151	11223†		12.80	38.37	low	#166 – thermo vent.
P	0151	11223†		12.80	38.37	low	#167 – thermo vent.
P	0151	11223†		12.80	38.37	low	#168 – thermo vent.
P	0151	11223†		12.80	38.37	low	#169 – thermo vent.
P	0151	11223†		12.80	38.37	low	#170 – thermo vent.
P	0151	11223†		12.80	38.37	low	#171 – thermo vent.
P	0151	11223†		12.80	38.37	low	#172 – thermo vent.
P	0151	11223†		12.80	38.37	low	#173 – thermo vent.
P	0151	11223†		12.80	38.37	low	#174 – thermo vent.
P	0151	11223†		12.80	38.37	low	#175 – thermo vent.
P	0151	11223†		12.80	38.37	low	#176 – thermo vent.
P	0151	11223†		12.80	38.37	low	#177 – thermo vent.
P	0151	11223†		12.80	38.37	low	#178 – thermo vent.
L	0152	11220		12.80	38.38	322/ 45.5°F	Emptying core 12C to gather core here of hydrothermal material.

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	
L	0155	11220		12.80	38.38	325/ 48.8°F	Core didn't empty all the way. Dark brown mud in top of core is 12C, Reddish brown is core 15C. Back into core holster A. (NOTE. sample 15C fell out into holster during recovery. Placed into ziplock bag.)
V	0157	11222®					Still on mound. 70°F. Core [sample A91-] 15C in tube A.
L	0158.30	11220		12.81	38.38	325/ 70.5°F	Temperature 70.5°F in mound again.
L	0159.50	11210		12.80	38.38	78.5°F	
V	0200	11222®					Temperature taken again ~76° F.
L	0202	11220		12.80	38.38		Trying to grab a rock sample but can't. Will move around a bit, get another temperature sample and call it quits.
V	0203						
V	0204						Backing off mound.
V	0206	11212®				144	Moving over to another hillock.
P	0207	11213†		12.80	38.37	low	#179 – thermo vent.
P	0207	11213†		12.80	38.37	low	#180 – thermo vent.
P	0207	11213†		12.80	38.37	low	#181 – thermo vent.
P	0207	11213†		12.80	38.37	low	#182 – thermo vent.
P	0207	11213†		12.80	38.37	low	#183 – thermo vent.
P	0207	11213†		12.80	38.37	low	#184 – thermo vent.
P	0207	11213†		12.80	38.37	low	#185 – thermo vent.
P	0207	11213†		12.80	38.37	low	#186 – thermo vent.
P	0207	11213†		12.80	38.37	low	#187 – thermo vent.
P	0207	11213†		12.80	38.37	low	#188 – thermo vent.
P	0207	11213†		12.80	38.37	low	#189 – thermo vent.
P	0207	11213†		12.80	38.37	low	#190 – thermo vent.
L	0208	11220		12.81	38.38	325/ 39.3°F	ATV has moved a little bit and now it's stopped.
V	0208	11220®				145	Mover to another mound. 146° !! 147.1°[F] highest [temperature measured].
L	0210	11190		12.80	38.37	327	Temperature probe reading. 147.1°F (63.3°C) & rising!! Cmr. Wende says "Pull Back!", didn't see any shimmering water. (Temperature probe has a maximum reading of 170°F, didn't want to approach that range.)
L	0214	11210		12.81	38.38	320/ 39.1°F	Ridge top.
L	0215.30	11210		12.81	38.38	320/ 39.0°F	Pillows, constructional feature.
V	0216						Surveying mound.
V	0216						Dropped off mound and saw pillow.
N	0216.57						EOF A91.14
L	0217	11210		12.81	38.38	305/ 39.1°F	Great mound.
N	0217.55						SOF A91.15
L	0218						Turning left.

	(PDT)	(ft)	itude (ft)	Latitude (°N)	Longitude (°W)	Hdg (°)/ Turb./ Temp.	Observations
V	0218	11217®				161	Small mound at base of larger [one]. Going to try to probe it. 44.5° [F]. 45° base of [illegible serial? several?] mound – so looks like cooler at base of large mound.
L	0219						Pillows and mounds.
L	0221	11210		12.81	38.38	332/ 39.0°F	Just stopped to look at mounds and measure temperature.
L	0222.50	11220		12.81	38.38	325/ 46.6°F	Will try to grab a rock sample. It's all hydrothermal material, no basalt. All soft. (Temp is 8° C.)
L	0226						Moving upslope to try and grab rock and temperature
V	0226	11228®	13				94°, 97° [F] maximum.
L	0227	11220		12.81	38.38	324 97.0°F	Temperature.
L	0228.30	11210		12.81	38.37	324 77.7°F	Temperature.
V	0230	11224®	8	12.80	38.38		Storing temperature probe.
L	0233	11210		12.81	38.38	32542° F	Trying to stow temperature probe. Have to be really careful because hose is attached to hydraulics for whole vehicle.
V	0236						Storing temperature probe.
L	0239						Moving toward pillows to try and grab basalt with hydrothermal coating.
L	0241	11210		12.81	38.38	330/ 39.4°F	Stopped to try and get sample.
L	0247						Moving to try and get sample.
L	0254	11170		12.80	38.38	000/ 39.1°F	Basalt sample A91-16R1 and R2 in bin 17.
V	0254						Tried and failed to smple mound. Continued going around mound base.
V	0255	11178®					Sampling basalt. Flat piece of lobate flat piece in after center of main. [Rock sample A91-] 16R1 in bin. Rock sample A91-] 16R2 [in 17?]. Several samples in bin 17. [Rock sample A91-] 16R3.
P	0257	11128†		12.80	38.37	low	#191 – vent field.
P	0257	11128†		12.80	38.37	low	#192 – vent field.
P	0257	11128†		12.80	38.37	low	#193 – vent field.
P	0257	11128†		12.80	38.37	low	#194 – vent field.
P	0257	11128†		12.80	38.37	low	#195 – vent field.
P	0257	11128†		12.80	38.37	low	#196 – vent field.
L	0258	11170		12.81	38.38	000/ 39.1°F	Picture 198.
P	0258						#197 – no strobe. [Time approximate]
P	0258						#198 – no strobe. [Time approximate]
V	0259	11162®					Picture 198. Leaving bottom.
L	0259	11120		12.81	38.37	010/ 39.2°F	Off bottom, END DIVE, END CRUISE.
N	0303.40						EOF A91.15. Dive terminated at 0300.

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