PROTOCOL DREDGE

Cruise No. SO 37	Stat. No. Equipm. 30 DKS	Location 3	Area I
Date 27.5.1985	Protocol written by : Herzig / Cremer		

Pinger on wire 3.00 m from dredge

	Time GMT	Latit. N	Longit. W	Water depth	Wire length	Tension (t)	Remarks
begin operation	0814	15°39.18	170°23.42	1273	—	.2	
begin lowering	0815	15°39.19	170°23.41	1273	—	.2	
+1. bottom contact	0930	15°39.59	170°23.62	1134	1520	2.8	
	0931	15°39.59	170°23.62	1138	1520	3.0	
	0934	15°39.57	170°23.61	1132	1530	2.9	
	0935	15°39.91	170°23.11	1130	1530	3.2	
	0944	15°39.87	170°23.05	1109	1540	4.3	
	0946	15°39.87	170°23.05	1111	1541	5.5	
	0950	15°39.86	170°23.04	1108	1570	3.3	
	0953	15°39.86	170°22.99	1104	1570	4.6	
	0956	15°39.86	170°22.94	1095	1571	4.0	
begin heaving	1003	15°39.84	170°22.86	1151	1515	3.8	
	1007	15°39.82	170°22.87	1153	1431	3.2	
	1008	15°39.81	170°22.87	1154	1403	4.0	
End Bottom Contact	1016	15°39.77	170°22.86	1224	1180	1.8	
Sampling	from ~1200		to	1080 m			
begin heaving	1000	15°39.85	170°22.86	1151	1562	2.6	
end heaving	1051	15°40.20	170°22.40	—	—	—	
end operation							

+Corrected data 15° 39.93' N 170° 23.15' W

ship course ...080°T... calcul. mean water depth.....m

total time of bottom contact.....min ship velocity..1...kts

bottom topography ..... length of dredge section .....m

Result

120.kg Total 90.kg Substrate

....kg Nodules ....kg Sediment

Pings 300 m from wire

	Time (GMT)	Lat N	Lon W	Water depth	Wire length	Tension
Begin Operation	08:14	15°39'19"	170°23'42"	1273	—	0.2
Begin Lowering	08:15	15°39'19"	170°23'41"	1273	—	0.2
+1 bottom contact	0930	15°30'59"	170°23'82"	1134	1520	2.8
End Bottom Contact	10:16	15°30'77"	170°22'86"	1224	1190	1.9

Sampling from 1200 – 1080 m

Begin Hauling	1006	15°39'85"	170°22'86"	1151	1562	2.6

Ship Course 080° T

Ship Velocity 1 Kt

total dredge Wt 120 kg 80 kg substrate

total Wt crust recovery: 30 kg

100% Crust coverage

100% talus

2 generations, older dense, laminar, younger dendritic; no obvious separation (i.e. phosphorite)

Surface topography: Subdued bottryoidal

max. thickness ~ 4 cm
min. thickness ~ 3 mm
} ~2 cm average

2 photos

Biology: red Corals

Gen. Substrates
chalk
phosphorite / volcanogenic breccia

Rock Type:	Hornblende(?) Diorite(?)	Andesite(?)	Trachyte(?)
Color:	Dark greenish-gray (5GY4/1)	medium Brownish-gray (5YR5/1)	Brownish orange pink 5YR 6/2)
Texture:	microgabbroic Intergranular	Intergranular	
Phenocrysts:	Hornblende(?) Augite(?) ±10%, 2mm dia (combined)	±7%, but	Mafics (augite? hornblende?) ±10%
	Plagioclase(?), ±3%, ±2mm dia	Olivine(?) ±5%	Plagioclase ±10%
Groundmass: not differentiated	Mafics – ±42% ≤0.5mm; Felsics – ±45%	Not determined (grainsize too small to resolve w/ handlens)	-do-
Vesicles:	none (dense)	±3% irregular vesicles, ~1mm dia, none w/ filled w/ calcite avge	absent (dense)
Alteration:	moderate (oxidation, smectitization weathering rind peripheral to sample clasts; smectitization of some groundmass material(?) & plagioclase(?) pxts	extensive (oxidation of many groundmass mafics; smectitization, zeolitization(?); $Fe(OH)_3$(?) deposited along numerous fractures. Olivine(?) is altered universally to greenish-white smectite.	superficial (oxidation of some groundmass components, smectitization of some feldspars
Remarks:	large angular cobble-size clasts, edges somewhat rounded; has basically the same mineral assemblage as andesites(?) from other areas in this site (i.e. 28DS-1). Only the grainsize is coarser; has numerous blocky, small xenoliths of much coarser diorite(?) included. may be a fragment of a dike or trap-rock. occurs as talus with thin patina of cuticle ferromanganese oxide encrustation	-do-	Small cobble-size, rounded talus clast w/ patina of phosphorite then dendritic ferromanganese encrustation; origin of cobble unknown but appears to have been subjected to subaerial water working prior to incorporation in slope debris volcanogenic breccia, density suggests that it may have been injected as trap.

Sample No:	30 37 30 DS4	30 37 30 DS5	30 37 30 DS6
Rock Type:	Andesite? Hyaloclastite Breccia	→ -do- Volcanogenic Breccia	→ -do-
Color:	Greenish-gray (5GY 6/1) to moderate brown (5YR 3/4)	Light olive gray (5Y 5/2) (mean color)	Moderate yellowish-brown (10YR 4/2) (matrix) to very pale orange (10YR 8/2)
Texture:	Pyroclastic	clastic	→ -do-
Framework Grains:	Andesite? hyaloclasts ±45%, ±3 mm dia Andesite? clasts ±5%, ±5 mm dia Hornblende? crystals } ±10%, ±2 mm dia Augite? crystals } openspace ±20%, ±1 mm dia	→ -do-, ±18%, also, trachyte clasts, ±5%, phosphorite clasts ±5% → -do-, ±30% → -do-, } ±5% → -do-, ±8%	andesite? clasts only, ±30%, ±1 mm dia
Cement:	Zeolites (phillipsite?) ±20%	Phosphorite ±35%	→ -do-, (±70%, use densely phosphorized)
Average grain size:	±2 mm (range: ≤1 mm – 1 cm)	±1 mm → (Range: ≤1 mm – 1 cm) -do-	±1 cm (range: ~5 mm → ±2 cm)
Average grain shape:	Subangular	Subround	angular
Sorting:	moderately poor	poor	extremely poor
Porosity	Very high	→ Very high	Moderately high
Permeability	High	→ High	Very low
Alteration:	extensive (Oxidation, Smectitization, zeolitization)	} -do-; also phosphorization of original chalk cement	→ -do-
Remarks	Not abundantly retrieved with dredge material, but found as clasts w/ 1 cm ± thick 2 generations of dendritic internal growth, subdued botryoidal externally (ferro) manganese crust; probably outcrop and talus as well; resembles other such deposits from "Black Friday Ridge"	Apparently extensive, though rather thin (±3.5 cm) irregular thickness bedded deposit related to 30 DS4 (phosphorite cement instead of zeolite, more closed texture, more varied component matrix) is both undergirded and capped by other volcanogenic breccia units whose cement is phosphorite, and the volcanic components are less abundant and more rudaceous; the whole of these three units (represented in this sample) is capped by ±0.5 cm-thick, 2 generation, (lower laminar, upper dendritic), largely and subtly botryoidal externally, w/ finely nodose supertopography); the main unit (30 DS5) in this stratigraphic cross-section displays faint poorly-defined bedding; occurs as both outcrop & talus.	Plat slab of talus encrusted w/ ferro manganese deposit; large cobble-size in dimension; contains slabby, prismatic clasts of andesite set in partially-phosphorized chalk. Some of the slabby clasts bear ±1 mm-thick crusts on their under-sides. The chalk-phosphorite cement is penetrated by tolerantly dendrites; may represent a dislodged, disaggregated fragment of a bedded unit. -do-

...ck Type:	Andesite, Volcanogenic Breccia	Andesite(?) Hyaloclastite Breccia	→ -do-
...olor:	Olive gray (5Y 4/1) matrix to grayish-orange	Greenish-gray (5GY 6/1) to moderate brown (5YR 3/4)	Olive gray (5Y 4/1) to very pale yellowish-orange (10YR ...)
...re:	clastic	→ pyroclastic	≠ clastic
...ramework grains:	Andesite(?) clasts ±10%, ±1 cm dia; Trachyte clasts ±10%, ±1 cm dia	→ -do-, but ±50%, up to 3 cm dia. Andesitic hyaloclasts, ±40%, up to 2 cm dia	→ -do-, but, ±20%, ±5 mm dia. avge; → -do-, but ±25%, ±5 mm dia avge; & phosphorite clasts, ±10%, ±5 mm dia avge
...ment:	phosphorized foraminiferal chalk, ±80%	≠ Zeolites ±10% (Phillipsite?)	≠ phosphorite, ±35%
...erage grain size:	±1 cm (matrix); ≤0.20 mm (cement)	→ ±1 cm	≠ ±0.5 cm
...nge:	±2 mm–±1.5 cm	(range: ≤0.5 mm–±3 cm)	(range: ≤1 mm – 2.5 cm)
...erage grain shape:	subangular	→ -do-	≠ angular, but a number are subrounded
...rting:	extremely poor	→ -do-	→ -do-
...rosity:	Very high	≠ High	≠ Moderately high
...meability:	Very low	≠ High	≠ Very low
...eration:	penultimate (oxidation of some of matrix clasts groundmass, zeolitization, smectitization, phosphorization.	variable – some pieces of andesitic(?) matrix are only superficially smectitized, zeolitized; others are insensely so, and oxidized as well	≠ penultimate (smectitization, zeolitization, oxidation of matrix components, phosphorization of cement)
...marks:	See 30 DS 5	Probably a variant of 30 DS 4 but is composed of very large (pebble-size) subangular-to-subrounded clasts included in andesitic(?) hyaloclastite and forming rounded, flattened cobble-size, ferromanganese-encrusted (see 30 DS 4) talus clasts; (also available as outcrop); the clasts in this breccia, however are often nearly scoriaceous andesitic(?) material	Similar to other V.B.'s from this dredge, but contains a wider range of volcaniclastic components; framework grain components seem as a general statement to have been subjected to far less subareal water-working than many other of the V.B.'s from "Black Friday Ridge"; occurs as both outcrop and talus, and is coated with ferromanganese oxide deposit as in 30 DS 4.

...mple No: S03730 DS 10

...k Type: Andesite(?)/Phosphorite Volcanogenic Breccia.

...or: Moderate yellowish-brown (10YR 5/4)

...ture: Clastic

...mework grains: pebbles of other phosphorized V.B.'s ±25%, ±2 cm dia; phosphorite intraclasts ±10%, ±3 mm dia.; Andesitic(?) hyaloclasts ±5%, ±2 mm dia; " rock fragments ±5%, ±2 mm dia

...ment: dense phosphorite ±55%

...ge grain size: ±2 mm dia.

...ge grain shape: Subangular

...ting: poorly sorted

...osity: Very low

...eability: Extremely low

...eration: Total (phosphorization of nearly everything; zeolitization(?), Smectitization, Oxidation of matrix components)

Remarks: cobble-size talus clast; no pieces of outcrop seen; covered by thick ≥ generation laminar/dendritic ferromanganese oxide crust, as in (30 DS 4); strange inclusion of pebble-size subrounded pieces composed of other, similar phosphorite breccia; main "cement" of this lithology displays a high degree of stratification, is very hard, heavy and dense, though for all the advanced state of phosphorization, foram "ghosts" and pellet(?) "ghosts" can still be observed in abundance