PROTOCOL DREDGE

Cruise No. SO 37	Stat. No. Equipm.	Location	Area
7	15 1) ~~BK~~ DS	III	I

Date 29/05 1985 | Protocol written by : Henzig / Commeau

Pinger on wire 300 m from dredge Kettensackdredge

	Time GMT	Latit. N	Longit. W	Water depth	Wire length	Tension (t)	Remarks
begin operation	08.55	15°41'.11	170°20'.70	2062	0000	.2	
begin lowering	09.00	15°41'.16	170°20'.62	2091	0000	.2	
+1. bottom contact	09.58	15°41'.34	170°20'.15	2260	2295	1.8	
Ship Moving forward	09.59	15°41'.34	170°20'.19	2254	2344	2.0	
	10.33	15°41'.11	170°20.57	1802	2596	3.3	
	10.35	15°41'.11	170°20'.60	1815	2594	4.1	
	10.38	15°41'.11	170°20'.64	1769	2592	4.3	
	10.54	15°41'.06	170°20'.87	1618	2589	4.6	
	11.05	15°41'.06	170°20.95	1496	2438	4.5	
	11.13	15°41.05	170°21.02	1411	2294	4.3	
	1120	15°41.04	170°21.10	1357	2157	5.9	
OFF BOTTOM	1139	15°40.93	170°21.45	1175	1709	2.0	
begin heaving	11:00	15°41'.06	170°20'.90	1497	2589		
end heaving	1217	15°40.85	170°21.67	1082	998 (?)		
end operation	1230	15°40.90	170°21.65	1095	—		

+Corrected data 15°41.76 N 170°20.64 W

ship course ...244°..... calcul. mean water depth.....m

total time of bottom contact 1 HR 37 min ship velocity 1 ...kts

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

Result

200 kg Total 175 kg Substrate

5 kg Nodules - kg Sediment

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5037 -15 DS Area I

bottom Contact 09.58 GMT - 15°41.34' 170°20.15' 2260m,
Off Bottom 11.39 GMT - 15°40.93' 170°21.45' 1175m,
2440 CS,

200 kg Total
5 kg Nodules
20 kg Crusts

175 kg Substrate
No Sediment
No organisms

98% encrusted
90% broken from outcrop
< 1% nodules

Thickest Crust - 1.5 To 4 cm
Thinnest Crust - patina
Average - 0.5

No obvious encrusting forams
No organisms
50% botryoidal, 50% Thin-smooth, some granular black
No obvious internal structure-

	1	2	3
ock Type:	Alkali Olivine Basalt ≠	Andesite (?) →	-do-
olor:	Medium dark Gray (N4) ≠	grayish brown (5YR 4/2) ≠	Dark gray (N3)
xture:	Phyric intergranular →	-do- (melaphyric) ≠	subaphyric intergranular strong flow structure, orientati
enocrysts:	Olivine, ±20%, ±2mm dia Pyroxene (aegirite-diopside?) (very bright green) ~3%, ≤1mm dia. ≠	Pyroxene (Augite?), ±5%, ≤1mm Amphibole (Hornblende?) ±5%, ≤1mm Plagioclase(?) very rare ≪1%, ≤1mm	-do-, but <1%, <1%, ≪1% seen: 1 titanite(?) phenocrystal honey yellow
oundmass:	Plagioclase? Olivine? Pyroxene? Opaques? (not determined) ≠	Plagioclase? Augite? Hornblende? Opaques? (not determined)	-do- (?) (not determined)
esicles:	absent (trap rock?) ≠	%: ±2% shape: irregular → size: ±1mm dia. filling: lined w/ calcite(?) ≠	±3% -do-, elongate irregular ±3mm long tinedy w/ phillipsite filled
lteration:	moderate (smectitization, oxidation [iddingsitization of olivines]) ≠	partial/superficial (partial oxidation of mafics in groundmass, smectitization?) →	-do-, (zeolitization, smectitization)
ks:	rare, loose angular clasts in dredge; the pyroxene is nearly emerald green, diaphanous — great evidence for alkalic nature of the basalt. curious that it should be almost xenolithic amid the andesitic rocks which predominate in Area I — also, bears no evidence of manganese deposition or adhering cement, as most sample from this area do??? perhaps not from this area!	Most abundant primary igneous rock in dredge; usually found as angular clasts of vastly varying dimensions (sand-boulder size) incorporated in various volcanogenic breccias. curious rock that, were it lacking vesicles, should be called lamprophyre, since most of the phenocrysts are mafics, but this is not the case (plagioclase confined to groundmass?)	rare in dredge - occured as small boulder in andesite volcanogenic breccia, strong flow orientation, giving the rock a wood-like texture w/ "stairstep" fracturing, again, lamprophyric-like 15DS2

4	5	6
Rock Type: Trachyte	Andesite(?) Volcanogenic Breccia	-do-
Color: Pale olive gray (5Y 6/2)	Grayish yellow green (5GY 7/2) (matrix)	Pale yellowish green (10GY 7/2) (matrix andesite, color of matrix trachyte clasts)
Texture: trachytic(?) (not apparent in hand specimen)	very pale orange (10YR 8/2) (cement)	
	Clastic	-do-
Phenocrysts: Sanidine <1%, ±2mm dia; Amphibole <1%, ±2mm dia	(Framework Grains): Andesite clasts ±70%, ±2mm avge dia; Augite(?) crystals ±5%, ±1mm dia; Hornblende(?) crystals ±5%, ±1mm dia.	-do-, but ±58%; -do-, but ±1%; but ±1%.
Groundmass: Sanidine(?) (not differentiated)	(Cement): chalk/Phosphorite, ±20%.	Trachyte clasts, ±20%, ±2mm dia; but zeolite cement, open ±10%, ±10%
	(Sorting): Moderately poorly sorted	-do-
Vesicles: absent (dense)	(Average grain size): ±2mm (range: ≤0.10mm – 12mm)	-do-
Alteration: partial (smectitization [nontronite], zeolitization?) penetrated peripherally by todorokite(?) dendrites	(Average grain shape:) angular	-do-
	(Porosity) Very high	Extremely high
	(Permeability) Very high	High
Remarks: found as subrounded pebbles in volcanogenic breccia; apparently not of any great abundance at this site; probably derived from eruption at greater elevation and brought to present location by submarine debris flow.	(Alteration) superficial partial (smect. phosph.) -do-, also as loose manganese encrusted talus cobbles and boulders (manganese crust varies greatly in thickness – dendritic botryoidal, w/ finely-botryoidal supertopography) appears to be of fairly uniform grainsize with occasional clasts (more oxidized, less smectitized) of andesite of cm+ size range; likely that this deposit was erupted in hyaloclastite-like fashion, admixing pre-existing andesite clasts; some pieces are capped with very pale orange (10YR 8/2) phosphorized chalk (same material that forms the cement)	moderate-total (smectitization, zeolitization, carbonation) -do-, seems a mixture, gradational type between VB 15DS5 & VB 15DS7

	7	8	9
Rock Type:	Trachyte Volcanogenic breccia	Andesite/Trachyte Volcanogenic Breccia	Phosphorite
Color:	pale yellowish-brown (10YR 6/2) to very pale yellowish-orange (10YR 8/2)	Grayish-brown (5YR 3/2) (matrix) → do → very pale yellowish-orange (10YR 9/1)	Pale yellowish-brown (10YR 6/2)
Texture:	clastic	→ do -	microgranular
framework grains:	Trachyte clasts ± 65%, ± 4 mm dia; Andesite clasts ± 5%, ± 4 mm dia; Augite(?) crystals ± 5%, ± 2 mm dia; Hornblende(?) crystals ± 5%, - do -	Andesite clasts, ± 25%; Trachyte clasts, ± 10%; Ferromanganese crust clasts, ± 5%; Aug(?) crystals ≤ 1% ± 2 mm dia; Hornblende(?) crystals, ≤ 1% ± 2 mm dia	± 5% Andesite, trachyte clasts
cement:	zeolites, apatite(?) ± 20%	apatite (phosphorite) ± 60% (degree of phosphorization varies from pale to dark pink) → - do -, ± 90%	
Average grain size: (range: ≤ 0.10 mm - ± 8 cm)	± 2 mm	± 5 mm	
Average grain shape:	Subangular	angular → - do - (calc-alkaline clasts)	
Sorting:	very poorly-sorted	poorly-sorted → very inhomogeneous	
Porosity:	Extremely high	Low → - do -	
Permeability:	Extremely high	very low → - do -	
Alteration:	Nearly total (smectitization, zeolitization, phosphorization)	very extensive (phosphorization of clastic cement, smectitization, zeolitization, oxidation of matrix clasts)	complete (phosphorization of original foram chalk)
Remarks:	Angular clasts dislodged by bridge from outcrop; also included in talus deposits as clasts as units ± 5 cm thick interbedded w/ other volcaniclastic rocks units in stratified deposits. Very curious alteration - peculiar to trachyte clasts (see 9DK 4, 5), replacing sanidine and amphibole w/ apatite, calcite, phillipsite, smectite, leaving a skeletal, relict trachytic texture to the "pseudomorph"; Serves as substrate for ferromanganese crust of varying thickness - dendritic, botryoidal in internal and external structure; some solution texture observed)	- do -	flat, beam-shaped, rounded clasts of cobble size, forming large, flat rock coated with varying thicknesses of ferromanganese crust, probably dislocated as such from stratified deposits of 15DS5-8, which bear similar phosphorite deposits below ferromanganese crusts. The phosphorite contains clasts of altered trachyte, andesite, may represent simply a more clast-poor 15DS8

	10	11
ock Type:	Phosphorized Chalk →	Phosphorite
!	light gray (N7) to very pale yellowish-orange (10YR 9/6) ≠	very pale orange (10YR 9/2)
exture:	granular to spongy, cavernous →	spongy
atrix:	foraminiferal tests ±10%, ferromanganese micronodules, ±5%, open space ±35% ≠	open space ±50%
ment:	apatite ±50% →	-do-
verage grainsize:	±0.10 mm →	-do-
verage grainshape:	round →	-do-
orting:	well-sorted	
rosity:	Extremely high →	-do-
rmeability:	→	-do-
teration:	moderate-high (phosphorization of foraminiferal tests, solution, redeposition of $Fe(OH)_3$ (?) on walls of worm tubes, $MnO(OH)_3$ as micronodules & dendrites in matrix?) ≠	→ complete (Phosphorization)
marks:	capping deposit on volcaniclastic debris beds, underpinning, frequently for ferromanganese crust deposits; is sometimes itself clastic debris (talus) and enclosed in ferromanganese crust (pancake nodules); frequently (almost universally) burrow by clams or worms in long, sinuous round tubes; these are coated w/ $Fe(OH)_3$ (?) & for $MnO(OH)_3$ deposits derived from solution and redeposition of overlying ferromanganese crust; phosphorization is partial and patchy; apparently 2 generations deposited in some specimens — bedding plane accentuated by worm?/clam? activity — upper deposit is more phosphorized and manganized and harder; lower deposit is thicker, more inhomogeneously phosphorized, rather	like 15 DS 10, but more massive, less burrowed, more phosphorized: very porous, spongy — shells of foram tests have been replaced w/ apatite, hollow interiors joined w/ others yielding a honeycomb spongework