PROTOCOL DREDGE

Cruise No. SO 37	Stat. No. Equipm.	Location	Area
23,5	9 DK	II	G

Date ~~22.5~~ 1985 | Protocol written by : Halbach, Puteanus

Pinger on wire 300 m from dredge

	Time GMT	Latit. N	Longit. W	Water depth	Wire length	Tension (t)	Remarks
begin operation	0705	14°27,68	169 01,051	2091	–	–	
begin lowering	0710,36	14°27,676	169°01,100	2100	0	0.2	
+1. bottom contact	0742,46	14°27,68	169°01,041	2110	2120	3	
	0821,52	14°27,55	169°00,49'	1760	2313	3,7	
	0823,24	14°27,54	169°00,44'	1750	2313	7,8	
end bottom contact	0854,00	14°27,40	169°00,08'	1780	1820	2,8	
begin heaving	08 45.0	14°27,45	169°00,30	1780	2310	3,0	
end heaving	09 25.10	14°27,46	169°00,13	1760	0	–	
+end operation	09 28.40	14°27,45	169°00,16	1760	0	–	

+Corrected data 14° 27.69 N 169° 1.03 W

ship course 130° calcul. mean water depth 1680 m

total time of bottom contact 70 min ship velocity 0.8 kts

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

Result

250 kg Total 230 kg Substrate

/ kg Nodules 1 kg Sediment

5037 9DK (Area G) Station Data 5-22-95

Finger on wire 300 m from dredge

	Time (GMT)	Lat N	Long. W	Water Depth	Wire length	Tension
Begin Operation:	0705	14°27.68	169°01.057	2091	—	
Begin Lowering:	0710.36	14°27.676	169°01.100	2100	0	0.2
+1 bottom contact:	0742.46	14°27.68	169°01.041	2110	2120	3
end bottom contact:	0854.00	14°27.40	169°00.08	1780	1820	2.8
begin heaving	0845.0	14°27.45	169°00.30	1780	2310	3.0
end heaving	0925.10	14°27.46	169°00.13	1760	0	—
end operation	0928.40	14°27.45	169°00.16	1760	0	—

Ship course 130° Calc. mean water depth ~1680m

Total time of bottom contact 70 min, Ship reloc. 0.8 knots

Bottom topography slight slope

Major Hits ~1680-1765m

Vital Statistics:

250 kg total dredge

60% talus; 40% broken from outcrop

95% of substrate covered w/ crust

0% nodules

Thickest crust — 4 cm
Thinnest crust - Veneer
} avge 0.75 cm

botryoidal surface topography

One generation; black granular crusts on sides

encrusting organisms rare.

photographed with dredge & limestone

Gen. substrates.

Basalt hyaloclastite Volcanogenic breccia

Basalt

Chalk

	9DK1	9DK2	9DK3
ock Type:	AOB, scoriac	AOB Hyaloclastite	AOB Volcanogenic Breccia
olor:	Dark brownish-gray (5YR 3/1)	Moderate brown (5YR 4/4 to 5YR 3/4) (framework grains) to yellowish-orange (10YR 7/6) (cement)	→ -do- (the darker brown) orange pink (5YR 7/4)
exture:	Subaphyric intergranular	pyroclastic	clastic
henocrysts:	Olivine rare! (single-iddings) ≤ 1mm dia, <1%	(framework grains) AOB hyaloclastite fragments ±50% ~26cm avg. dia.	→ -do- but only ~25% basaltic clasts ~10% ≤ 1.5cm dia.
icrophyric	Augite(?) rare! ≤ 1mm dia, <1%	(Matrix): fine hyaloclastic fragments ±50% total	phosphorite, ±75%
		(Cement): smectite, zeolites, calcite	
roundmass:	plagioclase, Olivine, augite(?), opaques (not deter.)	(Average grain size: ±2mm dia. (range 0.20mm—15mm))	±1.5cm dia.
		(Average grain shape): subangular	angular
		(Sorting): moderately poorly sorted	extremely poorly-sorted
		(Porosity): very high	Moderate
		(Permeability): very high	Moderate
		Alteration: total (smectitization, oxidation, zeolitization, carbonation)	partially complete (phosphorite solution, redeposition of Fe and Mn-oxide crust, smectitization, oxidation of basaltic clasts)
		Remarks: most pieces are loose, rounded nodule complete encrusted with ferromanganese oxide deposits of varying thickness (2 generations on thicker pieces, with no phosphorite band separating dendritic internal growth botryoidal and microbotryoidal topography; external topography ridges ranging from patinas to 4.5 cm), some pieces display two or three changes in states of alteration; this hyaloclastite is the "tightest" of any represented in this dredge, and it begins to develop open spaces between hyaloclastite matrix clasts (smectites softened and leached away?); in some specimens, (?) coccolith ooze has penetrated the interstices left on leaching of the smectite/hyaloclastite cement; sometimes, the uppermost layer, directly beneath the manganese crust is found to be cemented with phosphorite & ferro-	→ small pebble- to boulder-size talus fragments completely encrusted with ferromanganese oxide deposits — do — probably of similar origin to 9DK1 & 2, with coccolith ooze housing fragments and clasts of 9DK1, subsequently phosphorite & indurated; much open space observed - possibly caused by additional leaching of 9DK2 phosphorite cement colored by downward-diffusing $Fe(OH)_3$?

Remarks: Much of the dredged material was loose, ferromanganese oxide covered talus (pebbles through boulders size), and the basalt was found incorporated in volcanogenic breccias as framework clasts. very likely erupted subaerially and washed down the slopes of the seamount by weathering incorporated into volcanogenic breccias.

* freshness of the basalt varies greatly from piece to piece.

	4	5	6
Rock Type:	Trachyte Volcanogenic Breccia	Trachyte	phosphorized foram. chalk
Color:	White (N9) to very pale greenish-yellow (10Y 9/2) to pale grayish-yellow (5Y 9/4)	→ -do-	→ very pale yellowish-orange (10YR 8/2) to very pale orange (10YR 8/2)
Texture:	granular / crystalline	→ -do-	→ -do-
Matrix:	foraminiferal test chalk	→ -do-	→ -do-
Framework grains:	Trachyte clasts, ± 90%, ± 2 cm avg. dia.		
Cement:	foraminiferal ooze, ± 10%	recrystallized calcite, phosphorite?	calcite, apatite?
Average grain size:	0.5 cm (range: ≤ 0.10 mm — 5 cm)	≤ 0.10 mm	→ -do-
Average grain shape:	subangular	angular (prismatic)	→ -do-
Sorting:	extremely poor	well-sorted	→ -do-
Porosity:	Extremely high	→ -do-	Moderate
Permeability:	Extremely high	→ -do-	Low
Alteration:	Intense (recrystallization, zeolitization of tuffs, spar of calcite from foram tests, phosphorization(?) of calcitic components, solution, redeposition of overlying ferromanganese deposit forming veinlets, bioturbated along fractures (Mn & Fe), totally altered dendrites within recryst. chalk (Mn)	→ -do-	→ -do- partial phosphorization, infiltration of $Fe(OH)_3$ to dor kite(?) from remobilized Fe, Mn from overlying ferromanganese crust
Remarks:	appears to be an auto-breccia composed of clasts of 9DK5 cemented by foraminiferal ooze; curious directed texture of MnO_2(?) dendrites in the trachyte clasts. numerous vugs lined with scalenohedral calcite prisms. Trachyte volcanic clasts frequently display little effervescence w/ HCl soln., yet are nearly as soft as the ooze cement which effervesces vigorously; the greenish color of the intraclasts is probably residual nontronite. Serves as substrate for dendritic ferromanganese crust with knobby, warty topography and finely botryoidal supertopography.	Similar to 9DK4 but appears to be its source material (suffused w/ directed dendritic Mn oxide, cross-cut by $Fe(OH)_3$(?) & Mn(OOH)? veinlets, colored very faintly yellowish-green.) → -do-	thick (> 5 cm) deposit of homogeneous foraminiferal chalk, partially replaced w/ apatite, overlain by thick (± 5 cm) ferromanganese crust
		→ -do-, but w/ finely-nodose supertopography	← -do-, w/ finely botryoidal supertopography

chiltoclasts quite randomly oriented.