DATE: 19 August 1984 SAMPLE: 56 DK box dredge
CRUISE ID: SO 33
LOC: VII
AREA: E

	time (GMT)	LAT (N)	LON (W)	water depth (m)	wire o
ON BOTTOM =	1521	15°35.38	169°12.44	1555	145
OFF BOTTOM =	1637	15°36.59	169°12.08	1484	148

RECOVERY WEIGHT = total 13 kg crust 3 kg
10 kg basalt + hyaloclasti

CRUST THICKNESS = 1–5 cm Avg = 2.5 cm
2 generations

SUBSTRATE = Basalt + hyaloclastite

COMMENTS:

* microbio sample

+ confidential

56. DK

	1	2
Rock Type:	Basalt (AOB?) Hyaloclastite I	→ -do- I
Color:	Moderate reddish-brown (matrix) (10 R 4/6)	Grayish yellow (5Y 8/4), (matrix) Olive gray (5Y 3/2)
Texture:	Pyroclastic	clastic
Matrix:	Basaltic glass shards, ±67 " rock fragments, ±3	→ -do- ±50%
Cement:	Zeolites, ±15% Phosphorite ±12% Calcite, ±3%	Phosphorite, calcite, zeolites, } ±50% (intimate mixture?)
Average grain size:	±1mm (range: fine sand - fine gravel)	±2mm (fine sand to medium gravel)
grain shape:	angular - subrounded	angular - subangular
Sorting:	moderately poorly sorted	poorly sorted
porosity:	±80%	±45%
permeability:	±80%	±5%
Alteration:	complete; (oxidation, hydration, zeolitization, smectitization, phosphorization, carbonation)	complete; (zeolitization, smectitization (montronite?) hydration, phosphorization, carbonation)
Remarks:	Similar to material from the previous two dredges, perhaps of the same derivation. In some specimens, cement is largely calcite and zeolites; in others, the calcite has been replaced with phosphorite and the degree of zeolitization varies from specimen to specimen, serves as substrate for encrustation of ferromanganese (±25 mm thick) deposit (knobby, warty surface); oxidation & zeolitization seem to be the dominant reactions in this alteration rock; curious development of very regular polygonal shapes of many matrix fragments; result of zeolite crystal growth (fer phenol to fragments?)	→ -do-, but type of alteration cementation is different, coloring the matrix fragments differently and creating different composition and color of cement → ±10mm thick encrustation of ferromanganese oxide

Some pieces have curious beds (± 2 cm thick) composed of phosphorized calcareous worm(?) colonies(?); these are found between the hyaloclastite and ferromanganese crust.

3	4
Rock Type: chalk-phosphorite	AOB(?) Hyaloclastite III
Color: [Very pale orange (10YR 8/2) usually stained externally by $Fe(OH)_3$(?) to pale yellowish-orange (10YR 8/6) to dark yellowish-orange (10YR 6/6)]	
Texture: microgranular	pyroclastic
Matrix: Globigerina(?) & globorotalia(?) test remnants and "ghosts" left by phosphorization process, 15-20%	Hyaloclastite fragments, ± 65%
Cement: phosphorite (francolite?) 80-85%	smectite, zeolites } ± 35% (undifferentiated)
Average grain size: < 0.010 mm (range: 0.005(?) — ± 1 mm)	0.50 mm (range: 0.10 mm — 5 mm)
" **grain shape:** round — acicular(?) (probably)	subangular - subrounded
Sorting: well sorted (prior to phosphorization)	moderately poorly-sorted
Porosity: ± 5%	± 30%
Permeability: ± 1%	± ± 60%
Alteration: extensive - nearly complete (phosphorization of calcite, oxidation of of siderite(?))	→ Complete (?) (oxidation, zeolitization, argillation, hydration, calcification, phosphorization?)
Remarks: fragments and clasts ranging from small pebbles to boulders, dislodged by dredge from outcrop(?); forms cap several mm to ± 1 cm thick ontop of 56 DK 1 & 4 lithologies; frequently composed in part of large (± 5 mm dia) meandering calcareous (phosphorized) worm tubes(?) the shells of which are concentric in development parallel to X-sections of the tubes, with central tubular channel 1-5 mm dia. Serve as substrate for knobby, botryoidal (grossly) (finely nodose) surficial 1-generation dendritic ferro-manganese crust; this crust delivers some $Fe(OH)_3$(?) by downward diffusion to underlying substrate altering color and compositions.	→ fragments and clasts ranging from small pebbles to boulders, dislodged by dredge from outcrop(?), probably related to 56 DK 4 and 2, just different types of cementation and alteration involved in lithification and diagenesis; generally much more dense and lithified than 56 DK 4, some of which is so friable as to be fragile (uncemented). Margins of grains are well-defined as with mineral overgrowth (dark — perhaps thin ferro-manganese oxide coating); internally some are highly altered to $Fe(OH)_3$(?) or perhaps goethite (reddish-brown color) in the interiors; exteriors are bleached or altered to montmorillonite(?) — must use this way all the way through — similar to 56 DK 2; serves as substrate for ferro-manganese oxide deposits (like those) as in the other lithologies of this dredge