DATE: 22 August
CRUISE ID: SO33
LOC: VII
AREA: E

SAMPLE:
62 DK

box dredge

	time (GMT)	LAT (N)	LON (W)	water depth (m)	wire o
ON BOTTOM =					
OFF BOTTOM =					

RECOVERY WEIGHT = total 10 kg (1 boulder) crust 2 kg

CRUST THICKNESS = 0.5 - 2 cm Avg = 1.5
knobby

SUBSTRATE = hyaloclastite
1 boulder

COMMENTS:

* bio sample

* confidential

62 DK

SO33 60GK

Rock Type: Basaltic Hyaloclastite (AOB(?))

Color: Moderate brown (5YR 3/4)

Texture: Pyroclastic

Matrix: Basaltic glass fragments, shards

Cement: Calcite(?)

Average grain size: (Range: Sand to coarse gravel size) (± 1mm avg)

" grain shape: angular

Sorting: moderately poor

Porosity: ± 50%

Permeability: -do-

Alteration: Complete? (oxidation, hydration, iddingsitization of olivines, sweetitization, zeolitization(?) of glass)

Remarks: Single ferromanganese crust-covered slab (± 5 mm thick knobby warty surface) ± 6 inches long by ± 3 inches wide, by ± 1 inch thick hyaloclasts apparently cemented, lithified in primary place of deposition as there is little evidence of reworking of the matrix material

(* no sample was given)

SO33 62DK1

Olivine [Tholeiitic(?)] basalt

Pale brown (5YR 5/2)

Phyric; intersertal

(Phenocrysts) Plagioclase, ±15%, ± 2 mm avge (wide variation)
Olivine, ±10%, ± 2 mm avge (-do-)
Clinopyroxene, ±5%, ± 1 mm avge

(Groundmass) Plagioclase, Clinopyroxene?, Olivine, glass?, opaques? (not determined)

(Vesicles:) %: 35%
Size: ± 1 mm (large variation)
Shape: round to irregular
filling: zeolites, calcite

extensive (oxidation, hydration, sweetitization, iddingsitization of olivines; carbonate, zeolitization)

Large cobble-size rounded clasts (wave-worked subaerial?) displaying effect of both chemical and mechanical weathering; probably oxidized in part (iddingsitization) prior to eruption; clasts display zone (± 1 cm thick) of peripheral exposure weathering; feldspar phenocrysts display strong zonation (changes in magma chemistry prior to eruption); probably a subaerial flow basalt (flow structure evident, large oblate vesicles); serves as substrate for deposition of ± 2 cm-thick encrustation of knobby, warty ferromanganese oxide.

	SO33 62DK2	SO33 62DK3
Rock Type:	Tuffaceous(?) Phosphorite	Phosphorized(?) Chalk
Color:	Yellowish-gray (5Y 7/2)	very pale orange (10 YR 8/2) to very light gray (N 8)
Texture:	granular	→ do -
Matrix:	unconsolidated phosphorite, smectitized tuff(?), manganese micronodules, dendrites } 50-90%; 10-50% (varies — deposit inhomogeneous)	calcareous foraminiferal tests, manganese micronodules } (variable proportions)
Cement:	— absent	calcite, phosphorite (francolite?) (minor) (variable proportion)
Average grain size:	± 0.10 mm	± 0.75 mm
" grain shape:	(equidimensional)(?)	round
Sorting:	(not determined)	moderately well-sorted
porosity	(- do -)	90+ %
permeability:	(- do -)	70+ %
Alteration:	complete tuff(?) component completely altered to smectite(?); calcareous component completely altered to phosphorite.	partial, superficial (recrystallization of calcite incipient to extensive phosphorization, superficial, local infill, rarity of $Fe(OH)_3$?)
Remarks:	fragments (lumps) of discontinuously bedded, largely unconsolidated phosphorite sediment ± permeated with manganese micronodules, dendrites; probably a foraminiferal ooze with volcanic ash(?) component; serves as substrate for deposition of ferromanganese crust (± 5 mm thick, knobby, warty surface topography)	pebble-size fragments of chalk deposit of unknown thickness, probably dislodged from outcrop by dredge; evidence of inhabitation by worms(?) (round, tubular sections penetrate the chalk, ± 8 mm dia); distribution of alteration discontinuous throughout the chalk, giving a mottled appear of various color tones; in some pieces, phosphorization is complete, the rock is dense, colored various shades of yellow by penetrating $Fe(OH)_3$(?); This material is deposited between volcanic substrate and encrusting manganese oxide; various septae found loose in dredge, representing phosphorite fracture fillings in softer sediment. Serves as substrate for (external morphology) botryoidal, knobby ferromanganese oxide crust with finely nodose surface subtopography, with one generation of dendritic (internal morphology) structure up to 1 cm thick

± Gives (+) test for phosphorus, does not react with HCl

	SO33 62DK4	SO33 62DK5	SO33 62DK6
Rock Type:	AOB(?) Hyaloclastite	Tuff, AOB(?)	Phosphorite Breccia
Color:	Moderate reddish-brown (10YR 4/6)	Grayish-orange (10YR 7/4) to very pale orange (10YR 8/2)	Pale yellowish-brown (10YR 6/2) to pale orange-pink (5YR 9/4) (Cem...)
Texture:	Pyroclastic	clastic	clastic
Matrix:	Basaltic glass shards ±67% " Basaltic rock fragments, ±3%	Basaltic rock fragments ±25% " Glass shards, ±65% ferromanganese micro nodules ±5%	phosphorite intraclasts } ± 75%
Cement:	Zeolites, ±15% Smectite, ± 3% calcite, ± 12%	Smectite(?) Zeolites(?) } (undiff) ± 15%	phosphorite / Calcite, ± 25%
Average grainsize:	± 1mm (range: fine silt-fine gravel)	± 0.20mm (fine sand - clay)	± 5 mm (matrix) to ± 0.50mm (cement) (Clay — Coarse gravel)
" grain shape:	angular-subrounded	subrounded	angular (matrix) to round (cem...
Sorting:	moderately poorly sorted	moderately well-sorted	poorly-sorted (matrix) to well so... (cement)
Porosity:	± 60%	± 40%	< 5%
Permeability:	± 50%	± 25%	< 2%
Alteration:	Complete (oxidation, zeolitization, hydration, argillization (smectite), carbonation)	Extensive - complete (argillation [smectite] zeolitization oxidation, hydration)	-do- (phosphorization of chalk, oxidation of siderite(?) original calcite compon...)
Remarks.	Very similar to (probably same as) red hyaloclastites of previous dredges, Area E; interiors of intraclasts are highly altered, oxidized to $Fe(OH)_3$(?), yielding a very reddish-brown color to the glass froth; thin rinds of yellow smectite / zeolite on most pieces, as in other material from Keli Ridge; serves as substrate for botryoidal (external mo-phology), dendritic (internal morphology) ferro-manganese deposit (± 2mm thick)	rare rhombic pebble-size fragments (shape derived from joint pattern in rock unit?) covered with thin soot-like coating of ferro-manganese oxide; faintly bedded, fairly-well-indurated, rock fragments are varicolored: black, brown, red, appear to have been water-worked, micronodules concentrated along certain bedding planes, fractures filled w/ calcite.	rare fragments of pebble si... Composed of angular intraclasts of older generation phosphorite (Globigerina(?) chalk) set in you... generation, less phosphorized mate... (both are well-indurated, but the younger is more porous, lighter in color, the older is much more dense, darker in color (contains a small volcanogenic component - tuff coated, as in 62DK4 & 5, with soot-like manganese oxide.