chapter V

LABORATORY INVESTIGATIONS

Major oxides and trace element analysis

Chemical analyses of samples from representative members of nearly all bauxitic profiles described earlier on was done. Normal wet variation diagrams of the oxides versus the depth have also been given.

In order to study the variation of major oxides and trace elements , 12 profiles were chosen, spanning from the northern end of the lateritic/bauxitic belt to the western end.

The profiles selected were (starting from the northern flank) (Fig. 9).

(a) Mota Asota
(b) Virpur
(c) Ran
(d) Mahadevia
(e) Mewasa
(f) Bhatiya
(g) Buddhadhar
(h) Bhopamadhi
(i) Khakharda
(j) Kenedi
(k) Karamkund
(l) Lamba

Chemical analysis for the determination of major oxides and trace elements was done on ICP at R.S.I.C., IIT Powai Bombay.

Sample preparation

0.5 gram of rock powder is weighed accurately into a platinum crucible together with 1.5 gram of lithium metaborate ($LiBO_2$). The mixture is carefully mixed and then heated upto 900°C for 30-45 minutes in a furnace. After cooling, the entire crucible should be immersed in beaker containing 175 ml of distilled water and 10 ml of conc. nitric acid. A magnetic bead is placed in the crucible and stirring over the surface of the fused mixture began without delay. Complete dissolution should be achieved in 1-2 hours and the solution is then diluted to 250 ml.

Further, in order to ascertain the relative losses and gains of chemical constituents in the various horizons of the 12 weathering profiles mentioned, a mass balance model was made of each of the profiles. The methodology followed was as per Esson's (1983) paper. Elements, conventionally those contributing significantly to the analytical total, reported as oxides were retained as oxides in the mass balance model. The mathematical basis of the model is as follows (after Esson, 1983).

The purpose of the model is to estimate:

(a) the thickness of bed rock consumed in forming the soil profile, and

(b) elemental balance for each sampling interval in the profile.

Aggregate bed rock thicknesses and elemental balances for individual horizons and the full profile are obtained by summing the results from (b) over the measured thicknesses. All calculations are based on unit area of profile.

Consider a sampling interval of thickness T formed, according to the model, by differential leaching of bedrock. The mass of index constituents in this interval is given by IDT/100 where I is weight % of index constituent and D, the bulk density of the dry sample. Let T' be the thickness of bed-rock containing an equal mass of index constituent. Then, IDT/100 = I'D'T'/100, where I' and D' are the weight % index constituent and density for bedrock. Thus, the model bedrock thickness consumed to produce thickness T of the soil profile is given by

$$T = \frac{IDT}{I'D'} \quad \text{- - - - - - - - - - - - - - -} \quad (1)$$

In order to estimate T', however, the bulk density of the dry soil is required and is difficult to measure because variable amounts of shrinkage and crumbling occur on drying. Values of the mean particle density for dried powdered samples from horizon 3B are in the range 3.05 - 3.50 gcm. Crude measurements of dry bulk density indicate a maximum porosity of about 50%. For the sake of uniformity, the D values used were taken as 50% of the mean particle densities, i.e. D value in the range 1.52 - 1.75. Bedrock density measurements given an approximate average value of 2.75 (D').

For any other constituent, the mass in dry soil of thickness T is given by EDT/100, where E is the constituent weight %. Similarly, a thickness T' of bedrock contains,

$$\frac{E'D'T'}{100}$$, where E' is the constituent weight % in brdrock.

These two expressions can be used to evaluate the weight % of the constituent lost during the conversion of thickness T' of bedrock into a thickness T of soil. The result is

$$100 \quad 1 - \frac{EDT}{E'D'T'}$$

using equation (1) to eliminate T', this reduces to wt % constituent lost

$$100 \quad 1 - \frac{EI'}{E'I} \qquad \text{------------- (2)}$$

The index constituent could be resistant mineral or a chemical constituent, and in the present case has been taken as the resistant index.

XRD Analyses

Minus 230 mesh portions of the powdered bulk samples of the sample were subjected to XRD studies. The instrument used was Philips X-ray diffractometer with a Cu-target and Cu K-alpha radiation. The study was carried out at the R & D laboratory of the I.P.C.L., Baroda. The samples were scanned from 10° to 50° at a speed rate of 2° per minute and having a chart speed of 2 cm per minute, the range being 2×10^3 C/S. The 'd' spacing and intensities were calculated and compared with ASTM standard charts for different minerals.

MOTA ASOTA

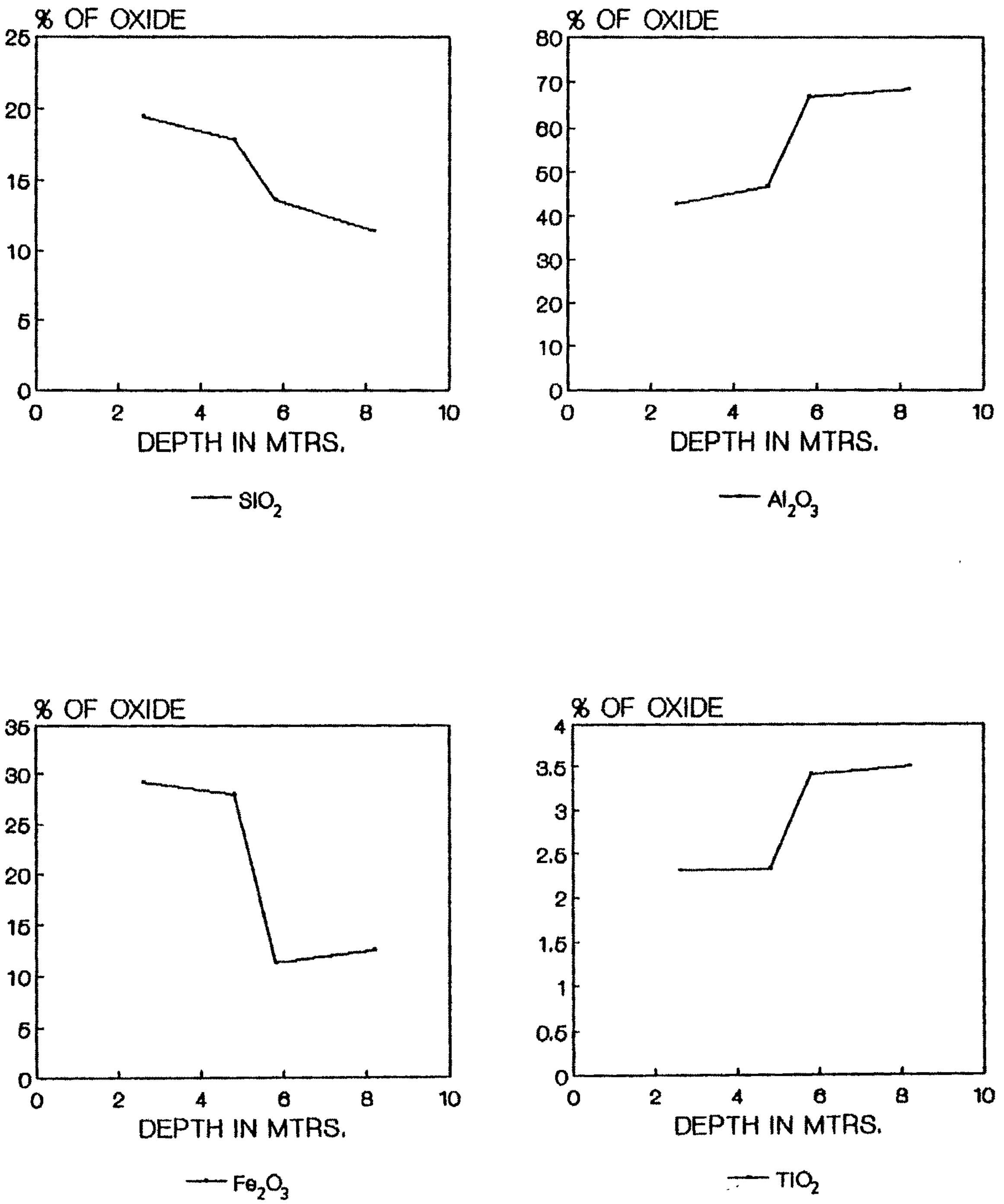
Table - 2

MAJOR OXIDES IN %										TRACE ELEMENTS IN ppm											
SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO_2	CaO	MgO	K_2O	Na_2O	P_2O_5	SC	Y	La	Ce	Pb	Zr	V	Cu	Zn	Cr	Ni	DEPTH IN MTS
19.47	42.83	29.18	2.30	0.36	4.11	1.20	0.15	0.32	0.08	89.23	T	18.26	63.50	T	131.32	320.11	95.80	10.10	332.00	27.57	0.00 – 2.6
17.85	46.68	27.91	2.32	0.31	3.56	0.77	0.18	0.30	0.12	101.34	T	7.12	79.32	T	161.53	417.27	121.21	T	208.16	40.62	2.6 – 4.8
13.61	66.72	11.27	3.41	0.21	3.21	0.63	0.18	0.24	0.12	117.27	T	1.03	101.58	T	89.47	271.99	98.86	T	191.63	18.36	4.8 – 5.8
11.43	68.36	12.41	3.50	0.34	3.08	0.41	0.14	0.18	0.10	90.90	T	0.82	80.63	T	101.03	129.63	70.39	T	233.65	32.79	5.8 – 8.2
49.00	13.20	8.60	2.40	0.88	0.97	0.90	1.20	0.80	0.08	95.00	T	1.50	70.00	T	95.00	265.00	99.00	8.00	163.00	22.00	

Basalt — 45 m

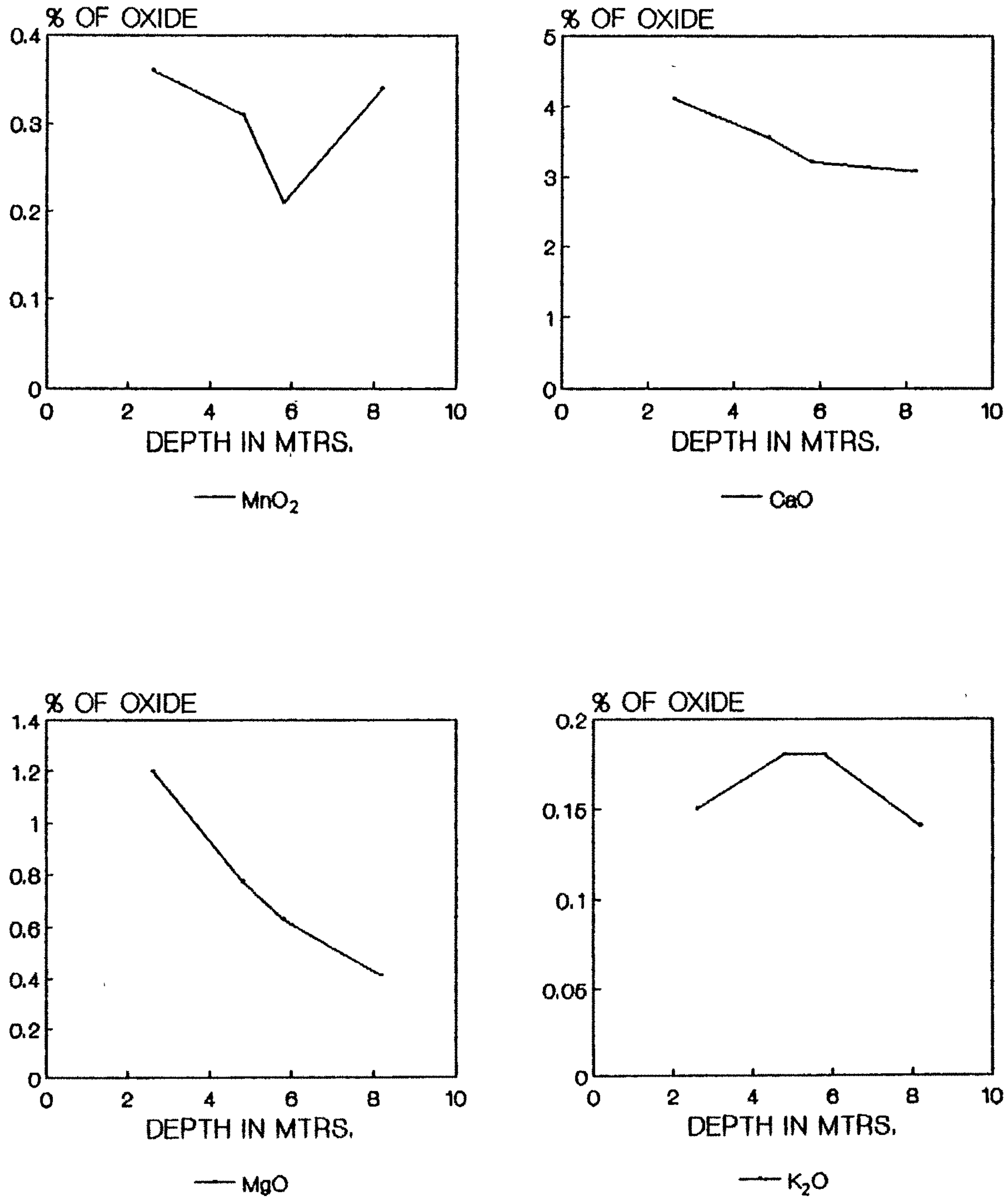
FIG 34a.

VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT MOTA ASOTA VILLAGE (SiO_2, Al_2O_3, Fe_2O_3, TiO_2)



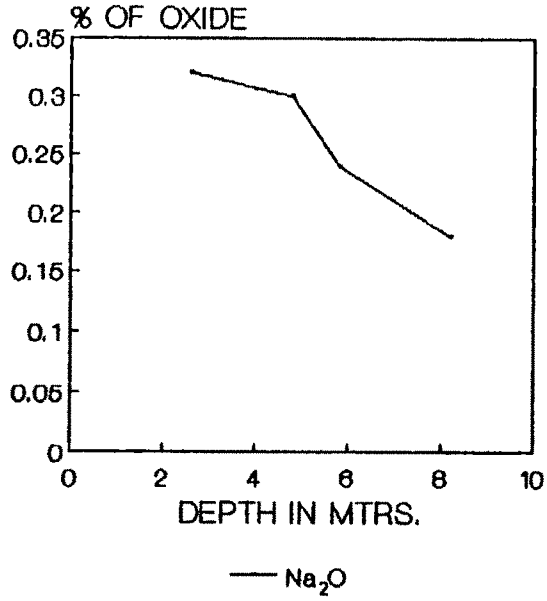
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT MOTA ASOTA VILLAGE (MnO_2, CaO, MgO, K_2O)

FIG. 34 b.



VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT MOTA ASOTA VILLAGE (Na_2O, P_2O_5)

FIG. 34c.



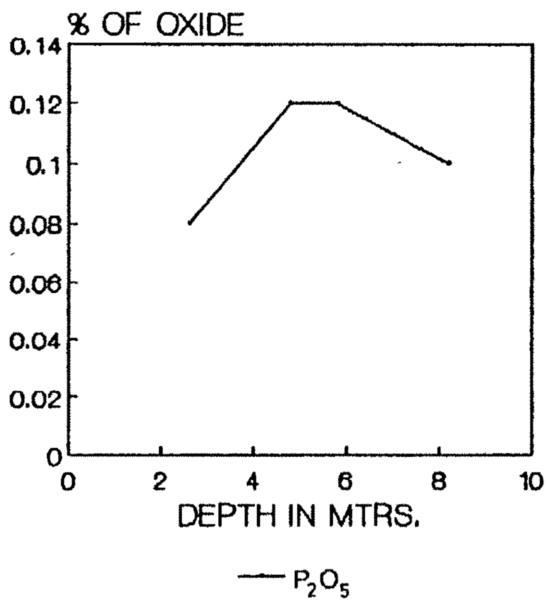
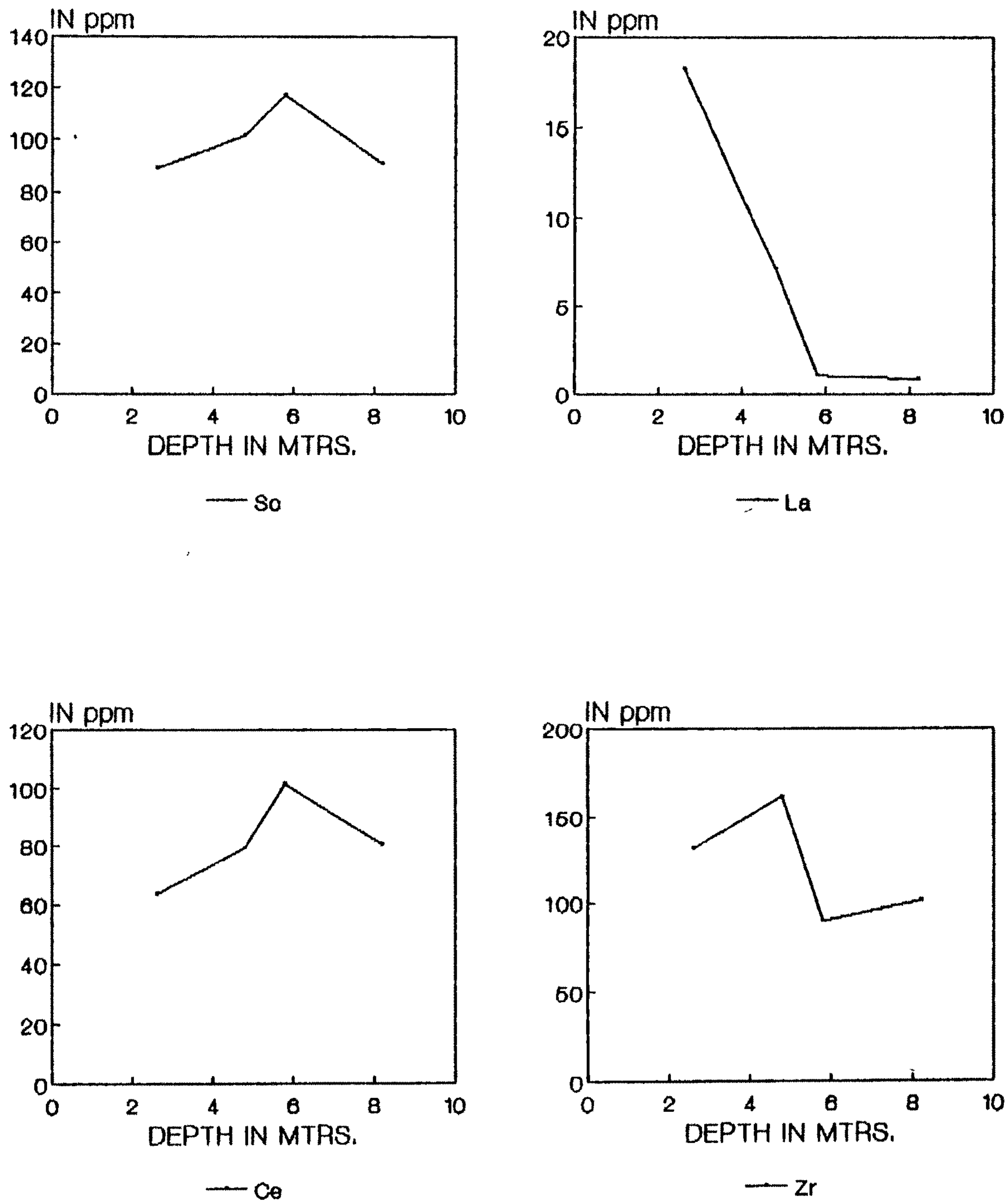


FIG. 34 d.

VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT MOTA ASOTA VILLAGE (Sc, La, Ce, Zr)



VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT MOTA ASOTA VILLAGE (V, Cu, Cr, Ni)

FIG. 34 e.

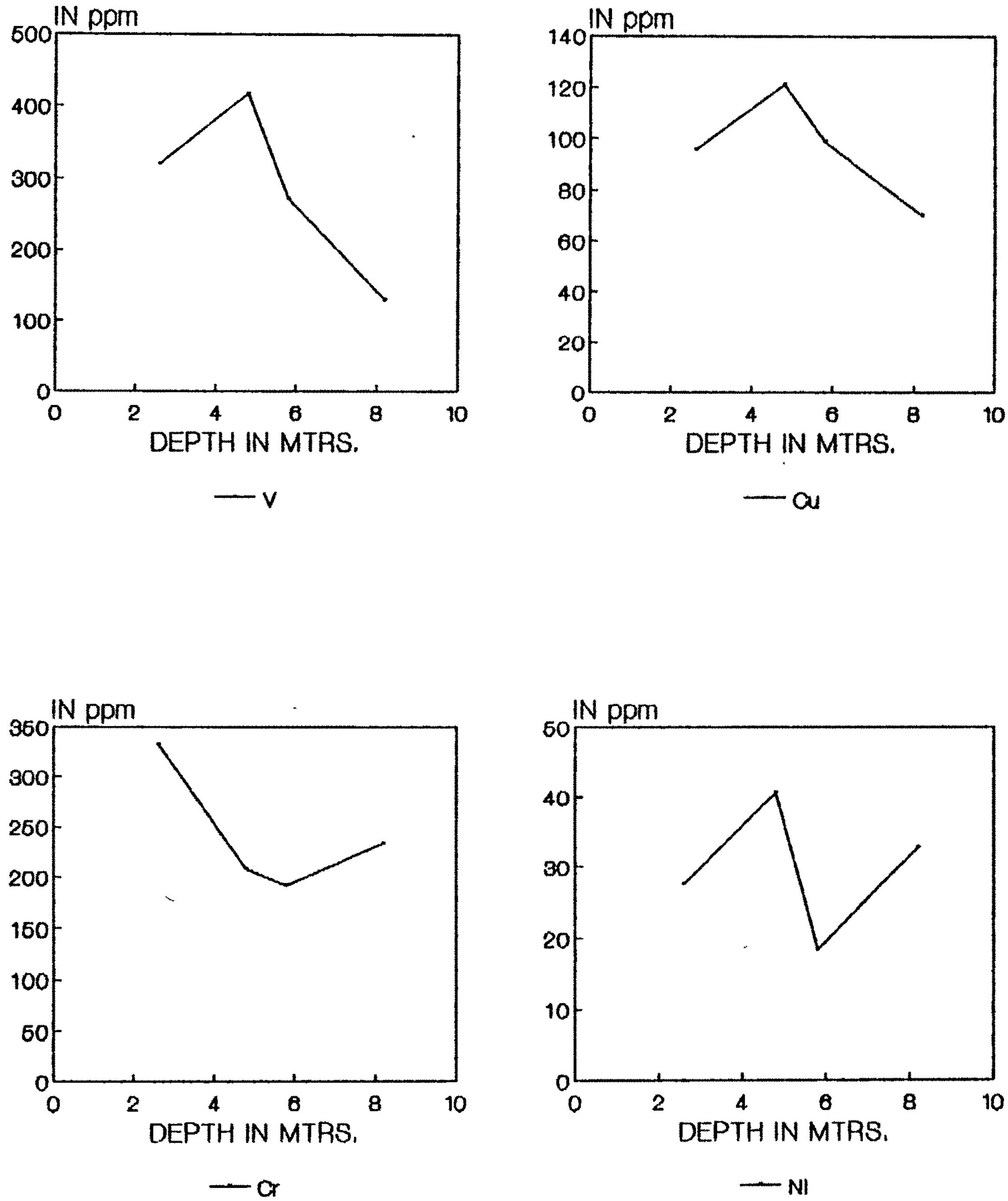


Table - 3

NET GAINS AND LOSSES OF MAJOR OXIDES AND TRACE ELEMENTS BASED ON A Ti-RETAINED MASS BALANCE MODEL

LOC. MOTA ASOTA

Bed rock thickness consumed to produce present thickness of the weathered profile 27.30 m.

Depth	0.00-2.6 m	2.6 m-4.8m	4.8 -5.8m	5.8m-8.2	
Horizon	B_{ox} (Fer)	B_{ox} (Fer)	B_{ox} (Alu)	B_{ox} (Alu)	Remarks
SiO_2	- 59.36	- 63.06	- 80.84	- 84.32	Downward increasing mobilities
Al_2O_3	237.05	264.18	254.14	40.89	mid profile gains in the Box(Alu) & Box(Fer) zone but with bottom and top horizon of substantial depletion.
Fe_2O_3	253.96	235.64	- 7.79	- 1.07	Top two horizon of gains in the Box(Fer) zone with two bottom horizon of losses in Box(Alu) zone.
TiO_2	-	-	-	-	— — — —
MnO_2	4.24	- 11.00	- 58.98	- 35.30	Top horizon of gain with three bottom horizons of losses
CaO	341.37	279.01	132.51	117.36	Upward increasing gains with a top horizon maxima
MgO	- 34.26	- 58.18	- 76.72	- 85.24	Downward increasing mobilities.
K_2O	- 86.95	- 84.48	- 89.44	- 76.57	Mobile throughout the profile.
Na_2O	- 58.26	- 61.20	- 78.88	- 84.57	Downward increasing mobilities.
P_2O_5	4.34	55.17	5.57	- 14.28	Top three horizon gain with a bottom horizon of losses in Box(Alu)
Sc	- 3.01	- 9.18	- 14.02	- 35.07	Top and two bottom horizons of losses with a gain in the mid-profile of Box(Fer) zone.
Y	T	T	T	T	— — — —
La	65.13	- 36.16	- 93.71	- 95.12	Top horizon of gain with three bottom horizons of losses.
Ce	- 61.30	16.24	1.28	- 21.67	Top and bottom horizon of losses with the mid-profile gain
Pb	T	T	T	T	— — — —
Zr	25.61	53.17	- 42.27	- 36.49	Top two profile of gain in Box(Fer) zone with bottom two profile of losses in Box(Alu) zone.
V	25.26	- 99.61	- 28.21	- 66.66	Top horizon of gain with three bottom horizons of losses.
Cu	- 98.95	25.38	- 30.42	- 51.73	Top horizon and bottom two horizon of losses with a gain in the Box(Fer) zone.
Zn	31.73	T	T	T	Top horizon of gain.
Cr	102.08	26.61	- 21.32	- 6.54	Top two horizon of gains with a bottom two horizon of losses
Ni	30.65	90.84	- 41.31	2.11	Top two and bottom horizon of gain with a losses in the Box(Alu) zone.

VIRPUR

Table - 4

MAJOR OXIDES IN %										TRACE ELEMENTS IN ppm											
SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO_2	CaO	MgO	K_2O	Na_2O	P_2O_5	Sc	Y	La	Ce	Pb	Zr	V	Cu	Zn	Cr	Ni	DEPTH IN MTS.
29.78	26.13	40.67	1.59	0.19	1.13	0.25	0.10	0.08	0.03	110.73	T	T	63.38	T	101.20	240.12	63.08	T	129.58	32.52	0·00 — 1·1
31.36	20.51	44.16	1.01	0.18	1.22	0.27	0.09	0.11	0.08	80.14	T	15.12	96.76	T	93.75	317.95	68.90	12.90	170.65	18.68	1·1 — 2·1
10.41	60.88	24.73	2.49	0.08	1.07	0.23	0.09	0.08	0.03	97.68	T	2.79	107.07	T	80.39	341.51	74.75	7.24	198.80	29.98	2·1 — 3·2
11.76	48.92	35.29	2.21	0.08	1.11	0.23	0.12	0.12	0.04	71.39	T	T	88.80	T	49.52	298.68	88.03	T	166.06	23.76	3·2 — 4·5
49.50	13.00	9.00	2.50	0.40	1.00	2.00	1.10	1.00	0.07	95.00	T	11.30	70.00	T	85.00	307.00	73.00	10.50	154.00	26.00	

— Basalt — 25.7 m

FIG. 35 a.

VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT VIRPUR VILLAGE
(SiO_2, Al_2O_3, Fe_2O_3, TiO_2)

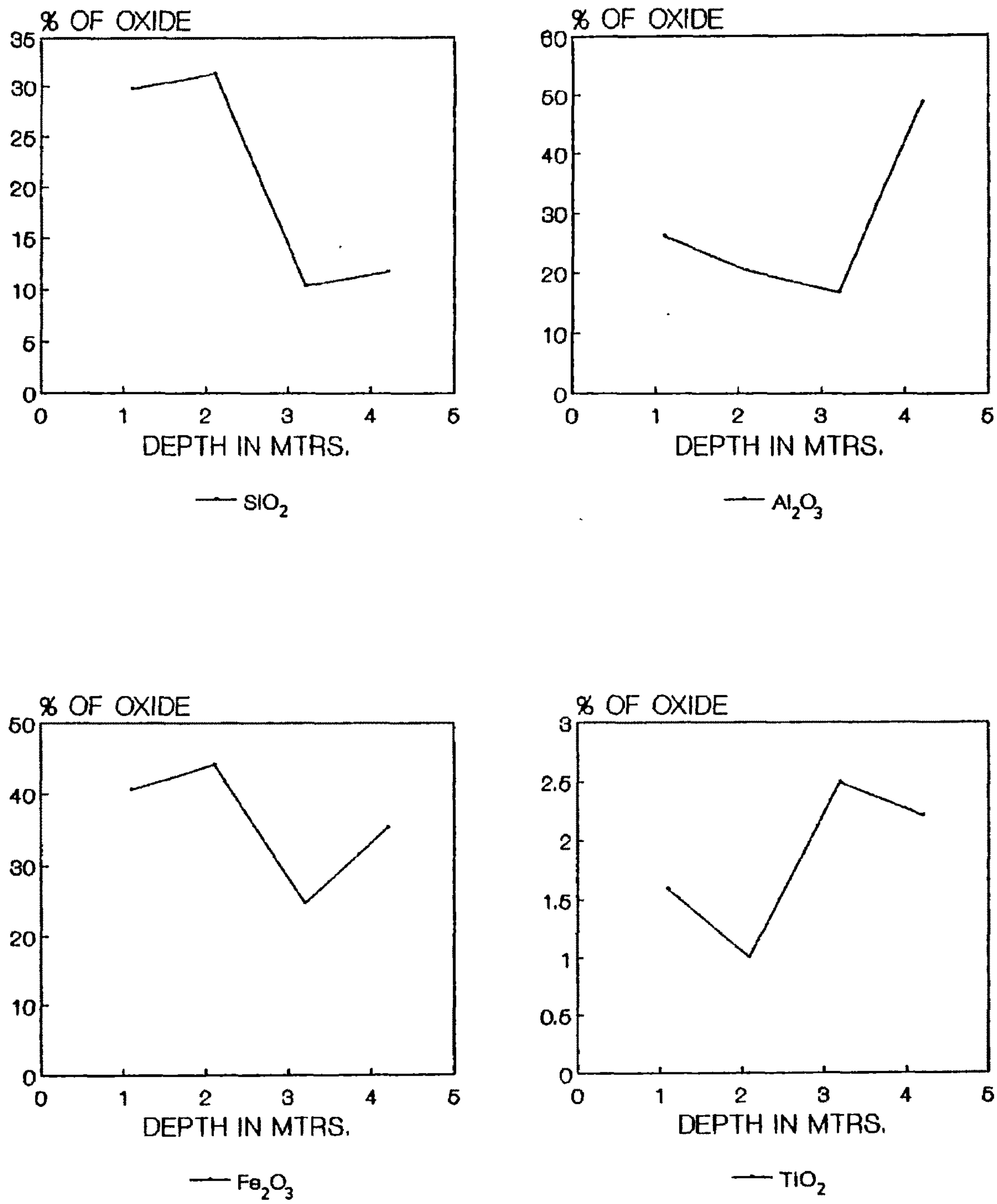
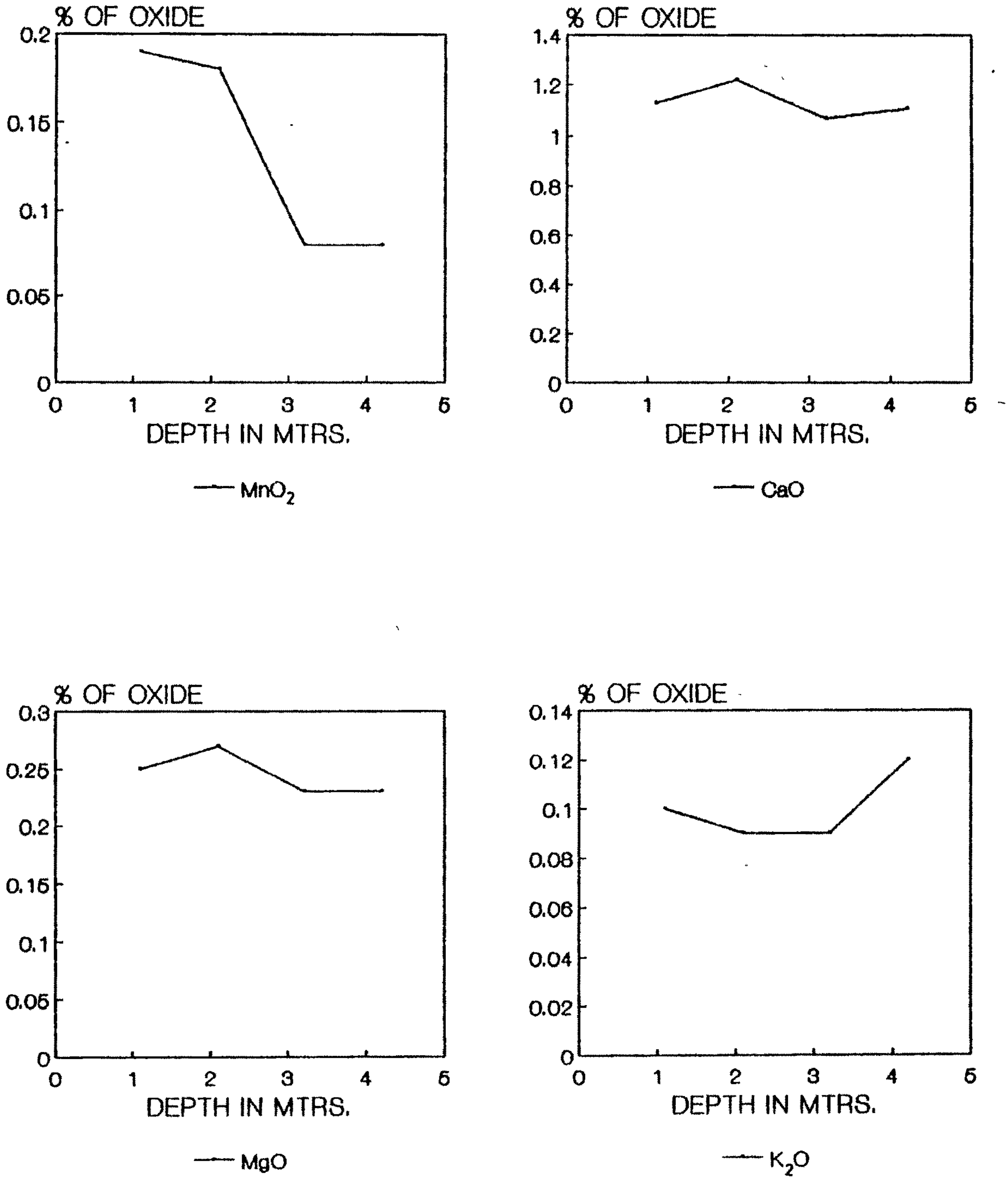


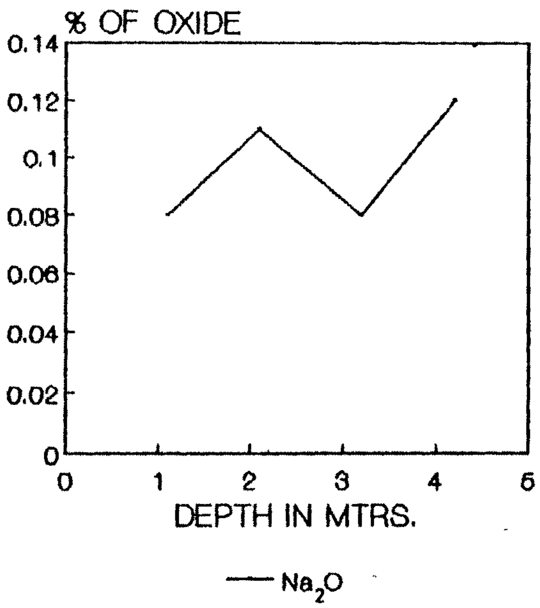
FIG. 35 b

VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT VIRPUR VILLAGE (MnO_2, CaO, MgO, K_2O)



VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT VIRPUR VILLAGE (Na_2O, P_2O_5)

FIG. 35 c.



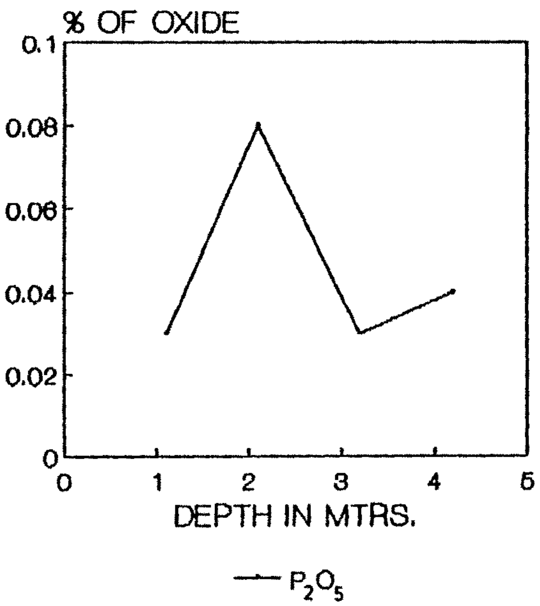
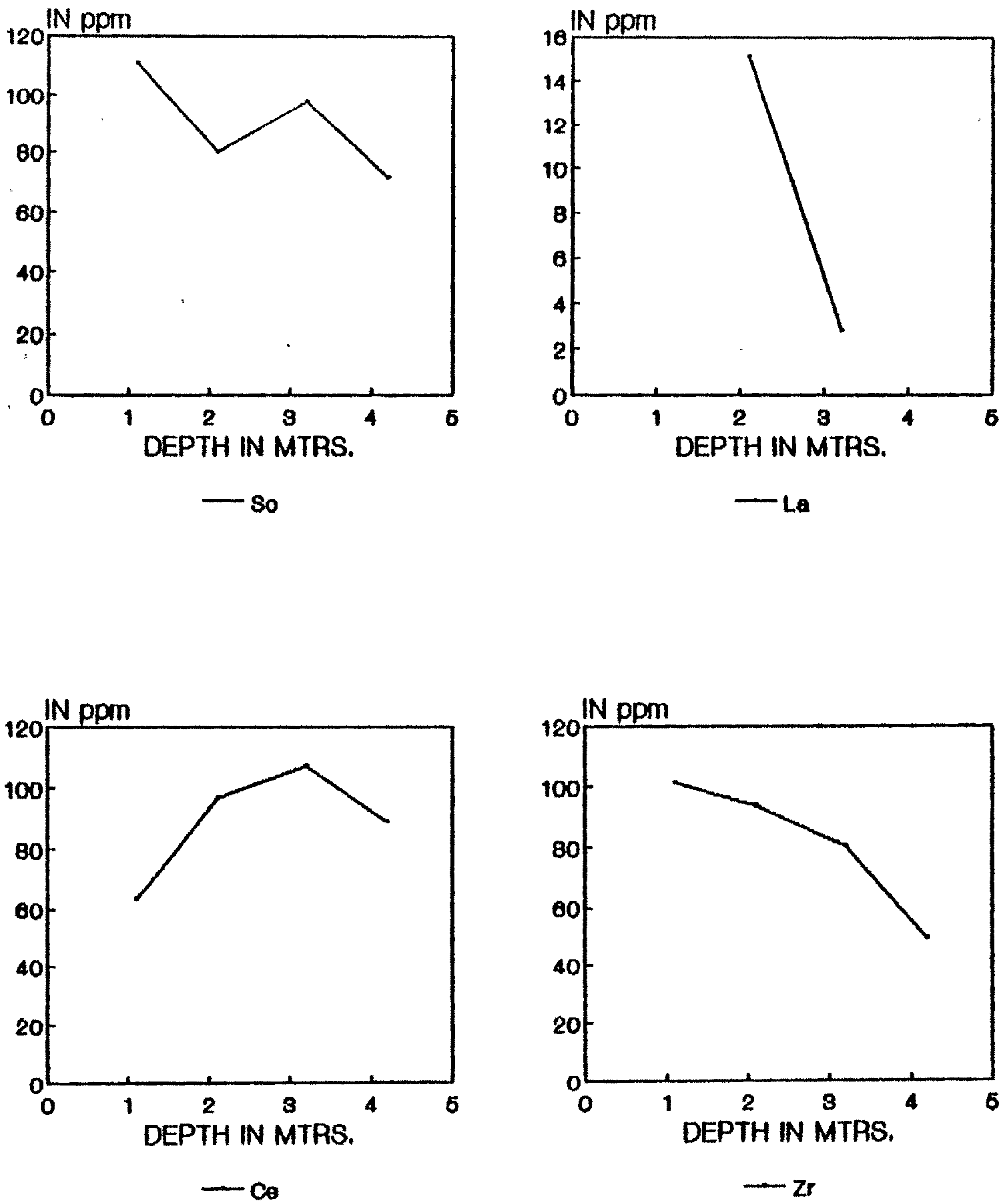


FIG. 35 d

VARIATION OF TRACE ELEMENTS IN THE BAUXITE
PROFILE AT VIRPUR VILLAGE
(Sc, La, Ce, Zr)



VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT VIRPUR VILLAGE
(V, Cu, Zn, Cr, Ni)

FIG. 35 e.

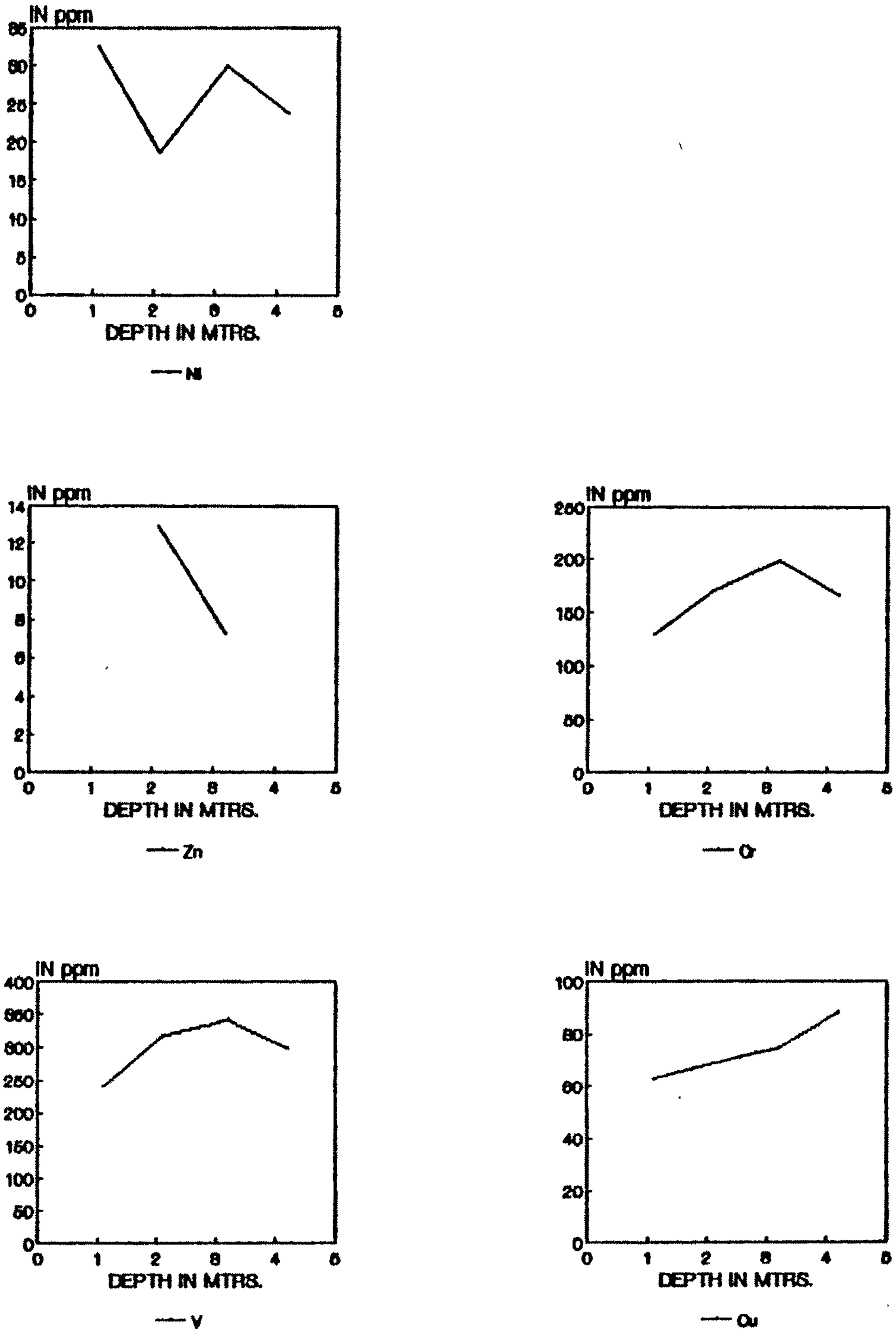


Table - 5

NET GAINS AND LOSSES OF MAJOR OXIDES AND TRACE ELEMENTS BASED ON A Ti-RETAINED MASS BALANCE MODEL

LOC: VIRPUR

Bed rock thickness consumed to produce present thickness of the weathered profile : 12.6 m.

Depth	0.00-1.1m	1.1m-2.1m	2.1m-3.2m	3.2m-4.5m	
Horizon	Lat.Soil	Lat.Soil	B_{ox} (Alu)	$B_{(sap)}$	Remarks
SiO_2	- 6.35	- 55.24	- 79.09	- 79.39	Top and bottom two horizon of losses with a mid-horizon of gain lateritic soil zone.
Al_2O_3	215.53	289.89	369.43	325.00	Downward increasing gain with a maxima in the Box (alu) zone.
Fe_2O_3	608.52	1111.12	175.10	262.48	Top two horizon of gain in lateritic soil zone with two bottom horizon of substantial depletion.
TiO_2	—	—	—	—	— — —
MnO_2	- 25.31	11.38	- 79.91	- 77.37	Top and two bottom horizon of losses with a mid-horizon of gain.
CaO	77.67	201.98	7.42	25.56	Top two profile gains in the lateritic soil zone with two bottom horizon of substantial depletion.
MgO	- 80.34	- 66.58	- 88.45	- 86.89	Mobilities throughout the profile.
K_2O	- 85.72	- 79.77	- 91.79	- 87.67	Mobilities throughout the profile.
Na_2O	- 87.42	- 72.77	- 91.96	- 86.42	Mobilities throughout the profile.
P_2O_5	- 32.62	182.85	- 56.97	- 35.36	Top and two bottom horizon of losses with a mid-profile horizon of gain in the lateritic soil.
Sc	81.06	106.30	1.99	- 16.01	Upward increasing gains with a maxima at the top, and bottom horizon of losses.
Y	T	T	T	T	— — —
La	T	229.34	- 75.34	T	Mid-profile gains in lateritic soil zone but in Bottom Box(Alu) zone of loss.
Ce	39.51	374.82	50.50	40.63	Increasing gains throughout the horizon with a maxima in lateritic soil zone.
Pb	T	T	T	T	— — —
Zr	84.57	169.18	- 6.37	- 35.01	Two top horizon of gain with two bottom horizon of losses.
V	20.81	151.84	9.72	8.11	Increasing gain throughout the horizon with a maxima in lateritic soil zone.
Cu	34.88	131.94	2.06	35.43	Increasing gain throughout the horizon with a maxima in lateritic soil zone.
Zn	T	1[illegible]5.76	- 33.12	T	Losses in the upper and lower portions with a mid-profile gain.
Cr	30.39	170.33	27.74	20.22	Increasing gain throughout the horizon with a maxima in lateritic soil zone
Ni	96.34	77.55	15.58	3.21	Upward increasing gains with a top horizon maxima.

RAN

Table - 6.

MAJOR OXIDES IN %										TRACE ELEMENTS IN ppm											
SiO_2	Al_3O_3	Fe_2O_3	TiO_2	MnO_2	CaO	MgO	K_2O	Na_2O	P_2O_5	SC	Y	La	Ce	Pb	Zr	Y	Cu	Zn	Cr	Ni	DEPTH IN MTS
21.73	42.17	27.24	3.17	0.83	0.51	1.36	1.61	0.78	0.08	102.78	T	T	52.48	T	141.42	287.23	80.15	T	716.27	27.18	0·00 — 1·9
17.30	60.79	11.76	3.31	0.99	0.69	1.32	1.61	0.77	0.09	90.25	T	T	79.80	T	131.19	312.17	246.76	T	628.13	17.88	1·9 — 3·9
16.49	61.14	11.12	3.58	1.06	0.53	1.22	1.44	0.61	0.07	107.19	T	T	101.67	T	155.27	341.71	127.17	T	178.23	89.05	3·9 — 5·5
22.47	40.25	29.73	3.20	1.01	0.49	1.11	1.23	0.59	0.06	87.06	T	T	90.01	T	88.46	298.63	108.09	T	129.16	44.66	5·5 — 7·1
39.00	17.50	8.80	2.16	0.50	1,20	7.70	1.20	0.70	0.06	89.00	T	T	63.30	T	101.20	301.00	97.50	T	156.00	32.00	

— Basalt — 32 m

VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT RAN VILLAGE (SiO_2, Al_2O_3, Fe_2O_3, TiO_2)

FIG. 36 a.

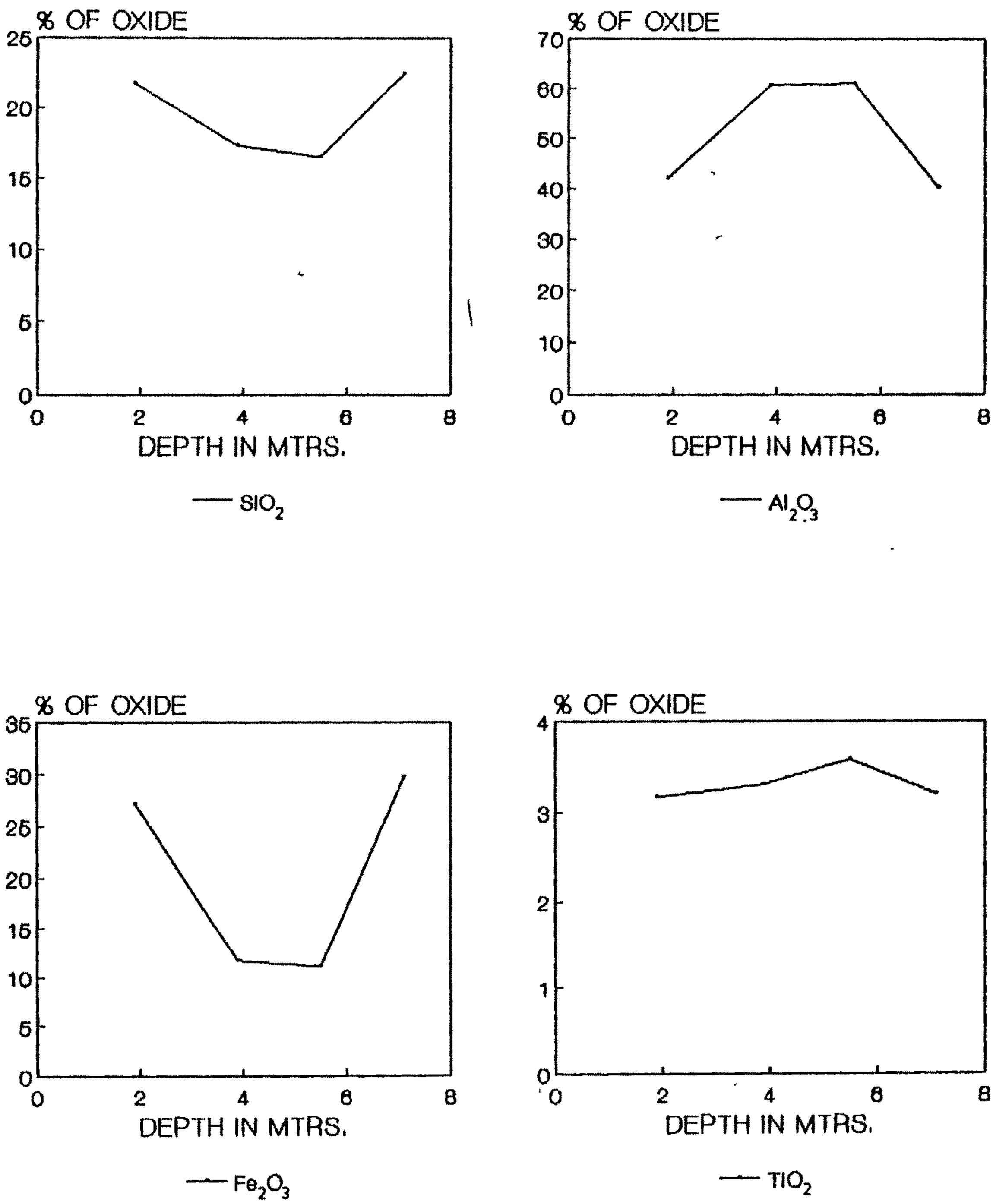
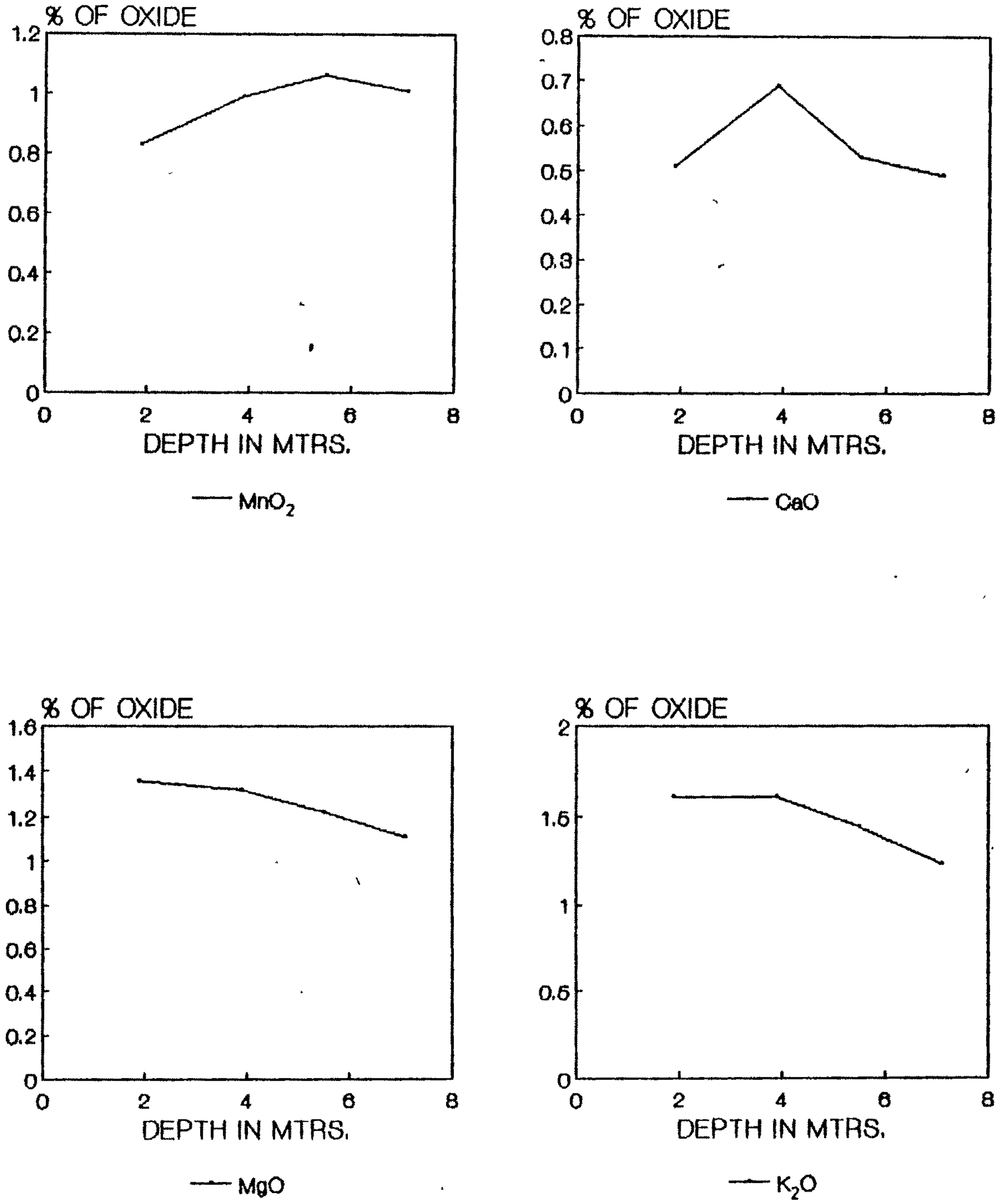


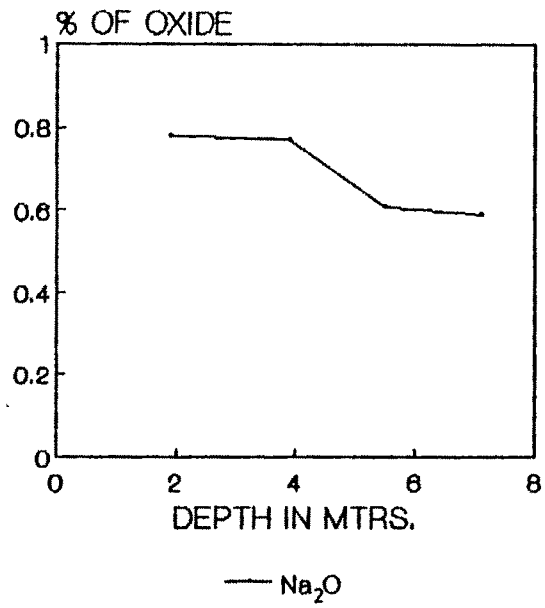
FIG. 36 b.

VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT RAN VILLAGE (MnO_2, CaO, MgO, K_2O)



VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT RAN VILLAGE (Na_2O, P_2O_5)

FIG. 36 c.



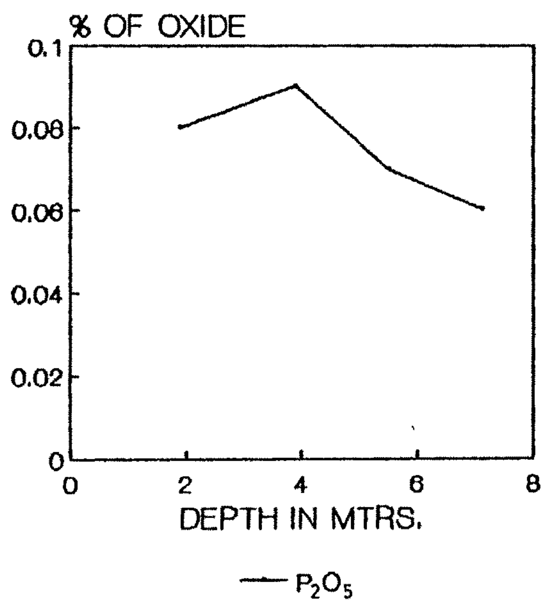
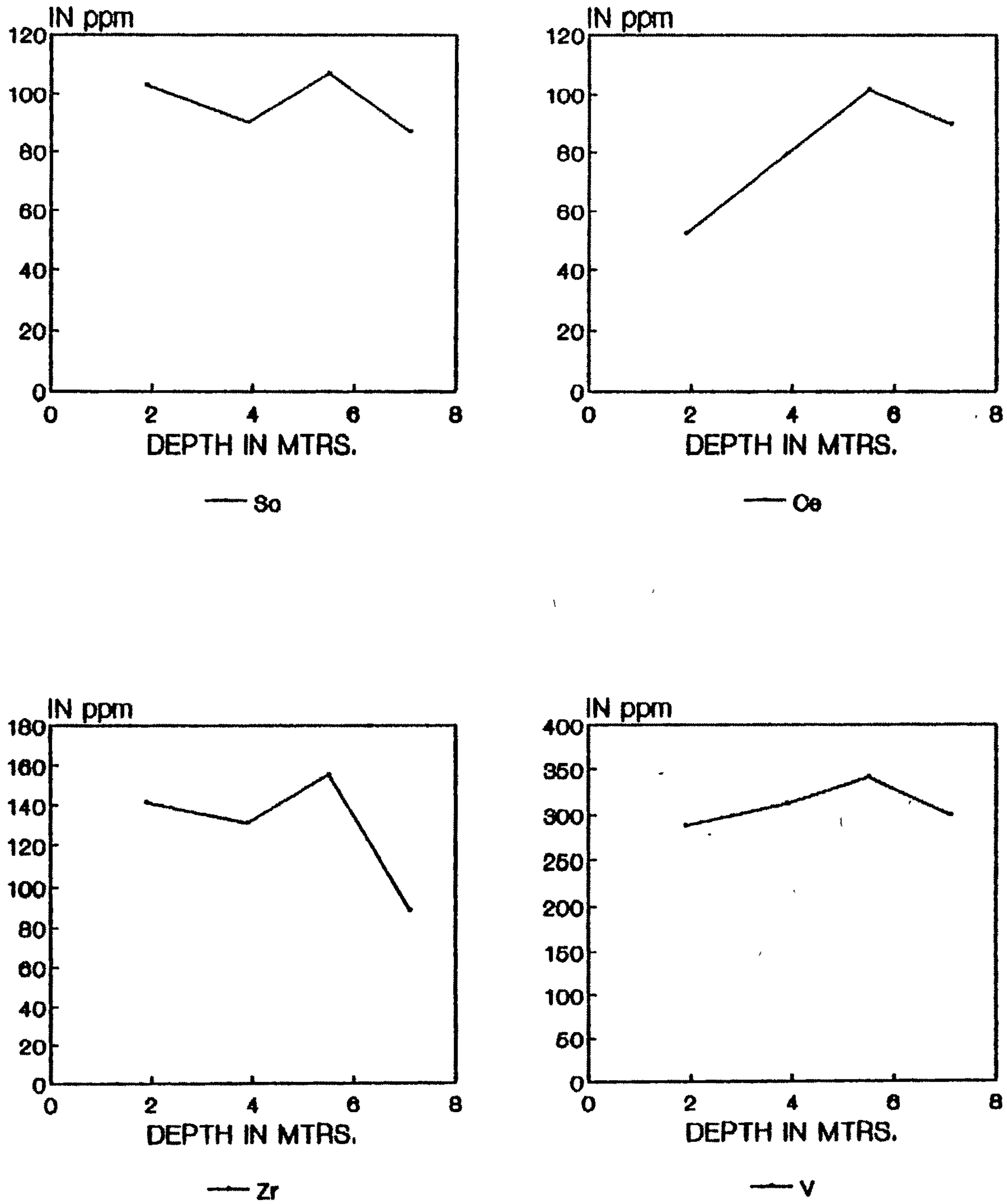
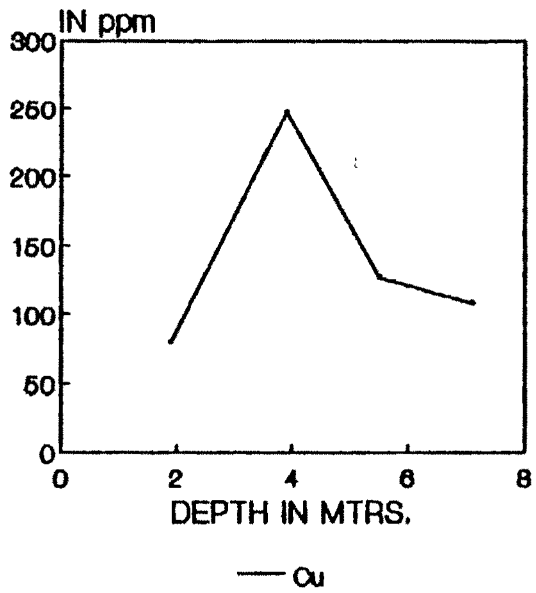


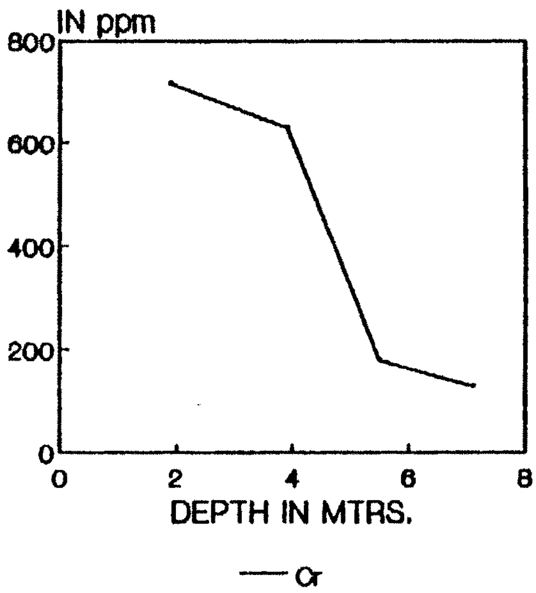
FIG. 36 d.

VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT RAN VILLAGE (Sc, Ce, Zr, V)



VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT RAN VILLAGE (Cu, Cr, Ni) FIG. 36 e.





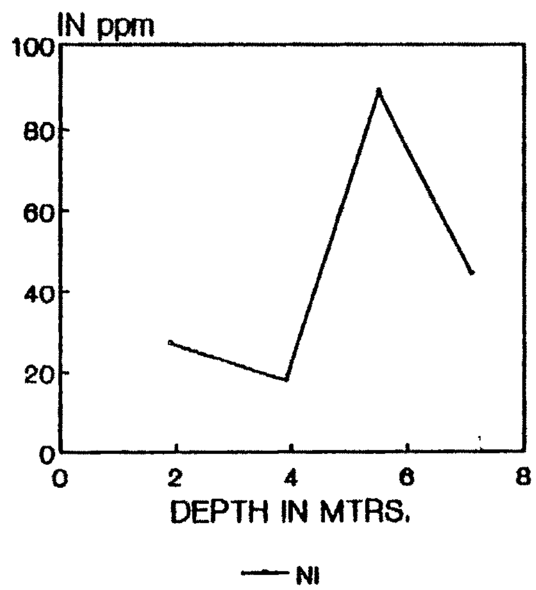


Table - 7

NET GAINS AND LOSSES OF MAJOR OXIDES AND TRACE ELEMENTS BASED ON A Ti-RETAINED MASS BALANCE MODEL

LOC.: RAN

Bed rock thickness consumed to produce present thickness of the weathered profile : 24.31 m

Depth	0.00-1.9m	1.9-3.9m	3.9-5.5m	5.5-7.1m	Remarks
Horizon	$B_{ox(Fer)}$	$B_{ox(Alu)}$	$B_{ox(Alu)}$	$B_{(sap)}$	
SiO_2	- 62.92	- 71.25	- 74.73	- 61.37	Mobile throughout the profile
Al_2O_3	63.62	135.87	110.06	54.71	Mid-profile gains in the Bax(alu) zone but with no bottom and top horizons of substantial depletion
Fe_2O_3	110.52	- 13.02	- 23.89	127.62	Top and bottom horizon of gain with a zone of depletion in the Box(Alu) zone.
TiO_2	-	-	-	-	--- --- ---
MnO_2	13.11	29.20	27.91	36.35	Downward increasing gains with a bottom horizon maxima
CaO	- 71.04	- 62.47	- 73.35	- 72.43	Mobile throughout the profile
MgO	- 45.51	- 49.35	- 56.72	- 55.94	Mobile throughout the profile
K_2O	- 8.50	- 12.44	- 27.59	- 30.81	Mobile throughout the profile increasing downwards.
Na_2O	- 24.21	- 28.35	- 47.51	- 43.21	Downward increasing mobilities
P_2O_5	- 9.14	- 2.11	- 29.60	- 32.5	Downward increasing mobilities
Sc	- 22.18	- 34.19	- 28.14	- 34.70	Downward increasing mobilities
Y	T	T	T	T	--- --- ---
La	T	T	T	T	--- --- ---
Ce	- 43.71	- 18.03	- 3.44	- 4.36	Upwards increasing mobilities
Pb	T	T	T	T	--- --- ---
Zr	- 6.31	- 16.76	- 8.91	- 41.94	Downward increasing mobilities
V	- 36.57	- 33.98	- 33.18	- 34.67	Mobile throughout the profile
Cr	- 44.37	64.00	- 21.85	- 25.68	Losses throughout the profile, with a mid-profile horizon of gain in the Box(Alu) zone.
Zn	T	T	T	T	--- --- ---
Cr	193.73	170.26	- 35.27	- 47.52	Top horizons of gain with two bottom horizons of losses.
Ni	- 42.55	- 63.80	66.65	- 6.49	Two top and bottom horizons of losses with a mid-profile horizon of gain in the Box(Alu) zone.

Table - 8

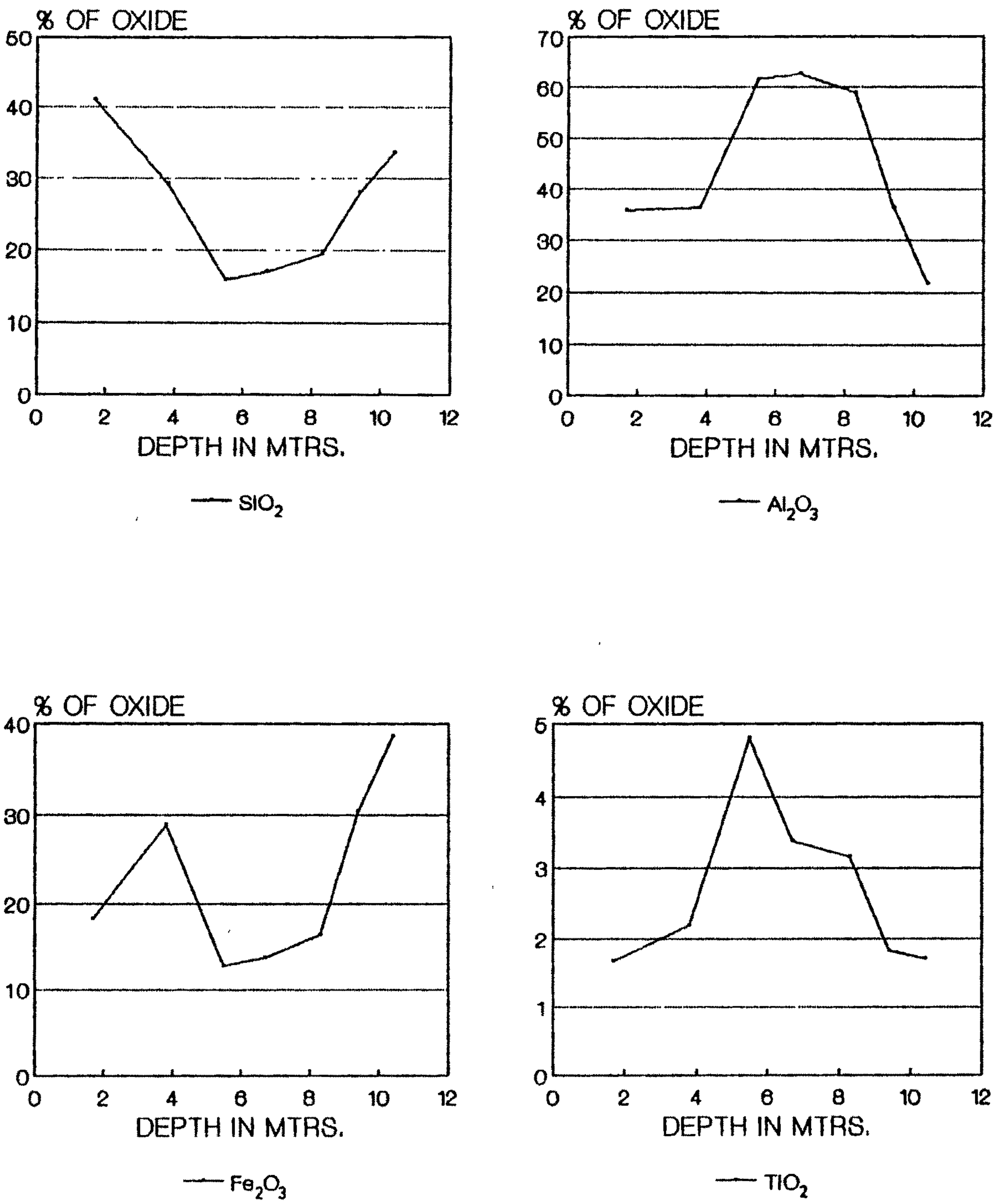
MARADEVIA

MAJOR OXIDES IN %										TRACE ELEMENTS IN ppm											
SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO_2	CaO	MgO	K_2O	Na_2O	P_2O_5	SC	Y	La	Ce	Pb	Zr	V	Cu	Zn	Cr	Ni	DEPTH IN MTS.
41.02	25.77	18.30	1.68	0.20	1.16	1.58	0.03	0.04	0.08	107.11	T	11.11	40.07	T	161.45	267.03	70.71	15.10	412.76	38.40	0.00 – 1.6
29.17	35.48	22.92	2.19	0.19	1.28	1.53	0.03	0.09	0.12	83.96	T	T	69.15	T	180.17	289.19	68.15	11.74	333.33	22.56	1.6 – 3.6
15.78	61.77	12.86	4.81	0.24	1.51	1.47	0.13	0.24	0.19	96.31	0.97	T	52.98	T	131.49	313.77	42.67	T	301.98	17.88	3.6 – 5.6
16.93	62.81	13.83	3.39	0.17	1.19	1.19	0.08	0.23	0.17	149.82	T	T	107.92	T	101.98	341.63	87.39	T	276.16	23.59	5.6 – 6.6
19.39	58.97	16.47	3.16	0.19	1.32	1.23	0.05	0.09	0.03	117.66	T	2.03	80.23	T	93.71	211.49	47.92	19.98	240.40	61.19	6.6 – 8.2
27.97	36.39	30.44	1.83	0.21	1.51	1.42	0.03	0.07	0.03	87.52	1.12	T	99.71	T	80.14	176.88	61.13	21.07	219.99	53.62	8.2 – 9.6
33.58	21.65	38.60	1.72	0.28	1.86	0.02	0.09	0.13	0.03	120.03	T	T	47.53	T	120.38	140.71	57.02	T	313.56	43.93	9.6 – 10.6
40.00	23.50	8.40	2.40	0.50	1.10	1.60	0.80	0.60	0.08	90.00	1.10	7.50	68.50	T	106.00	270.00	65.00	13.00	213.00	36.50	

— Basalt — 47 m.

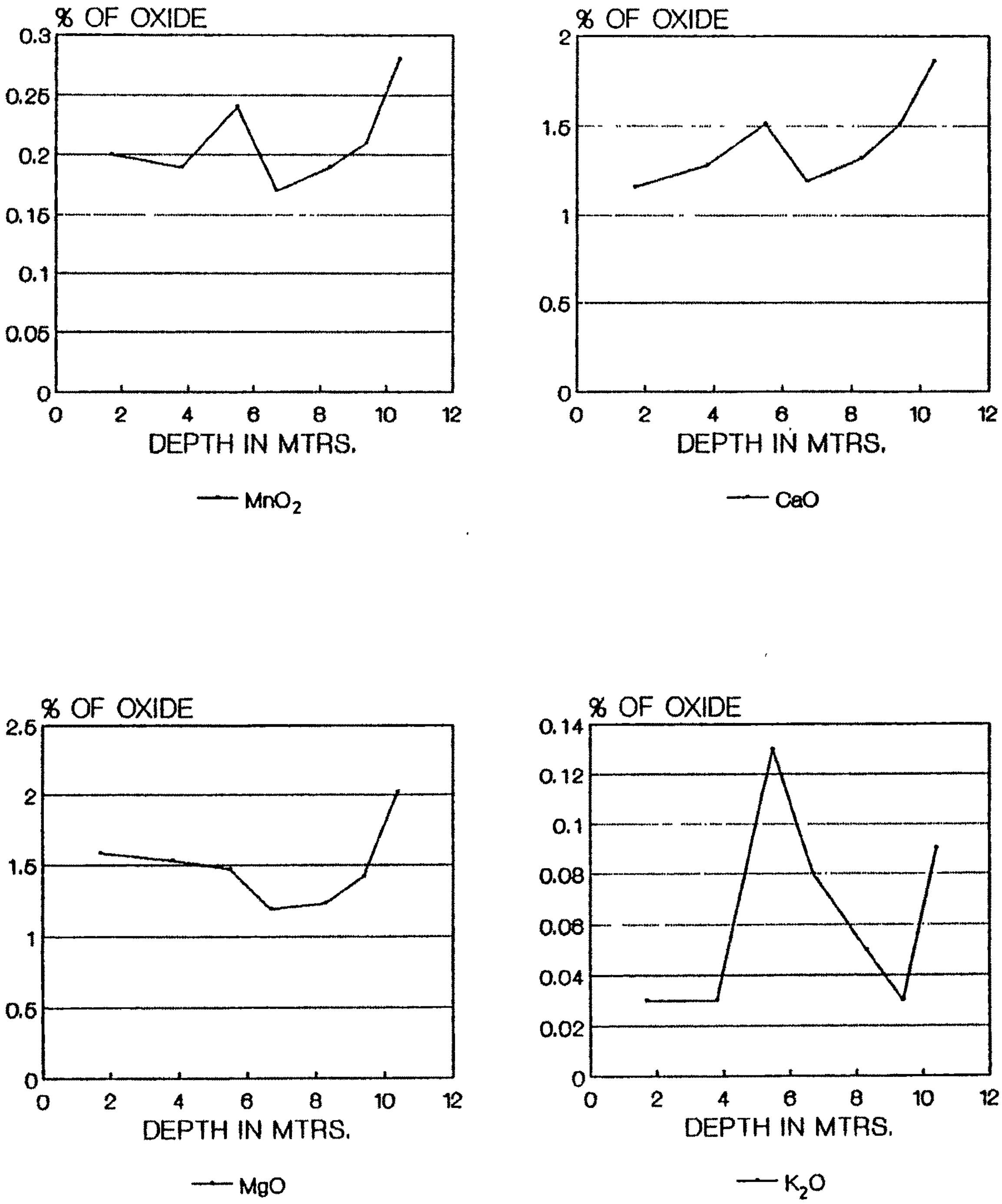
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT MAHADEVIA VILLAGE (SiO_2, Al_2O_3, Fe_2O_3, TiO_2)

FIG. 37a.



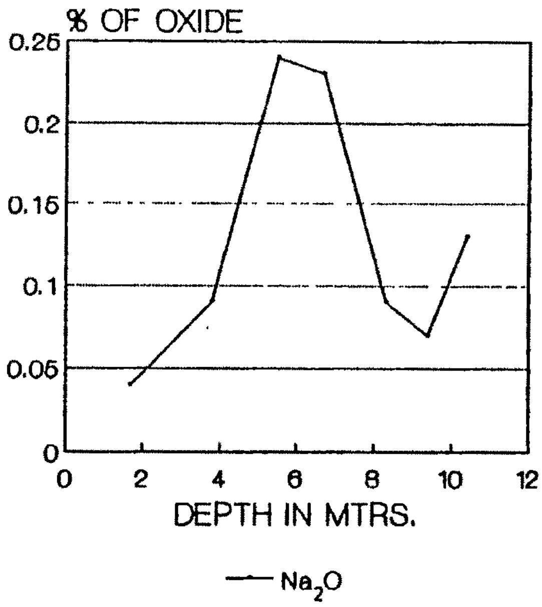
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT MAHADEVIA VILLAGE
(MnO_2, CaO, MgO, K_2O)

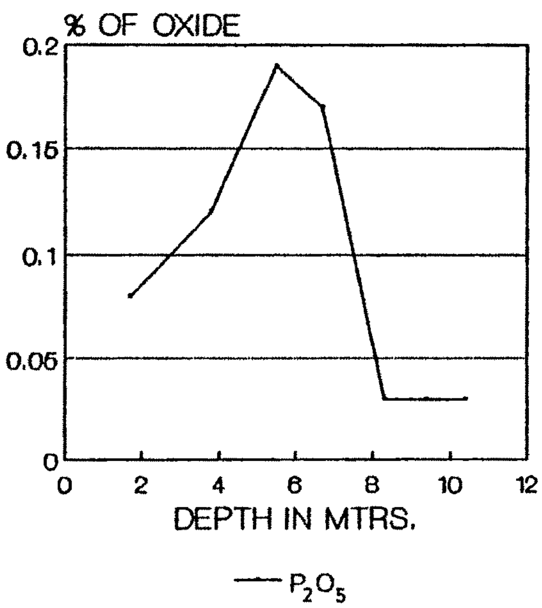
FIG. 37 b.



VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT MAHADEVIA VILLAGE (Na_2O, P_2O_5)

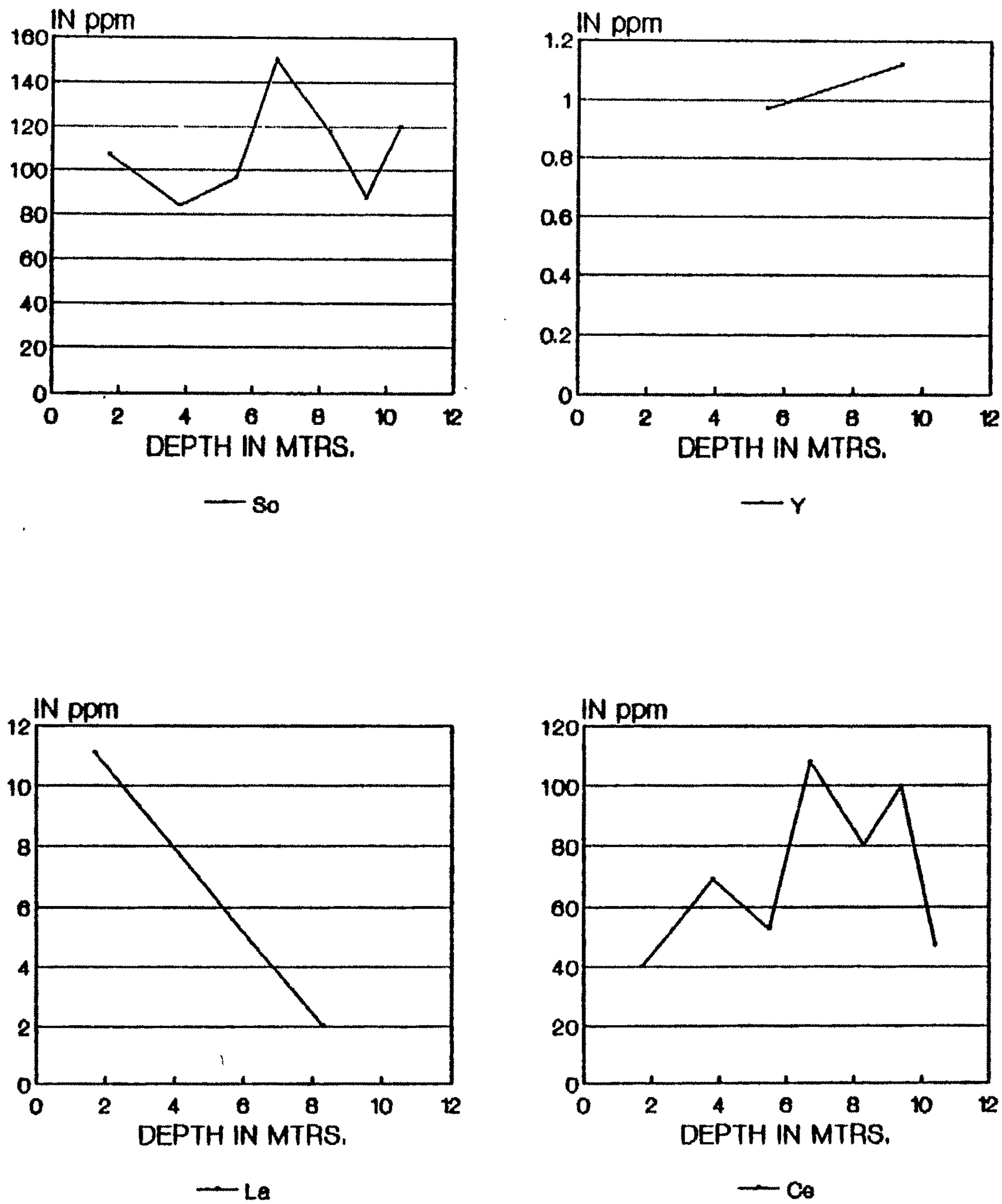
FIG. 37c.





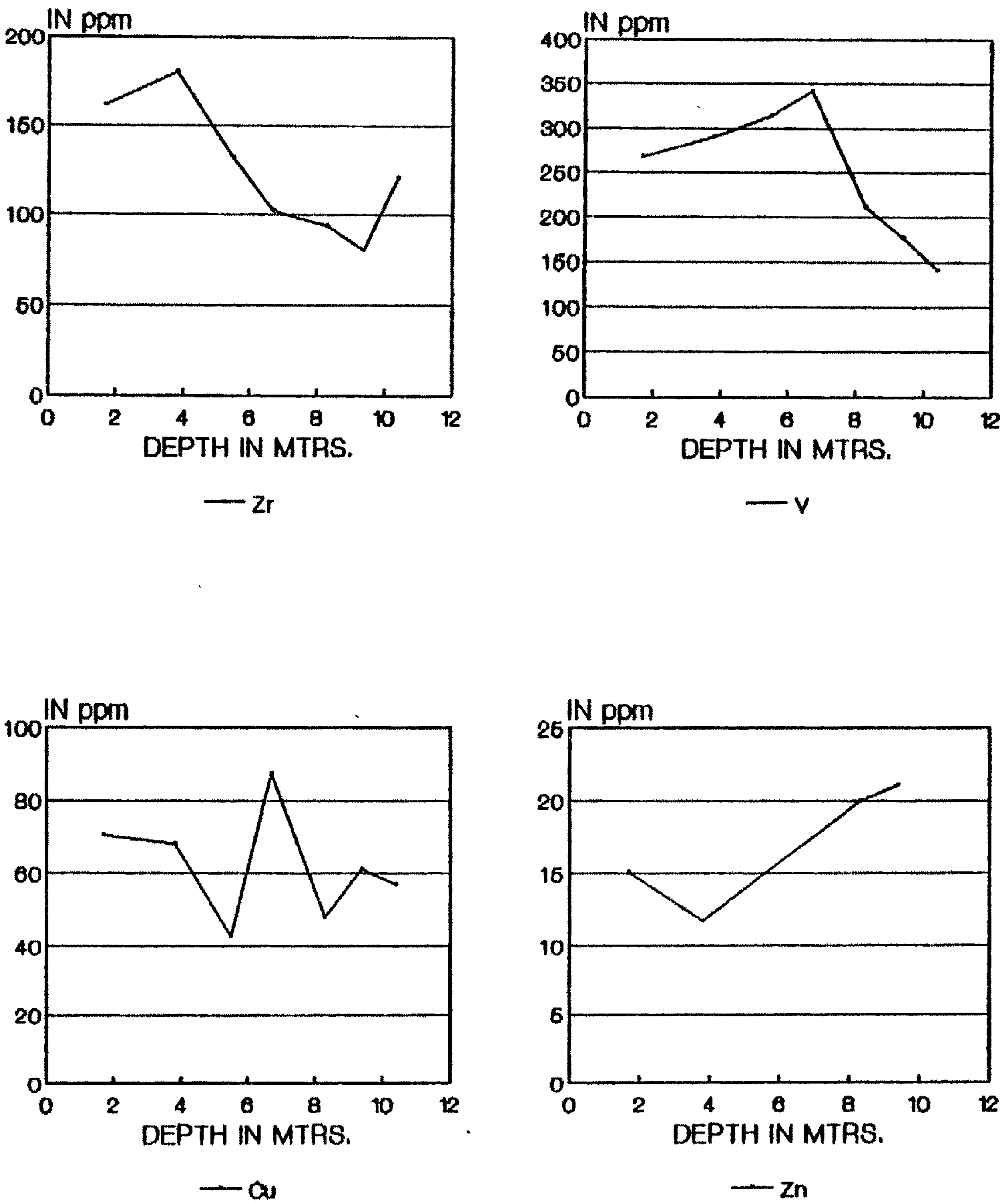
VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT MAHADEVIA VILLAGE (Sc, Y, La, Ce)

FIG. 37 d.



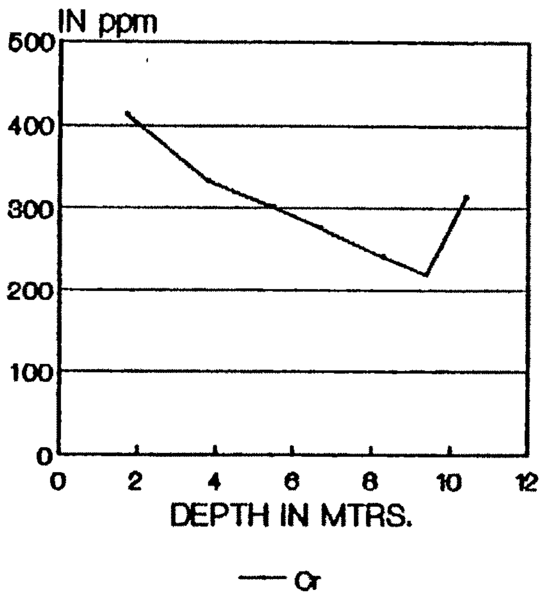
VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT MAHADEVIA VILLAGE
(Zr, V, Cu, Zn)

FIG. 37 e.



VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT MAHADEVIA VILLAGE
(Cr, Ni)

FIG. 37 f.



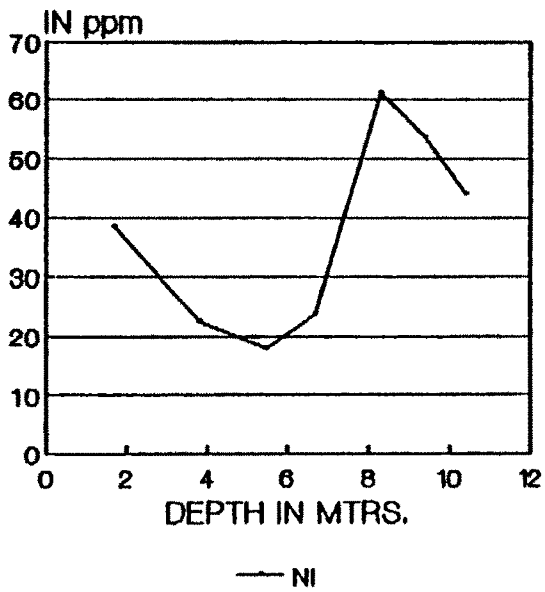


Table - 9

NET GAINS AND LOSSES OF MAJOR OXIDES AND TRACE ELEMENTS BASED ON A Ti-RETAINED MASS BALANCE MODEL

LOC.: MAHADEVIA

Bed rock thickness consumed to produce present thickness of the weathered profile : 22.8 m

Depth	0.00-1.6m	1-6- 3.6 m	3.6 -5.6m	5.6 - 6.6 m	6.6-8.2m	8.2-9.6m	9.6-10.6m	Remarks
Horizon	Soil	B_{ox}(Fer)	B_{ox}(Alu)	B_{ox} (Alu)	B_{ox}(Alu)	$B_{(Sap)}$	$B_{(sap)}$	
SiO_2	46.49	- 20.08	- 80.31	- 70.38	- 63.18	- 88.29	17.13	Top and bottom horizons of gain with mid-profile. losses
Al_2O_3	117.17	69.90	30.98	88.98	37.41	98.44	99.13	Top and bottom horizon of gain with mid-horizon of substantial depletion.
Fe_2O_3	210.44	276.35	- 23.80	16.26	48.54	374.06	539.59	Two top and four bottom horizon of gain with a mid horizon of losses in the Box(Alu) zone
TiO_2	-	-	-	-	-	-	-	— — —
MnO_2	- 42.85	- 58.35	- 76.04	75.92	- 71.13	- 44.91	- 21.86	Top three and three bottom horizons of losses with a mid-profile horizon of gain in the Box (alu) zone
CaO	50.52	- 98.72	- 30.28	- 23.47	- 8.93	79.87	135.74	Top and two bottom horizons of gain with a mid profile horizon of losses.
MgO	41.07	4.79	- 54.15	- 47.34	- 41.61	16.39	- 79.16	Top two and B(sap) horizon of gain with a mid-profile horizon and bottom horizon of losses.
K_2O	- 94.64	- 99.37	- 91.89	- 92.92	- 95.25	- 95.08	- 84.30	Mobilities throughout the profile
Na_2O	- 90.47	- 83.56	- 80.04	- 72.86	- 88.60	- 84.69	- 69.76	Upward increasing mobilities.
P_2O_5	42.85	64.38	18.50	50.44	- 71.51	- 50.81	- 47.67	Top four horizon of gain with a bottom three horizon of losses.
Sc	65.76	- 0.32	- 47.94	14.90	- 3.19	24.34	81.44	Top two bottom and mid profile horizon of gain with other mid profile horizon of losses
Y	T	T	- 56.03	T	T	33.42	T	Box(Alu) zone of losses and gain in B(sap) zone.
La	111.61	T	T	T	- 79.44	T	T	Top horizon of gain with a mid-profile horizon of loss in Box(Alu) zone
Ce	- 91.52	10.51	- 61.44	11.42	- 11.13	10.43	- 7.35	Mixed behaviour with alternate horizons of gains and losses.
Pb	T	T	T	T	T	T	T	— — —
Zr	111.42	80.99	- 39.85	- 33.81	- 34.75	- 44.20	53.97	Two top and bottom horizon of gains with a mid-profile of losses in Box(Alu) & B(Sap) zones.
V	27.15	5.64	- 47.81	- 19.37	- 46.45	- 22.67	- 34.55	Two top horizon of gain with a bottom five horizon of losses.
Cu	51.52	12.02	- 68.06	- 7.19	- 51.10	20.25	19.34	Two top and two bottom horizon of gain and mid-profile of losses in Box(Alu) zone.
Zn	61.78	- 3.50	T	T	13.81	107.24	T	Top and two bottom horizon of gains with a losses in Box(Fer) zone.
Cr	170.25	67.42	- 30.94	- 10.39	- 16.31	32.23	100.53	Top two and two bottom horizon of gain with a mid-profile of losses in Box(Alu) zone.
Ni	48.57	- 32.73	- 75.83	- 54.76	25.86	90.45	66.01	Top and three bottom horizon of gains with a mid-profile of losses in Box(Fer) & Box(Alu) zone.

Table - 10

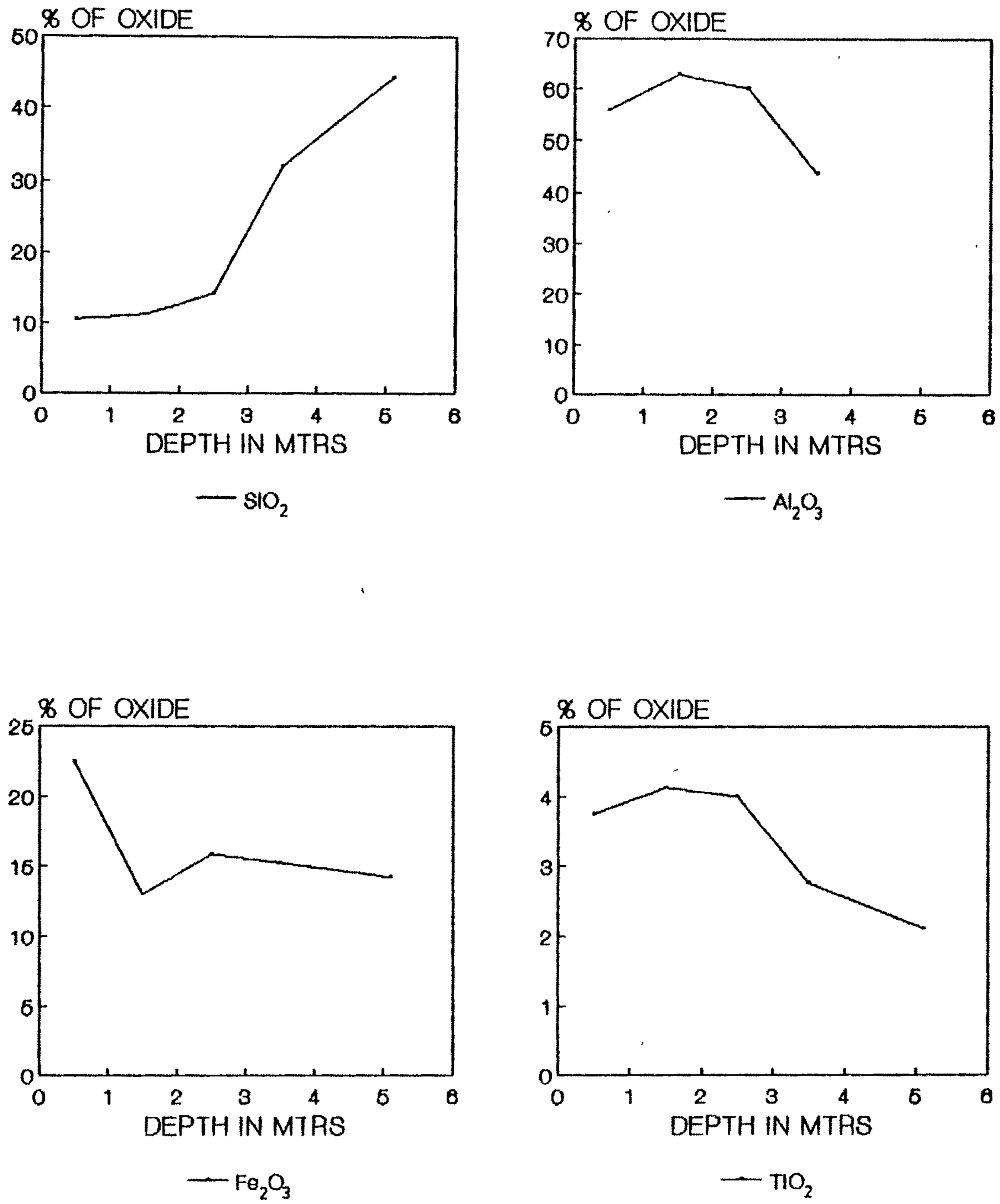
MEWASA

MAJOR OXIDES IN %										TRACE ELEMENTS IN ppm											
SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO_2	CaO	MgO	K_2O	Na_2O	P_2O_5	SC	Y	La	Ce	Pb	Zr	V	Cu	Zn	Cr	Ni	DEPTH IN MTS
10.51	55.86	22.50	3.76	0.69	3.98	1.53	0.47	0.46	0.24	80.92	16.76	T	69.22	T	100.79	317.24	79.97	T	318.18	14.26	0·00 – 0·6
11.60	62.92	13.00	4.13	0.71	4.06	1.69	0.58	0.54	0.30	110.80	T	T	23.45	T	121.13	360.60	26.95	11.14	636.36	40.12	0·5 – 1·6
14.13	60.11	15.87	4.01	0.53	3.26	1.11	0.32	0.44	0.19	66.76	T	24.13	55.22	T	80.74	216.91	63.88	T	427.17	17.24	1·6 – 2·6
32.00	43.73	15.24	2.76	0.44	3.13	0.93	0.30	0.33	0.14	98.02	10.04	0.81	76.22	T	98.90	193.69	103.19	17.25	279.63	86.56	2·6 – 3·6
44.18	-	14.21	2.11	0.44	38.08	2.31	0.27	0.30	0.13	127.76	T	3.15	101.10	T	63.39	128.37	91.26	1.39	128.41	53.19	3·6 – 5·1
49.8	11.70	8.20	1.40	0.20	0.90	1.50	0.70	0.50	0.05	77.00	13.5	18.0	62.0	T	83.00	178.00	89.50	3.20	170.00	55.00	

— Basalt - 38.1 m

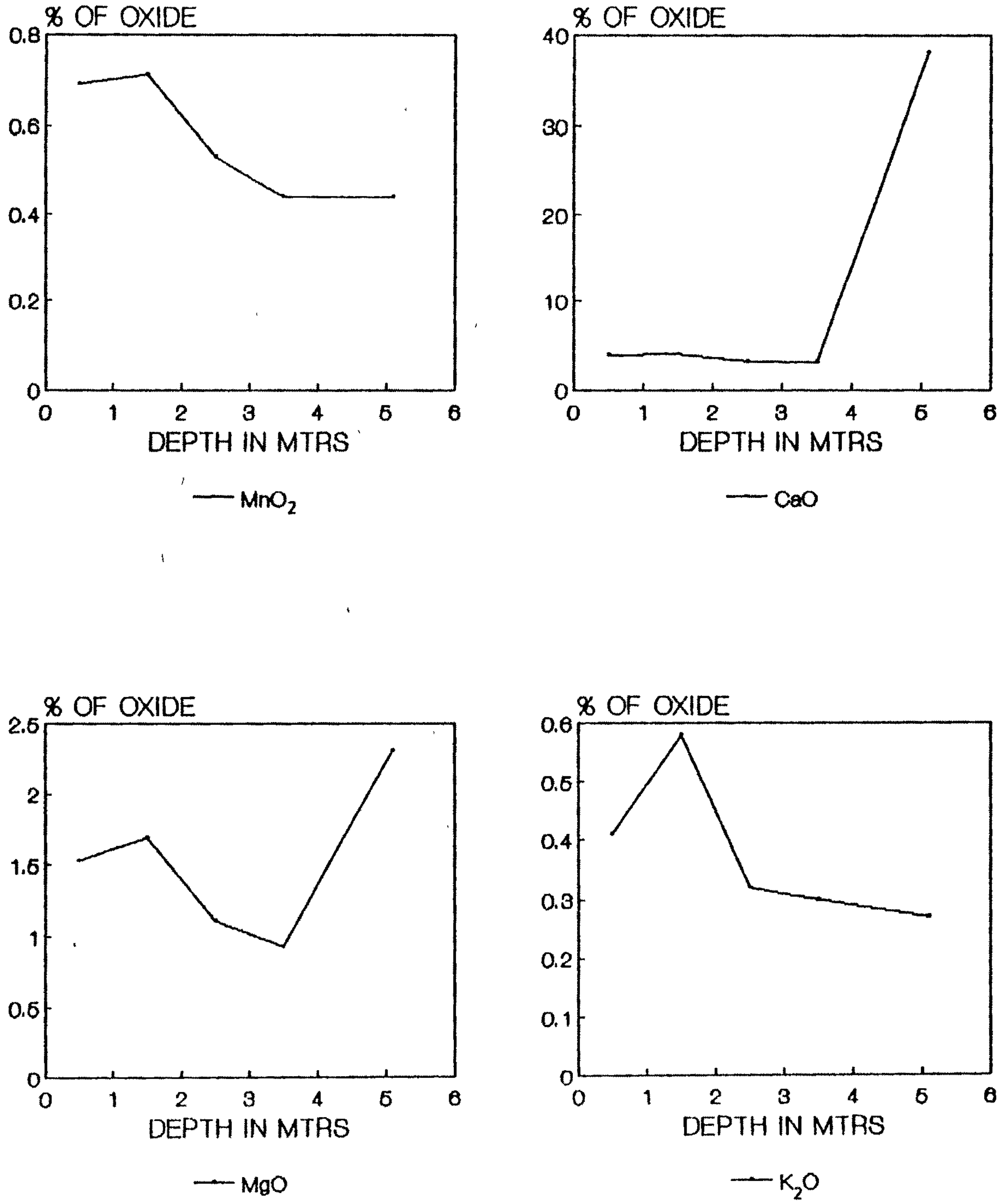
FIG. 38 a.

VARIATION OF MAJOR OXIDES IN THE BAUXITE
PROFILE AT MEWASA VILLAGE
(SiO_2, Al_2O_3, Fe_2O_3, TiO_2)



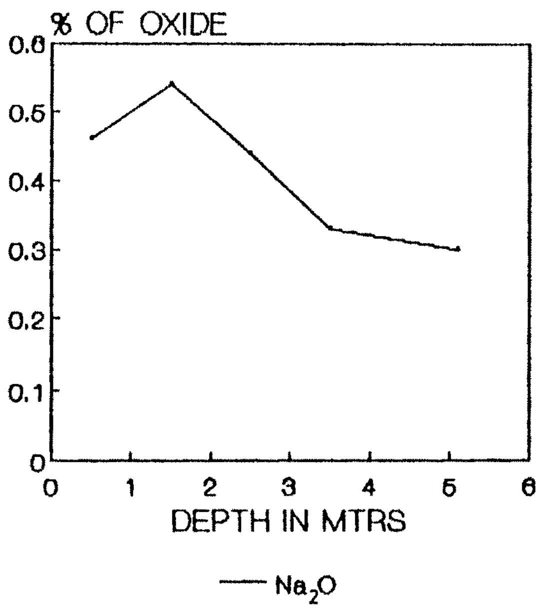
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT MEWASA VILLAGE (MnO_2, CaO, MgO, K_2O)

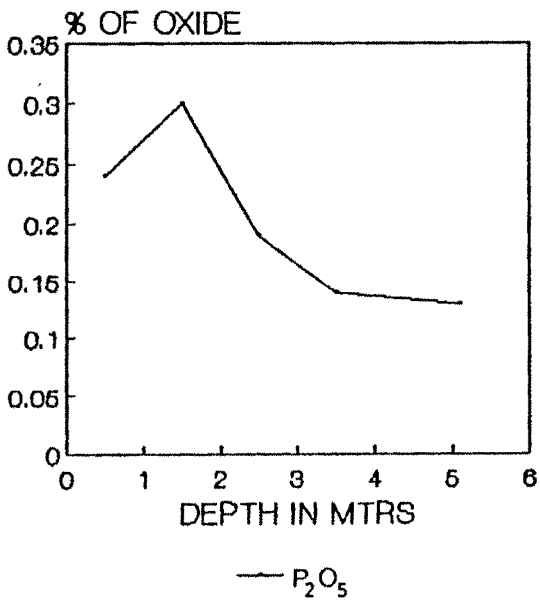
FIG.38 b.



VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT MEWASA VILLAGE
(Na_2O, P_2O_5)

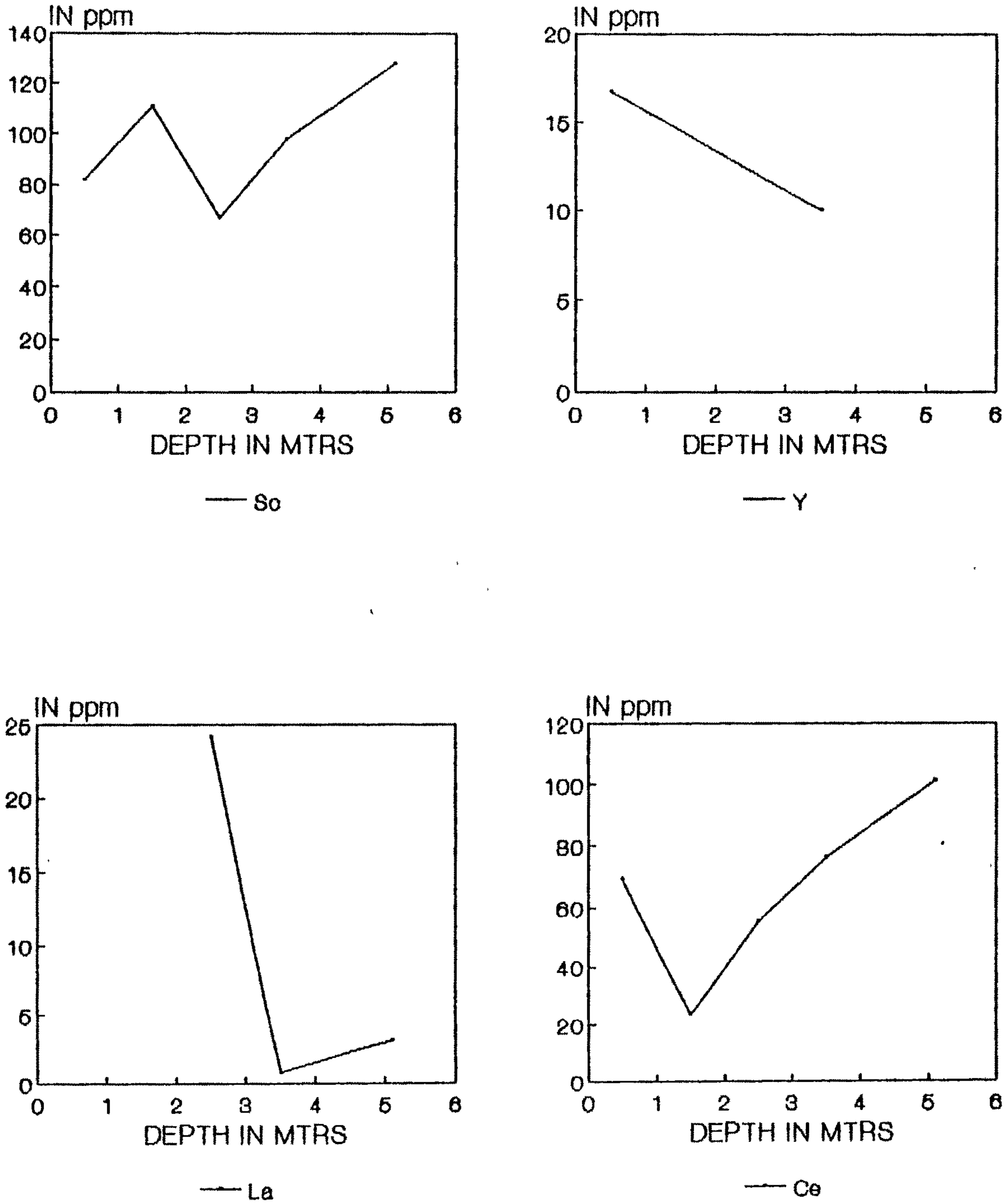
FIG. 38 c.





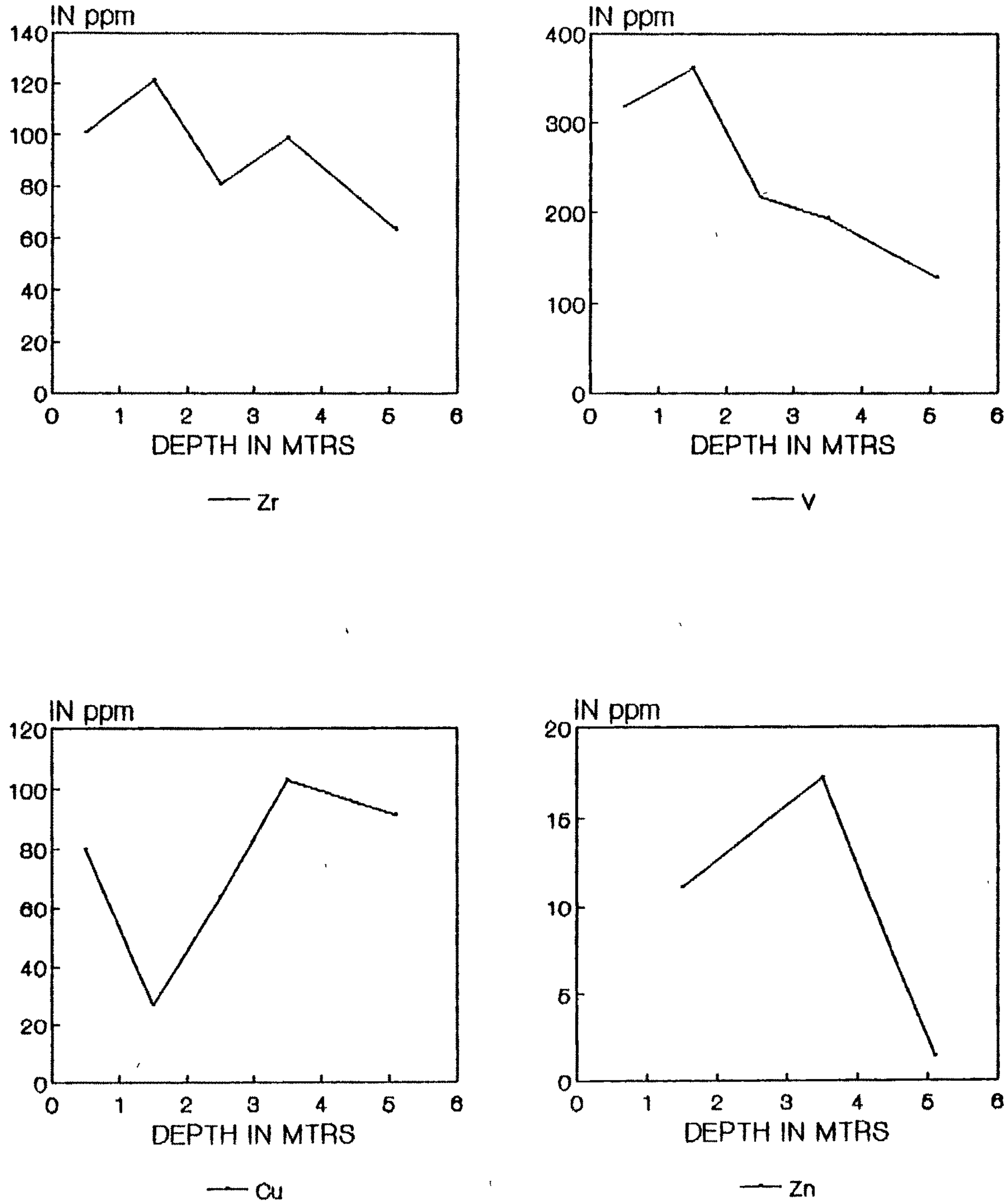
VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT MEWASA VILLAGE
(Sc, Y, La, Ce)

FIG. 38 d.



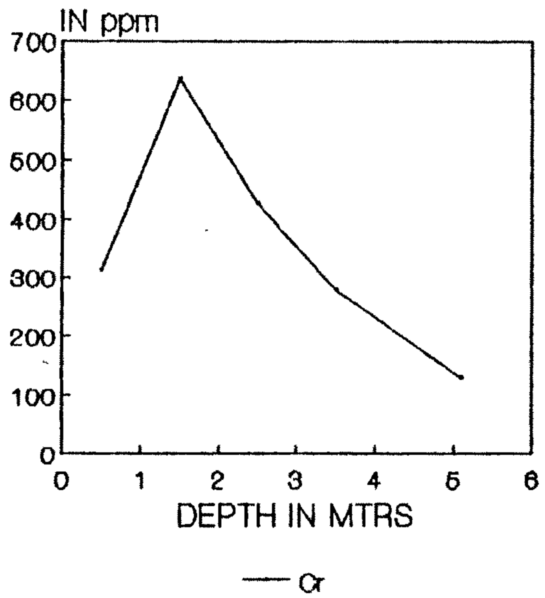
VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT MEWASA VILLAGE (Zr, V, Cu, Zn)

FIG. 38 e



VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT MEWASA VILLAGE (Cr, Ni)

FIG. 38 f.



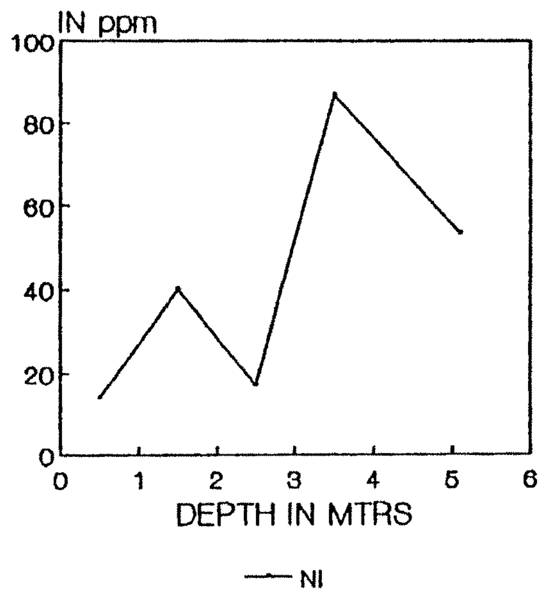


Table - 11

NET GAINS AND LOSSES OF MAJOR OXIDES AND TRACE ELEMENTS BASED ON A Ti-RETAINED MASS BALANCE MODEL

LOC.:MEWASA

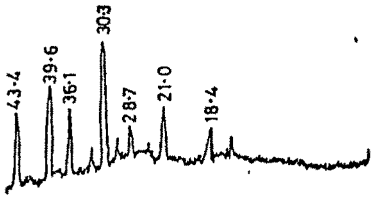
Bed rock thickness consumed to produce present thickness of the weathered profile : 51.60 m.

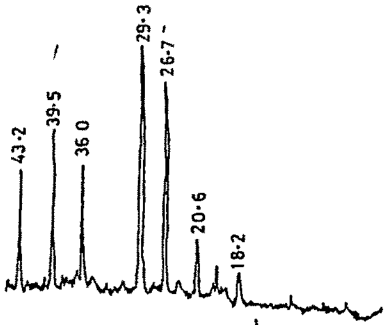
Depth	0.00-0.6m	0.6-1.6m	1.6-2.6m	2.6-3.6m	3.6m-5.1m	Remarks
Horizon	Gaj limestone	B_{ox} (Fer)	B_{ox}(alu)	B_{ox} (Alu)	$B_{(sap)}$	
SiO_2	- 92.17	- 92.13	- 34.76	- 67.53	1446.3	Losses throughout the profile with horizon of gain in the B(sap) zone
Al_2	76.79	81.29	78.38	88.54	N.D.	Downward increasing gain with a maxima in Box(Alu) zone.
Fe_2O_3	1.72	- 46.48	- 32.72	- 6.13	2919.62	Top and bottom horizon of gain with a mid horizon of losses.
TiO_2	-	-	-	-	-	—— —— ——
MnO_2	28.45	20.33	- 7.48	11.59	3750	Two top and two bottom horizon of gain and mid-horizon of losses.
CaO	64.06	52.37	26.00	75.77	73.68	Increasing throughout the profile with maxima in B(sap).
MgO	- 62.03	- 61.82	- 74.17	- 68.56	2594.03	Losses throughout the profile, with a bottom horizon of gain in the B(sap) zone.
K_2O	- 75.00	- 71.91	- 84.03	- 78.26	575.00	Top four horizon of losses with bottom horizon of gain in B(sap) zone.
Na_2O	- 65.74	- 63.38	- 69.27	- 66.52	950.00	Top four horizon of losses with bottom horizon of gain in B(sap) zone.
P_2O_5	78.76	103.38	32.66	42.02	4450.00	Top two horizon of gain with bottom three horizon of substantial depletion.
Sc	- 61.26	- 51.70	- 69.94	- 6.01	8.98	Top four horizon of losses with a bottom horizon of gain in B(sap) zone.
Y	- 54.08	T	T	- 16.62	T	Upward increasing mobilities.
La	T	T	- 53.66	- 97.74	- 88.50	Mobilities throughout the profile.
Ce	- 59.49	- 87.50	- 69.70	- 39.24	5.41	Losses throughout the profile, with a bottom horizon of gain in the B(sap) zone.
Pb	T	T	T	T	T	—— —— ——
Zr	- 57.11	- 53.07	- 67.78	- 42.66	- 51.93	Mobilities throughout the profile.
V	- 40.93	- 38.88	- 62.13	- 42.66	- 57.41	Mobilities through the profile.
Cu	- 68.09	- 90.21	- 76.10	- 43.91	- 34.76	Mobilities throughout the profile.
Zn	T	- 71.40	T	- 33.75	- 93.01	Mobilities throught the profile
Cr.	- 33.36	23.66	- 14.77	- 18.94	- 51.31	Top, and bottom horizon of losses with a mid-horizon of gain.
Ni	- 84.82	- 61.14	- 82.80	25.44	0.83	Top three horizon of losses with bottom two horizon of gain.

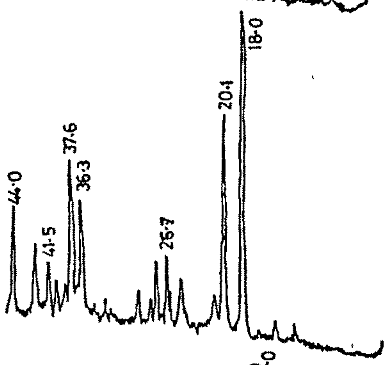
FIG. 39.

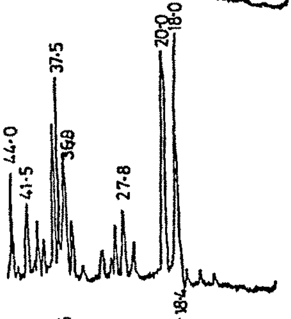
X - RAY DIFFRACTION TRACES OF VARIOUS HORIZONS OF BAUXITIC PROFILE AT MEWASA.

Depth in mtr.	Horizon	Dominating minerals
0.00- 0.6 m	Gaj limestone	Calcite, Rutile Baryte, Quartz, Maghemite, Saponite Beidellite, Nontronite
0.6 - 1.6 m	$B_{(ox)}$ Ferricrete	Maghemite Kaolinite Montmorillonite Saponite Quartz Anatase
1.6 - 2.6 m	$B_{(ox)}$ Alucrete	Gibbsite Diaspore Kaolinite Boehmite Saponite Geothite Quartz.
2-6 - 3.6 m	$B_{(ox)}$ Alucrete	Gibbsite Diaspore Kaolinite Montmorillonite Maghemite Nontronite Geothite Saponite
3.6 - 5.1 m	$B_{(Sap)}$	Kaolinite Nontronite Beidellite Maghemite Saponite Montmorillonite Hematite Augite Quartz









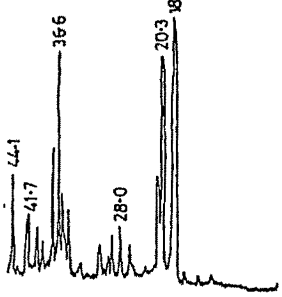


Table - 12

VILLAGE - MEWASA (0.00-0.6 m) X - ray data Gaj Limestone

2θ	d spacing	Intensity %		Remark
		I_o	I_c	
6.5	13.598	1.8	1.84	Nontronite
12.6	7.0251	2.9	2.97	Maghemite
18.4	4.8216	6.0	6.14	Maghemite
21.0	4.2302	8.1	8.29	Sphene
23.2	3.8338	18.0	18.44	Saponite
25.4	3.5065	4.6	4.71	Maghemite
26.2	3.4012	20.0	20.49	Maghemite
27.6	3.2318	5.0	5.12	Montmorillonite
28.7	3.1104	7.6	7.78	Quartz
29.4	3.0379	97.60	100.00	Calcite
30.3	2.9497	7.0	7.17	Calcite
31.6	2.8312	8.5	8.70	Calcite
36.1	2.4880	35.5	36.37	Rutile
36.7	2.4487	7.6	7.78	Baryte
39.6	2.2758	51.0	52.25	Sphene
40.5	2.2273	5.9	6.04	Saponite
41.8	2.1609	5.3	5.43	Beidellite
43.4	2.0849	47.2	48.36	Maghemite

Table - 13

VILLAGE - MEWASA   X - ray data B_{ox} - Ferricrete
(0.6 - 1.6 m)

2θ	d spacing	Intensity %		Remark
		I_o	I_c	
6.1	14.448	3.5	3.56	Saponite
12.3	7.1957	4.2	4.28	Kaolinite
18.2	4.8742	11.6	11.82	Gibbsite
19.8	4.4838	9.0	9.17	Montmorillonite
20.3	4.3744	9.1	9.27	Montmorillonite
21.3	4.1713	9.3	9.48	Kaolinite
23.0	3.8667	21.0	21.40	Maghemite
24.9	3.5758	9.5	9.68	Kaolinite
25.2	3.5339	9.8	9.98	Anatase
26.7	3.3386	60.0	61.16	Montmorillonite
29.3	3.0480	98.10	100.00	Calcite
31.4	2.8488	11.0	11.21	Sphene
34.9	2.5707	11.6	11.82	Kaolinite
36.0	2.4947	39.5	40.26	Kaolinite
36.5	2.4616	12.5	12.74	Quartz
39.5	2.2869	48.1	49.03	Quartz
40.3	2.2378	11.5	11.72	Gibbsite
42.3	2.1365	10.2	10.39	Quartz
43.2	2.0941	40.3	41.08	Maghemite
44.4	2.0402	10.9	11.11	Gibbsite

Table - 14

VILLAGE - MEWASA (1.6 - 2.6 m)   X - ray data B_{ox} - Alucrete

2Θ	d spacing	Intensity %		Remark
		I_o	I_c	
12.1	7.1342	8.5	8.82	Saponite
14.3	6.1935	9.0	9.34	Boehmite
15.4	5.7535	6.5	6.74	Nontronite
18.0	4.9279	96.3	100.00	Sphene
20.1	4.4175	61.0	63.34	Kaolinite
20.3	4.3744	30.5	31.67	Gibbsite
21.2	4.1907	15.5	16.09	Kaolinite
24.7	3.6043	14.5	15.05	Sphene
25.0	3.5617	21.0	21.80	Kaolinite
26.3	3.3885	19.0	19.73	Geothite
26.7	3.3386	26.3	27.31	Montmorillonite
27.8	3.2090	25.0	25.96	Saponite
28.5	3.1318	15.2	15.78	Saponite
29.9	2.9882	17.0	17.65	Sphene
31.7	2.8225	11.0	11.42	Calcite
33.6	2.6671	13.5	14.01	Sphene
34.8	2.5779	13.7	14.22	Diaspore
35.8	2.5081	15.4	15.99	Calcite
36.3	2.4747	29.0	30.11	Nontronite
36.4	2.4682	40.4	41.95	Quartz
36.9	2.4358	30.0	31.15	Diaspore
37.6	2.3921	50.0	51.92	Kaolinite
38.6	2.3324	19.7	20.45	Kaolinite
39.2	2.2981	21.0	21.80	Gibbsite
40.0	2.2539	25.0	25.96	Goethite
41.1	2.1961	15.1	15.68	Geothite
41.5	2.1759	29.0	30.11	Gibbsite
44.0	2.0579	40.0	41.53	Gibbsite

Table - 15

VILLAGE - MEWASA (2.6 - 3.6m) X - ray data B_{ox} - Alucrete

2Θ	d spacing	Intensity %		Remark
		I_o	I_c	
12.1	7.3142	6.2	6.34	Saponite
14.2	6.2369	7.0	7.16	Saponite
18.0	4.9279	97.70	100.00	Sphene
20.0	4.4394	94.2	96.41	Montmorillonite
20.3	4.3744	42.9	43.90	Montmorillonite
21.2	4.1907	9.1	9.31	Kaolinite
25.1	3.5477	19.0	19.44	Nontronite
26.3	3.3885	18.8	19.24	Geothite
26.7	3.3386	30.3	31.01	Montmorillonite
27.8	3.2090	25.9	26.50	Saponite
28.5	3.1318	14.3	14.63	Saponite
29.2	3.0582	8.7	8.90	Nontronite
30.0	2.9785	15.5	15.86	Augite
34.8	2.5779	8.8	9.00	Kaolinite
35.7	2.5149	10.4	10.64	Maghemite
36.2	2.4813	29.8	30.50	Geothite
36.4	2.4682	46.0	47.08	Quartz
36.9	2.4358	73.8	75.53	Diaspore
37.5	2.3982	59.5	60.90	Kaolinite
38.1	2.3681	15.0	15.35	Beidellite
39.2	2.2981	20.3	20.77	Gibbsite
39.9	2.2593	26.5	27.12	Goethite
40.4	2.2325	12.2	12.48	Gibbsite
41.0	2.2012	11.2	11.46	Maghemite
41.5	2.1759	31.4	32.13	Kaolinite
43.2	2.0941	10.1	10.33	Saponite
44.0	2.0579	43.1	44.11	Gibbsite

Table - 16

VILLAGE - MEWASA (3.6 - 5.1m) X - ray data B(Sap)

2Q	d spacing	Intensity %		Remark
		I_o	I_c	
12.3	7.1957	5.8	5.91	Kaolinite
14.5	6.1085	5.4	5.50	Boehmite
16.5	5.3723	7.8	7.95	Maghemite
18.4	4.8216	89.10	100.00	Maghemite
20.3	4.3744	85.0	86.64	Montmorillonite
25.3	3.5201	17.1	17.43	Illite
26.5	3.3624	18.0	18.34	Illite
26.8	3.3264	27.2	27.72	Quartz
28.0	3.1865	22.5	22.93	Nontronite
28.7	3.1104	18.8	19.16	Nontronite
29.4	3.0379	9.8	9.98	Nontronite
30.0	2.9785	16.7	17.02	Augite
32.1	2.7883	7.8	7.95	Maghemite
33.2	2.6984	10.1	10.29	Hematite
33.8	2.6518	8.5	8.66	Saponite
35.0	2.536	9.0	9.17	Saponite
35.9	2.5014	11.0	11.21	Montmorillonite
36.3	2.4747	26.9	27.42	Nontronite
37.0	2.4295	39.6	40.36	Montmorillonite
37.4	2.4044	87.7	89.39	Maghemite(?)
37.6	2.3921	52.0	53.00	Kaolinite
38.3	2.3500	13.9	14.16	Boehmite
39.2	2.2981	18.8	19.16	Kaolinite
40.1	2.2485	23.2	23.64	Quartz
40.6	2.2220	13.0	13.25	Saponite
41,2	2.1910	11.1	11.31	Kaolinite
41.7	2.1659	29.0	29.56	Beidellite
43.6	2.0758	10.2	10.39	Sphene
44.1	2.0534	43.0	43.83	Sphene

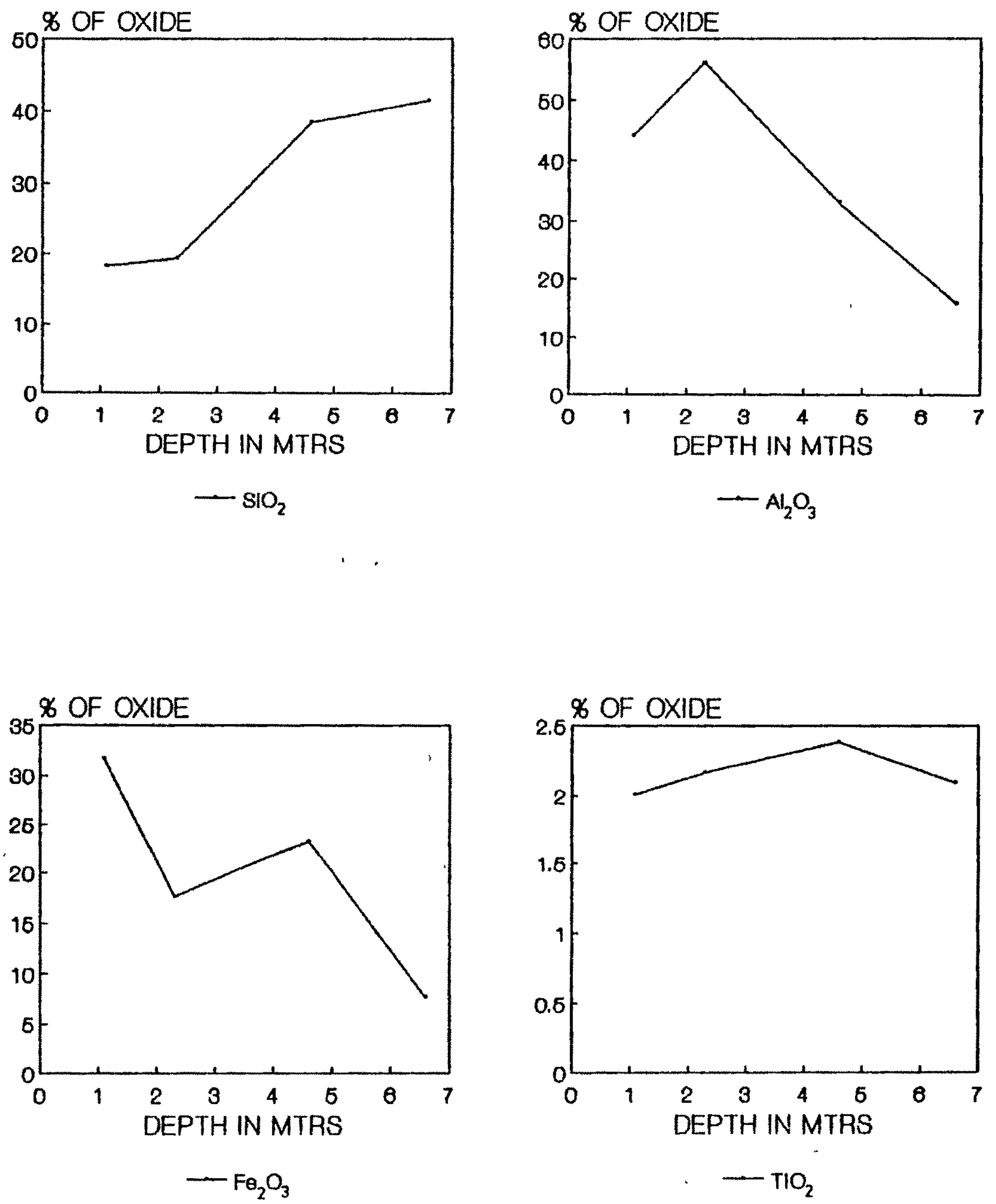
Table - 17

BHATIYA

MAJOR OXIDES IN %										TRACE ELEMENTS IN ppm											
SiO_2	Al_3O_3	Fe_2O_3	TiO_2	MnO_2	CaO	MgO	K_2O	Na_2O	P_2O_5	SC	Y	La	Ce	Pb	Zr	V	Cu	Zn	Cr	Ni	DEPTH IN MTS.
18.27	44.22	31.76	2.01	0.72	0.98	0.76	0.41	0.20	0.17	115.11	T	20.11	89.62	7.62	160.15	216.15	97.56	T	517.11	40.42	0.00 — 1.1
19.39	56.29	17.63	2.17	0.68	0.72	0.59	0.47	0.31	0.05	178.02	T	11.78	101.27	2.15	121.70	276.11	131.42	T	328.76	58.03	1.1 — 2.3
38.52	33.18	23.71	2.39	0.23	0.62	0.43	0.51	0.33	0.06	121.17	T	8.01	98.56	T	114.22	311.76	80.70	16.11	278.66	46.13	2.3 — 4.6
41.50	16.00	7.60	2.10	0.60	1.30	1.40	0.90	0.60	0.05	102.00	T	25.5	83.4	22.00	95.50	215.50	88.00	18.00	236.00	49.00	4.6 — 6.6

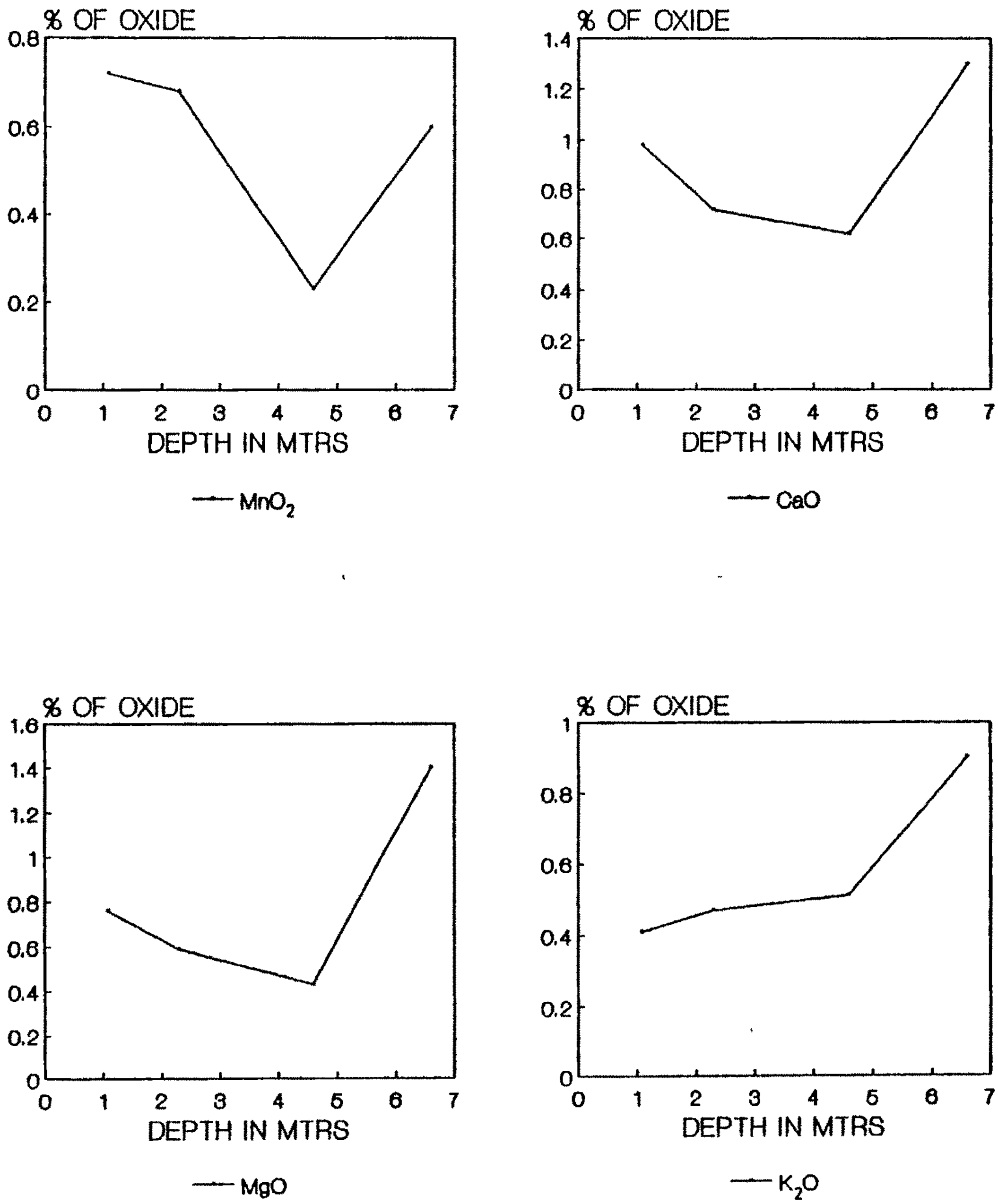
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT BHATIYA VILLAGE (SiO_2, Al_2O_3, Fe_2O_3, TiO_2)

FIG. 40 a.



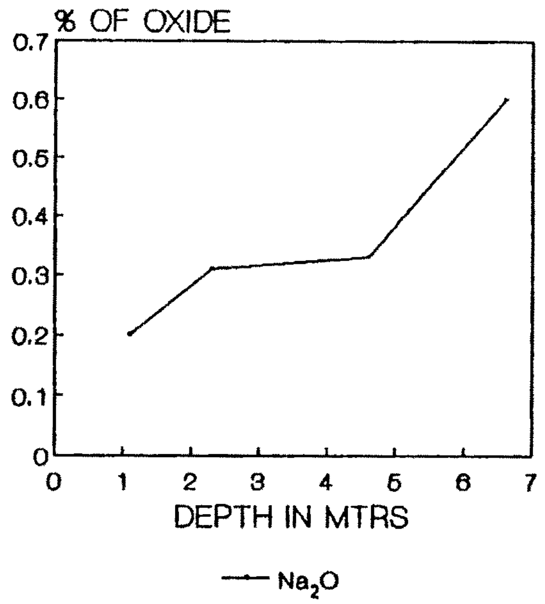
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT BHATIYA VILLAGE (MnO_2, CaO, MgO, K_2O)

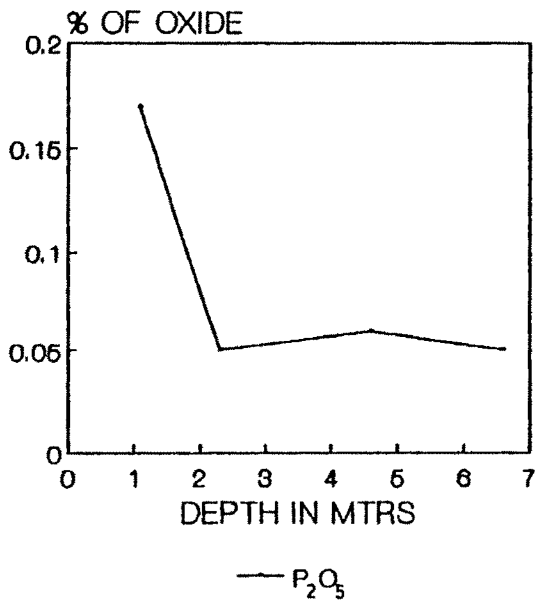
FIG. 40 b.



VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT BHATIYA VILLAGE (Na_2O, P_2O_5)

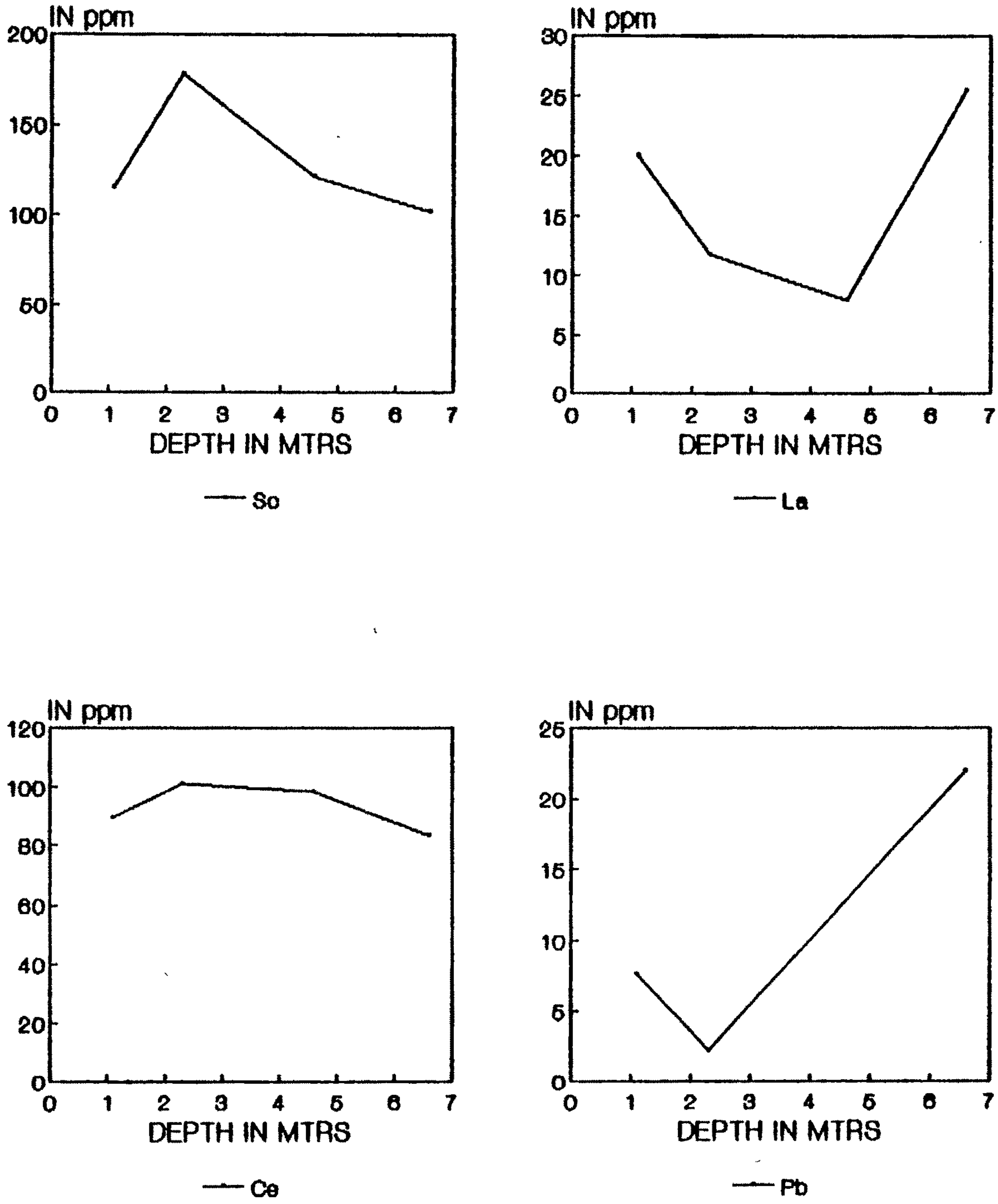
FIG. 40 c.



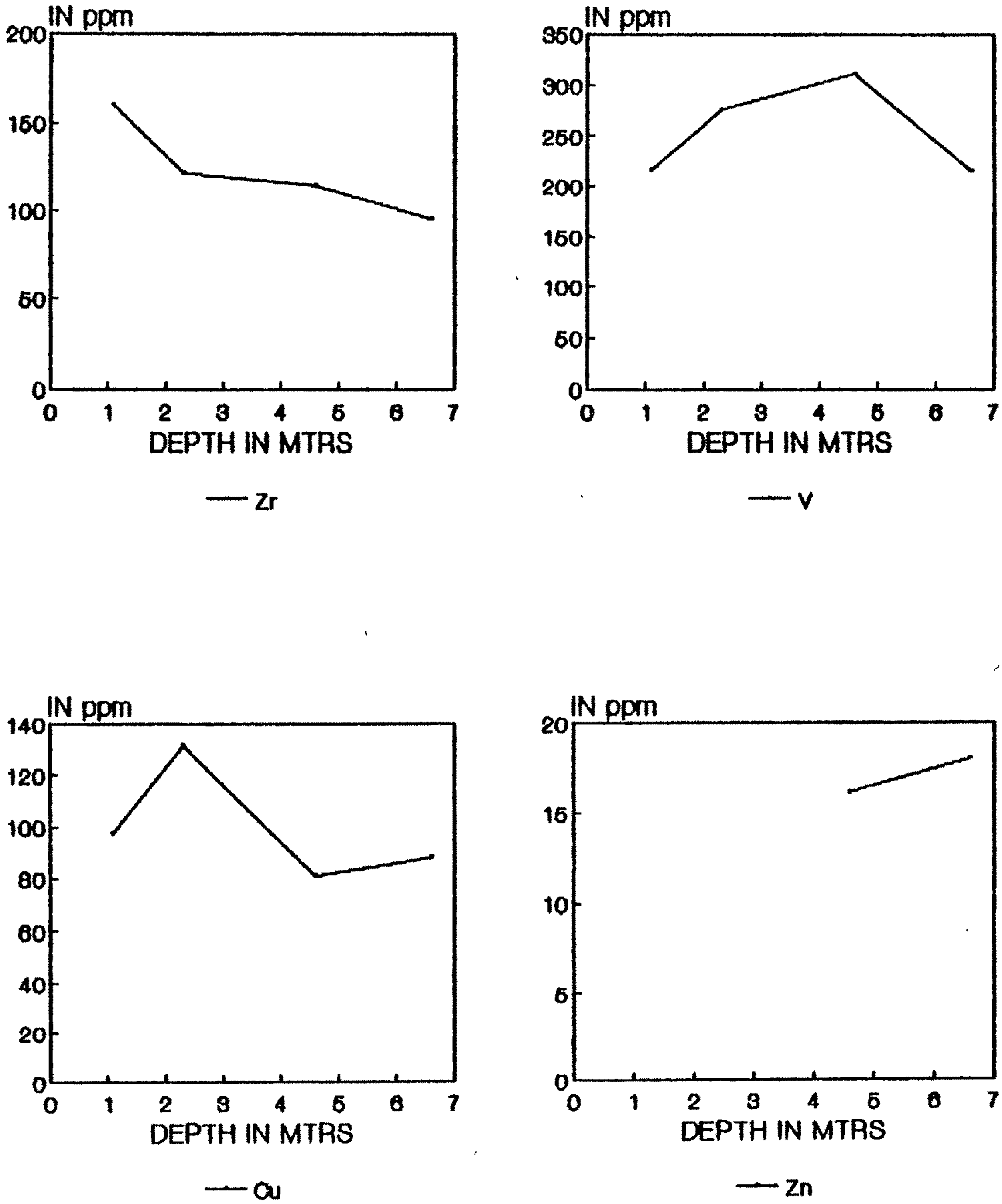


VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT BHATIYA VILLAGE (Sc, La, Ce, Pb)

FIG. 40 d.

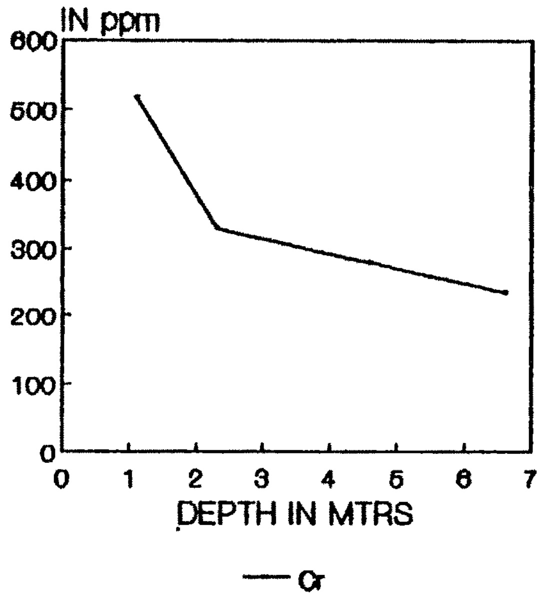


VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT BHATIYA VILLAGE (Zr, V, Cu, Zn) FIG. 40 e.



VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT BHATIYA VILLAGE (Cr, Ni)

FIG. 40 f.



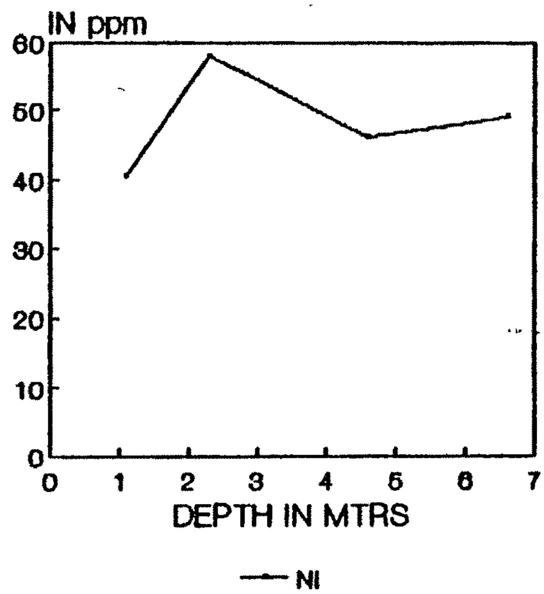


Table - 18

NET GAINS AND LOSSES OF MAJOR OXIDES AND TRACE ELEMENTS BASED ON A Ti-RETAINED MASS BALANCE MODEL

LOC.: BHATIYA

Bed rock thickness consumed to produce present thickness of weathered profile : 3.37 m

Depth	0.00-1.1m	1.1 -2.3m	2.3 - 4.6m	Remarks
Horizon	$B_{ox(Fer)}$	$B_{ox(Alu)}$	$B_{(sap)}$	
SiO_2	- 54.55	- 55.32	- 19.41	Upwards increasing mobilities
Al_2O_3	188.20	239.81	81.86	Upward increasing gainsthroughoutthe profile with maxima in Box(Alu) horizon.
Fe_2O_3	336.10	124.23	169.18	Top and bottom horizon of gains with - . mid-horizon of substantial depletion.
TiO_2	-	-	-	—— —— ——
MnO_2	25.37	9.67	- 66.31	Top two horizon of gains and - bottom horizon of losses.
CaO	- 21.50	- 46.58	- 58.23	Downward increasing mobilities throughout the profile
MgO	- 43.28	- 59.21	- 73.01	Mobile throughout the profile
K_2O	- 52.47	- 49.53	- 50.28	Mobile throughout the profile increasing upward.
Na_2O	- 93.43	- 90.57	- 90.88	Upward increasing mobilities.
P_2O_5	255.22	- 3.22	5.43	Top Box(Fer) and B(sap) horizone of gain with losses in Box(Alu) . zone.
Sc	14.53	64.07	479.19	Top three horizon of gain with bottom horizon of losses
Y	T	T	T	—— —— ——
La	- 17.95	- 96.22	- 56.97	Top two horizon of losses with the gain in the B(sap) zone.
Ce	- 10.82	- 6.66	- 17.52	Downward increasing mobilities.
Pb	- 65.88	- 91.08	T	Downward increasing mobilities.
Zr	74.49	22.82	4.66	Top three horizon of gain with bottom horizon of losses.
V	- 4.31	23.42	- 26.53	Top and bottom horizon of gains with mid profile horizon of gains in the Box(Alu) zone
Cu	11.63	39.29	- 22.33	Top two horizon of gain with bottom horizon of losses.
Zn	T	T	- 21.80	Bottom . horizon of losses.
Cr	105.82	21.20	- 6.72	Top two horizon of gain with bottom horizon of losses
Ni	- 15.54	12.31	- 18.93	Top horizon of Box(Fer) and B(sap) horizon of losses with Box(Alu) - zone of gain.

BUDDHAIHAR

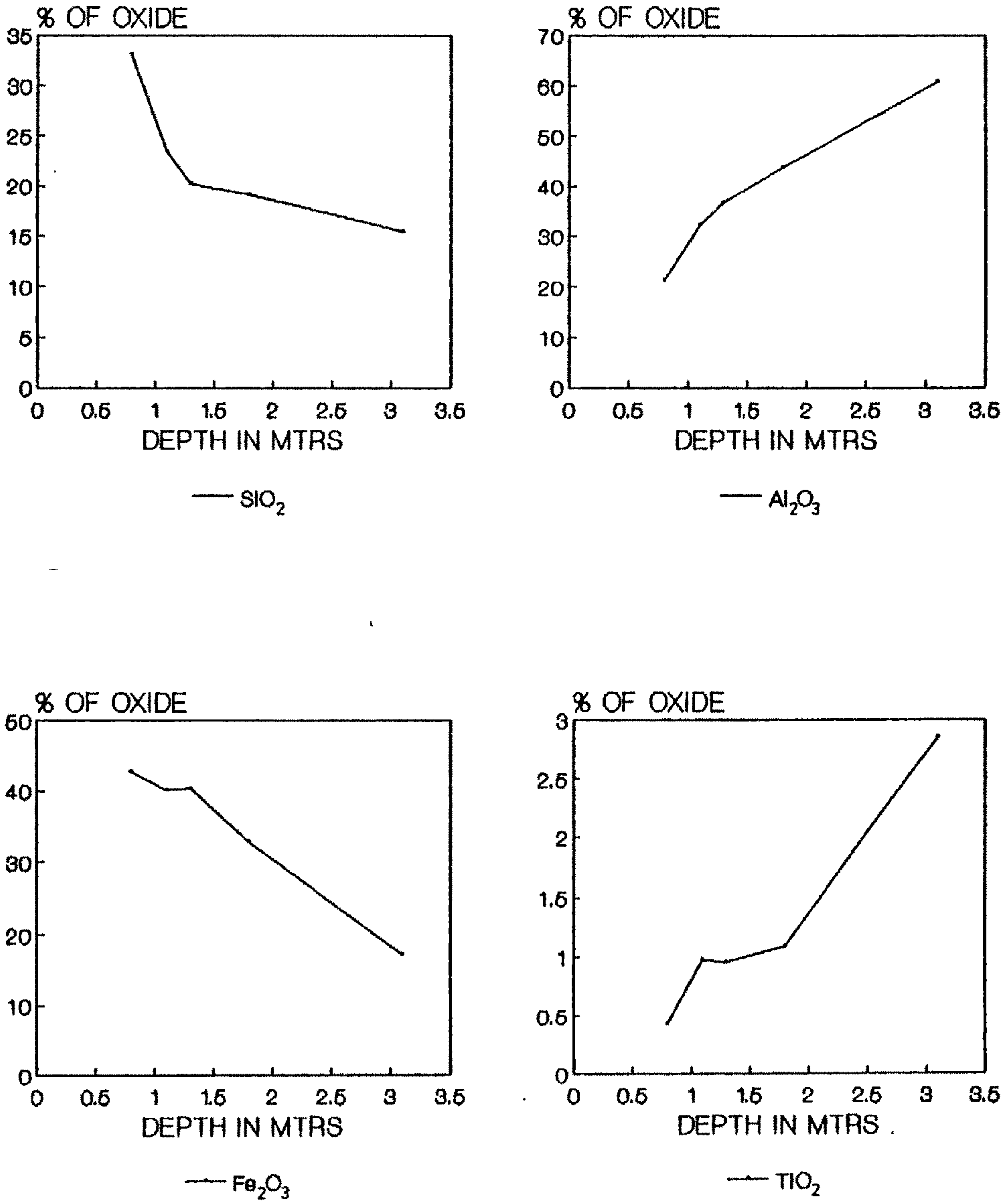
Table - 19

MAJOR OXIDES IN %										TRACE ELEMENTS IN ppm											
SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO_2	CaO	MgO	K_2O	Na_2O	P_2O_5	SC	Y	La	Ce	Pb	Zr	V	Cu	Zn	Cr	Ni	DEPTH IN MTS.
33.18	21.43	42.78	0.43	0.19	1.24	0.51	0.11	0.09	0.03	130.50	T	18.88	63.13	T	161.25	148.50	45.11	15.57	237.50	32.17	0.00 — 0.8
23.37	32.07	40.10	0.98	0.24	1.31	0.72	0.16	0.11	0.05	90.36	T	T	80.59	T	101.02	219.67	60.77	T	115.11	14.13	0.8 — 1.1
20.20	36.71	40.42	0.96	0.32	1.23	0.71	0.21	0.15	0.09	62.39	T	T	96.24	T	79.90	340.50	111.11	T	178.47	8.25	1.1 — 1.4
19.17	43.65	32.87	1.09	0.41	1.43	0.86	0.23	0.19	0.11	89.27	T	14.10	117.27	T.	40.35	276.61	40.23	6.06	190.48	43.79	1.4 — 1.8
15.40	60.84	17.20	2.86	0.47	1.37	0.89	0.32	0.36	0.18	101.38	T	1.06	75.75	T	119.08	129.00	78.35	0.83	279.95	48.93	1.8 — 3.1
38.3	16.8	8.7	2.40	0.40	1.00	1.90	1.10	0.90	0.08	84.00	T	15.0	7.20	T	110.00	268.00	89.00	12.50	169.00	29.00	

— Basalt—33m

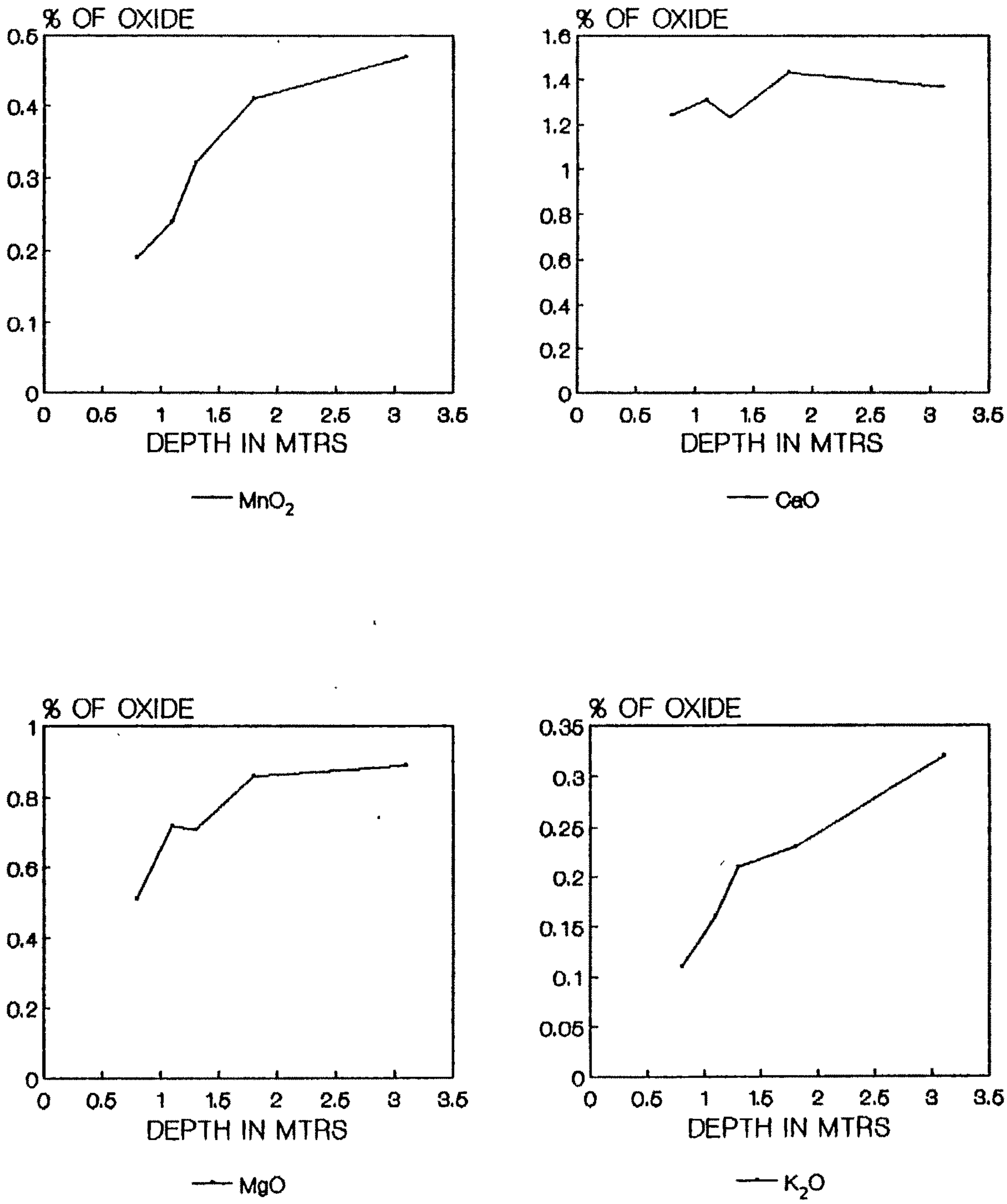
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT BUDDHADHAR VILLAGE (SiO_2, Al_2O_3, Fe_2O_3, TiO_2)

FIG. 41a.

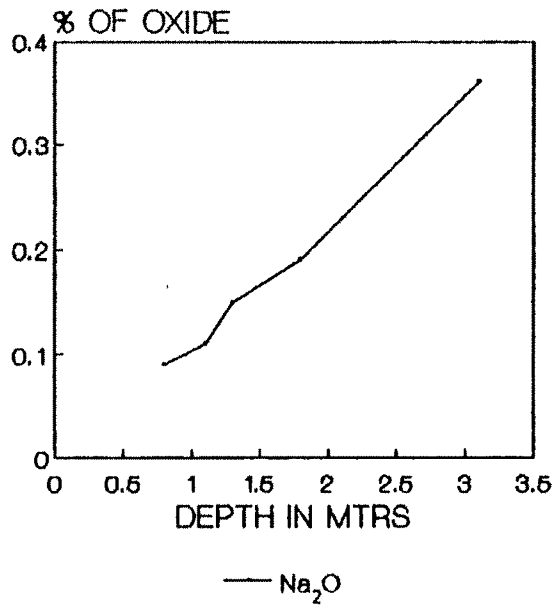


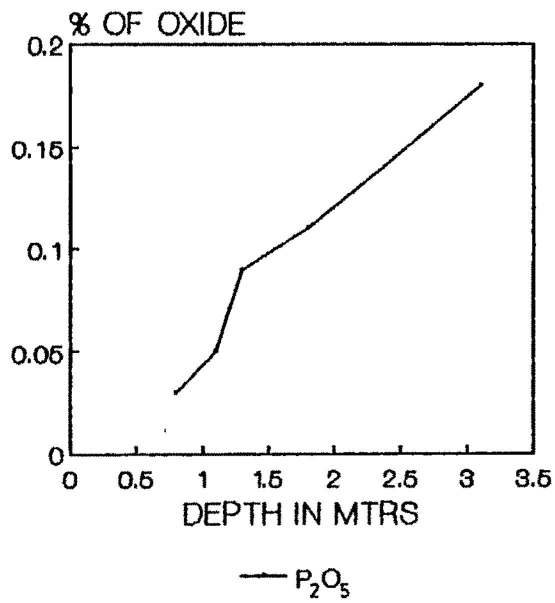
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT BUDDHADHAR VILLAGE (MnO_2, CaO, MgO, K_2O)

FIG. 41 b.



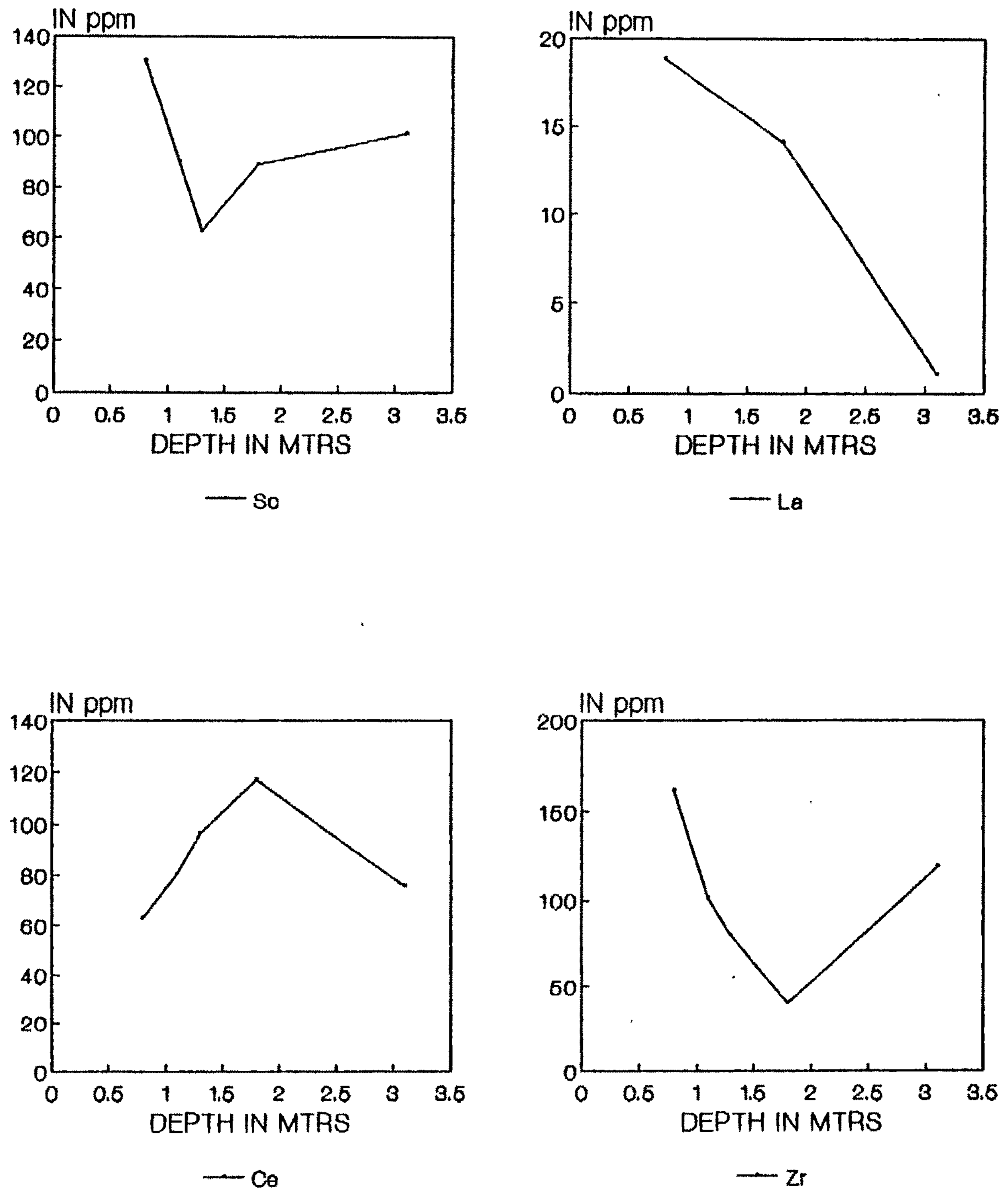
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT BUDDHADAR VILLAGE (Na_2O, P_2O_5) FIG.41 c.





VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT BUDDHADHAR VILLAGE (Sc, La, Ce, Zr)

FIG. 41d



VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT BUDDHADAR VILLAGE (V, Zn, Cu, Ni, Cr)

FIG. 41 e.

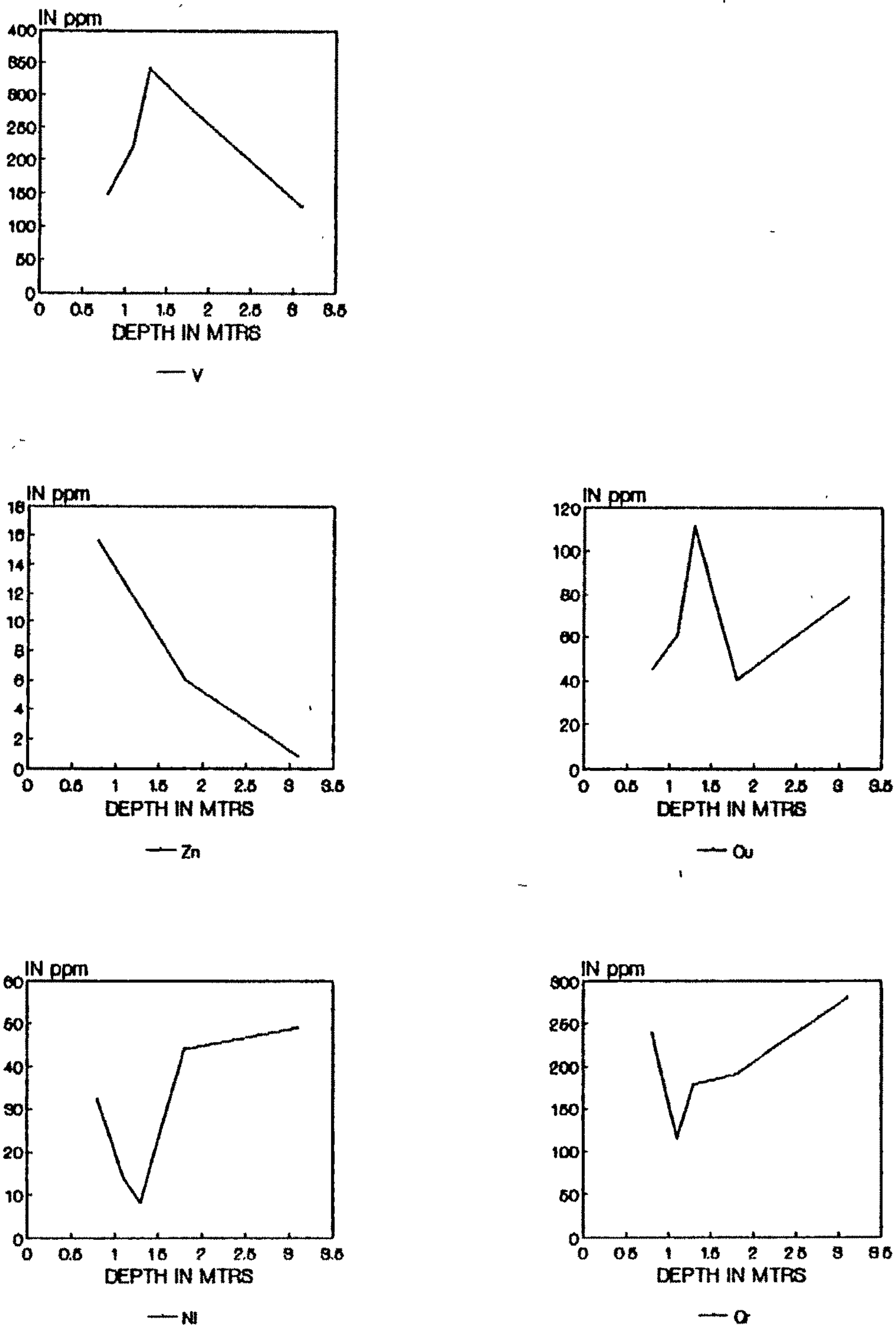


Table - 20

NET GAINS AND LOSSES OF MAJOR OXIDES AND TRACE ELEMENTS BASED ON A Ti-RETAINED MASS BALANCE MODEL

LOC.:BUDHADHAR

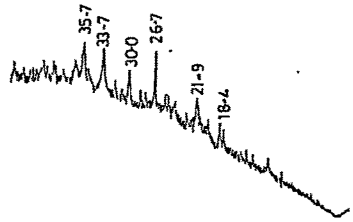
Bed rock thickness consumed to produce present thickness of the weathered profile : 16.03

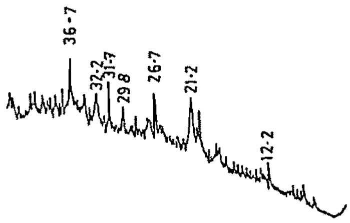
Depth	0.00-0.80m	0.80-1.1m	1.1-1.4m	1.4-1.8m	1.8m-3.1m	Remarks
Horizon	$B_{(Fer)}$	$B_{(Fer)}$	$B_{ox(Fer)}$	$B_{ox(Fer)}$	$B_{(Alu)}$	
SiO_2	378.40	47.25	30.45	9.04	- 66.61	Upward increasing gains throughout the profile with a bottom horizon of B(Alu) losses.
Al_2O_3	607.68	364.68	443.00	468.65	202.07	Upward increasing gains with maxima in the B(Fer) zone.
Fe_2O_3	2635.93	1025.25	1057.86	729.28	65.38	Upward increasing gains with maxima in the B(Fer) zone.
TiO_2	-	-	- -	-	-	— — —
MnO_2	165.11	46.93	99.99	125.68	- 1.39	Top four horizon of gain with bottom horizon of losses.
CaO	592.09	220.81	207.50	214.86	98.88	Upward increasing gain throughout the profile with maxima in B(Fer) zone.
MgO	49.79	- 7.20	- 6.59	- 0.35	- 60.69	Losses throughout the profile with a top horizon of gain in B(Fer) zone.
K_2O	- 44.23	- 64.40	- 51.31	- 54.00	- 75.60	Downward increasing mobilities.
Na_2O	- 44.32	- 70.14	- 58.43	- 53.63	- 66.51	Downward increasing mobilities.
P_2O_5	109.30	53.06	181.25	202.75	88.81	Mid-profile gains in the Box(Fer) zone but with bottom and top horizons of substantial depletion.
Sc	749.76	158.17	81.79	129.31	- 0.746	Upward increasing gain with a maxima in top B(Fer) zone and bottom horizon of losses in B(Alu) zone.
Y	T	T	T	T	T	— — —
La	602.51	T	T	106.97	493.50	Increasing throughout the profile
Ce	340.44	146.70	200.75	222.76	- 10.54	Increasing throughout profile with maxima in top horizon in B(Fer) and losses in B(Alu) zone.
Pb	T	T	T	T	T	— — —
Zr	650.00	106.16	66.45	- 25.27	- 16.72	Top three horizon of gain with two bottom horizon of losses.
V	176.27	79.32	183.80	-103.01	- 63.91	Top three horizon of gain with two bottom horizon of losses.
Cu	172.75	61.22	200.92	- 4.03	- 28.77	Top three horizon of gain with two bottom horizon of losses.
Zn	595.21	T	T	6.74	- 94.42	Top horizon of gain and bottom horizon of losses.
Cr	673.25	64.44	160.26	144.65	37.03	Upward increasing gain with maxima in B(Fer) zone.
Ni	513.47	18.23	- 29.53	229.42	40.28	Top two and bottom two hirizon of gain with a mid-profile of losses in the Box(Fer) zone.

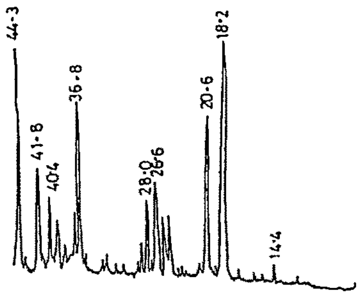
FIG. 42.

X-RAY DIFFRACTION TRACES OF VARIOUS HORIZONS OF BAUXITIC PROFILE AT BUDDHADHAR

Depth in mtr.	Horizon	Dominating minerals
0.00-0.80m	$B_{(ox)}$ Ferricrete	Maghemite, Saponite, Kaolinite, Montmorillonite Nontromite, Ilmenite, Fayalite, Calcite
0.80-1.1m	$B_{(ox)}$ Ferricrete	Maghemite Saponite Kaolinite Montmorillonite, Quartz, Hematite Illite, Calcite Sphene.
1.1 - 1.4 m	$B_{(ox)}$ Ferricrete	Montmorillonite Saponite Kaolinite Quartz, Calcite Illite, Hematite, Fayalite
1.4 - 1.8 m	$B_{(ox)}$ Ferricrete	Kaolinite Montmorillionite Maghemite Illite Fayalite Hematite
1.8 - 3.1 m	$B_{(ox)}$ Alucrete	Gibbsite Diaspore Boehmite Kaolinite Montmorillonite Geothite Anatase







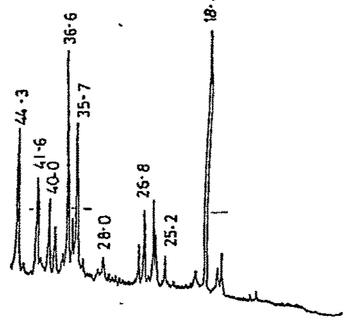


Table - 21

VILLAGE - BUDDHADHAR (0.80 - 1.1 m) X - ray data B_{ox}-Ferricrete

2θ	d spacing	Intensity %		Remarks
		I_o	I_c	
6.0	14.730	7.2	14.17	Saponite
9.0	9.8254	10.1	19.88	Illite
12.3	7.1957	18.9	37.20	Kaolinite
17.8	4.9828	10,7	21.06	Illite
18.4	4.8216	18.7	36.81	Illite
19.7	4.5063	18.8	37.00	Montmorillonite
21.0	4.2302	22.2	43.70	Sphene
21.2	4.1907	21.7	42.71	Kaolinite
24.2	3.6776	15.6	30.70	Saponite
25.0	3.5617	31.0	61.02	Maghemite
25.7	3.4662	22.6	44.48	Illite
26.8	3.3264	50.8	100.00	Quartz
28.3	3.1534	16.3	32.08	Montmorillonite
30.0	2.9785	17.4	34.25	Magnetite
31.3	2.8577	15.2	29.92	Calcite
33.2	2.6984	15.3	30.11	Hematite
35.0	2.5636	21.2	41.73	Montmorillonite
35.8	2.5081	19.6	38.58	Calcite
36.6	2.4551	21.0	41.33	Maghemite
37.2	2.4169	17.7	34.84	Maghemite
38.7	2.3266	20.0	39.37	Beidellite
39.6	2.2758	19.5	38.38	Sphene
40.2	2.2432	17.6	34.64	Montmorillonite
41.0	2.2012	16.7	32.87	Hematite
42.7	2.1175	17.0	33.46	Illite
44.6	2.0316	19.8	38.97	Gibbsite

Table - 22

VILLAGE - BUDDHADHAR (0.00-0.80 m) X-ray data B_{ox} - Ferricrete

2θ	d spacing	Intensity %		Remark
		I_o	I_c	
6.2	14.225	5.9	12.66	Saponite
6.8	12.998	7.1	15.23	Nontronite
12.3	7.1957	14.5	31.11	Kaolinite
15.0	5.9060	17.3	37.12	Maghemite
18.4	4.8216	25.3	54.29	Maghemite
19.7	4.5063	21.5	46.13	Montmorillonite
21.3	4.1713	27.6	59.22	Kaolinite
21.9	4.0583	31.6	67.81	Saponite
22.6	3.9342	26.8	57.51	Saponite
24.2	3.6776	30.0	64.37	Saponite
25.0	3.5617	30.3	65.02	Kaolinite
26.7	3.3386	43.2	92.70	Montmorillonite
27.4	3.2549	31.5	67.59	Augite
28.5	3.1318	32.0	68.66	Saponite
30.0	2.9785	39.3	84.12	Augite
33.7	2.6595	44.5	94.84	Fayatite
35.2	2.5495	38.6	82.83	Ilmenite
35.7	2.5149	46.6	100.00	Hermatite
37.2	2.4169	38.9	83.47	Maghemite
38.3	2.3500	39.0	83.69	Boehmite
39.2	2.2981	37.3	80.04	Calcite
40.3	2.2378	40.0	85.83	Maghemite
40.5	2.2273	41.1	88.19	Saponite
43.4	2.0849	38.7	83.04	Maghemite
44.8	2.0230	41.3	88.62	Maghemite

Table - 23

VILLAGE - BUDDHADHAR (1.1 - 1.4 m) X - ray data B_{ox}-Ferricrete

2θ	d spacing	Intensity % I_o	Intensity % I_c	Remark
8.2	10.782	7.8	16.70	Montmorillonite
11.2	7.8998	10.8	23.12	Saponite
11.8	7.4995	12.2	26.12	Saponite
12.2	7.2545	14.0	29.97	Kaolinite
14.8	5.9854	14.8	31.69	Montmorillonite
15.4	5.7535	15.0	32.111	Maghemite
17.1	5.1852	17.0	36.40	Montmorillonite
17.7	5.0107	18.5	39.61	Montmorillonite
18.2	4.8742	21.2	45.39	Illite
19.5	4.5521	19.4	41.54	Nontronite
20.0	4.4394	22.7	48.60	Montmorillonite
20.3	4.3744	31.0	66.38	Montmorillonite
21.2	4.1907	34.0	72.80	Kaolinite
23.0	3.8667	23.0	49.25	Calcite
25.3	3.5201	28.4	60.81	Illite
26.7	3.3386	36.0	77.08	Montmorillonite
27.0	3.3022	29.0	62.09	Montmorillonite
28.2	3.1644	28.1	60.17	Nontronite
28.5	3.1318	27.8	59.52	Saponite
29.8	2.9882	27.4	58.67	Montmorillonite
31.7	2.8225	39.0	83.51	Fayalite
33.2	2.6984	36.1	77.30	Hematite
33.4	2.6827	34.0	72.80	Sphene
34.8	2.5779	35.8	76.65	Kaolinite
35.9	2.5014	35.7	76.44	Calcite
36.7	2.4487	46.7	100.00	Illite
37.6	2.3921	38.2	81.79	Kaolinite
39.2	2.2981	34.6	74.08	Calcite
39.5	2.2813	35.0	74.94	Quartz
41.7	2.1659	36.0	77.08	Beidellite
42.4	2.1317	33.0	70.66	Quartz
42.9	2.1080	33.1	70.87	Calcite
44.3	2.0446	36.0	77.08	Gibbsite
44.6	2.03116	37.3	79.87	Gibbsite

Table - 24

VILLAGE - BUDDHADHAR   X - ray data B_{ox} - Ferricrete
(1.4 - 1.8 m)

2θ	d spacing	Intensity %		Remark
		I_o	I_c	
12.4	7.1379	4.0	6.01	Kaolinite
14.4	6.1507	5.4	8.12	Boehmite
16.7	5.3084	5.0	7.51	Fayalite
18.2	4.8742	66.5	100.00	Illite
20.6	4.3114	47.0	70.67	Illite
21.4	4.1520	8.2	12.33	Kaolinite
24.3	3.6627	7.0	10.52	Hematite
25.2	3.5339	21.6	32.48	Anatase
26.6	3.3510	20.8	31.27	Montmorillonite
27.0	3.3022	30.0	45.11	Montmorillonite
28.0	3.1865	25.8	38.79	Nontronite
28.7	3.1104	14.0	21.05	Kaolinite
29.2	3.0582	7.9	11.87	Calcite
32.1	2.7883	8.1	12.18	Maghemite
33.2	2.6984	10.9	16.39	Hematite
33.8	2.6518	9.6	14.43	Saponite
35.7	2.5149	11.0	16.54	Maghemite
36.8	2.4422	51.5	77.44	Gibbsite
37.2	2.4169	23.0	34.58	Maghemite
37.8	2.3799	13.8	20.75	Gibbsite
38.3	2.3500	13.2	19.84	Boehmite
40.4	2.2325	27.5	41.35	Maghemite
41.3	2.1859	12.3	18.49	Illite
41.8	2.1609	34.6	52.03	Gibbsite
43.5	2.0804	11.4	17.14	Gibbsite
44.3	2.0446	49.6	74.58	Gibbsite

Table - 25

VILLAGE - BUDDHADHAR (1.8 - 3.1 m) X - ray data B_{ox} - Alucrete

2θ	d spacing	Intensity %		Remark
		I_o	I_c	
18.4	4.8216	98.00	100.00	Gibbsite
20.3	4.3744	81.1	82.75	Gibbsite
21.5	4.1329	12.2	12.44	Kaolinite
24.1	3.6929	9.3	9.48	Illite
25.2	3.5339	15.9	16.22	Anatase
26.6	3.3510	21.5	21.93	Gibbsite
26.8	3.3264	31.0	31.63	Montmorillonite
28.0	3.1865	27.7	28.26	Gibbsite
28.7	3.1104	18.6	18.97	Gibbsite
30.6	2.9214	10.0	10.20	Montmorillonite
32.4	2.7621	10.9	11.12	Beidellite
33.2	2.6984	15.1	15.40	Geothite
35.7	2.5149	14.7	15.00	Maghemite
36.6	2.4551	50.8	60.00	Gibbsite
37.0	2.4295	25.0	25.51	Gibbsite
37.6	2.3921	62.4	63.67	Diaspore
38.3	2.3500	16.0	16.32	Boehmite
39.2	2.2981	22.4	22.85	Calcite
40.0	2.2539	30.5	31.12	Gibbsite
41.6	2.1709	35.3	36.02	Augite
43.4	2.0849	13.6	13.87	Gibbsite
44.3	2.0446	49.3	50.30	Gibbsite.

BHOPAMADHI

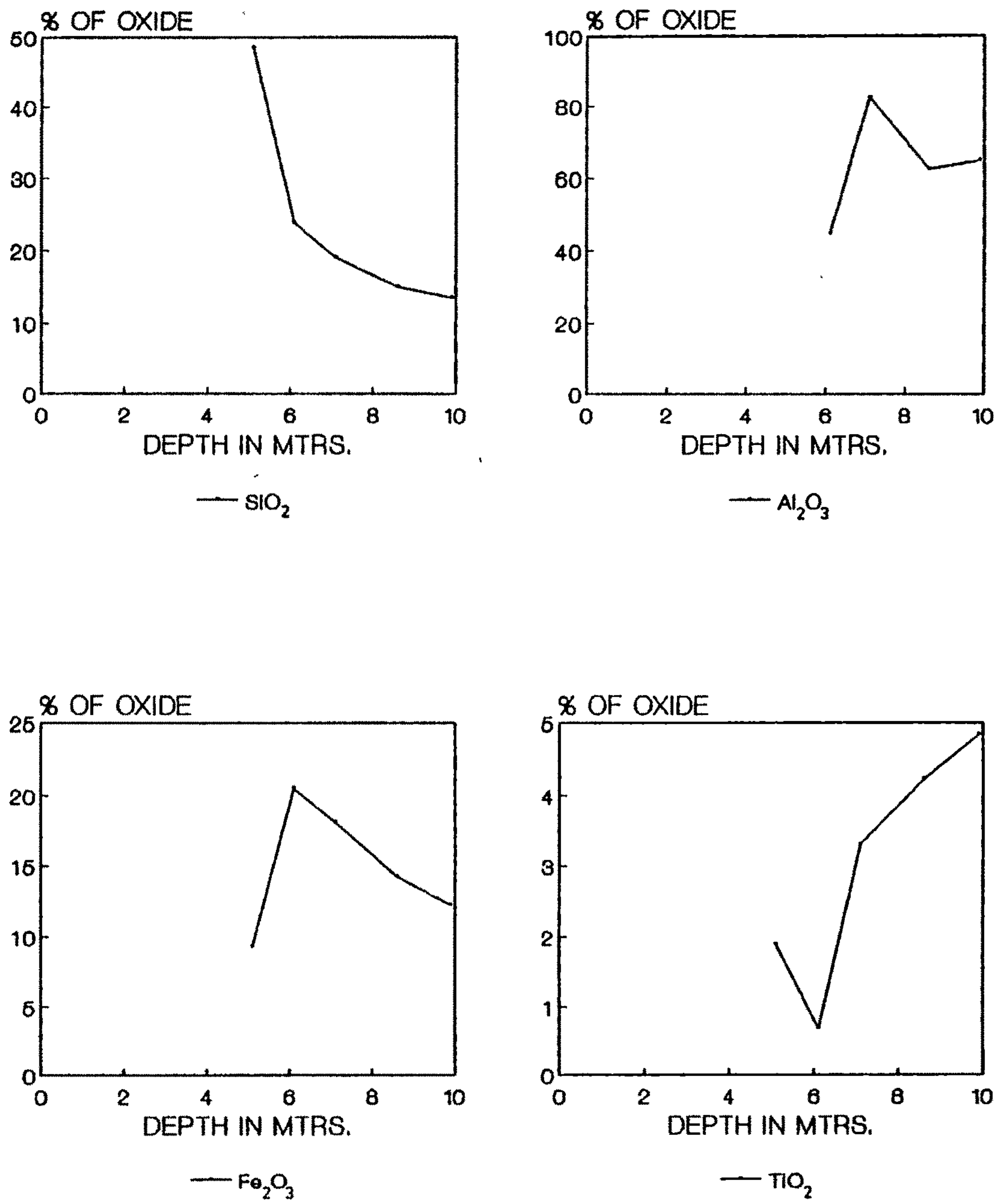
Table - 26

MAJOR OXIDES IN %										TRACE ELEMENTS IN ppm											
SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO_2	CaO	MgO	K_2O	Na_2O	P_2O_5	SC	Y	La	Ce	Pb	Zr	V	Cu	Zn	Cr	Ni	DEPTH IN MTS
48.47	-	9.32	1.90	0.63	33.11	4.87	0.66	0.59	0.29	129.25	T	19.19	110.85	13.23	130.91	360.11	143.12	17.25	419.19	47.17	0.00 – 5.1
23.81	44.88	20.53	0.69	0.51	2.64	2.06	0.32	0.29	0.26	120.98	T	T	83.12	T	86.00	321.63	88.67	T	276.03	21.42	5.1 – 6.1
19.08	52.45	18.12	3.31	0.64	2.64	2.83	0.41	0.28	0.24	88.55	T	T	71.61	T	69.83	129.97	63.76	T	138.41	56.89	6.1 – 7.1
15.11	62.50	14.29	4.23	0.63	2.61	2.79	0.41	0.27	0.26	140.22	T	4.76	52.10	T	107.77	267.09	110.22	8.98	115.76	76.13	7.1 – 8.3
13.50	64.92	12.31	4.84	0.58	1.76	2.32	0.30	0.25	0.21	71.58	T	T	93.03	0.81	98.86	293.13	99.90	T	216.09	29.00	8.3 – 9.9
41.00	22.50	11.80	2.35	0.30	0.90	1.80	1.00	0.80	0.07	80.00	T	12.00	56.00	11.5	83.00	205.00	76.00	14.00	130.00	25.00	

Basalt — 38 m

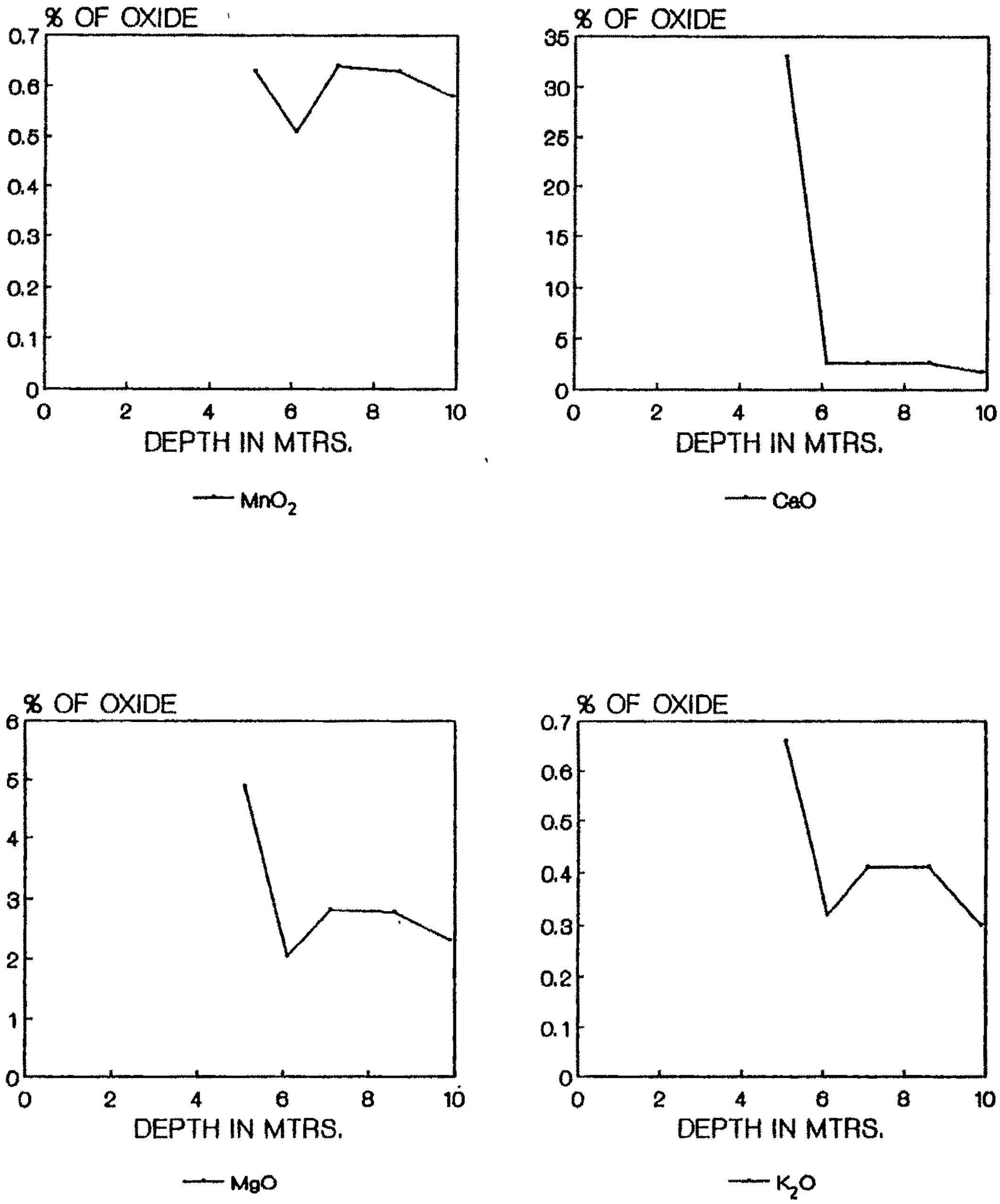
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT BHOPAMADHI VILLAGE (SiO_2, Al_2O_3, Fe_2O_3, TiO_2)

FIG. 43 a.



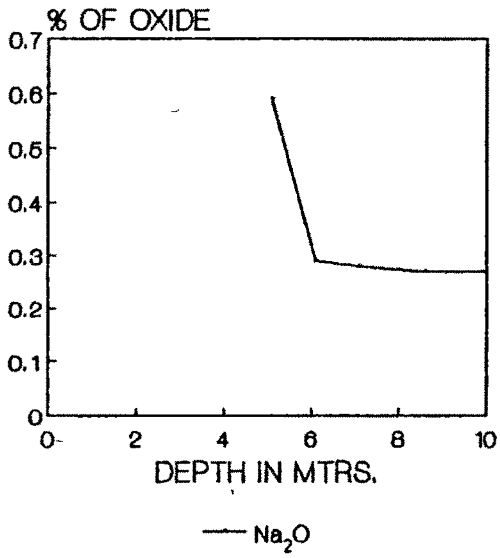
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT BHOPAMADHI VILLAGE (MnO_2, CaO, MgO, K_2O)

FIG. 43 b.



VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT BHOPAMADHI VILLAGE (Na_2O, P_2O_5)

FIG. 43 c.



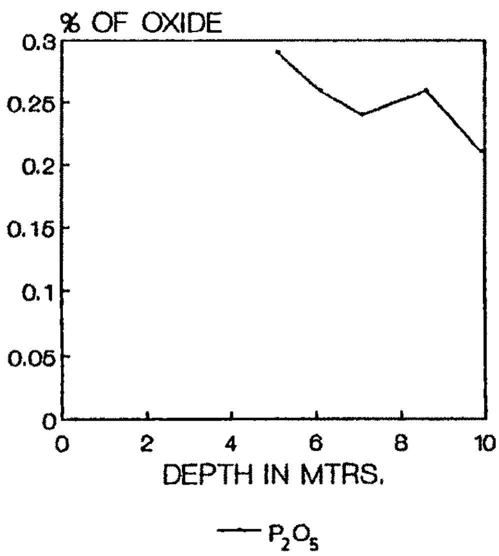
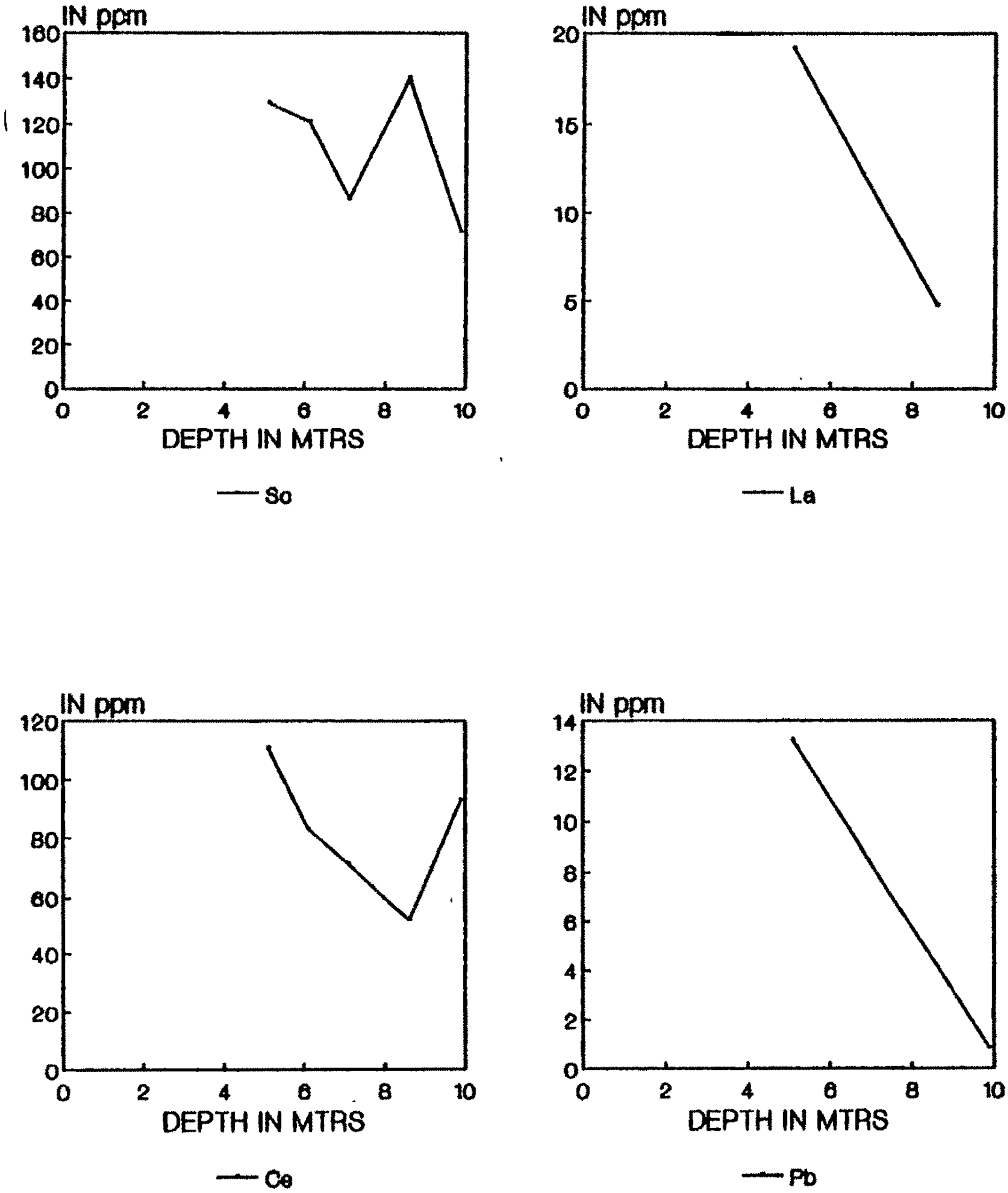


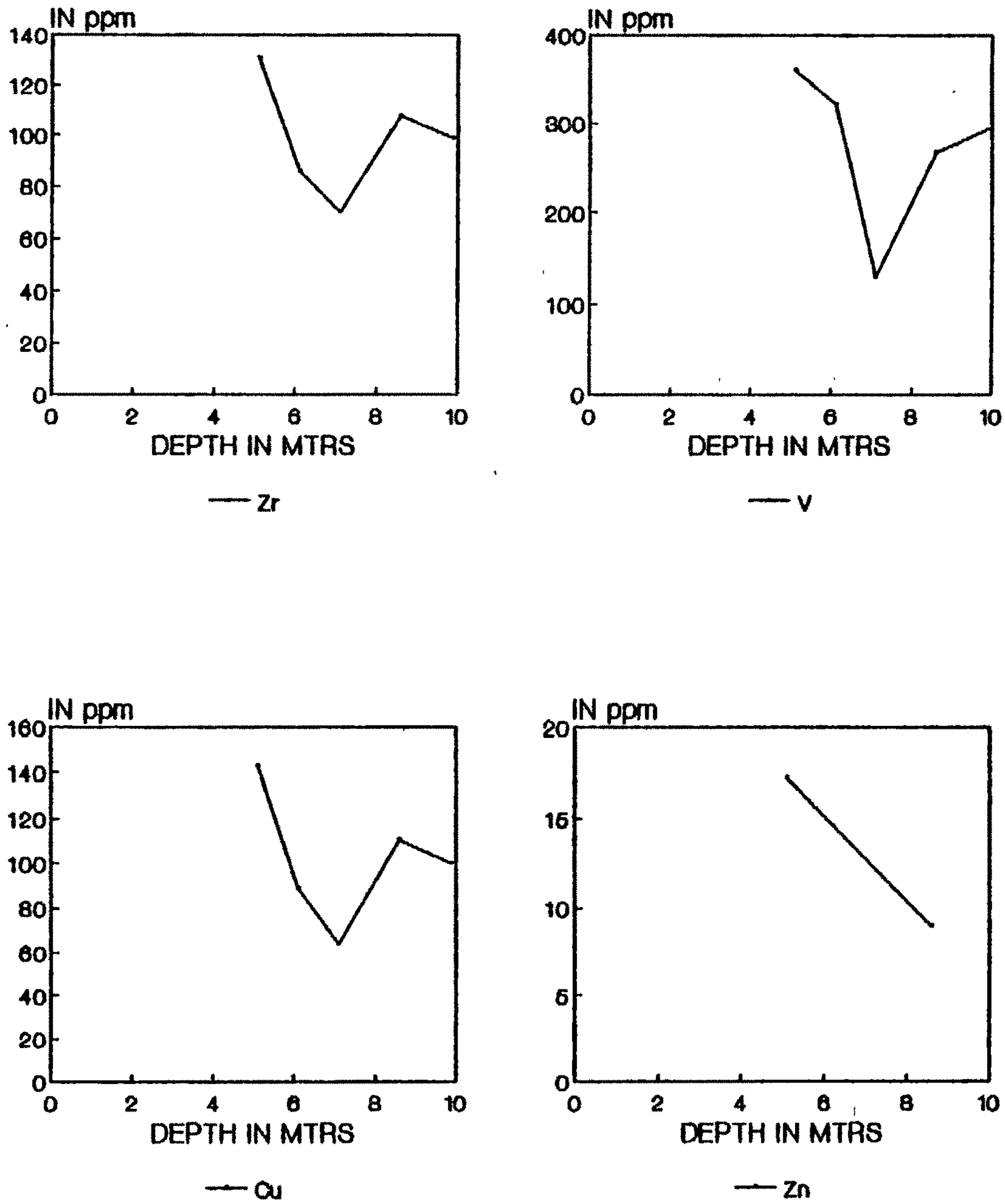
FIG. 43 d.

VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT BHOPAMADHI VILLAGE (Sc, La, Ce, Pb)



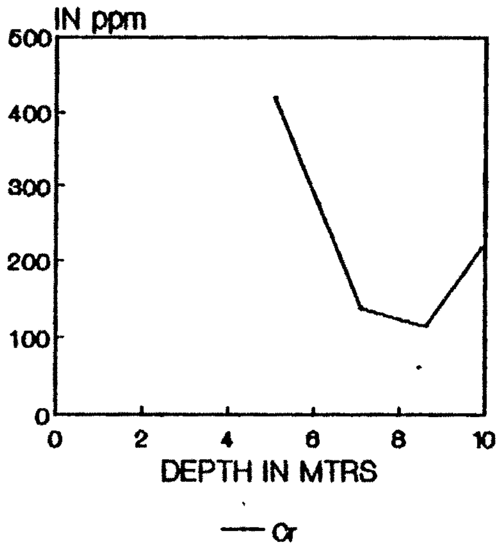
VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT BHOPAMADHI VILLAGE (Zr, V, Cu, Zn)

FIG. 43 e.



VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT BHOPAMADHI VILLAGE (Cr, Ni)

FIG. 43 f.



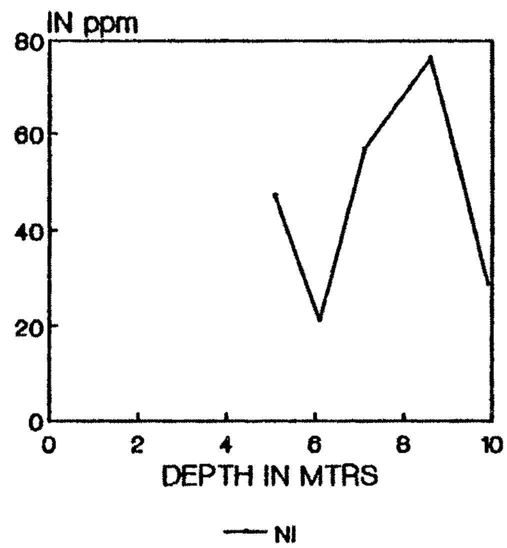


Table - 27

NET GAINS AND LOSSES OF MAJOR OXIDES AND TRACE ELEMENTS BASED ON A Ti-RETAINED MASS BALANCE MODEL

LOC.: BHOPAMADHI

Bed rock thickness consumed to produce present thickness of the weathered profile : 35.52

Depth	0.00-5.1m	5.1-6.1m	6.1-7.1m	7.1-8.3m	8.3-9.9m	Remarks
Horizon	Gaj limestone	B_{ox}(Fer)	B_{ox}(Alu)	B_{ox}(Alu)	B_{ox}(Alu)	
SiO_2	45.40	96.69	- 67.14	- 79.63	- 84.10	Top two horizon of gain with three bottom horizon of losses.
Al_2O_3	-	576.45	64.79	53.66	39.49	Upward increasing gain with a maxima with a Box (fer)
Fe_2O_3	1.53	515.89	13.31	- 30.07	- 47.35	Top three horizon of gain with two bottom horizon of losses.
TiO_2	-	-	-	-	-	— — —
MnO_2	159.62	478.73	51.39	16.61	- 6.16	Top four horizon of gain with bottom horizon of losses.
CaO	4450.01	898.99	108.24	61.10	- 5.05	Top four horizon of gain with bottom horizon of losses.
MgO	234.49	289.60	11.57	- 13.92	- 37.44	Top three horizon of gain with two bottom horizon of losses.
K_2O	- 18.36	8.98	- 70.89	- 77.25	- 85.43	Mobile throughout the profile increasing downwards except gain in Box(Fer) horizon.
Na_2O	- 8.79	23.43	- 75.15	- 81.25	- 84.82	Top and three bottom horizon of losses with mid-horizon of gain in Box(Fer) zone.
P_2O_5	412.38	-1165.95	143.40	106.34	45.65	Top and three bottom horizon of gain with mid-horizon of losses in Box(Fer) zone.
Sc	97.27	408.4	- 24.17	- 3.86	- 57.11	Top two horizon of gain, and bottom three horizon of losses.
Y	T	T	T	T	T	— — —
La	96.95	T	T	- 78.05	T	Top horizon of gain, and Box(Alu) horizon of losses.
Ce	144.92	405.94	- 6.59	- 48.26	- 19.27	Top two horizon of gain and bottom three horizon of losses.
Pb	42.04	T	T	T	- 96.58	Top horizon of gain and Box(Alu) horizon of losses.
Zr	92.92	248.98	- 40.92	- 28.66	- 42.80	Top two horizon of gain and three bottom horizon of losses.
V	108.48	412.74	- 56.80	- 30.54	- 33.37	Top two horizon of gain and three bottom horizon of losses.
Cu	133.51	298.37	- 40.28	- 19.22	- 36.01	Top two horizon of gain and three bottom horizon of losses.
Zn	51.61	T	T	- 64.54	T	Top horizon of gain and, Box(Alu) horizon of losses.
Cr	297.12	620.07	- 24.73	- 50.74	- 19.63	Top two horizon of gain and bottom three horizon of losses.
Ni	133.36	191.80	61.56	69.17	- 43.67	Top four horizon of gain with bottom horizon Box(Alu) zone of losses.

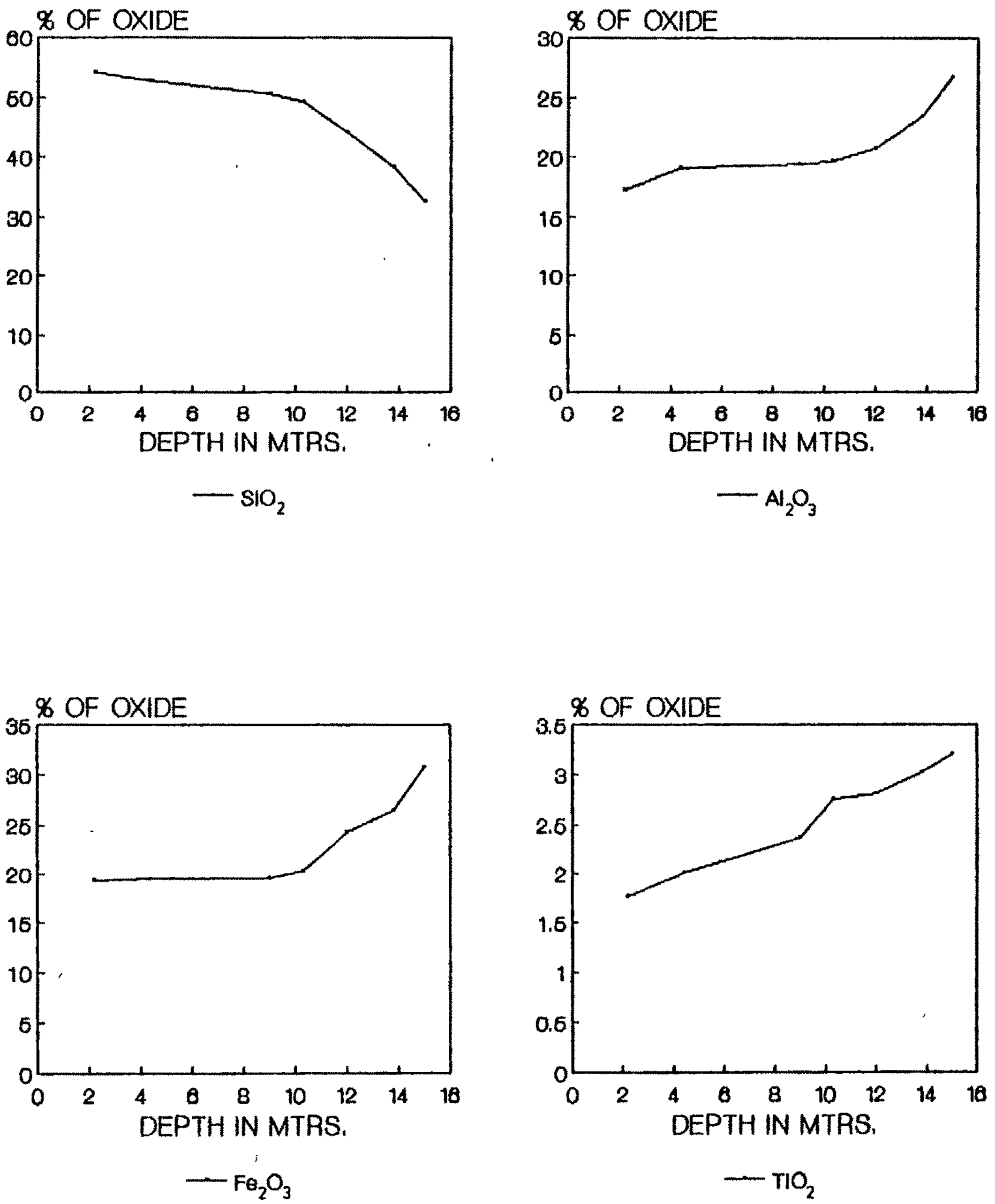
Table - 28

KHAKHARDA

MAJOR OXIDES IN %										TRACE ELEMENTS IN ppm											
SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO_2	CaO	MgO	K_2O	Na_2O	P_2O_5	SC	Y	La	Ce	Pb	Zr	V	Cu	Zn	Cr	Ni	DEPTH IN MTS
54.13	17.23	19.35	1.76	0.22	2.36	2.92	0.80	0.90	0.09	80.00	T	21.20	57.93	T	101.10	202.54	97.50	T	331.34	27.44	0.00 – 2.2
52.71	19.11	19.53	2.01	0.30	2.67	2.81	1.07	-	-	93.21	T	11.98	69.95	T	147.53	358.90	80.49	T	258.46	60.52	2.2 – 4.4
50.53	19.39	19.54	2.37	0.33	2.79	2.48	1.11	1.16	-	111.67	T	7.63	107.73	T	163.56	301.03	117.97	T	236.18	49.71	4.4 – 9.0
49.22	19.63	20.26	2.75	0.39	3.01	2.27	1.29	0.98	-	106.55	T	1.98	141.39	T	80.79	350.41	98.11	11.22	137.49	19.99	9.0 – 10.3
44.17	20.76	24.31	2.81	0.41	3.11	1.96	1.41	0.92	0.04	126.59	T	0.91	159.98	T	97.64	220.47	101.41	8.53	246.00	40.59	10.3 – 12.0
38.36	23.43	26.47	3.02	0.59	3.23	2.19	1.78	0.78	0.03	87.83	T	T	83.59	T	80.03	297.23	99.99	1.07	187.56	57.66	12.0 – 13.0
32.72	26.72	30.80	3.21	0.69	3.42	1.72	1.80	0.68	0.02	90.69	T	8.1	63.87	T	115.47	236.16	88.08	7.18	170.36	24.50	13.0 – 16.0

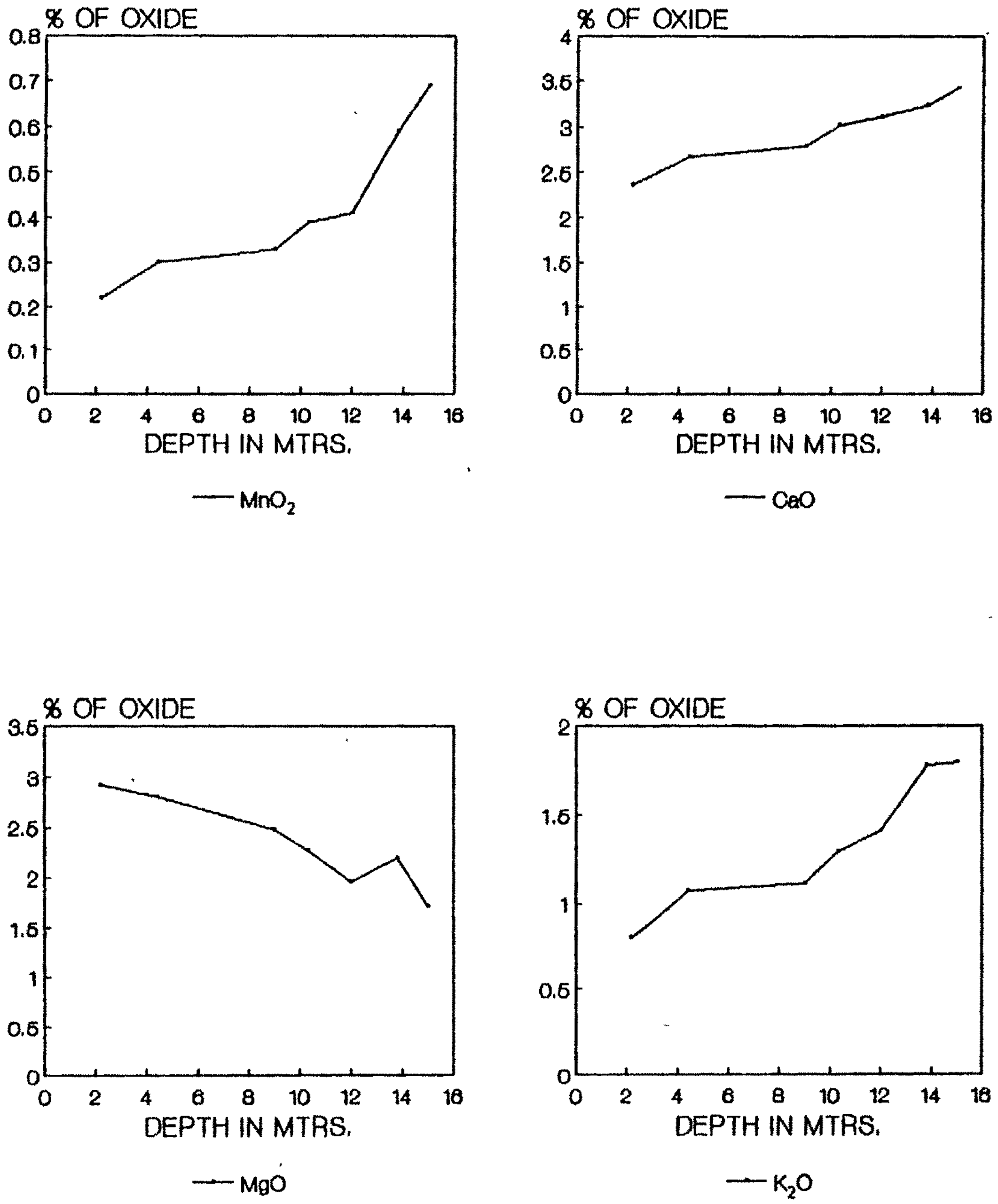
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT KHAKHARDA VILLAGE (SiO_2, Al_2O_3, Fe_2O_3, TiO_2)

FIG. 44 a



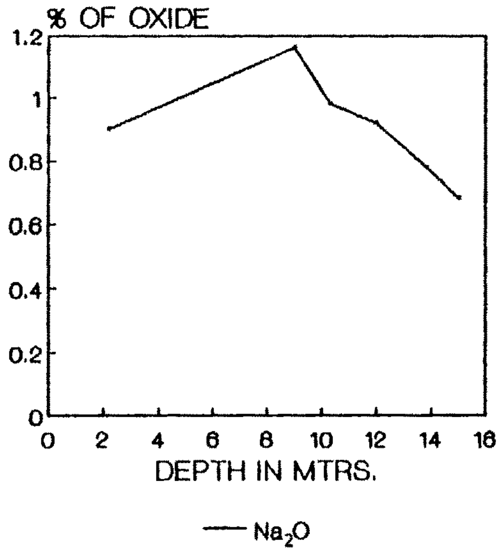
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT KHAKHARDA VILLAGE (MnO_2, CaO, MgO, K_2O)

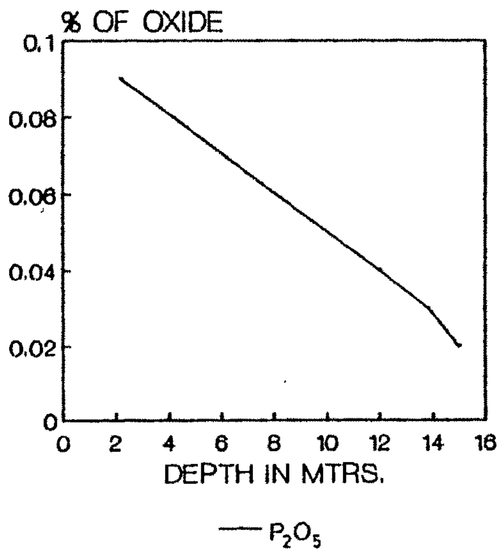
FIG. 44 b.



VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT KHAKHARDA VILLAGE (Na_2O, P_2O_5)

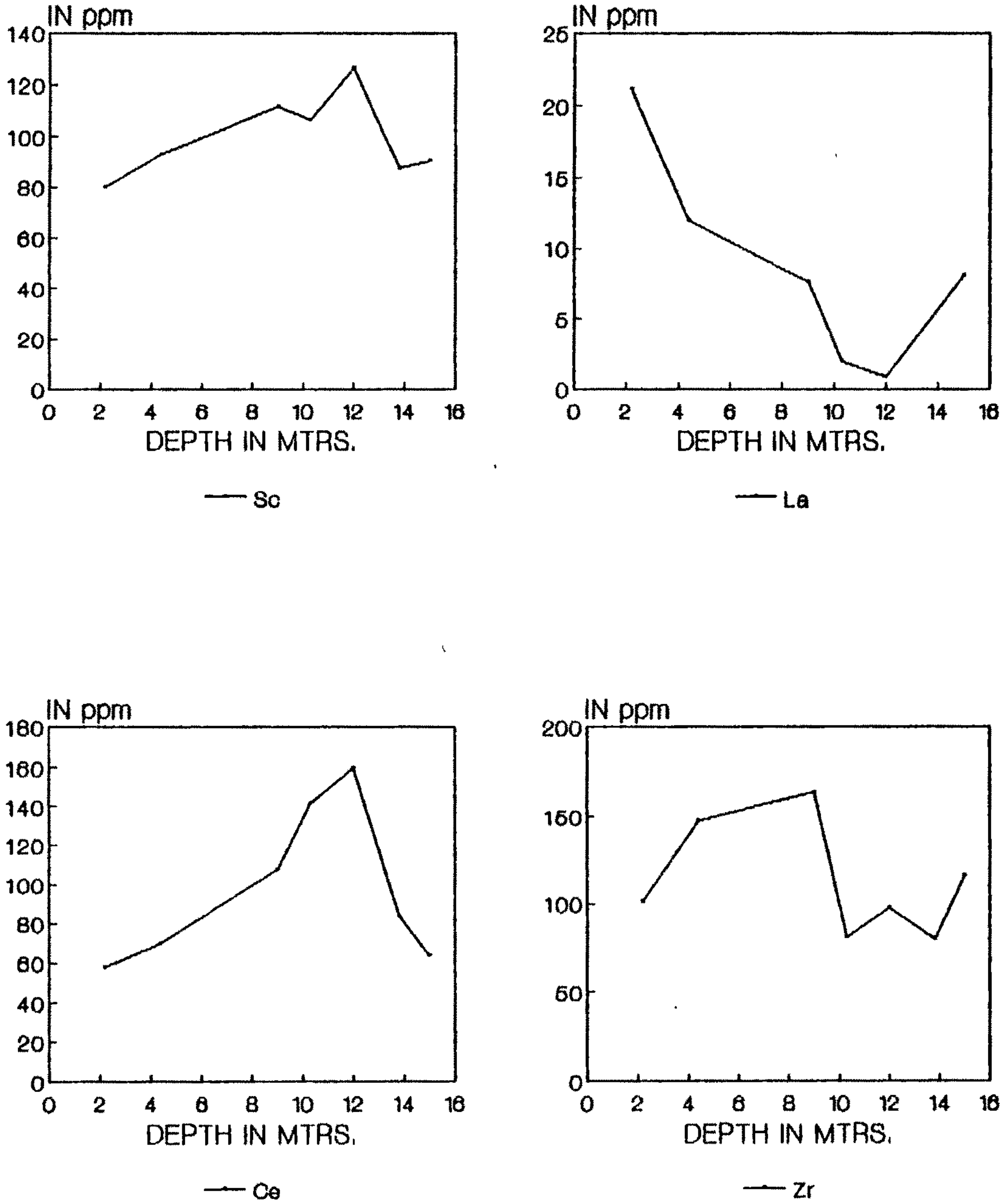
FIG. 44 c.





VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT KHAKHARDA VILLAGE (Sc, La, Ce, Zr)

FIG. 44 d.



VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT KHAKHARDA VILLAGE (V, Zn, Cu, Ni, Cr)

FIG.44 e.

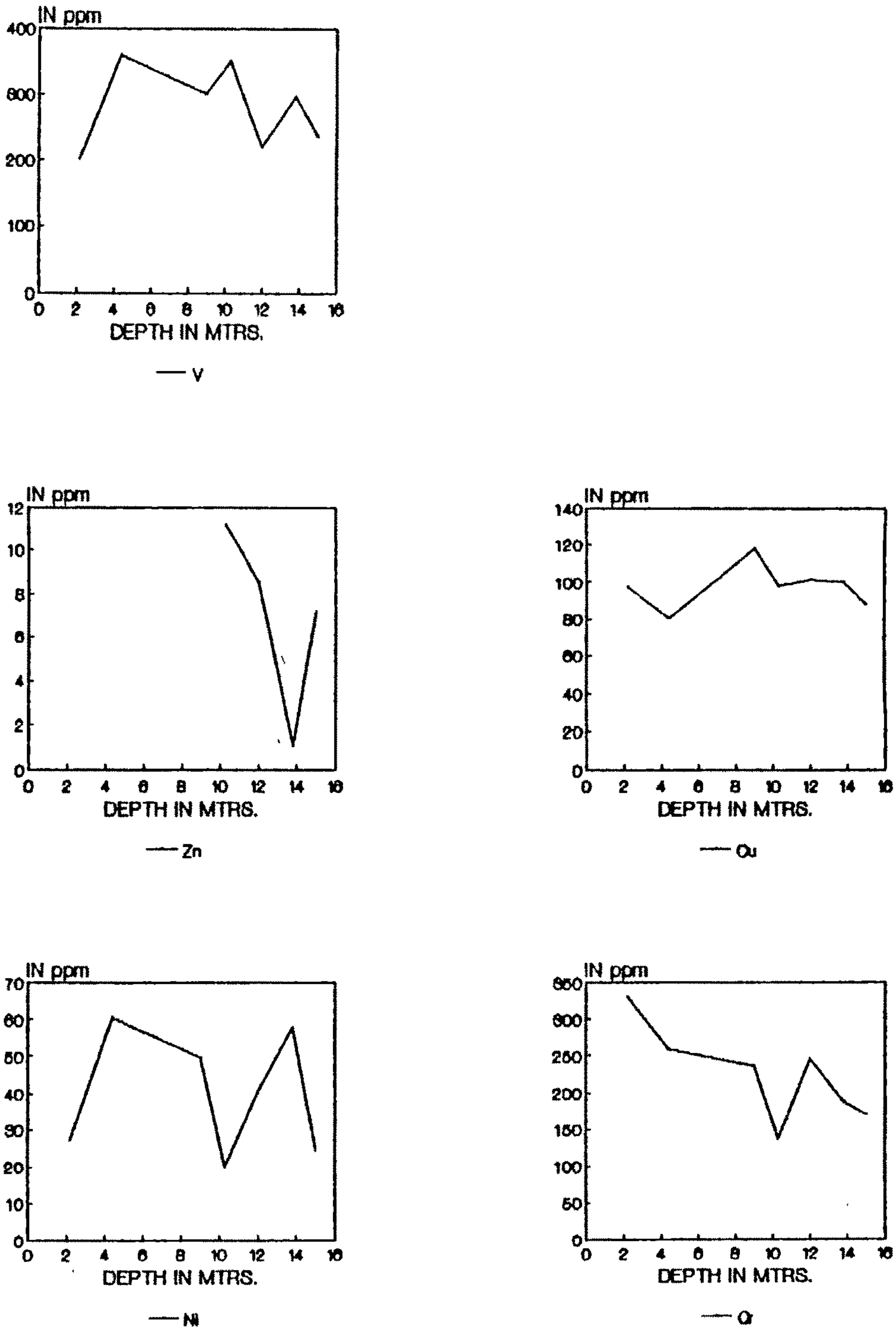


Table - 29

NET GAINS AND LOSSES OF MAJOR OXIDES AND TRACE ELEMENTS BASED ON A Ti-RETAINED MASS BALANCE MODEL

LOC.: KHAKHARDA.

Bed Rock thickness consumed to produce present thickness of weathered profile : 4.64 m.

Depth	0.00-2.2m	2.2-4.4m	4.4-9.00m	9.0-10.3m	Remarks
Horizon	Box(Fer)	Box(Fer)	Box(Fer)	Box(Fer)	
SiO_2	210.00	156.99	108.94	52.95	Upward increasing gains with a top horizon maxima
Al_2O_3	17.40	14.08	1.82	14.34	Increasing throughout the profile with maxima in Box(Fer)
Fe_2O_3	14.34	1.05	- 14.25	- 23.38	Top two horizon of gains and bottom four horizon of losses.
TiO_2	-	-	-	-	— — —
MnO_2	- 41.87	- 30.59	- 35.25	- 34.05	Upward increasing mobilities
CaO	25.77	24.59	10.42	2.66	Upward increasing gains with top horizon maxima
MgO	208.5	160.02	94.63	53.53	Upward increasing gains with a top horizon maxima.
K_2O	- 19.09	- 5.24	- 16.63	- 16.50	Mobile throughout the profile
Na_2O	118.35	T	108.89	52.16	Top horizon of gain with bottom horizon of losses.
P_2O_5	771.87	T	T	T	Top horizon of gain with intermediate and bottom horizon of losses.
Sc	59.09	62.30	- 64.91	35.60	Top two and bottom horizon of gains with a mid profile horizon of losses in the Box(Fer) zone.
Y	T	T	T	T	— — —
La	376.99	136.02	27.48	- 71.48	Top three horizon of gains with the bottom horizon of losses Box(Fer) and C zone.
Ce	64.28	74.00	127.27	157.07	downward increasing mobilities.
Pb	T	T	T	T	— — —
Zr	55.55	48.17	86.33	- 20.67	Top three horizons of gain and bottom horizon of losses
V	49.60	132.12	68.12	- 65.64	Losses in Box(Fer)zone, else, gain throughout the profile
Cu	99.43	44.16	79.19	28.43	Upward increasing gains with top horizon maxima.
Zn	T	T	T	82.37	Gain in the bottom horizon else, lost throughout the profile
Cr	238.87	131.45	79.37	- 10.00	Three top and two bottom horizon of gains with a mid-profile horizon of losses in the Box(Fer) zone
Ni	104.24	294.43	174.76	- 4.77	Three top horizon of gain with bottom horizon of losses.

X - RAY DIFFRACTION TRACES OF VARIOUS HORIZONS OF BAUXITIC PROFILE AT KHAKHARDA.

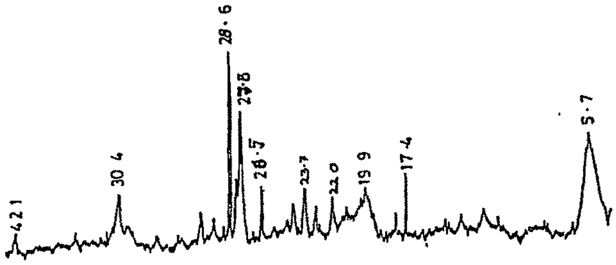
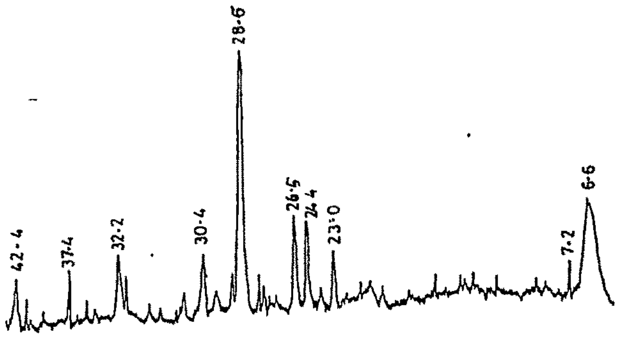
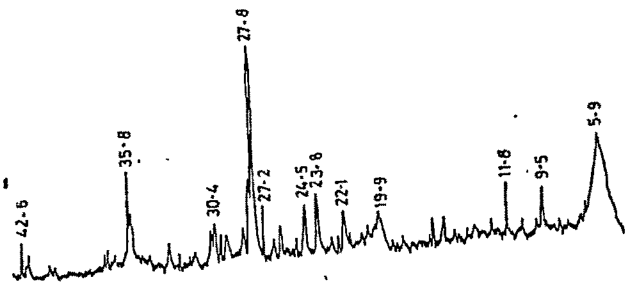
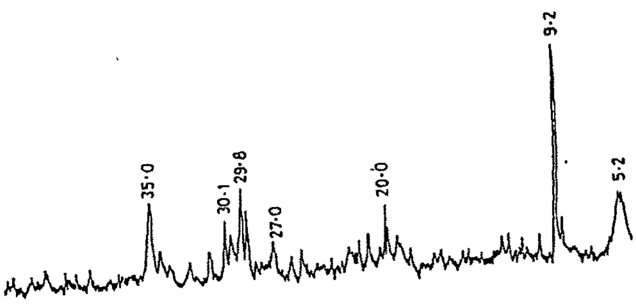
Depth in Mtr.	Horizon	Dominating Minerals	
0.00-4.4m	$B_{(ox)}$ Ferri-crete	Saponite Montmorillonite Maghemite Kaolinite, Illite Goethite Sphene, Boehmite Halloysite Gibbsite	
4.4-9.0m	$B_{(ox)}$ Ferri-crete	Saponite Kaolinite Maghemite Goethite Illite Titanite Sphene Diaspore Halloysite	
9.00 10.3m	$B_{(ox)}$ Ferri-crete	Nontronite Saponite-Kaolinite-Smectite, Mont-morillonite, Maghemite, Lepidocrocite, Goethite, Ilmenite, Quartz, Halloysite, Dia-spore, Gibbsite Augite	
10.3-15.0m	C (Basalt)	Augite, Sphene Fayalite, Smectite Forsterite Hemalite Maghemite Anatase	

Table - 30

VILLAGE - KHAKHARDA (0.00 - 2.2 m) X - ray data B_{ox} - Ferricrete

2θ	d spacing	Intensity		Remark
		I_o	I_c	
5.7	15.504	37.5	63.13	Saponite
8.6	10.281	16.0	26.93	Halloysite
12.4	7.1379	19.2	32.32	Kaolinite
13.8	6.4168	17.5	29.46	Illite
17.4	5.0964	28.5	47.97	Sphene
18.0	4.9279	18.6	31.31	Sphene
19.4	4.5753	18.8	31.64	Saponite
19.9	4.4615	23.7	39.89	Montmorillonite
20.2	4.3959	22.2	37.37	Gibbsite
21.0	4.2302	19.0	31.98	Sphene
21.1	4.2104	20.1	33.83	Sphene
22.0	4.0401	22.3	37.54	Saponite
22.8	3.9001	16.0	26.93	Diaspore
23.1	3.8502	19.8	33.33	Kaolinite
23.7	3.7540	24.2	40.74	Kaolinite
24.2	3.6776	15.7	26.43	Illite
24.5	3.6322	20.6	34.68	Saponite
24.8	3.5900	16.3	27.44	Halloysite
26.5	3.3634	25.5	42.92	Sphene
27.0	3.3022	13.7	23.06	Gibbsite
27.8	3.2090	44.6	75.08	Maghemite
28.1	3.1754	26.9	45.28	Gibbsite
28.6	3.1210	59.4	100.00	Sphene
28.9	3.0893	14.4	24.94	Gibbsite
29.5	3.0278	15.4	25.92	Sphene
30.4	2.9402	18.0	30.30	Maghemite
35.0	2.5636	15.6	26.26	Kaolinite
35.6	2.5218	22.06	38.04	Goethite
36.1	2.4880	15.1	25.42	Halloysite
36.4	2.4682	12.8	21.54	Illite
38.4	2.3441	13.3	22.39	Boehmite
42.1	2.1462	13.5	22.72	Illite

Table - 31

VILLAGE - KHAKHARDA (4.4 - 9.00 m)

X - ray data

B_{ox} - Ferricrete

2θ	d spacing	Intensity %		Remark
		I_o	I_c	
6.6	13.392	33.1	34.24	Saponite
7.2	12.277	16.8	17.39	Illite
8.6	10.281	10.8	11.18	Illite
11.9	7.4367	13.8	14.28	Halloysite
13.6	6.5107	13.2	13.66	Saponite
15.7	5.6442	13.8	14.28	Maghemite
17.5	5.0675	9.5	9.83	Illite
19.9	4.4838	12.5	12.62	Illite
20.5	4.3322	11.8	12.21	Kaolinite
21.4	4.1520	9.4	9.73	Kaolinite
22.2	4.0052	20.2	20.91	Diaspore
23.0	3.8667	11.1	11.49	Maghemite
23.9	3.7231	28.3	29.29	Kaolinite
24.4	3.6479	12.8	13.25	Illite
24.7	3.6043	29.3	30.33	Halloysite
26.5	3.3510	8.9	9.21	Gibbsite
26.9	3.3022	11.9	11.49	Montmorillonite
28.0	3.1865	14.2	14.69	Gibbsite
28.6	3.1210	96.60	100.00	Sphene
29.6	3.0178	15.0	15.52	Kaolinite
30.4	2.9402	10.8	11.18	Illite
31.7	2.8225	19.0	19.66	Titanite(Sphene)
32.0	2.7968	10.0	10.35	Maghemite
32.2	2.7798	6.4	6.62	Illite
33.6	2.6671	7.5	7.76	Sphene
33.9	2.6442	15.0	15.52	Maghemite
35.4	2.5355	20.1	20.80	Kaolinite
36.1	2.4880	7.0	7.24	Kaolinite
37.4	2.4044	9.6	9.93	Sphene
37.9	2.3738	6.0	6.21	Kaolinite
39.0	2.3094	9.7	10.04	Goethite
40.7	2.2168	5.9	6.10	Illite
41.8	2.1609	17.1	17.70	Illite
42.4	2.1317	14.5	15.01	Diaspore

Table - 32

VILLAGE - KHAKHARDA (9.00-10.3 m) X - ray data B_{ox} - Ferricrete

2θ	d spacing	Intensity %		Remarks
		I_o	I_c	
5.9	14.979	38.1	56.86	Nontronite
6.2	14.255	42.5	63.43	Saponite
9.5	9.3093	25.8	38.50	Kaolinite-Smectite
9.8	9.0250	16.8	25.07	Montmorillonite
11.8	7.4995	27.1	40.44	Halloysite
12.9	6.8624	17.2	25.67	Maghemite
14.4	6.1507	14.8	22.08	Boehmite
15.8	5.6088	18.0	26.86	Maghemite
16.5	5.3723	18.2	27.16	Maghemite
16.7	5.3084	13.6	20.29	Fayalite
18.4	4.8216	13.8	20.59	Maghemite
18.8	4.7199	12.2	18.20	Diaspore
19.9	4.4615	19.0	28.35	Kaolinite
20.6	4.3114	17.2	25.67	Halloysite
21.0	4.2302	15.4	22.98	Sphene
21.8	4.0767	15.3	22.83	Saponite
22.1	4.0220	21.0	31.34	Diaspore
22.5	3.9515	15.0	22.38	Beidellite
22.9	3.8833	18.4	27.46	Illite
23.8	3.7385	26.1	38.95	Kaolinite
24.5	3.6332	23.2	34.47	Illite
25.1	3.5477	12.8	19.10	Beidellite
26.1	3.4140	17.7	26.41	Maghemite
26.5	3.3634	14.0	20.89	Illite
27.2	3.2784	23.6	35.22	Sphene
27.8	3.2090	67.0	100.00	Maghemite
28.1	3.1754	30.8	45.97	Gibbsite
28.5	3.1318	17.8	26.56	Saponite
29.6	3.0178	16.0	23.88	Forsterite
30.0	2.9785	16.1	24.02	Augite
30.4	2.9402	17.7	26.41	Augite
30.6	2.9314	17.4	25.97	Sphene
31.6	2.8312	11.7	17.46	Augite
32.0	2.7958	10.8	16.11	Lepidocrocite
32.6	2.7466	11.7	17.46	Illmenite
32.2	2.6984	14.0	20.89	Goethite/Hematite?
34.5	2.5996	11.8	17.61	Nontronite
35.7	2.5149	22.5	33.58	Maghemite
35.8	2.5081	34.0	50.74	Montmorillonite
36.7	2.4487	11.1	16.56	Gibbsite
37.2	2.4169	13.8	20.59	Maghemite
37.4	2.4044	12.2	18.20	Maghemite
40.5	2.2273	8.9	13.28	Sphene
40.9	2.2064	9.0	13.43	Maghemite
42.2	2.1414	12.0	17.91	Illite
42.6	2.1222	16.1	25.67	Quartz
43.5	2.0804	11.2	16.71	Gibbsite

Table - 33

VILLAGE - KHAKHARDA (13.7-15.00m) X-ray data C - Basalt

2θ	d spacing	Intensity %		Remark
		I_o	I_e	
5.2	16.994	30.1	38.19	Saponite
5.8	15.237	18.5	23.47	Nontronite
9.2	9.6122	78.8	100.00	Nontronite
11.8	7.4995	15.7	19.92	Saponite
12.1	7.3142	19.9	25.25	Saponite
12.6	7.0251	19.0	24.11	Maghemite
14.8	5.9854	15.2	19.28	Montmorillonite
16.9	5.2461	15.2	19.28	Fayalite
17.7	5.0107	13.4	17.00	Montmorillonite
19.8	4.4838	21.2	26.90	Montmorillonite
20.0	4.4394	28.1	35.65	Montmorillonite
20.3	4.3744	16.9	21.44	Montmorillonite
21.0	4.2302	20.2	25.63	Sphene
22.8	3.9001	13.8	17.51	Baryte
24.3	3.6627	13.6	17.25	Hematite
25.0	3.5617	13.8	17.51	Maghemite
25.2	3.5339	17.0	21.57	Anatase
25.9	3.4399	14.6	18.52	Anatase
27.6	3.3022	18.4	23.35	Montmorillonite
27.8	3.2090	18.8	23.85	Saponite
28.2	3.1644	14.0	17.76	Nontronite
28.7	3.1104	27.2	34.51	Nontronite
29.8	2.9980	24.2	30.71	Montmorillonite
30.1	2.9688	16.8	21.23	Augite
31.2	2.8666	13.7	17.38	Fayalite
32.4	2.7631	13.5	17.13	Beidellite
33.7	2.6595	13.6	17.25	Nontronite
34.4	2.6069	17.1	21.70	Fayalite
35.0	2.5636	29.5	37.43	Nontronite
36.0	2.4947	11.2	14.21	Montmorillonite
36.8	2.4422	11.0	13.95	Fayalite
38.8	2.3208	12.2	15.48	Beidellite
39.7	2.2703	9.9	12.56	Sphene
40.4	2.2325	10.7	13.57	Illmenite
40.6	2.2220	9.3	11.80	Forsterite
41.6	2.1709	12.2	15.48	Forsterite
42.6	2.1212	10.3	13.07	Sphene
43.2	2.0941	8.5	10.78	Beidellite
43.8	2.0668	10.0	12.69	Saponite
44.1	2.0534	9.9	12.56	Augite

Table - 34

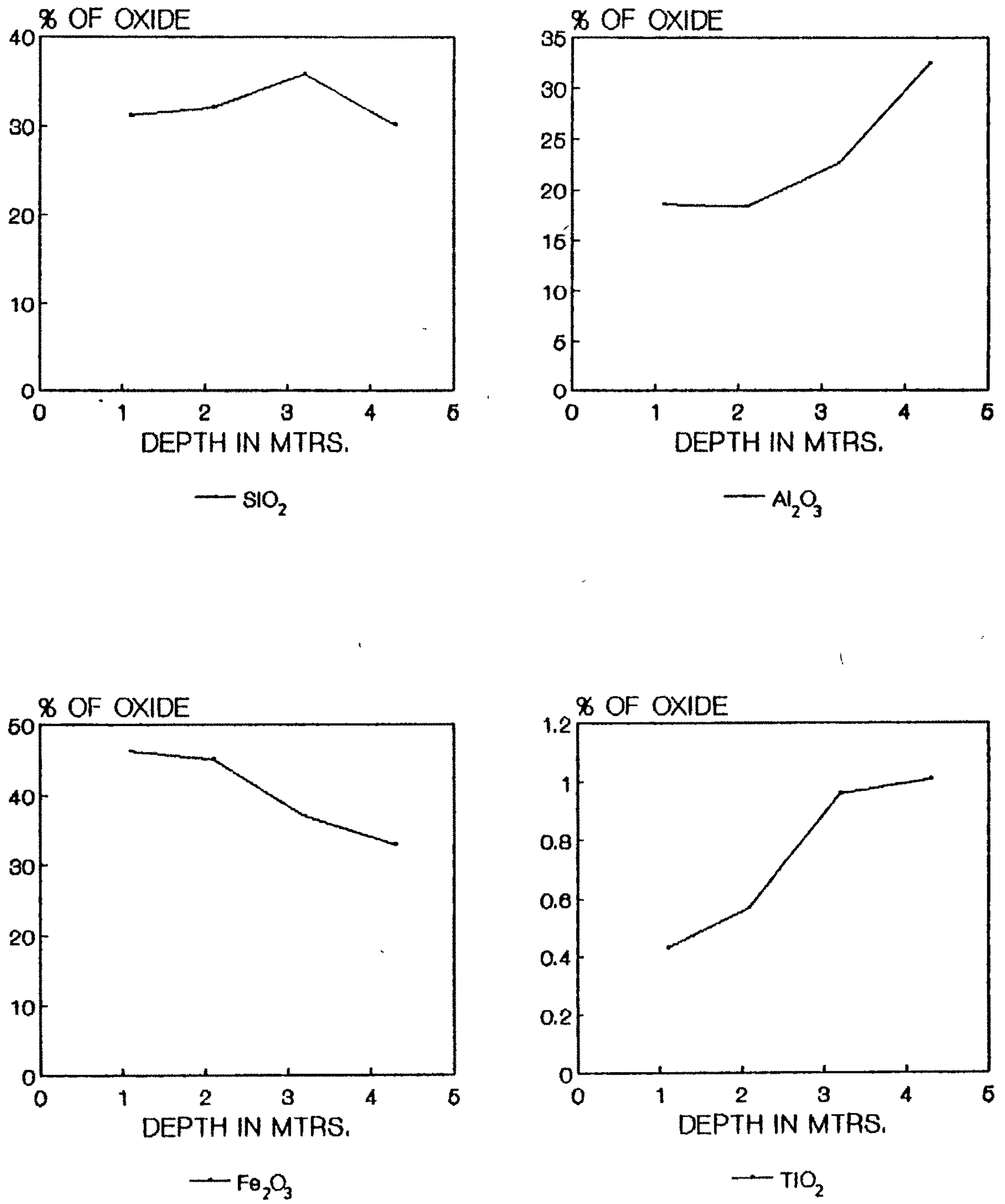
KENEDI

MAJOR OXIDES IN %										TRACE ELEMENTS IN ppm											
SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO_2	CaO	MgO	K_2O	Na_2O	P_2O_5	SC	Y	La	Ce	Pb	Zr	V	Cu	Zn	Cr	Ni	DEPTH IN MTS
31.21	18.56	46.29	0.43	0.71	0.09	1.59	0.50	0.34	0.27	91.95	T	T	80.76	T	98.02	342.24	40.17	T	286.28	33.00	0.00 — 1.1
32.13	18.32	45.14	0.57	0.63	1.03	1.28	0.41	0.29	0.18	140.12	T	T	42.46	T	120.15	287.15	102.27	T	216.66	41.98	1.1 — 2.1
35.85	22.63	37.00	0.96	0.59	1.11	1.23	0.32	0.21	0.09	120.76	T	T	101.66	T	80.14	240.01	91.34	12.35	193.93	17.25	2.1 — 3.2
30.09	32.57	33.00	1.01	0.50	1.29	1.08	0.24	0.19	0.03	80.19	T	T	54.26	T	88.10	173.13	80.76	8.76	140.24	40.18	3.2 — 4.3
38.50	18.6	11.30	2.40	0.60	1.00	1.70	0.70	0.90	0.07	85.00	T	T	50.00	T	85.00	280.00	65.30	35.5	168.00	44.50	

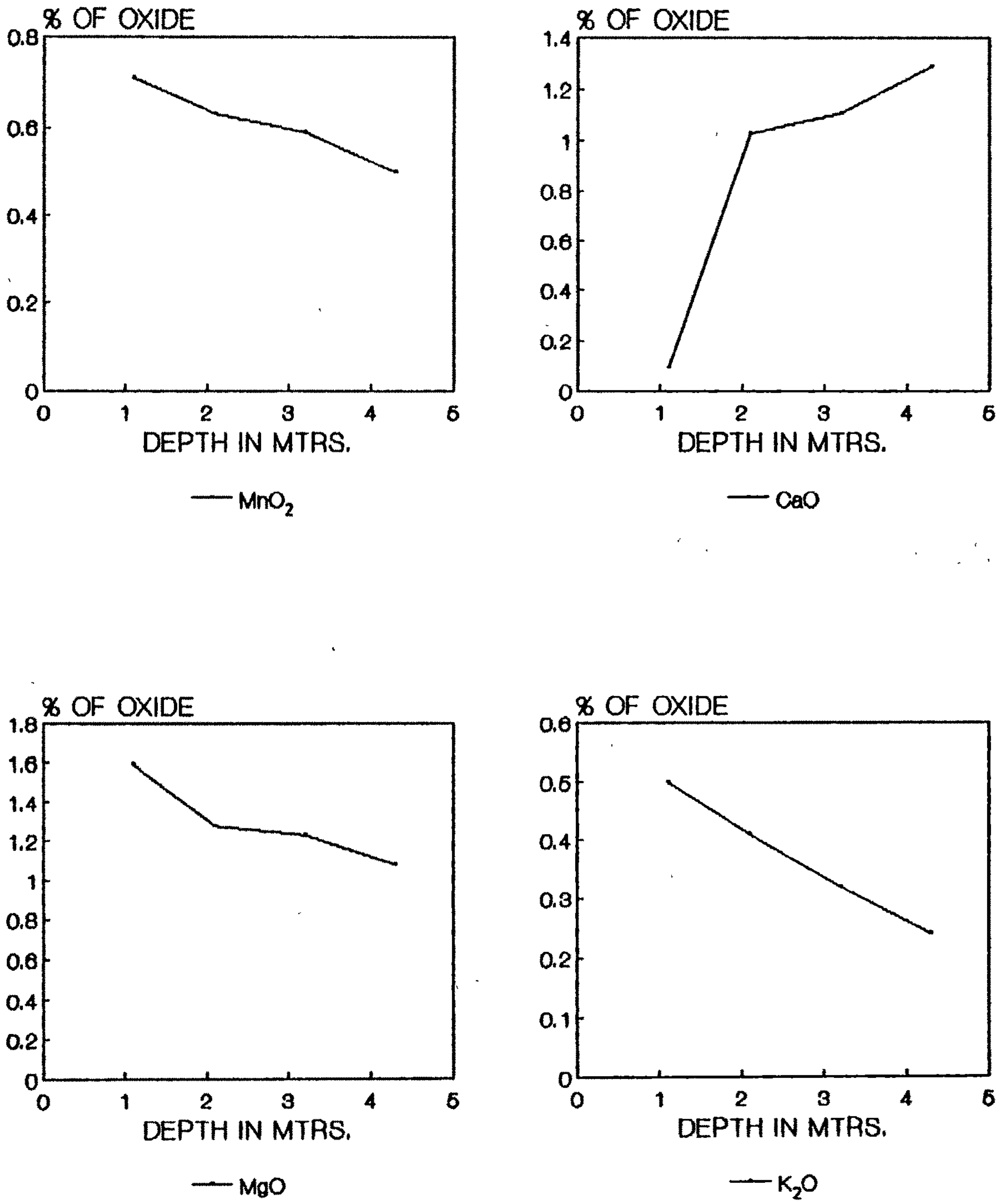
— Basalt 22.20 m

FIG. 46 a.

VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT KENEDI VILLAGE
(SiO_2, Al_2O_3, Fe_2O_3, TiO_2)

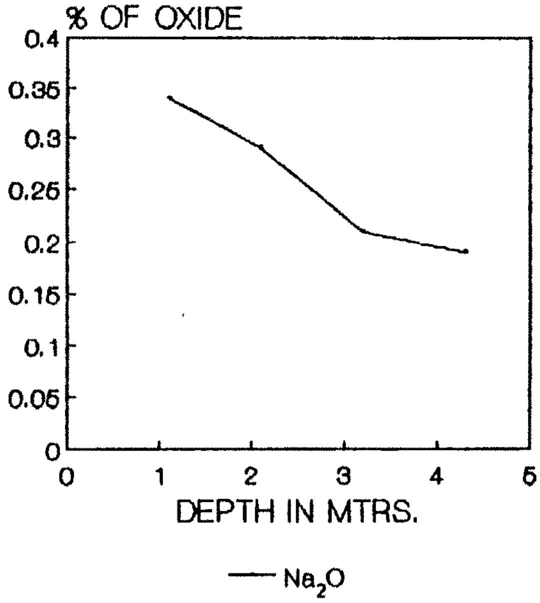


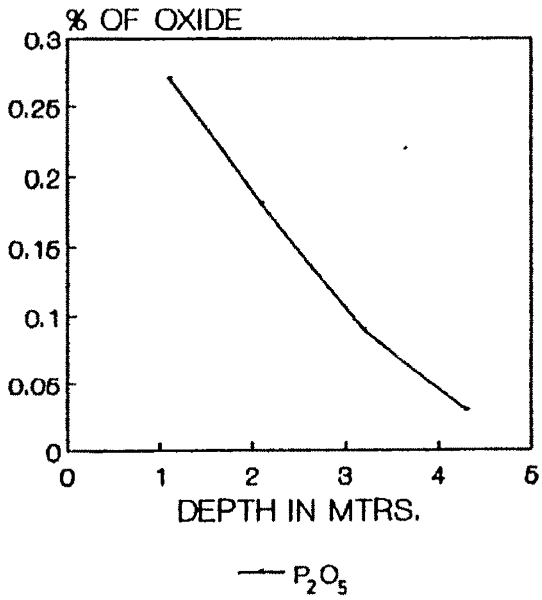
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT KENEDI VILLAGE (MnO_2, CaO, MgO, K_2O) FIG. 46 b



VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT KENEDI VILLAGE (Na_2O, P_2O_5)

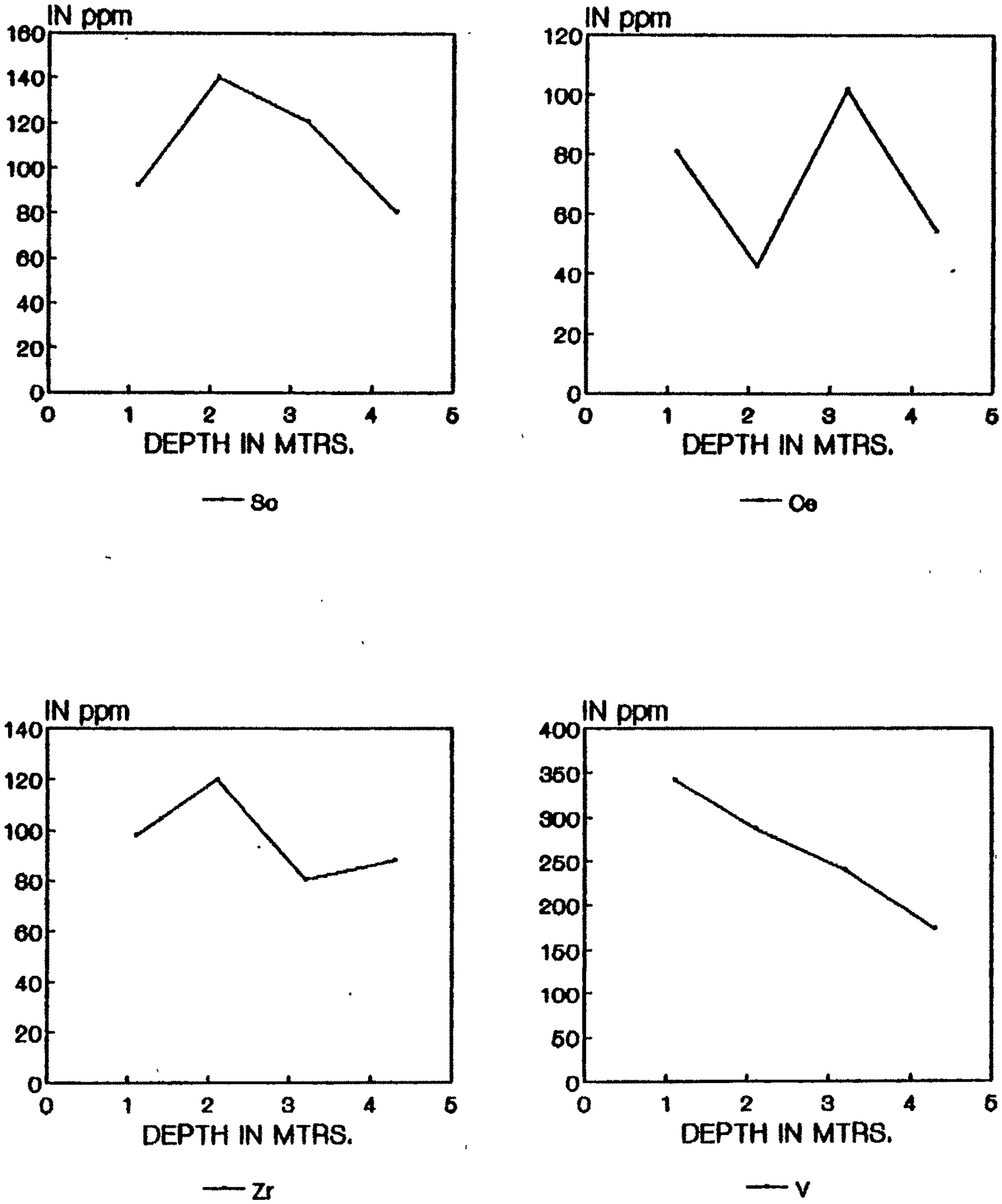
FIG. 46 c.





VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT KENEDI VILLAGE (Sc, Ce, Zr, V)

FIG.46 d.



VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT KENEDI VILLAGE (Cu, Zn, Cr, Ni)

FIG.46 e.

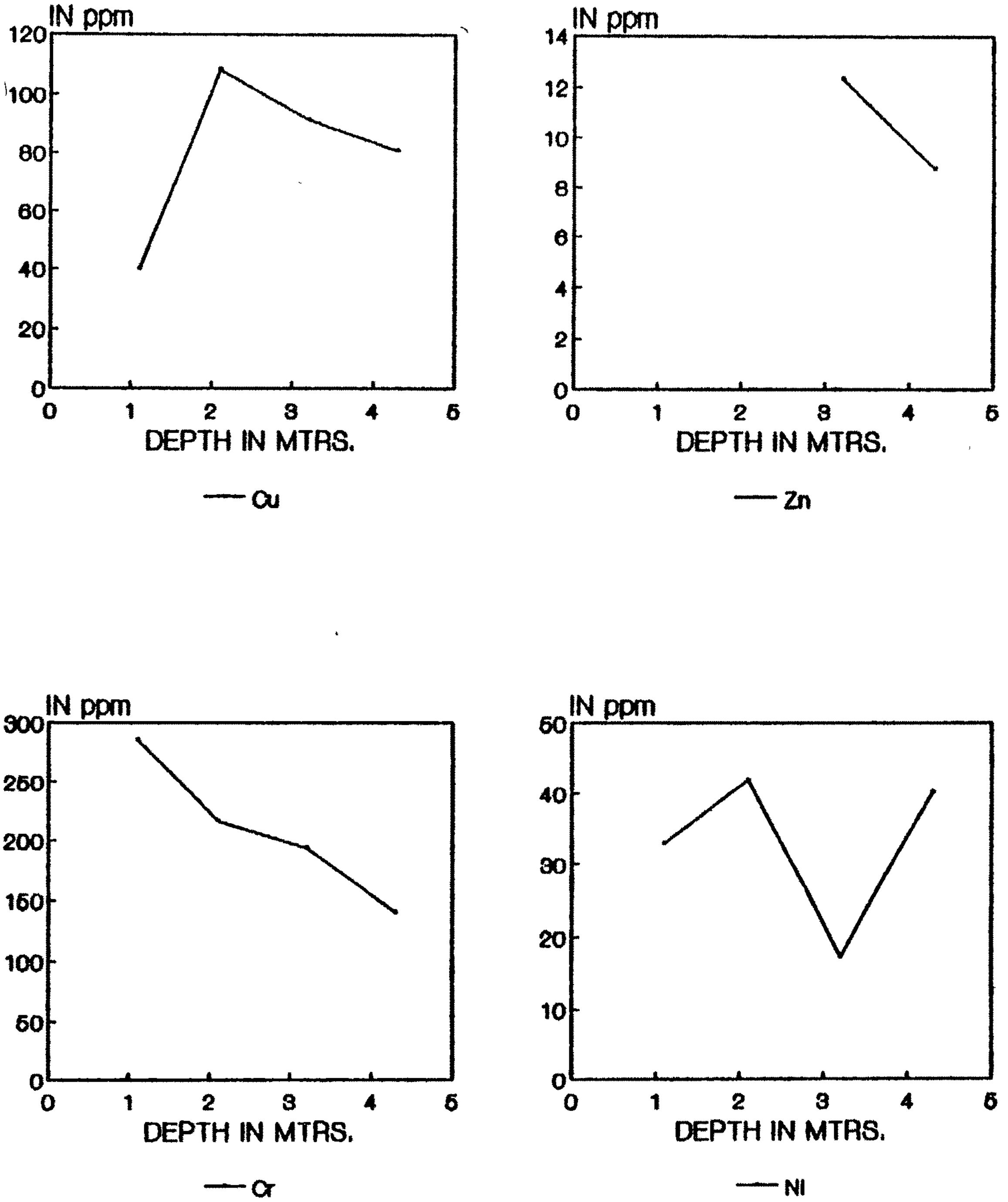


Table - 35

NET GAINS AND LOSSES OF MAJOR OXIDES AND TRACE ELEMENTS BASED ON A Ti-RETAINED MASS BALANCE MODEL

LOC.: KENEDI

Bed rock thickness consumed to produce present thickness of weathered profile : 3.04 m

Depth	0.00-1.1 m	1.1 - 2.1 m	2.1-3.2 m	3.2 - 4.3 m	Remarks
Horizon	B_{ox}(Fer)	B_{ox}(Fer)	B_{ox}(Fer)	B_{ox} (sap)	
SiO_2	335.48	238.21	124.06	78.75	Upward increasing gains
Al_2O_3	456.79	314.61	204.09	315.99	Upward increasing gain with top horizon maxima
Fe_2O_3	2182.20	1578.89	717.08	529.67	Upward increasing gain with a top horizon maxima.
TiO_2	-	-	-	-	—— —— ——
MnO_2	560.46	342.10	145.83	- 79.33	Top four horizon of gains with a bottom horizon of losses.
CaO	- 49.76	333.68	177.5	181.45	Bottom three horizon of gain with top horizon of losses.
MgO	31.96	216.85	80.78	50.87	Mid profile gains in the Box(Fer) zone but with bottom and top horizon of substantial depletion.
K_2O	297.67	145.99	13.99	- 18.73	Top three horizon of gain with bottom horizon of losses in B(sap) zone.
Na_2O	110.32	35.33	- 41.81	- 54.05	Two top horizon of gain and two bottom horizon of losses.
P_2O_5	2052.46	982.52	221.37	1.82	Upward increasing gain with a top horizon maxima.
Sc	498.71	58.30	252.21	122.30	Upward increasing gain, except Box(Fer) horizon of substantial depletion.
Y	T	T	T	T	—— —— ——
La	T	T	T	T	—— —— ——
Ce	801.50	257.55	408.29	157.86	Upward increasing gain, except Box(Fer) horizon of substantial depletion.
Pb	T	T	T	T	—— —— ——
Zr	438.26	490.21	133.74	144.23	Upward increasing gain with a maxima with a top horizon.
V	536.72	303.01	100.00	37.13	Upward increasing gain with a maxima with a top horizon.
Cu	236.30	583.81	242.52	187.85	Upward increasing gain with maxima with a Box(Fer).
Zn	T	T	- 8.66	- 38.41	Downward decreasing mobilities.
Cr	832.07	432.14	187.18	94.39	Upward increasing gain with maxima with a top horizon.
Ni	306.74	290.34	- 4.76	110.84	Top two and bottom horizon of fains with mid-profile horizon of losses in Box(Fer).

FIG. 47

X - RAY DIFFRACTION TRACES OF VARIOUS HORIZONS OF BAUXITIC PROFILE AT KENEDI

Depth in mtr.	Horizon	Dominating minerals
0.00 - 1.1m	B(ox) Ferricrete	Maghemite, Kaolinite Montmorillonite Nontronite Saponite Ilmenite Illite Quartz
1.1-2.1m	B(ox) Ferricrete	Maghemite Kaolinite Montmorillonite Saponite Hematite Quartz Diaspore Anatase
2.1-3.2m	B(ox) Ferricrete	Kaolinite Montmorillonite Beidellite Saponite Nontronite Illite Quartz Calcite
3.2-4.3m	B(Sap)	Maghemite Saponite Montmorillonite Nontronite Beidellite Illite Anatase.

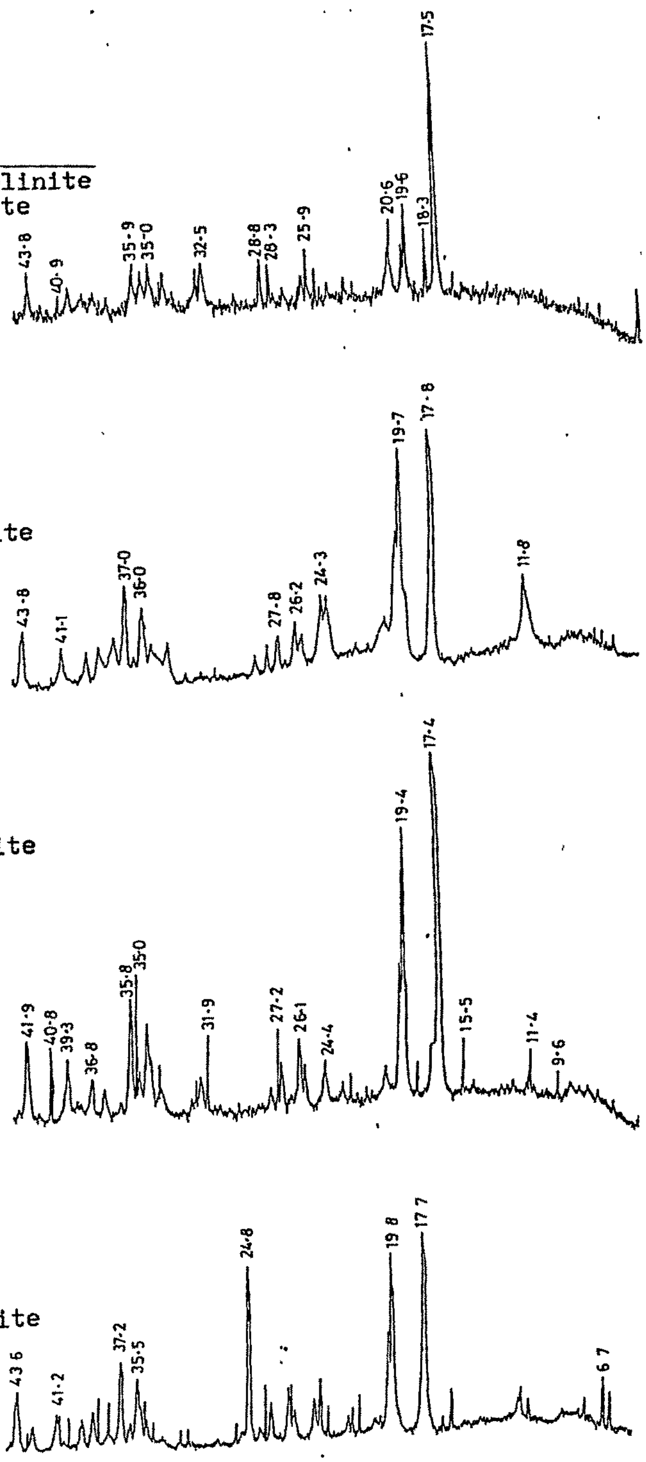


Table - 36

VILLAGE - KENDI
Top (0.00-1.1m)

X - ray data

B_{ox} - Ferricrete

2θ	d Spacing	Intensity %		Remark
		I_o	I_c	
6.2	14.255	1.3	1.72	Saponite
7.2	12.277	6.5	8.64	Montmorillonite
15.2	5.8288	12.1	16.09	Nontronite
15.9	5.5737	13.5	17.95	Nontronite
16.5	5.3723	16.0	21.27	Maghemite
17.5	5.06.5	75.2	100.00	Illite
18.3	4.8478	26.8	35.63	Maghemite
19.6	4.5291	33.7	44.81	Saponite
19.8	4.4838	23.0	30.58	Montmorillonite
20.6	4.3114	29.8	39.62	Kaolinite
21.7	4.0953	12.9	17.15	Saponite
23.0	3.8667	14.7	19.54	Maghemite
25.1	3.5477	12.8	17.02	Nontronite
25.4	3.5065	18.0	23.93	Montmorillonite
25.9	3.4399	23.1	30.71	Illite
26.2	3.4012	15.9	21.14	Maghemite
26.5	3.3634	12.6	16.75	Illite
27.4	3.2549	13.3	17.68	Augite
28.3	3.1534	19.3	25.66	Montmorillonite
28.8	3.0998	20.7	27.52	Kaolinite
30.4	2.9402	12.4	16.48	Kaolinite
31.3	2.8577	11.8	15.69	Calcite
32.5	2.7549	20.2	26.86	Kaolinite
32.9	2.7223	19.0	25.26	Forsterite
34.4	2.6069	13.5	17.95	Illite
35.0	2.5636	18.0	23.93	Montmorillonite
35.3	2.5425	15.4	20.47	Illmenite
35.9	2.5014	20.6	27.39	Beidellite
36.4	2.4682	18.8	25.00	Quartz
36.9	2.4358	20.5	27.26	Illite
39.4	2.2869	13.8	18.35	Hematite
40.1	2.2485	13.2	17.55	Montmorillonite
40.9	2.2064	15.7	20.87	Hematite
41.6	2.1709	13.2	17.55	Forsterite
43.1	2.0987	14.3	19.01	Magnetite
43.8	2.0668	20.0	26.59	Kaolinite
44.8	2.0230	13.2	17.55	Illite

Table - 37

VILLAGE - KENDI (1.1 - 2.1 m) X - ray data B_{ox} - Ferricrete

2θ	d spacing	Intensity %		Remark
		I_o	I_c	
5.8	15.237	19.4	20.12	Nontronite
6.2	14.255	23.0	23.85	Saponite
7.5	11.787	18.2	18.87	Saponite
11.1	7.9708	17.9	18.56	Saponite
11.8	7.4995	20.6	21.36	Saponite
16.0	5.5391	20.2	20.95	Nontronite
16.5	5.3723	13.7	14.21	Maghemite
17.8	4.9828	96.4	100.00	Montmorillonite
19.7	4.5063	60.0	62.24	Montmorillonite
20.0	4.4394	35.6	36.92	Montmorillonite
20.5	4.3322	14.0	14.52	Kaolinite
21.8	4.0767	19.2	19.91	Saponite
22.2	4.0042	16.0	16.59	Diaspore
23.8	3.7385	16.2	16.80	Kaolinite
24.3	3.6627	23.3	24.17	Hematite
24.7	3.6043	18.7	19.39	Sphene
26.0	3.4269	15.5	16.07	Maghemite
26.2	3.4012	21.6	22.40	Maghemite
26.4	3.3759	21.0	21.78	Kaolinite
27.4	3.2549	17.3	17.94	Illite
27.8	3.2090	21.8	22.61	Saponite
28.2	3.1644	11.2	11.61	Nontronite
28.9	3.0893	53.2	55.18	Gibbsite
29.7	3.0079	11.9	12.34	Montmorillonite
33.3	2.6905	11.4	11.82	Hematite
35.0	2.5636	12.1	12.55	Montmorillonite
35.4	2.5355	13.5	14.00	Kaolinite
35.6	2.5218	17.8	18.46	Maghemite
36.0	2.4947	23.8	24.68	Kaolinite
36.4	2.4682	12.1	12.55	Quartz
37.0	2.4295	28.0	29.04	Magnetite
37.8	2.3799	17.7	18.36	Anatase
38.5	2.3382	18.6	19.29	Forsterite
38.8	2.3208	14.1	15.66	Sphene
39.5	2.2813	13.2	13.69	Quartz
40.4	2.2325	19.0	19.70	Hematite
40.9	2.2064	14.2	14.73	Hematite
41.1	2.1961	14.8	15.35	Beidellite
42.7	2.1175	11.5	11.92	Montmorillonite
40.0	2.1034	9.8	10.16	Calcite
43.8	2.0668	20.3	21.05	Kaolinite

Table - 38

VILLAGE - KENEDI (2.1 - 3.2 m) X - ray data B_{ox} - Ferricrete

2θ	d spacing	Intensity % I_o	Intensity % I_c	Remark
6.0	14.730	11.9	12.25	Saponite
9.1	9.7176	16.7	17.19	Nontronite
9.6	9.21.26	19.4	19.97	Saponite
11.4	7.7617	24.4	25.12	Saponite
12.5	7.0810	16.8	17.30	Nontronite
15.5	5.7166	28.4	29.24	Nontronite
17.4	5.0964	97.10	100.00	Sphene
18.5	4.7958	22.7	23.37	Beidellite
19.3	4.5988	52.3	53.86	Saponite
19.4	4.5753	81.1	83.52	Nontronite
19.5	4.5521	47.7	49.12	Nontronite
20.6	4.3114	20.8	21.42	Illite
21.8	4.0767	15.9	16.37	Saponite
22.3	3.9864	14.3	14.72	Illite
22.8	3.9001	19.8	20.39	Illite
23.2	3.8338	16.1	16.58	Kaolinite
24.4	3.6479	21.6	22.24	Illite
25.7	3.4662	22.2	22.86	Illite
26.1	3.4140	28.0	28.83	Maghemite
26.6	3.3510	15.0	15.44	Illite
27.2	3.2784	22.2	22.86	Sphene
27.9	3.1977	15.6	16.06	Kaolinite
28.4	3.1426	12.3	12.66	Kaolinite
31.0	2.8847	17.1	17.61	Illite
31.9	2.8053	30.4	31.30	Fayalite
32.4	2.7631	19.2	19.77	Beidellite
34.9	2.5707	16.8	17.30	Montmorillonite
35.0	2.5636	22.5	23.17	Montmorillonite
35.8	2.5081	33.2	34.19	Calcite
36.3	2.4747	21.0	21.62	Nontronite
36.4	2.4682	46.1	47.47	Quartz
36.8	2.4422	39.2	40.37	Illite
37.5	2.3982	12.7	13.07	Kaolinite
38.0	2.3678	11.2	11.53	Beidellite
38.5	2.3382	15.8	16.27	Forsterite
39.3	2.2924	18.7	19.25	Calcite
40.2	2.2432	13.2	13.59	Quartz
40.8	2.2116	24.3	25.02	Illite
41.9	2.1560	27.2	28.01	Montmorillonite

Table - 39

VILLAGE - KENEDI (3.2 - 4.3 m) X - ray data $B_{(Sap)}$

2θ	d spacing	Intensity %		Remark
		I_o	I_c	
6.1	14.488	17.0	17.18	Saponite
6.7	13.192	18.5	18.70	Nontronite
17.7	5.0107	98.90	100.00	Saponite
19.8	4.4838	72.9	73.71	Montmorillonite
20.0	4.4294	46.4	46.91	Nontronite
20.7	4.2908	23.6	23.86	Maghemite
22.5	3.9515	17.5	17.69	Beidellite
24.4	3.6479	29.0	29.32	Illite
24.8	3.5900	30.0	30.33	Fayalite
26.0	3.4269	19.7	19.91	Maghemite
26.4	3.3759	22.6	22.85	Kaolinite
27.0	3.3022	13.8	13.95	Montmorillonite
27.5	3.2433	19.2	19.41	Augite
28.2	3.1644	17.7	17.89	Nontronite
28.9	3.0893	14.3	14.45	Fayalite
34.4	2.6069	17.5	17.69	Illite
35.5	2.5286	17.6	17.79	Maghemite
37.2	2.4169	33.0	33.36	Maghemite
37.8	2.3799	19.0	19.21	Anatase
38.8	2.3208	17.5	17.69	Maghemite
39.6	2.2758	16.1	16.27	Illite
41.2	2.1910	17.3	17.49	Beidellite
43.6	2.0758	21.3	21.53	Sphene

KARAMKUND

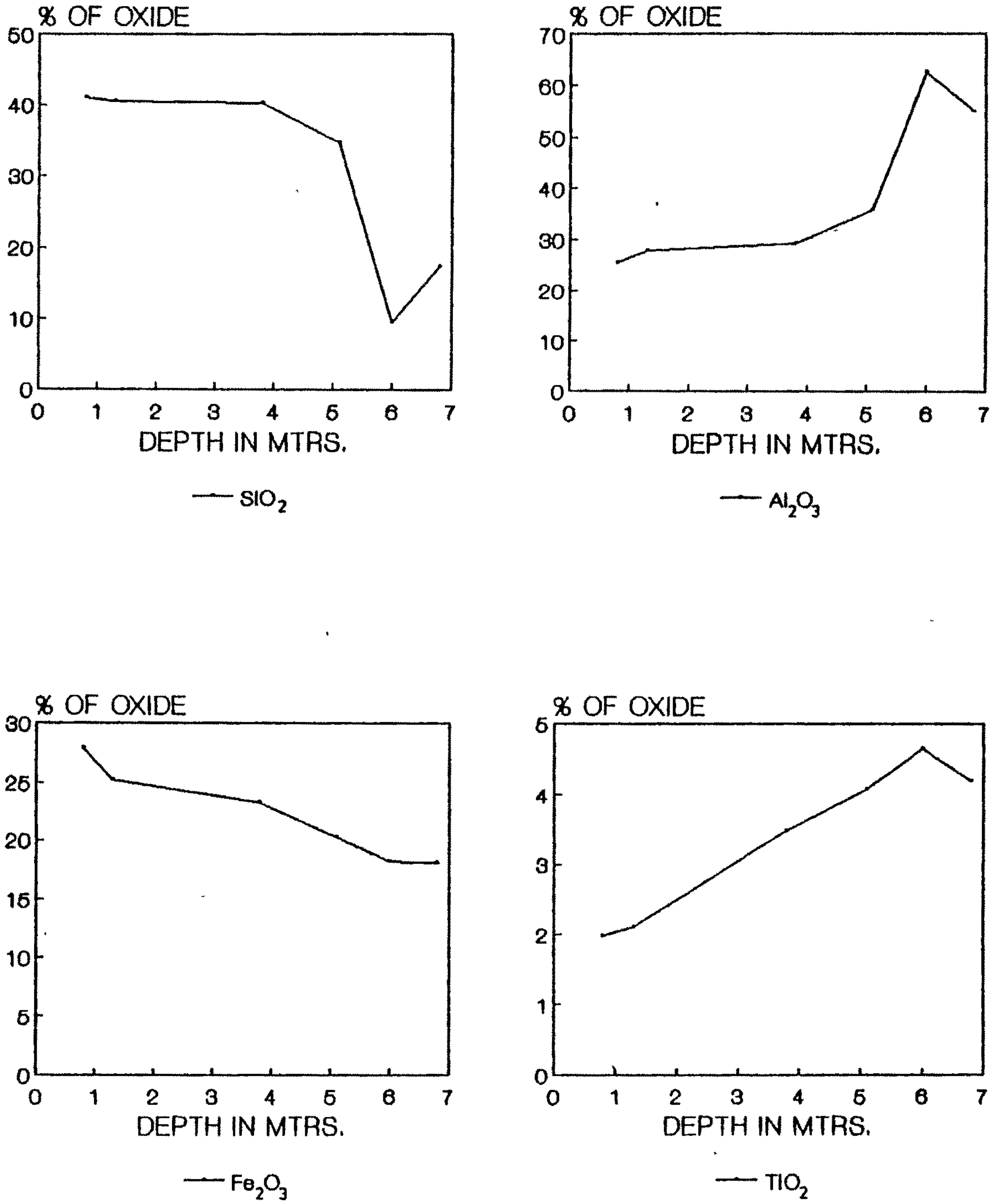
Table – 40

MAJOR OXIDES IN %										TRACE ELEMENTS IN ppm											
SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO_2	CaO	MgO	K_2O	Na_2O	P_2O_5	SC	Y	La	Ce	Pb	Zr	V	Cu	Zn	Cr	Ni	DEPTH IN MTS
41.00	25.48	27.96	1.98	0.19	0.47	1.14	0.81	0.97	–	41.08	T	T	101.52	T	80.98	178.44	97.17	T	222.67	44.76	0.00 0.70
40.90	28.00	25.26	2.11	0.21	0.58	1.63	0.72	0.91	–	108.25	0.91	21.83	88.25	T	140.22	239.18	86.15	17.26	161.33	58.25	0.70 1.4
40.31	29.47	23.26	3.40	0.25	0.63	1.92	0.68	0.77	0.08	90.42	T	10.47	119.57	T	91.68	196.11	257.26	T	237.24	22.98	1.4 3.8
34.75	35.96	20.28	4.08	0.30	0.97	1.99	0.75	0.81	0.13	142.98	T	24.12	141.63	7.21	156.14	217.26	63.11	T	356.68	34.54	3.8 5.2
9.55	62.67	18.23	4.66	0.31	1.81	1.73	0.25	0.34	0.18	73.16	T	T	76.91	3.00	77.33	143.12	105.55	5.06	124.53	20.11	5.2 6.0
17.44	55.33	18.11	4.21	0.37	1.21	1.69	0.11	0.32	0.15	115.22	T	T	101.50	T	61.54	122.22	80.74	T	89.90	63.67	6.0 5.8
46.00	17.40	7.50	2.40	0.50	1.10	2.00	1.20	1.00	0.09	81.00	0.73	18.00	8.20	6.00	90.00	185.00	75.00	11.5	110.00	28.0	

— Basalt — 66 m

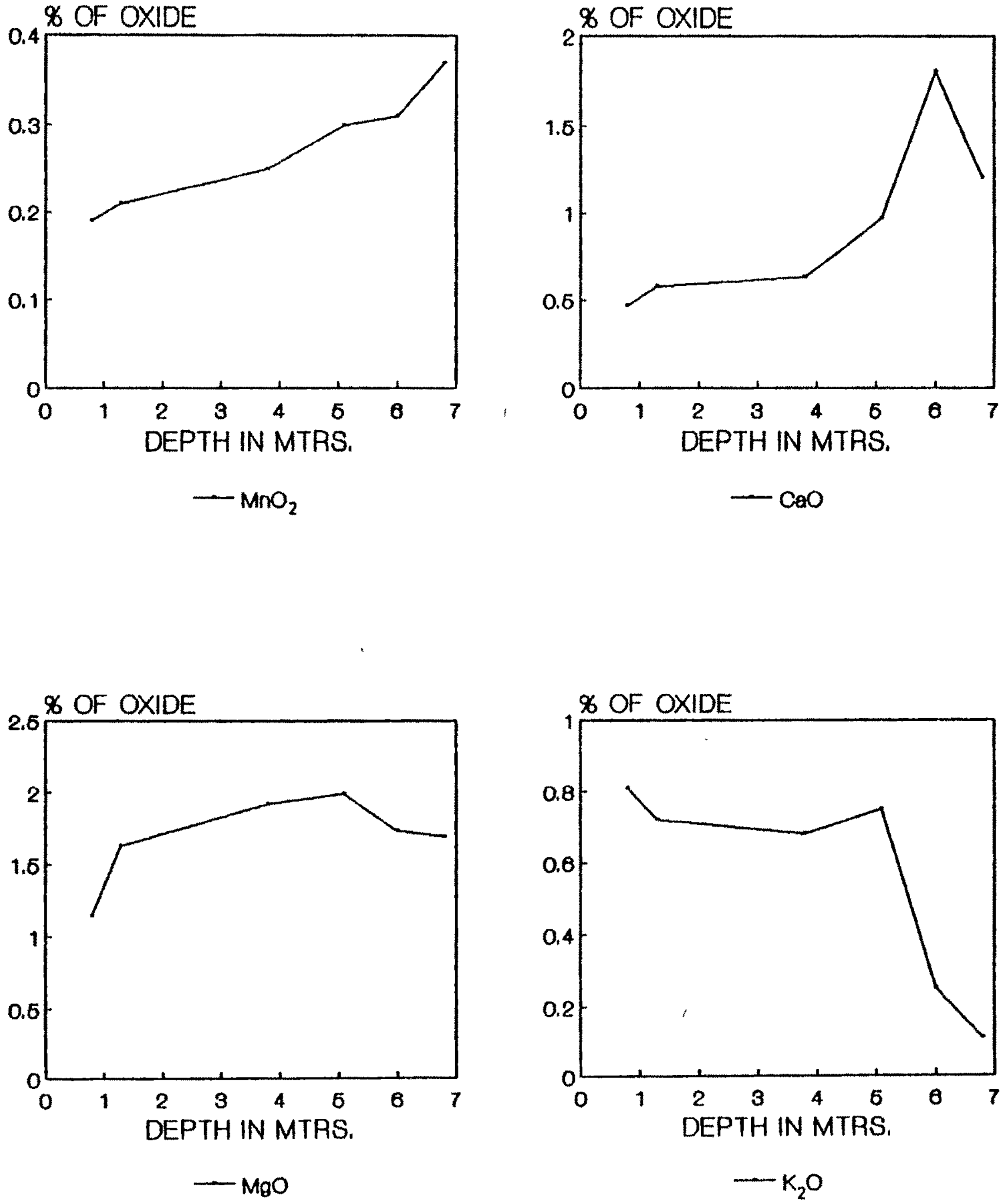
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT KARAMKUND VILLAGE (SiO_2, Al_2O_3, Fe_2O_3, TiO_2)

FIG. 48 a.



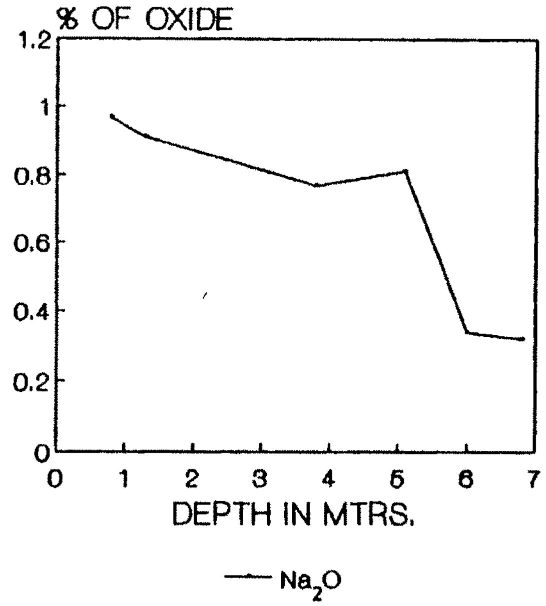
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT KARAMKUND VILLAGE (MnO_2, CaO, MgO, K_2O)

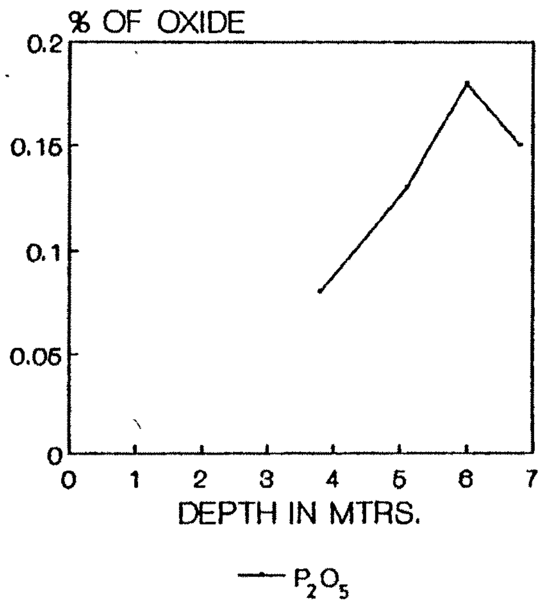
FIG. 48 b.



VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT KARAMKUND VILLAGE (Na_2O, P_2O_5)

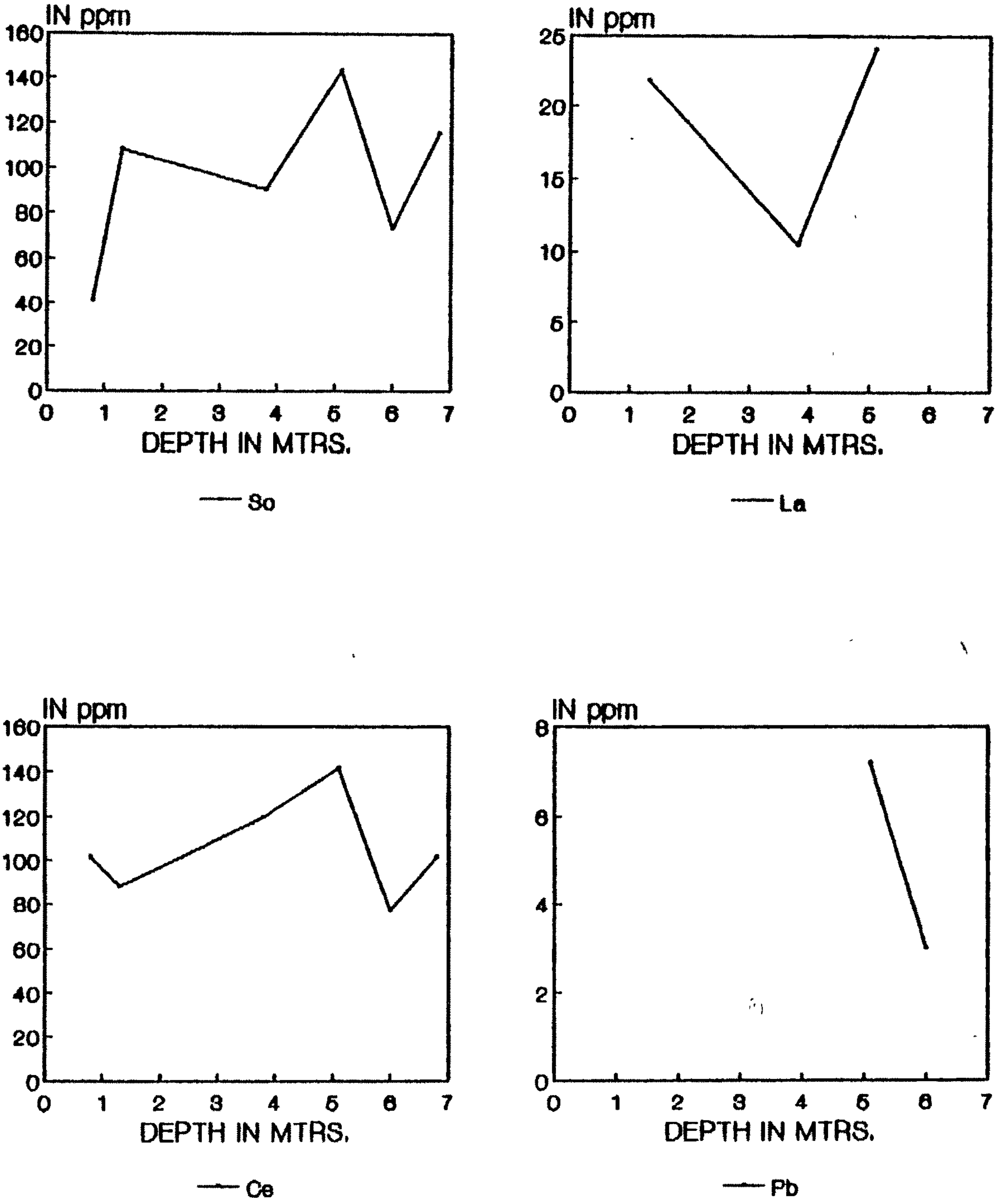
FIG. 48 c.





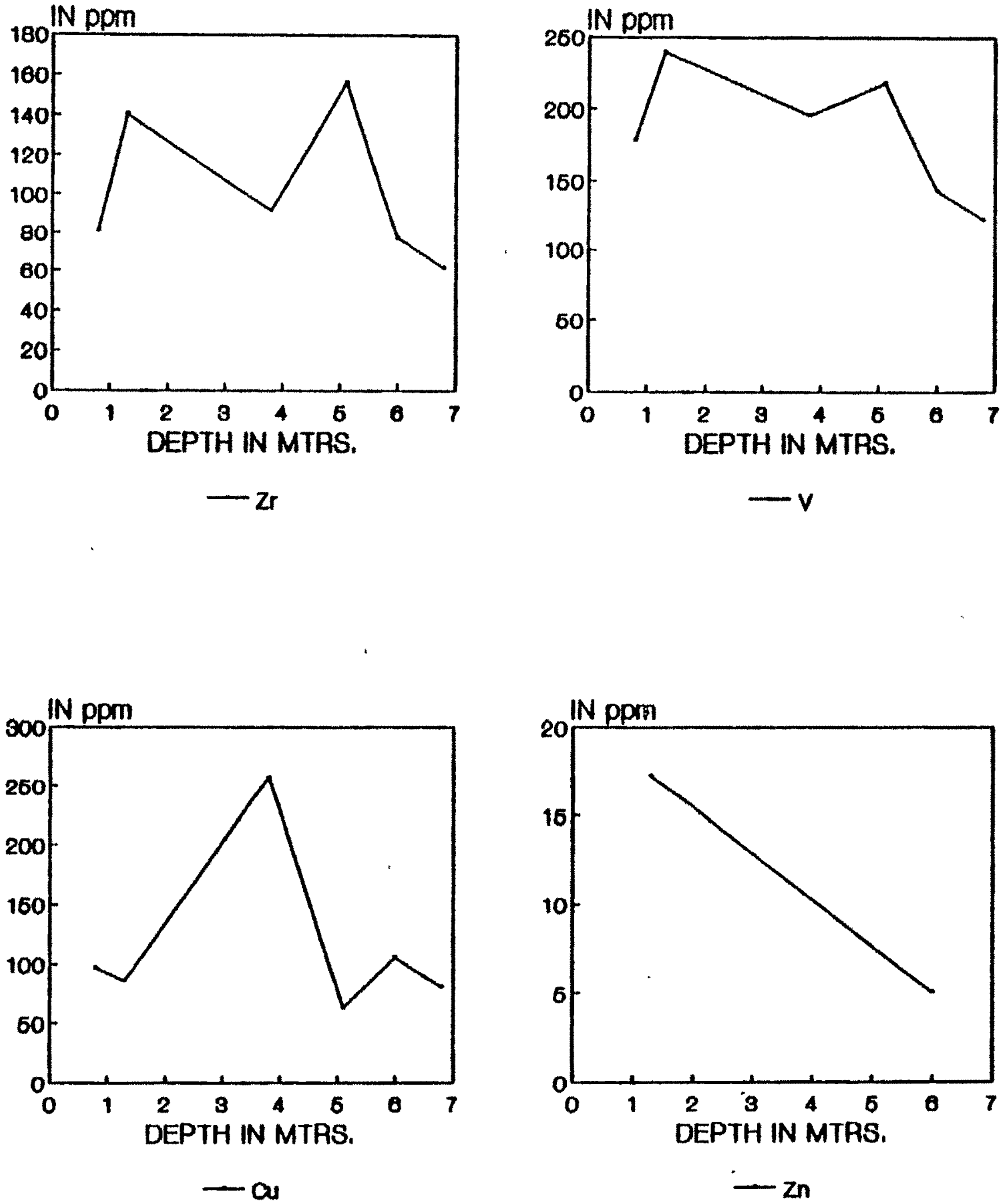
VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT KARAMKUND VILLAGE (Sc, La, Ce, Pb)

FIG. 48d.

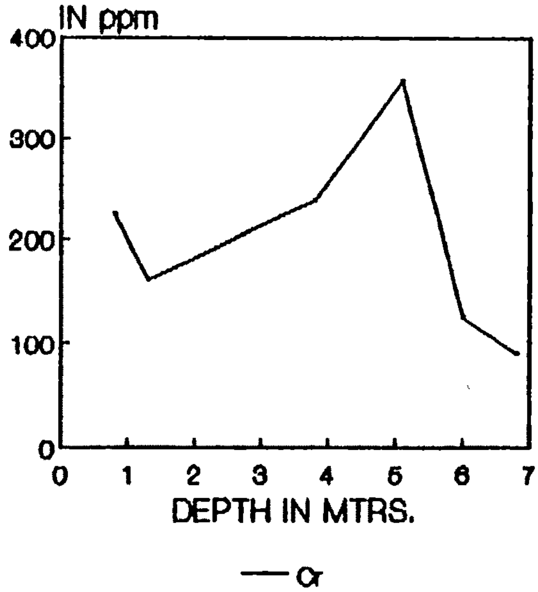


VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT KARAMKUND VILLAGE (Zr, V, Cu, Zn)

FIG.48 e.



VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT KARAMKUND VILLAGE (Cr, Ni) FIG. 48 f



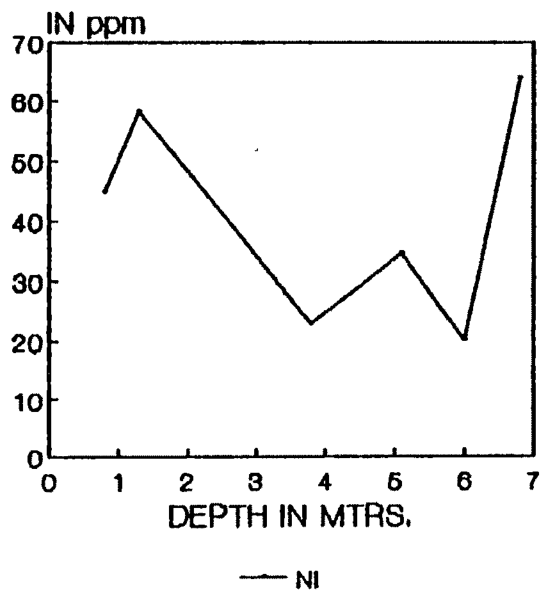


Table - 41

NET GAINS AND LOSSES OF MAJOR OXIDES AND TRACE ELEMENTS BASED ON A Ti-RETAINED MASS BALANCE MODEL

LOC.: KARAMKUND

Bed rock thickness consumed to produce present thickness of the weathered profile : 69. 33

Depth	0.00-0.7m	0.7-1.4m	1.4-3.8m	3.8-5.2m	5.2-6.00m	6.00-6.8 m	Remarks
Horizon	$B_{(Fer)}$	$B_{(Fer)}$	$B_{(Fer)}$	$B_{(Alu)}$	$B_{(Alu)}$	$B_{(Sap)}$	
SiO_2	7.67	- .214	- 39.76	- 55.71	- 89.34	- 78.40	Top horizon of gain with downward increasing of losses.
Al_2O_3	76.30	81.80	16.01	20.74	84.24	80.05	Top two and bottom two horizon of gain with mid-profile of substantial depletion.
Fe_2O_3	-351.87	283.09	113.88	59.05	25.18	37.65	Top horizon of losses with the bottom profile of gains
TiO_2	-	-	-	-	-	-	--- --- ---
MnO_2	- 53.93	- 52.22	- 65.51	- 64.70	- 68.06	- 57.81	Mobile throughout the profile
CaO	- 48.25	- 40.07	- 60.53	- 48.17	- 15.32	- 37.34	Mobile throughout the profile.
MgO	- 30.90	- 7.29	- 33.79	- 41.47	- 55.45	- 51.82	Mobile throughout the profile.
K_2O	- 18.18	- 31.75	- 60.91	- 63.23	- 89.27	- 94.77	Mobile throughout the profile
Na_2O	17.57	3.50	- 46.89	- 52.35	- 82.48	- 81.75	Top two horizon of gain with four bottom horizon of losses.
P_2O_5	-	-	- 38.71	- 15.05	- 2.97	- 5.01	Top two and bottom of losses with a gain in the Box(Alu) zone.
Sc	- 39.83	48.77	- 24.65	1.62	- 54.47	- 20.63	Top and bottom horizon of gain and intermediate zones of losses.
Y	T	41.45	T	T	T	T	Gain in the Box(Fer) zone.
La	T	37.60	- 59.94	- 21.37	T	T	Top horizon of gain with underlying zone of depletion.
Ce	48.69	21.29	- 0.35	0.66	- 52.13	- 23.10	Top two horizon of gain with bottom four horizon of losses.
Pb	T	T	T	- 29.31	- 74.24	T	Losses in the Box(Alu) zone.
Zr	6.33	72.78	- 31.50	- 0.58	- 59.08	- 61.99	Top two horizon of gain with bottom four horizon of loses
V	17.15	47.36	- 26.74	- 30.77	- 60.07	- 62.25	Top two horizon of gain with bottom four horizon of losses.
Cu	57.04	30.65	136.50	- 50.50	- 27.51	- 38.62	Top three horizon of gain with bottom three horizon of losses
Zn	T	70.14	T	T	- 77.41	T	Gain in the Box(Fer) zone with losses in the Box(Alu) zone.
Cr	136.16	60.56	43.16	83.58	- 43.88	- 55.15	Top four horizon of gain with two bottom horizon of losses.
Ni	92.15	134.65	- 43.87	- 28.04	- 63.31	28.67	Top two and bottom horizon of gains with mid-profile horizon of losses.

FIG. 49.

X - RAY DIFFRACTION TRACES OF VARIOUS HORIZONS OF BAUXITIC PROFILE AT KARAMKUND

Depth in mtr.	Horizon	Dominating minerals.
0.00-0.70m	$B_{(ox)}$ Ferricrete	Maghemite, Kaolinite, Nontronite, Saponite, Montmorillonite, Quartz, Gibbsite
0.7-1.4m	$B_{(ox)}$ Ferricrete	Maghemite, Kaolinite, Saponite, Montmorillonite, Hematite, Gibbsite, Sphene
1.4-3.8m	$B_{(ox)}$ Ferricrete	Maghemite, Kaolinite, Montmorillonite, Goethite, Quartz, Calcite, Boehmite, Gibbsite
3.8-5.2m	$B_{(ox)}$ Alucrete	Gibbsite, Diaspore, Kaolinite, Montmorillonite, Maghemite, Calcite, Anatase
5.2-6.00m	$B_{(ox)}$ Alucrete	Gibbsite, Boehmite, Malloysite, Kaolinite, Beidellite, Montmorillonite, Saponite, Geothite
6.00-6.8m	$B_{(sap)}$	Montmorillonite, Saponite, Nontronite, Maghemite, Kaolinite, Beidellite, Quartz, Anatase

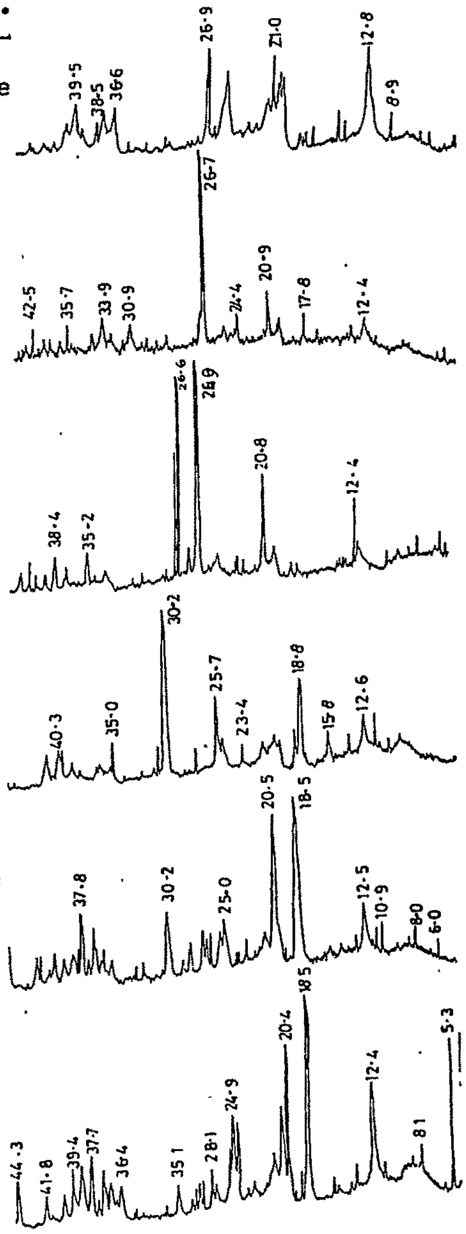


Table - 42

VILLAGE - KARAMKUND X - ray date B_{ox} - Ferricrete

(0.00 - 0.7 m)

2θ	d spacing	Intensity %		Remarks
		I_o	I_c	
4.6	19.206	16.2	16.78	Saponite
5.1	17.327	20.0	20.72	Saponite
7.2	12.277	18.3	18.96	Illite
8.9	9.9355	13.8	14.30	Illite
12.4	7.1379	16.7	17.30	Nontronite
12.8	6.9157	34.0	35.23	Nontronite
17.9	4.9552	9.0	9.32	Saponite
18.4	4.8216	8.9	9.22	Maghemite
19.9	4.4615	15.1	15.64	Kaolinite
21.0	4.2302	43.2	44.76	Sphene
22.7	3.9171	11.5	11.91	Diaspore
23.2	3.8338	12.8	13.26	Saponite
25.0	3.5617	13.2	13.67	Kaolinite
25.8	3.4530	9.9	10.25	Maghemite
26.9	3.3143	96.50	100.00	Quartz
27.6	3.2318	15.8	16.37	Maghemite
28.6	3.1210	78.1	80.93	Gibbsite
28.8	3.0998	51.6	53.47	Gibbsite
29.6	3.0178	6.8	7.04	Forsterite
35.0	2.5636	7.2	7.46	Montmorillonite
36.0	2.4947	5.4	5.59	Kaolinite
36.6	2.4551	14.0	14.50	Saponite
38.5	2.3382	9,0	9.32	Kaolinite
39.5	2.2813	12.6	13.05	Quartz
40.4	2.2325	6.2	6.42	Maghemite
41.2	2.1910	6.3	6.52	Kaolinite
41.7	2.1659	11.1	11.50	Beidellite
42.6	2.1222	7.2	7.46	Sphene

Table - 43

VILLAGE - KARAMKUND . X - ray data B_{ox} - Ferricrete
(0.7 - 1.4 m)

2θ	d spacing	Intensity %		Remarks
		I_o	I_c	
5.4	16.365	6.2	7.17	Saponite
6.0	14.730	3.8	4.39	Saponite
12.4	7.1379	22.8	26.38	Kaolinite
16.6	5.3402	13.0	15.04	Maghemite
17.8	4.9828	19.8	22.91	Geothite
20.0	4.4394	16.5	19.09	Kaolinite
20.2	4.3959	16.0	18.51	Gibbsite
20.9	4.2502	27.8	32.17	Montmorillonite
21.4	4.1520	14.5	16.78	Kaolinite
23.7	3.7540	19.9	23.03	Kaolinite
24.0	3.7078	15.0	17.36	Saponite
24.9	3.5758	15.6	18.05	Kaolinite
26.7	3.3386	86.4	100.00	Montmorillonite
27.0	3.3022	21.3	24.65	Gibbsite
30.9	2.8938	10.4	12.03	Saponite
33.3	2.6905	16.8	19.44	Hematite
33.9	2.6442	10.2	11.80	Saponite
35.0	2.5636	13.3	15.39	Saponite
35.7	2.5149	18.9	21.87	Maghemite
38.6	2.3324	10.4	12.03	Anatase
38.9	2.3151	17.5	20.25	Maghemite
39.6	2.2758	11.3	13.07	Sphene
40.4	2.2325	10.8	12.5	Meghemite
41.0	2.2012	12.8	14.81	Hematite
42.5	2.1270	9.3	10.76	Sphene

Table - 44

VILLAGE -KARAMKUND X - ray data B_{ox} - Ferricrete
(1.4 - 3.8 m)

2θ	d spacing	Intensity %		Remark
		Io	Ic	
6.8	12.998	11.3	26.84	Saponite
7.6	11.632	11.1	26.36	Maghemite
10.2	8.6720	18.5	43.94	Maghemite
12.4	7.1379	42.1	100.00	Kaolinite
14.3	6.1935	14.4	34.20	Boehmite
17.2	5.1552	12.0	28.50	Montmorillonite
17.8	4.9828	9.8	23.27	Geothite
18.0	4.9279	8.4	19.95	Geothite
18.3	4.8478	9.0	21.37	Maghemite
19.7	4.5063	29.3	69.59	Montmorillonite
20.3	4.3744	27.6	65.55	Gibbsite
20.8	4.2704	38.2	90.73	Halloysite
21.2	4.1907	22.0	52.25	Kaolinite
21.4	4.1520	20.6	48.93	Kaolinite
24.9	3.5758	31.8	75.53	Kaolinite
25.9	3.4399	11.4	27.07	Anatase
26.6	3.3510	40.4	95.96	Quartz
30.4	2.9402	6.3	14.96	Calcite
32.1	2.7883	8.2	19.47	Maghemite
34.9	2.5707	16.8	39.90	Kaolinite
36.5	2.4616	10.3	24.46	Quartz
38.4	2.3441	17.1	40.61	Boehmite
39.2	2.2981	9.9	23.51	Kaolinite
40.3	2.2378	3.0	7.12	Maghemite
41.2	2.1910	3.1	7.36	Kaolinite
42.4	2.1317	2.0	4.75	Quartz

Table - 45

VILLAGE - KARAMKUND (3.8 - 5.2 m) X - ray data B_{ox} - Alucrete

2Q	d spacing	Intensity %		Remarks
		I_o	I_c	
6.1	14.488	15.2	18.46	Saponite
8.3	10.652	19.6	23.81	Montmorillonite
10.4	8.5057	21.3	25.88	Saponite
11.5	7.6944	30.5	37.05	Saponite
12.6	7.0251	29.6	35.96	Maghemite
13.9	6.3708	23.6	28.67	Maghemite
15.8	5.6088	25.0	30.37	Maghemite (?)
18.2	4.8742	43.1	52.36	Gibbsite
18.8	4.7199	25.2	30.61	Diaspore
20.0	4.4394	22.0	26.73	Nontronite
23.4	3.8015	21.1	25.63	Diaspore
25.2	3.5339	23.2	28.18	Bedillite
25.7	3.4662	37.9	46.05	Maghamite
27.6	3.2318	20.0	24.30	Maghamite
30.2	2.9592	82.3	100.00	Maghamite
30.8	2.9029	21.3	25.88	Gibbsite
31.3	2.8577	13.0	15.79	Calcite
32.5	2.7549	12.0	14.58	Kaolinite
35.0	2.5636	22.8	27.70	Montmorillonite
36.2	2.4813	15.0	18.22	Geothite
38.0	2.3678	13.0	15.79	Beidellite
38.6	2.3324	15.4	18.71	Anatase
39.5	2.2813	21.3	25.88	Gibbsite
39.8	2.2648	20.5	24.90	Montmorillonite
40.3	2.2378	12.6	15.30	Maghemite
40.9	2.2064	19.0	23.08	Maghemite
43.8	2.0668	9.8	11.90	Kaolinite

Table - 46

VILLAGE - KARAMKUND X - ray data B_{ox} - Alucrete
(5.2 - 6.00 m)

2θ	d spacing	Intensity %		Remark
		I_o	I_c	
6.0	14.730	11.5	11.67	Nontromite
8.0	11.051	16.8	17.05	Montmorillonite
10.9	8.1166	18.9	19.18	Saponite
11.4	7.7617	16.6	16.85	Saponite
12.5	7.0810	25.6	25.98	Kaolinite
13.3	6.6569	13.8	14.01	Saponite
14.6	6.0669	11.2	11.37	Boehmite
18.5	4.7958	98.50	100.00	Gibbsite
20.4	4.3532	77.4	78.57	Kaolinite
20.7	4.2908	38.6	39.18	Halloysite
21.4	4.1520	16.3	16.54	Saponite
23.2	3.8338	12.9	13.09	Saponite
23.8	3.7385	7.9	8.02	Kaolinite
24.0	3.7078	8.1	8.22	Saponite
25.0	3.5617	21.4	21.72	Kaolinite
25.4	3.5065	16.8	17.05	Montmorillonite
26.3	3.3885	16.5	16.75	Geothite
26.6	3.3510	13.9	14.11	Gibbsite
27.0	3.3022	17.3	17.56	Gibbsite
28.2	3.1644	13.1	13.29	Beohmite
28.8	3.0998	12.0	12.18	Kaolinite
30.2	2.9592	24.9	25.27	Saponite
32.4	2.7631	6.8	6.90	Beidellite
35.9	2.5014	11.8	11.97	Montmorillonite
36.7	2.4487	19.8	20.10	Gibbsite
37.2	2.4169	9.0	9.13	Saponite
37.8	2.3799	25.2	25.58	Gibbsite
38.1	2.3618	12.6	12.79	Beidellite
38.6	2.3324	10.0	10.15	Boehmite
39.4	2.2981	9.1	9.23	Gibbsite
40.2	2.2432	11.2	11.37	Gibbsite
41.5	2.1759	10.6	10.76	Gibbsite
41.8	2.1609	10.1	10.25	Gibbsite
44.3	2.0446	14.2	14.41	Gibbiste

Table - 47

VILLAGE - KARAMKUND (6 - 6.8 m) X - ray data B(Sap)

2Q	d spacing	Intensity %		Remark
		I_o	I_c	
5.3	16.673	70.4	71.91	Montmorillonite
8.1	10.915	32.1	32.78	Montmorillonite
8.9	9,9355	28.1	28.70	Saponite
11.4	7.7617	26.0	26.55	Saponite
12.4	7.1379	55.2	56.38	Nontronite
12.9	6.8624	26.2	26.76	Nontronite
14.4	6.1507	18.5	18.89	Boehmite
16.0	5.5391	21.8	22.26	Nontronite
18.5	4.7958	97.9	100.00	Beidellite
20.0	4.4394	31.8	32.48	Beidellite
20.4	4.3532	79.3	81.00	Kaolinite
20.6	4.3114	48.2	49.23	Kaolinite
21.3	4.1713	30.7	32.35	Kaolinite
23.2	3.8338	20.0	20.42	Saponite
23.7	3.7540	7.2	7.35	Maghemite
24.6	3.6187	43.3	44.22	Kaolinite
24.9	3.5758	45.4	46.37	Kaolinite
25.3	3.5201	33.2	33.91	Anatase
26.6	3.3510	20.3	20.73	Augite
27.0	3.3022	24.6	25.12	Montmorillonite
27.8	3.2090	21.4	21.85	Saponite
28.1	3.1754	20.3	20.73	Beidellite
28.4	3.1426	18.4	18.79	Kaolinite
28.8	3.0998	15.3	15.62	Kaolinite
30.1	2.9688	20.0	20.42	Megnetite
31.1	2.8756	12.2	12.46	Maghemite
34.0	2.6367	10.3	10.52	Meghemite
35.1	2.5565	20.1	20.53	Saponite
36.0	2.4947	21.7	22.16	Kaolinite
36.4	2.4682	20.0	20.42	Montmorillonite
37.1	2.4232	15.4	15.73	Montmorillonite
37.7	2.3860	31.6	32.27	Kaolinite
38.6	2.3324	28.0	28.60	Kaolinite
39.4	2.2869	27.2	27.78	Quartz
40.2	2.2432	16.8	17.16	Montmorillonite
41.8	2.1609	17.7	18.07	Beidellite
44.3	2.0446	23.0	23.49	Beidellite

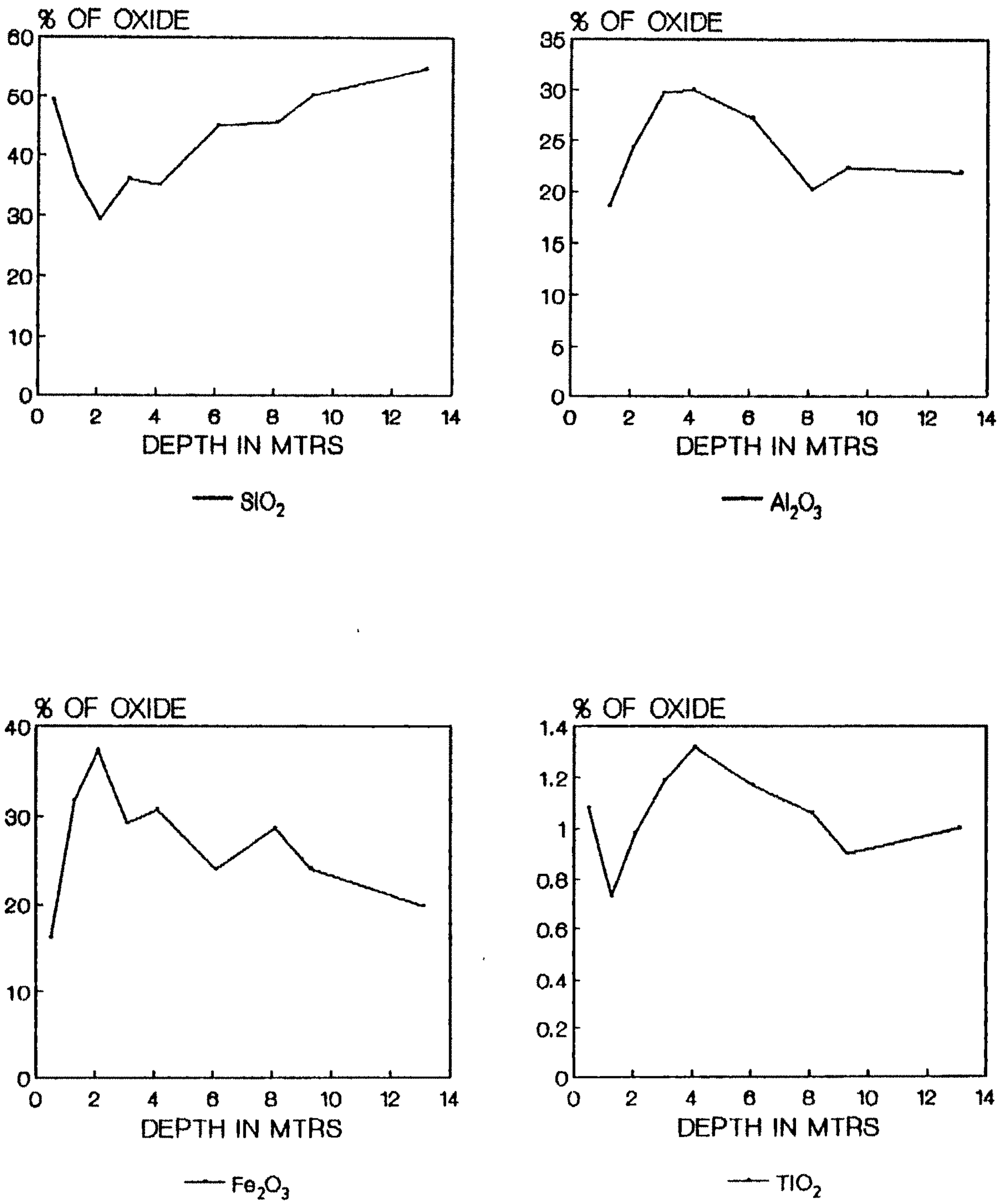
LAMBA

Table - 48

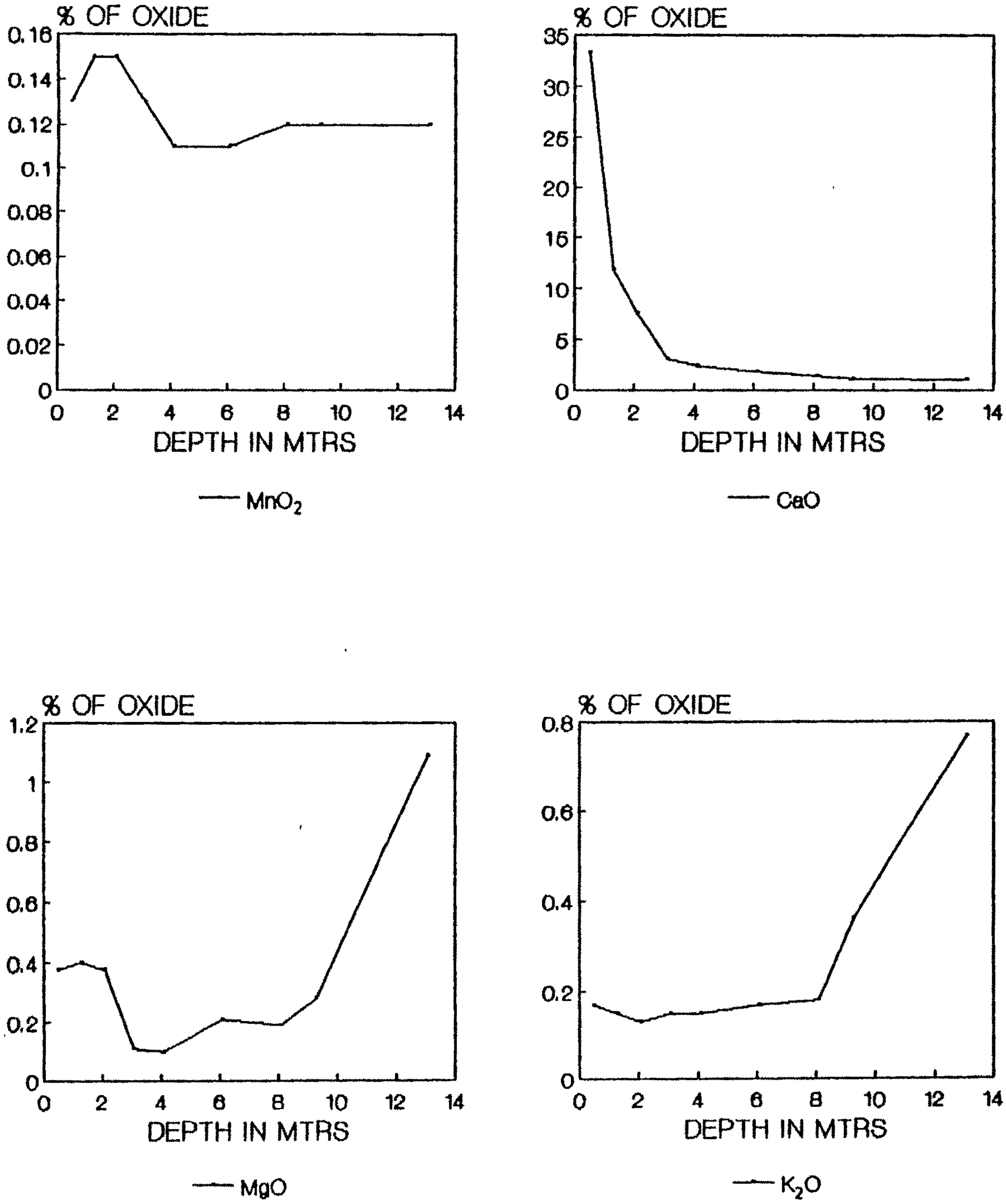
MAJOR OXIDES IN %										TRACE ELEMENTS IN ppm											
SiO_2	Al_2O_3	Fe_2O_3	TiO_2	MnO_2	CaO	MgO	K_2O	Na_2O	P_2O_5	SC	Y	La	Ce	Pb	Zr	V	Cu	Zn	Cr	Ni	DEPTH IN MTS
49.27	-	16.11	1.08	0.13	33.33	0.38	0.17	0.28	0.03	89.26	5.02	T	60.65	T	110.10	300.40	117.16	T	T	20.11	0.00 – 0.50
36.18	18.55	31.72	0.73	0.15	11.82	0.40	0.15	0.23	0.07	110.56	11.25	3.62	110.14	25.05	141.27	342.67	85.11	T	60.12	34.30	0.05 – 1.5
29.34	24.33	37.29	0.98	0.15	7.56	0.38	0.13	0.25	0.08	140.12	T	7.52	75.25	13.42	17.55	285.16	141.76	T	24.15	42.15	1.5 – 2.1
36.08	29.76	29.15	1.19	0.13	3.09	0.11	0.15	0.21	0.13	95.96	T	16.31	60.72	11.16	88.96	190.81	137.66	T	146.29	26.79	2.1 – 3.1
35.19	29.98	30.71	1.32	0.11	2.40	0.10	0.15	0.21	0.13	30.12	T	T	90.66	4.93	40.9	110.04	103.02	T	198.76	19.67	3.1 – 4.1
45.11	27.23	23.97	1.17	0.11	1.79	0.21	0.17	0.22	0.11	80.95	17.02	T	31.32	T	33.12	90.12	76.14	27.19	120.52	56.19	4.1 – 6.1
45.68	20.18	28.63	1.06	0.12	1.42	0.19	0.18	0.29	0.23	111.09	14.15	4.30	41.56	T	153.23	311.71	213.17	42.05	427.16	17.27	6.1 – 8.1
50.23	22.36	24.11	0.90	0.12	1.11	0.28	0.36	0.31	0.18	133.11	T	2.10	29.06	T	77.06	285.85	120.53	56.44	143.04	48.12	8.1 – 9.4
54.71	21.93	19.81	1.00	0.12	1.03	1.09	0.77	0.43	0.24	122.20	T	T	66.90	T	85.70	332.12	80.15	70.66	121.11	60.56	9.4 – 13.1

VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT LAMBA VILLAGE (SiO_2, Al_2O_3, Fe_2O_3, TiO_2)

FIG. 50 a

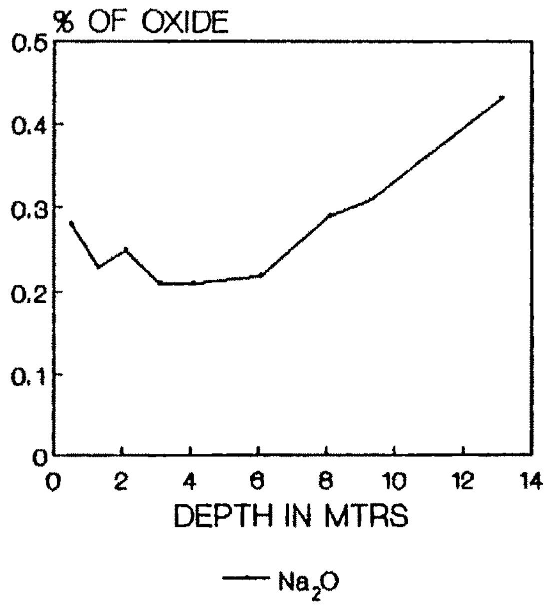


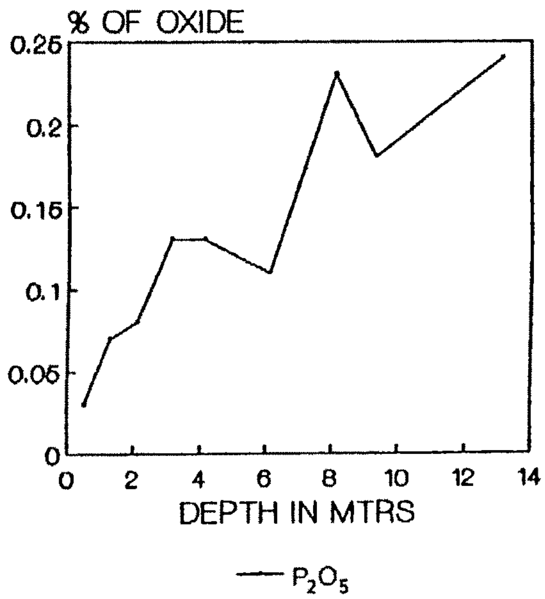
VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT LAMBA VILLAGE (MnO_2, CaO, MgO, K_2O) FIG. 50 b.



VARIATION OF MAJOR OXIDES IN THE BAUXITE PROFILE AT LAMBA VILLAGE (Na_2O, P_2O_5)

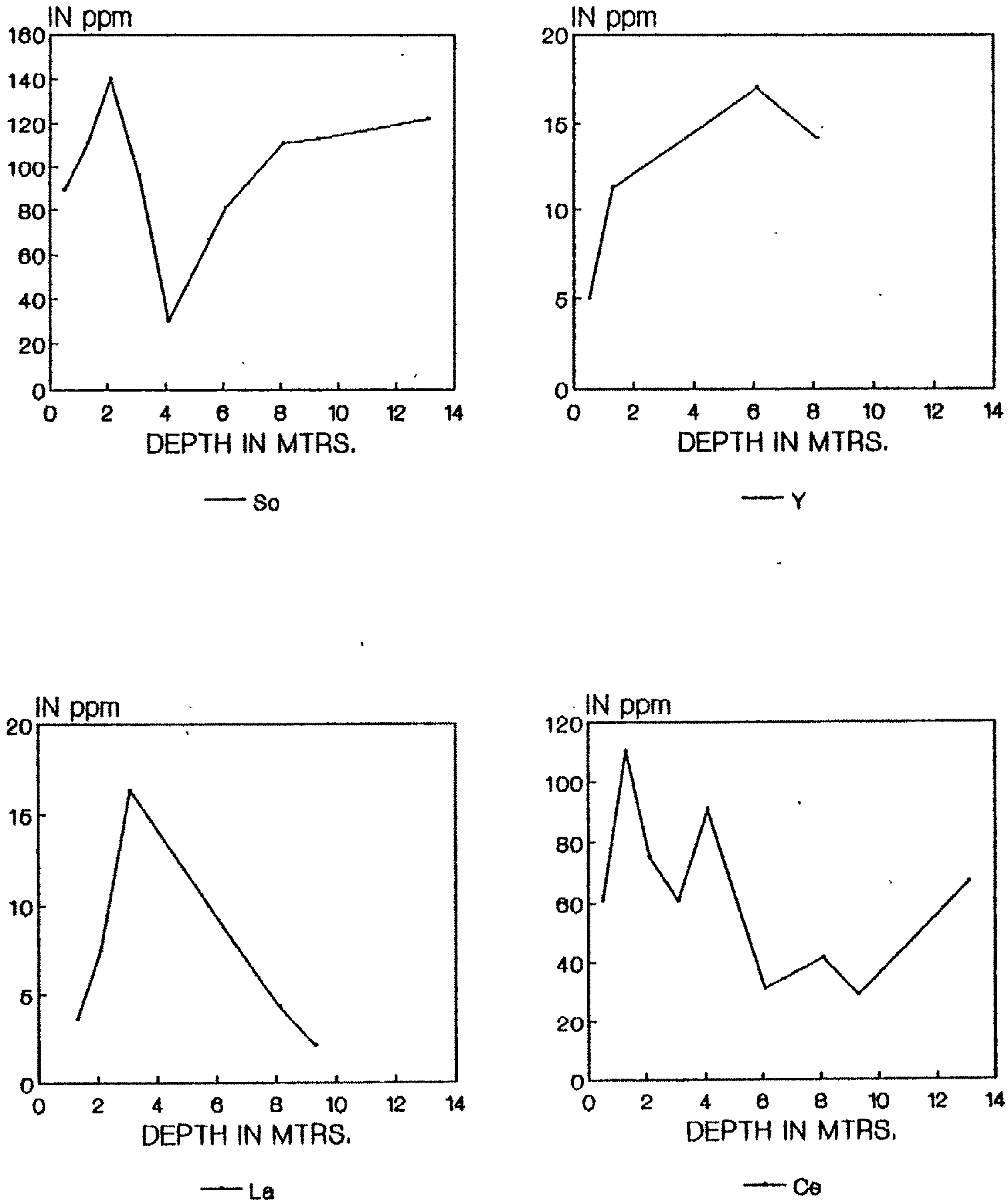
FIG. 50 c.



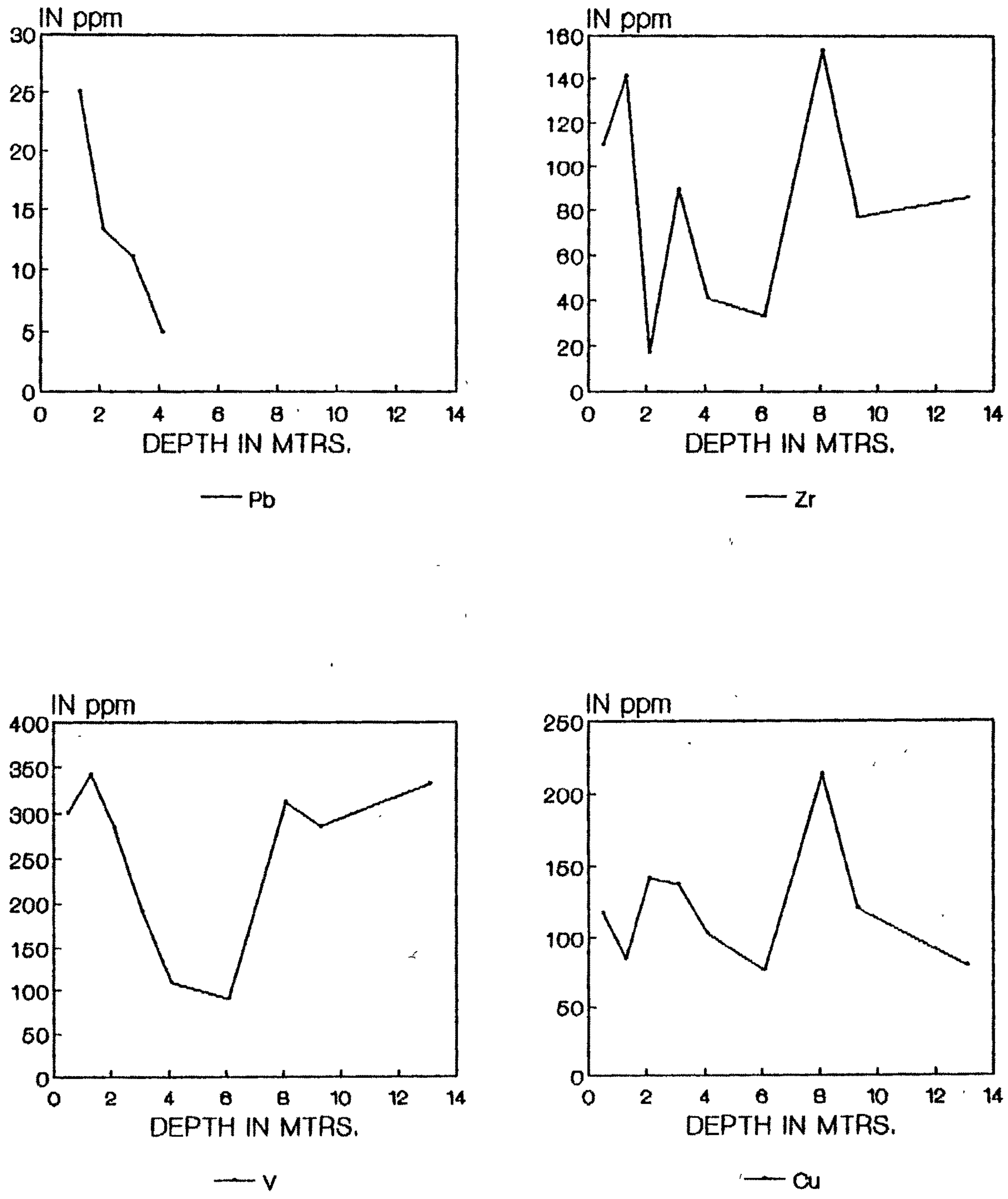


VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT LAMBA VILLAGE (Sc, Y, La, Ce)

FIG. 50 d.

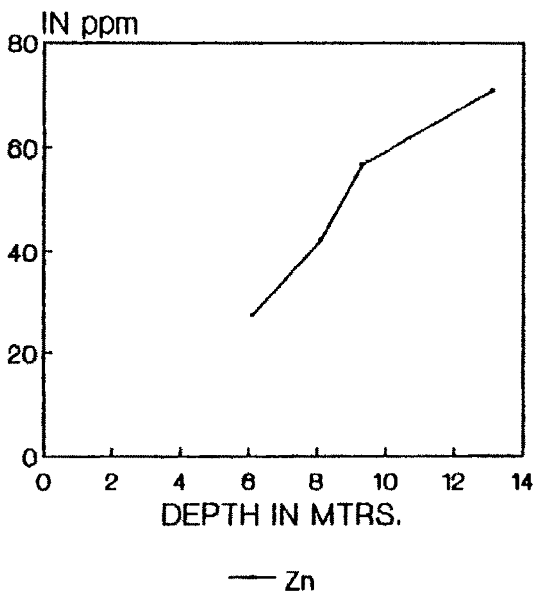


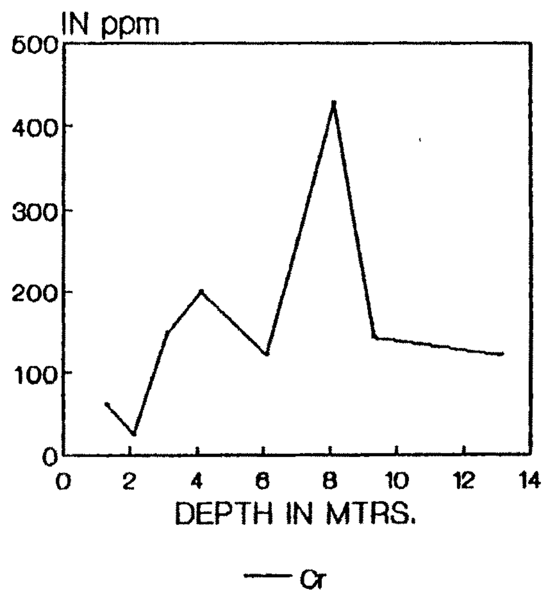
VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT LAMBA VILLAGE (Pb, Zr, V, Cu) FIG. 50 e.



VARIATION OF TRACE ELEMENTS IN THE BAUXITE PROFILE AT LAMBA VILLAGE (Zn, Cr, Ni)

FIG. 50 f.





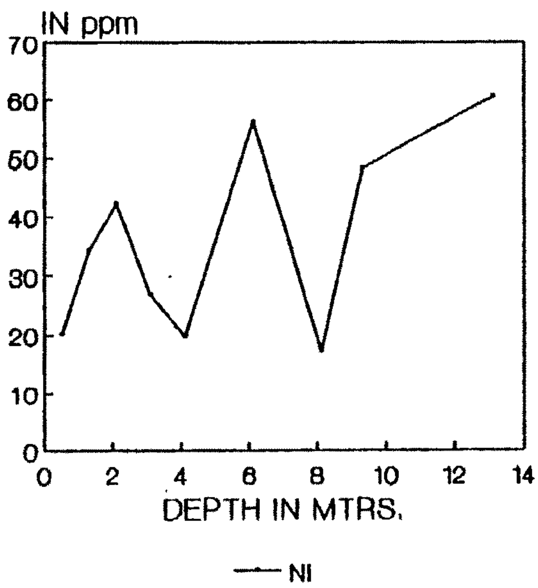


Table - 49

NET GAINS AND LOSSES OF MAJOR OXIDES AND TRACE ELEMENTS BASED ON A Ti-RETAINED MASS BALANCE MODEL

LOC.: LAMBA

Bed rock thickness consumed to produce present thickness of weathered profile : 4.95m.

Depth	0.00-0.5m	0.5-1.5m	1.5-2.1m	2.1-3.1m	3.1-4.1m	4.1-6.1m	6.1-8.1m	8.1-9.4m	Remarks
Horizon	Gaj Lime-stones	B_{ox}(Fer)	B_{ox}(Fer)	B_{ox}(Fer)	B_{ox}(Fer)	B(sap)	B (sap)	B(sap)	
SiO_2	- 17.88	- 10.78	- 46.11	- 45.42	- 52.01	- 30.60	- 22.43	0.45	Mobile throughout the profile exeept the bottom horizon of gain in B(Sap) zone
Al_2O_3	—	- 14.34	11.71	12.53	2.20	4.73	14.33	11.79	Gain throughout the profile
Fe_2O_3	- 25.41	117.26	90.25	22.47	16.32	2.43	35.04	33.94	Top horizon of losses with all the bottom horizon of gains.
TiO_2	-	-	-	-	-	-	-	-	— —
MnO_2	0.268	15.69	27.49	- 9.00	- 30.58	- 21.68	- 5.69	11.66	Top three and bottom horizon of gain with the mid-profile of losses.
CaO	2893.5	1470.6	648.28	151.87	76.36	48.40	29.94	23.33	Upward increasing gain with a top horizon maxima
MgO	- 67.73	- 42.21	- 64.44	- 91.52	- 93.05	- 83.54	- 21.27	- 71.47	Mobile throughout the profile
K_2O	- 79.56	- 73.32	- 82.78	- 83.63	- 85.25	- 81.14	- 77.95	- 48.08	Mobile throughout the profile
Na_2O	- 39.85	- 26.90	- 40.81	- 59.05	- 63.09	- 56.37	- 36.52	- 20.08	Mobile throughout the profile
P_2O_5	- 88.44	- 60.10	- 66.04	- 54.55	- 59.03	- 60.88	- 9.73	- 16.8	Mobile throughout the profile
Sc	- 33.88	21.16	14.38	- 35.48	- 81.74	- 44.64	- 16.15	18.32	Bottom and top horizon of gain with intermediate zones of losses,
Y	T	T	T	T	T	T	T	T	— —
La	T	T	T	T	T	T	T	T	— —
Ce	- 15.76	126.31	15.17	- 23.46	3.02	- 59.84	- 41.18	- 99.51	Top horizon of gain with underlying znes of depletion.
Pb	T	T	T	T	T	T	T	T	— —
Zr	12.13	112.87	9.49	- 13.76	- 65.91	- 68.86	59.01	- 5.81	Top horizons of gains with underlying zones of depletion with a zone of gain in the bottom horizon.
V	- 16.41	40.82	- 12.70	- 12.70	- 51.89	- 79.99	- 11.78	- 4.71	Losses throughout the profile with a mid profile horizon of gain in Box(Fer) zone.
Cu	30.17	39.90	73.58	38.81	- 6.34	- 21.9	141.32	60.70	Top four and bottom two horizon of gains gains with mid profile horizons of losses.
Zn	T	T	T	T	T	- 67.46	- 44.46	- 12.20	Bottom thr horizon of losses.
Cr	T	- 34.11	- 80.28	- 1.65	20.44	- 17.59	222.38	27.14	Top horizon of depletion with bottom horizons of gain.
Ni	- 70.20	- 24.82	- 31.18	- 63.97	- 76.15	- 23.15	- 73.93	- 14.45	Mobile throughout the profile

FIG.51.

X - RAY DIFFRACTION TRACES OF VARIOUS HORIZONS OF BAUXITIC PROFILE AT LAMBA

Depth in Mtr.	Horizon	Dominating minerals
0.00-0.50m	Gaj Limestone	Calcite, Quartz Kaolinite, Goethite, Illite Maghemite Montmorillonite
0.50-1.5m	$B_{(ox)}$ Ferricrete	Nontronite Montmorillonite Maghemite, Lepidocrocite,Kaolinite Goethite, Calcite, Ilmenite
1.5-2.1m	$B_{(ox)}$ Ferricrete	Nontronite,Maghemite Montmorillonite, Kaolinite, Goethite
2.1-3.1m	$B_{(ox)}$ Ferricrete	Maghemite,Montmorillonite, Illite, Geothite, Quartz, Fayalite, Ilmenite
3.1-4.1m	$B_{(ox)}$ Ferricrete	Nontronite,Kaolinite Maghemite, Illite Gibbsite
4.1-6.1m	$B_{(sap)}$	Nontronite,Kaolinite Beidellite, Maghemite,Quartz, Calcite, Gibbsite
6.1-8.1m	$B_{(sap)}$	Kaolinite, Maghemite, Hemalite Calcite, Boehmite, Quartz, Gibbsite
8.1-9.4m	$B_{(sap)}$	Saponite,Montmorillonite Kaolinite,Maghemite Calcite, Ilmenite
9.4-13.2m	C (Basalt)	Augite, Quartz, Ilmenite Sphene, Maghemite Forsterite

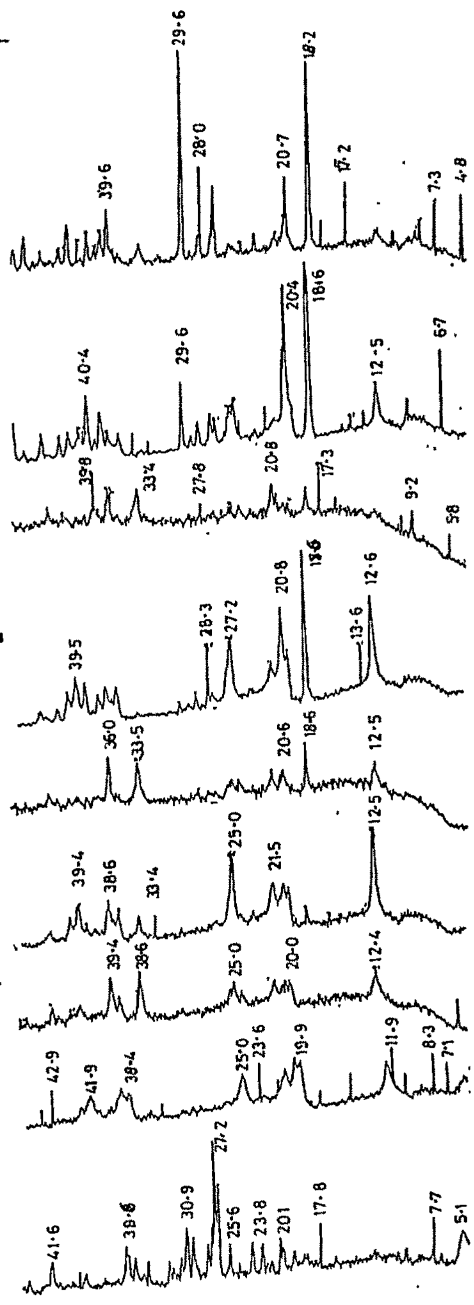


Table - 50

VILLAGE - LAMBA   X - ray data   Gaj Limestone
(0.00 - 0.5 m)

2Q	d spacing	Intensity %		Remark
		I_o	I_c	
4.8	18.409	22.0	24.04	Nontromite
7.3	12.109	18.5	20.21	Illite
8.6	10.281	13.0	14.20	Illite
9.0	9.8254	10.0	10.90	Illite
11.0	8.0430	9.5	10.38	Saponite
12.4	7.1379	11.5	12.56	Kaolinite
12.6	7.0251	11.0	12.02	Maghemite
15.2	5.8288	27.0	29.50	Montmorillonite
17.2	5.1552	14.0	15.30	Montmorillonite
18.2	4.8742	88.5	96.72	Illite
20.4	4.3532	29.5	32.24	Kaolinite
20.7	4.2908	16.0	17.48	Maghemite
21.4	4.1500	9.0	9.38	Kaolinite
23.2	3.8338	10.0	10.92	Kaolinite
24.4	3.6479	6.0	6.55	Saponite
25.5	3.4930	6.5	7.10	Kaolinite
26.8	3.3264	27.0	29.50	Quartz
27.1	3.2903	10.5	11.47	Lepidocrocite
28.0	3.1865	34.0	37.15	Calcite
29.6	3.0178	91.5	100.00	Calcite
33.4	2.6827	7.0	7.65	Geothite
36.2	2.4813	19.5	21.31	Geothite
36.6	2.4551	11.0	12.02	Meghemite
37.2	2.4169	6.0	6.55	Meghemite
37.9	2.3738	1.0	1.09	Kaolinite
38.8	2.3208	8.0	8.74	Maghemite
39.6	2.2758	14.0	15.30	Illite
40.2	2.2432	5.0	5.46	Quartz
40.4	2.2325	4.5	4.91	Ilmenite
41.9	2.1560	4.0	4.37	Montmorillonite
43.4	2.0849	10.0	10.92	Maghemite
44.3	2.0446	6.0	6.55	Kaolinite
45.7	1.9852	9.0	9.83	Kaolinite

Table - 51 .

VILLAGE - LAMBA X - ray data B_{ox} - Ferricrete

(0.5 - 1.5 m)

2θ	d spacing	Intensity %		Remark
		I_o	I_c	
6.7	13.1920	30.5	31.12	Nontronite
9.8	9.0250	13.0	13.26	Montmorillonite
12.5	7.0810	17.5	17.85	Nontronite
13.7	6.4634	10.0	10.20	Augite
14.6	6.0669	7.5	7.65	Boehmite
18.6	4.7702	98.0	100.00	Quartz
20.4	4.3532	54.0	55.10	Kaolinite
20.7	4.2908	31.5	32.14	Maghemite
22.3	3.9864	12.0	12.24	Diaspore
24.6	3.6187	8.0	8.16	Kaolinite
25.0	3.5617	14.0	14.28	Kaolinite
25.4	3.5065	12.0	12.24	Montmorillonite
26.7	3.3386	8.0	8.16	Montmorillonite
27.1	3.2903	11.0	11.22	Lepidocrocite
28.2	3.1644	8.0	8.16	Nontronite
29.6	3.0178	21.5	21.93	Calcite
32.6	2.7466	2.0	2.04	Ilmenite
34.0	2.6367	5.0	5.10	Maghemite
35.2	2.5495	4.0	4.08	Ilmenite
36.1	2.4880	6.5	6.63	Goethite
36.8	2.4422	12.5	12.75	Geothite
37.9	2.3738	18.5	18.75	Kaolinite
38.6	2.3324	6.0	6.12	Kaolinite
39.6	2.2758	4.0	4.08	Sphene
40.4	2.2325	3.0	3.06	Maghemite
41.9	2.1560	4.0	4.08	Montmorillonite
44.4	2.0402	9.0	9.18	Gibbsite

Table - 52

VILLAGE - LAMBA   X - ray data B_{ox} - Ferricrete
(1.5 - 2.1 m)

2θ	d spacing	Intensity %		Remark
		I_o	I_c	
5.8	15.237	15.0	37.50	Nontronite
9.2	9.6122	24.0	60.00	Nontronite
10.1	8.8450	22.0	55.00	Maghemite
17.3	5.1257	40.0	100.00	Montmorillonite
18.5	4.7958	33.0	82.50	Illite
20.2	4.3959	28.0	70.00	Montmorillonite
21.2	4.1907	30.00	75.00	Kaolinite
21.5	4.1329	35.0	87.50	Kaolinite
24.4	3.6479	27.0	67,50	Illite
25.0	3.5617	27.0	67.50	Kaolinite
27.8	3.2090	28.0	70.00	Maghemite
33.4	2.6827	34.0	85.00	Geothite
35.7	2.5149	32.0	80.00	Kaolinite
35.9	2.5014	33.0	82.50	Montmorillonite
37.2	2.4169	38.0	95.00	Montmorillonite
39.8	2.2648	26.0	65.00	Montmorillonite
41.2	2.1910	27.0	67.00	Kaolinite

Table - 53

VILLAGE - LAMBA (2.1 - 3.1 m) X - ray data B_{ox} - Ferricrete

2Q	d spacing	Intensity %		Remark
		I_o	I_c	
12.6	7.0251	39.0	67.24	Meghemite
13.6	6.5107	20.0	34.48	Maghemite
18.6	4.7703	58.0	100.00	Quartz
20.1	4.4175	19.0	32.75	Illite
20.8	4.2704	36.0	62.06	Illite
21.6	4.1140	23.0	39.65	Illite
25.2	3.5339	15.0	25.86	Fayalite
27.2	3.2784	24.0	41.37	Sphene
28.3	3.1534	21.5	37.06	Montmorillonite
29.0	3.0789	4.5	7.75	Maghemite
29.7	3.0079	2.0	3.44	Montmorillonite
35.2	2.5495	2.0	3.44	Ilmenite
36.2	2.4813	9.0	15.51	Geothite
36.8	2.4422	9.0	15.51	Goethite
38.0	2.3678	6.5	11.20	Beidellite
38.8	2.3208	11.0	18.96	Maghemite
39.5	2.2813	12.0	20.68	Quartz
40.4	2.2325	6.5	11.20	Maghemite
41.6	2.1708	2.0	3.44	Sphene
44.4	2.0402	1.0	1.72	Gibbsite

Table - 54

VILLAGE - Lamba (3.1 - 4.1 m) X - ray data B_{ox} - Ferricrete

2θ	d spacing	Intensity %		Remark
		I_o	I_c	
12.5	7.0811	24.5	79.03	Nontronite
18.6	4.7703	31.0	100.00	Gibbsite
19.9	4.4615	22.0	77.41	Kaolinite
20.6	4.3114	24.0	70.96	Gibbsite
21.6	4.1140	23.0	74.19	Illite
24.6	3.6187	21.5	69.35	Kaolinite
25.1	3.5477	21.5	69.35	Kaolinite
28.1	3.1754	18.5	59.67	Beidellite
33.5	2.6749	28.5	91.93	Fayalite
35.1	2.5565	18.5	59.67	Kaolinite
36.0	2.4946	30.0	96.77	Kaolinite
41.3	2.1859	19.0	61.29	Kaolinite
43.4	2.0849	18.5	59.67	Maghemite
44.2	2.0490	18.5	59.67	Gibbsite
44.8	2.0229	20.0	64.51	Maghemite

Table - 55

VILLAGE - LAMBA X - ray data $B_{(Sap)}$
(4.1 - 6.1 m)

2θ	'd' spacing	Intensity %		Remark
		I_o	I_c	
12.5	7.0811	38.0	100.00	Nontromite
15.6	5.6802	10.5	27.63	Nontromite
16.4	5.4049	8.5	22.36	Nontromite
18.5	4.7958	11.0	28.94	Nontromite
19.5	4.5521	13.0	34.21	Kaolinite
20.1	4.4175	19.0	50.00	Beidellite
21.5	4.1329	20.5	53.94	Kaolinite
23.2	3.8338	21.0	55.26	Kaolinite
25.0	3.5617	11.0	28.94	Kaolinite
29.6	3.0178	30.0	78.94	Calcite
31.1	2.8756	5.5	14.47	Maghemite
33.4	2.6826	11.0	28.94	Geothite
35.1	2.5565	10.5	27.63	Kaolinite
36.0	2.4946	12.5	32.89	Kaolinite
38.6	2.3324	7.5	19.73	Kaolinite
39.4	2.2868	15.0	39.47	Quartz
41.1	2.1961	11.0	28.94	Kaolinite
44.2	2.0490	7.0	18.42	Gibbsite

Table - 56

VILLAGE - LAMBA (6.1 - 8.1 m) X - ray data $B_{(Sap)}$

2θ	d spacing	Intensity % I_o	Intensity % I_c	Remark
9.0	9.8255	13.0	44.82	Illite
12.4	7.1380	14.0	48.27	Kaolinite
20.0	4.4394	25.0	86.20	Kaolinite
20.4	4.3532	23.0	79.31	Kaolinite
21.3	4.1713	23.5	81.03	Kaolinite
21.5	4.1329	23.5	81.03	Kaolinite
24.3	3.6627	23.5	81.03	Hematite
25.0	3.5617	21.0	72.41	Kaolinite
33.2	2.6983	23.0	79.31	Hematite
33.6	2.6671	28.0	96.55	Sphene
35.2	2.5495	21.5	74.13	Ilmenite
35.8	2.5081	20.0	68.96	Calcite
38.6	2.3324	29.0	100.00	Boehmite
39.4	2.2868	19.0	65,51	Quartz
40.5	2.2272	16.5	56.89	Saponite
41.0	2.2012	16.5	55.17	Maghemite
43.4	2.0849	18.5	63.79	Maghemite
44.0	2.0578	16.5	56.89	Sphene
44.3	2.0446	14.0	48.27	Gibbsite

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VILLAGE - LAMBA (8.1 - 9.4 m) X - ray data $B_{(Sap)}$

2Θ	d spacing	Intensity % I_o	Intensity % I_c	Remark
5.3	16.6736	10.5	46.66	Saponite
5.6	15.7810	11.0	48.88	Saponite
7.1	12.4500	16.0	71.11	Illite-Montmorillonite
8.3	10.6525	19.5	86.66	Montmorillonite
10.8	8.1916	12.0	53.33	Montmorillonite
11.9	7.4367	22.5	100.00	Saponite
12.4	7.1380	21.0	93.33	Kaolinite
15.6	5.6802	13.0	57.77	Nontronite
18.4	4.8217	6.5	28.88	Maghemite
19.9	4.4615	18.5	82.22	Kaolinite
20.4	4.3532	20.0	88.88	Kaolinite
21.3	4.1713	16.0	71.11	Kaolinite
21.5	4.1329	13.5	60.00	Kaolinite
23.6	3.7697	19.0	84.44	Kaolinite
25.0	3.5617	15.0	66.66	Kaolinite
32.2	2.7798	4.0	17.77	Illite
35.2	2.9495	9.5	42.22	Ilmenite
35.8	2.5081	11.5	51.11	Calcite
36.6	2.4551	4.5	20.00	Maghemite
37.7	2.3860	3.5	15.55	Kaolinite
38.4	2.3441	9.0	40.00	Illite
39.3	2.2924	4.5	20.00	Calcite
41.9	2.1560	12.0	53.33	Montmorillonite
42.9	2.1080	4.5	20.00	Calcite

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VILLAGE - LAMBA (9.4 - 13.2 m) X - ray data C - Basalt

2Q	d spacing	Intensity %		Remark
		I_o	I_c	
5.1	17.3270	14.0	29.16	Saponite
7.7	11.4811	18.5	38.54	Maghemite
10.1	8.7577	8.0	16.66	Maghemite
17.8	4.9828	19.0	39.58	Montmorillonite
20.1	4.4175	8.0	16.66	Nontronite
21.1	4.2104	10.5	21.87	Sphene
21.3	4.1713	13.5	28.12	Kaolinite
23.0	3.8667	11.5	23.95	Calcite
23.8	3.7385	12.5	26.04	Illmenite
25.0	3.5617	5.0	10.41	Kaolinite
25.6	3.4795	12.0	25.00	Nontronite
26.8	3.3264	33.0	68,75	Quartz
27.2	3.2784	48.0	100.00	Sphene
27.4	3.2549	18.5	38.54	Augite
27.8	3.2090	12.0	25.00	Maghemite
29.1	3.0685	14.5	30.28	Nontronite
29.7	3.0079	18.0	37.50	Augite
30.2	2.9592	7.5	15.62	Maghemite
30.9	2.8937	4.0	8.33	Augite
33.1	2.7063	6.5	13.54	Forsterite
34.3	2.6143	8.0	16.66	Beidellite
35.1	2.5565	12.0	25.00	Kaolinite
38.6	2.3324	3.0	6.25	Kaolinite
39.2	2.2980	4.0	8.33	Calcite
41.6	2.1708	7.5	15.62	Augite
42.7	2.1174	1.0	2.08	Augite

DISCUSSION ON THE MOBILITIES OF VARIOUS MAJOR OXIDES AND TRACE ELEMENT IN THE SECTION BASED ON Ti- RETAINED MASS BALANCE MODELS.

SiO_2 :- The mobility of SiO_2 shows a varied behaviour as given below.

Downward increasing mobilities at Mota Asota, top and two bottom horizon of losses with a mid horizon of gain at village Virpur, top and bottom horizons of gain with a mid-profile zone of losses at Mahadevia, losses throughout the profile with a bottom horizon of gain at village Mewasa, upward increasing gain throughout the profile with a bottom horizon of loss at Buddhadhar, top two horizons of gain with three bottom horizons of losses at Bhopamadhi, top horizon of gain with downward increasing losses at Karamkund, mobile throughout the profile at village Ran, upward increasing mobilities at village Bhatiya, upward increasing gains with a top horizon maxima at Khakharda, upward increasing gains at Kenedi, mobile throughout the profile except the bottom horizon of gain at Lamba.

The increased mobility of SiO_2 in the B_{ox} zone can be indicative of freer drainage conditions. Further, minimum mobility is observed at some places in the near bottom horizon i.e., B_{sap}, indicating that quite a lot of silica must be going into the reconstitution of the neo-formed mineral assemblages and that the drainage must have been sluggish in contrast to the freer drainage conditions in the upper horizons. According to

Okamoti et. al. (1957), the presence of Si and Al in small amounts would cause immediate co-precipitation. This indicates that the removal of Si predates Al accumulation in the profiles. It could also mean that Si and Al are not both in true solution. If Al is for example, organically bound, it could be simultaneously mobilised with Si in solution (Mcfarlane, 1989).

Al_2O_3 :- The behaviour of Al_2O_3 in the weathering profiles is not constant. Mid profile gains but bottom and top horizon of substantial depletion at Mota Asota, downward increasing gains at Virpur, top and bottom horizons of gain with a mid-horizon of substantial depletion at Mahadevia, downward increasing gains at Mewasa, upward increasing gains at Buddhadhar, upward increasing gains at Bhopamadhi, top and two bottom horizons of gains with a mid-profile zone of substantial depletion at Karamkund, mid-profile gains with bottom and top horizons of substantial depletion at village Ran, upward increasing gains throughout the profile at Bhatiya, gains throughout the profile at Khakharda, upward increasing gains at Kenedi, gain throughout the profile at village Lamba.

Fe_2O_3 :- The behaviour of Fe_2O_3 is also erratic. Two top horizons of gains with two bottom horizons of losses at Mota Asota, two top horizons of gains with two bottom horizons of gain with two bottom horizons of substantial depletion at

Virpur, two top and four bottom horizons of gain with a mid-horizon zone of losses at Mahadevia, top and bottom horizon of gain with a mid-horizon zone of losses at Mewasa, upward increasing gains at Buddhadhar, top three horizons of gains with two bottom horizons of losses at Bhopamadhi, top horizon of losses with a bottom horizon of gains at Karamkund, top and bottom horizons of gains with a zone of depletion in the mid-horizons at village Ran, top and bottom horizons of gains with two-mid-horizons of substantial depletion at Bhatiya, top two horizons of gains and bottom four horizons of losses at Khakharda, upward increasing gains at Kenedi, top horizon of losses with bottom horizon of gains at village Lamba.

In accordance with laboratory leaching experiments, Fe and Al are inseparable. This could be due to that adequate leaching and other organic conditions were not amenable for the leaching of either Fe or Al, during the formation and stabilization of these sections.

MnO_2 :- MnO_2 is generally speaking, enriched in the top horizons with a few exceptions. Top horizon of gain with three bottom horizons of losses at Mota Asota, top and two top and two bottom horizons of gain and mid-horizon losses at village Mewasa, top four horizons of gain with a bottom horizon of losses at Buddhadhar, top four horizon of gains with bottom horizon of losses at Bhopamadhi, mobile throughout the profile at Karamkund, downward increasing gains at village Ran, top two horizon of gains and two bottom horizon of losses at Bhatiya, upward increasing mobilities at Khakharda, top four horizon of gains with bottom horizon of losses at Kenedi, top three and bottom horizon of gains with mid-horizon of losses at village Lamba.

This points towards a general oxidizing environment (Burridge and Ahn, 1965). Further, although a high humus content of the surface material favours loss of manganese (Heintze, 1946) plants may under certain circumstances be responsible for its uptake and accumulation in the soil (Tiller, 1963). This is an indication of the presence of vegetal cover during the process of lateritization.

CaO :- CaO is also enriched in the top horizons with a few exceptions. Upward increasing gains at Mota Asota, top two horizon of gain with two bottom horizon of substantial depletion at Virpur, top and two bottom horizon of gains and mid-horizons losses at Mahadevia, increasing throughout the profile at Mewasa, upward increasing gains at Buddhadhar, top four horizon of gains with bottom horizon of losses at Bhopamadhi,mobile throughout the profile at Karamkund, mobile throughout the profile at village Ran, downward increasing mobilities at village Bhatiya, top five and bottom horizon of gains with mid-horizon losses at Khakharda, top horizon of losses with three bottom horizon of gains at Kenedi, upward increasing gains at village Lamba. The top horizon of gains can be attributed to downward percolation from the overlying Gaj limestones.

MgO :- MgO shows a varied behaviour with downward increasing mobilities at Mota Asota, mobile throughout the profile at Virpur, top two horizons and bottom horizon of gains with mid-horizon losses at Mahadevia, top four horizons of losses with a bottom horizon of losses at village Mewasa, top horizon of gain with bottom four horizons of losses at Buddhadhar, top three horizon of gains with bottom two horizons of losses at Bhopamadhi, mobile throughout the profile at Karamkund, mobile throughout the profile at village Ran, mobile throughout the profile at Bhatiya, upward incfeasing gains at Khakharda, mid-profile gains with bottom and top horizon of substantial depletion at village Kenedi, mobile throughout the profile at Lamba.

K_2O :- K_2O is mobile throughout the profile at Mota Asota, mobile throughout the profile at Virpur, mobile throughout the profile at village Mahadevia, top four horizons of losses with a bottom horizon of gain at village Mewasa, downward increasing mobilities at Buddhadhar, top and three bottom horizons of losses with mid-horizon gain at Bhopamadhi, mobile throughout the profile at Karamkund, mobile throughout the profile increasing downward at Ran, upward increasing mobilities at Bhatiya, top five horizon of losses with a bottom horizon of gain at Khakharda, top three horizons of gains with a bottom horizon of losses at Kenedi and is mobile throughout the profile at village Lamba.

<u>Na_2O</u> :- Na_2O shows downward increasing mobilities at Mota Asota, mobilities throughout the profile at village Virpur, upward increasing mobilities at Mahadevia, top four horizons of losses with a bottom horizon of gain at Mewasa, downward increasing mobilities at Buddhadhar, top and bottom three horizons of losses with mid-horizon gains at Bhopamadhi, top two horizons of gains and four bottom horizons of losses at Karamkund, downward increasing mobilities at village Ran, upward incfeasing mobilities at Bhatiya, top four horizons of gain with a bottom horizon of losses at Khakharda, top two horizons of gain and bottom two horizons of losses at Kenedi and is mobile throughout the profile at Lamba.

<u>P_2O_5</u> :- P_2O_5 shows top three horizons of gain with a bottom horizon of losses at Mota Asota, top and two bottom horizons of losses with mid-horizon gains at Virpur, top four horizons of gain with bottom three horizons of losses at Mahadevia, top two horizons of gain with bottom three horizons of substantial depletion at Mewasa, mid-profile gains with bottom and top two horizons of substantial depletion at Buddhadhar, top

and three bottom horizons of gain with mid-horizon losses at Bhopamadhi, top two and bottom horizons of losses with a mid-horizon gain at Karamkund, downward increasing mobilities at Ran, alternate gains and losses in the profile at Bhatiya, top horizon of gain with intermediate and bottom horizons of losses at Khakharda, upward increasing gains at Kenedi while its mobile throughout the profile at Lamba.

Trace Elements

Sc :- Sc exhibits top and two bottom horizons of losses with a mid-horizon of gain at Mota Asota, top three horizons of gains and bottom horizon of losses at Virpur, top and two bottom horizons of gains with mid-profile horizon of losses at Mahadevia, top four horizons of losses with a bottom horizon of gain at Mewasa, top four horizon of gains with a bottom horizon of losses at Buddhadhar, top two horizons of gain and bottom three horizons of losses at Bhopamadhi, top and bottom horizon of gain and intermediate zones of losses, at Karamkund, downward increasing mobilities at Ran, top three horizons of gain with a bottom horizon of losses at Bhatiya, top two and bottom three horizons of gain with a mid-profile horizon of losses at Khakharda, upward increasing gains with mid-profile zone of substantial depletion at Kenedi, top and bottom horizon of gain with intermediate zones of losses at Lamba.

Y :- Y occurs in trace at Mota Asota, Virpur, Buddhadhar, Bhopamadhi, Ran, Bhatiya, Khakharda, Kenedi and Lamba and shows losses in the upper portion with a lower portion of gains at Mahadevia and upward increasing mobilities at Mewasa.

La :- La shows a top horizon of gain with three bottom horizons of losses at Mota Asota, top horizon gains and bottom horizon of losses at Virpur, top horizon gains with mid-horizon losses at Mahadevia, mobile throughout the profile at Mewasa, increasing gains throughout the profile at Buddhadhar, top horizon of gain with mid horizon losses at Bhopamadhi, top horizon of gain with an underlying zone of depletion at Karamkund, top two horizon of losses with gains in the mid-profile zones at Bhatiya, top three horizons of gain with the bottom two horizons of losses at Khakharda. it occurs in a trace at Ran, Kenedi and Lamba.

Ce :- Ce exhibits top and bottom horizons of losses with mid-profile gains at Mota Asota, increasing gains throughout the profile at Virpur, mixed behaviour with alternate horizons of gains and losses at Mahadevia, top four horizons of losses with a bottom horizon of gain at Mewasa, top four horizons of gains with a bottom horizon of losses at Buddhadhar, top two horizons of gains with bottom three horizons of losses at Bhopamadhi, top two horizons of gain with bottom four horizons of losses at Karamkund, upward increasing mobilities at Ran, downward increasing mobilities at Bhatiya, mid-profile gains with top two and bottom horizons of substantial depletion at Khakharda, upward increasing gains except a mid-profile horizon of substantial depletion at Kenedi, top horizon gains with an underlying zone of depletion at Lamba.

Pb :- Pb shows a top horizon of gain with a bottom horizon of losses at Bhopamadhi, mid-profile losses at Karamkund, downward increasing mobilities at Bhatiya, and occurs in traces at Mota Asota, Virpur, Mahadevia, Mewasa, Buddhadhar, Ran, Khakharda, Kenedi and Lamba.

Zr :- Zr shows top two zones of gain with bottom two zones of losses at Mota Asota, top two horizons of gains with bottom two horizons of losses at Virpur, two top and bottom horizons of gains with mid-profile losses at Mahadevia, mobilities throughout the profile at Mewasa, top three horizons of gains with bottom two horizons of losses at Buddhadhar, top two horizons of gain with bottom three horizons of losses at Bhopamadhi, top two horizons of gain with bottom four horizons of losses at Karamkund, downward increasing mobilities at Ran, top three horizons of gains with a bottom horizon of losses at Bhatiya, top three horizons of gains and bottom three horizons of losses at Khakharda, upward increasing gains at Kenedi, top horizons of gains with underlying zones of depletion with a zone of gain in the bottom last horizon at Lamba. Generally, it is enriched in the upper reaches of the profile.

V :- V shows a top horizon of gain with three bottom horizons of losses at Mota Asota, increasing going throughout the profile at Virpur, two top horizons of gain with fine bottom horizons of losses at Mahadevia, mobilities throughout the profile at Mewasa, top three horizons of gain with bottom two horizon of losses at Buddhadhar, top two horizon of gains with bottom three horizon of losses at Bhopamadhi, top two horizons of gain with bottom four horizons of losses at Karamkund, mobile throughout the profile at Ran, top and bottom two horizons of losses with a mid- profile horizon of gain at Bhatiya, top three and bottom two horizons of gains with a mid-profile horizon of losses at Khakharda, upward increasing gains at Kenedi, losses throughout the profile except a mid profile horizon of gain at Lamba. It is also generally, enriched in the upper horizons of the profile.

Cu :- Cu shows top and bottom two horizons of losses with mid-horizon gain at Mota Asota, increasing gains throughout the profile at Virpur, two top and two bottom horizons of gains with mid-profile losses at Mahadevia, mobilities throughout the profile at Mewasa, top three horizons of gains with bottom two horizons of losses at Buddhadhar, top two horizons of gain with bottom three horizons of losses at Bhopamadhi, top three horizons of gain with bottom three horizons of losses at Karamkund, losses throughout the profile with a mid-profile horizon of gain at Ran, top two horizons of gains with bottom two horizons of losses at Bhatiya, three top and bottom two horizon of gains with a mid-profile horizon of losses at Khakharda, upward increasing gains at Kenedi, top four and bottom two horizon of gains with a mid profile horizon of losses at Lamba.

Zn :- Zn exhibit a top horizon of gains at Mota Asota, losses in the upper and lower portions with mid-profile gains at Virpur, top and two bottom horizons of gains with mid-horizon losses at Mahadevia, mobilities throughout the profile at Mewasa, top two horizons of gains with a bottom horizon of losses at Buddhadhar, top horizon of gain with mid-horizon losses at Bhopamadhi, gains in the top horizon with mid-profile losses at Karamkund, bottom two horizons of losses at Bhatiya, top and bottom horizons of losses with an intermediate zone of gains at Khakharda, downward incfeasing mobilities at Kenedi, bottom three horizons of losses at Lamba.

Cr :- Cr exhibits top two horizons of gains with bottom two horizons of losses at Mota Asota, increasing gains throughout the profile at Virpur, top two and bottom two horizons of gains with a mid-profile losses at Mahadevia, top and bottom three horizons of losses with mid-horizon gain at Mewasa, upward increasing gains at Buddhadhar, top two horizon of gains with bottom three horizons of losses at Bhopamadhi, top four horizons of gain with the bottom two horizons of losses at Karamkund, top horizon of gain with two bottom horizons of losses at Ran, top two horizons of gain with bottom two horizons of losses at Bhatiya, top three and bottom two horizons of gain with mid-profile losses at Khakharda, upward increasing gains at Kenedi, top horizon of depletion with bottom horizon of gain at Lamba. Cr is generally enriched in the upper reaches of the weathering profile.

<u>Ni</u> :- Ni shows two top and bottom horizons of gain with mid-horizon losses at Mota Asota, upward increasing gains at Virpur, top and bottom three horizons of gains with mid-profile losses at Mahadevia, top three horizons of losses with bottom two horizons of gains at Mewasa, top two and bottom two horizons of gains with mid-horizon losses at Buddhadhar, top four horizons of gains with bottom horizons of losses at Bhopamadhi, top two and bottom horizons of gains with mid-profile losses at Karamkund, top two and bottom horizons of losses with a mid-profile horizon of gains at Ran, top and mid-profile losses with bottom and mid-profile gains at Bhatiya, three top and two bottom horizons of gains with a mid-profile horizon of losses at Khakharda, top two and bottom horizons of gains with a mid-profile horizon of losses at Kenedi, mobile throughout the profile at Lamba.

In conclusion, it is very noticeable that not a single element shows steady behaviour in the weathering profiles, and do not confirm to any text-book geochemical laws. So any distinct genetic implications from just the behaviour of the elements in the weathering profiles cannot be deduced.