CHAPTER FIVE

METING - JHIMPIR COALFIELD

INTRODUCTION

The Meting-Jhimpir coalfield lies approximately 125km east of Karachi in the vicinity of Meting-Jhimpir railway stations on the main railway line extending from Karachi to Peshawar. This coalfield covers an area of about 218km in Thatta district. Only one seam with thickness ranging from 0.3 to 1.0 metre is being commercially mined in the area. The total reserves of coal have been estimated as 161 million metric tones. The coal of Meting-Jhimpir is classified as highly volatile bituminous 'C' to high volatile bituminous 'B'

Meting-Jhimpir coalfield is the second oldest coalfield of Sindh, after Lakhra coalfield lying between latitudes 25° 03'- 25° 07' 30'' N and longitudes 68° 02'-68° 08'E and falls in toposheet No. 40 D/1 and 40 C/4. (Fig. 5.1). The railway line between Jhimpir and Meting runs along the western limit of the coalfield whereas the old Karachi-Hyderabad National Highway runs close to the eastern limit of the coalfield. The area is part of tropical coastland dominated by sea breezes, with humid climate. Natural vegetation comprises shrubs, herbs, and grasses (Khan, 2003).

Meting-Jhimpir coal basin has been developed as small coal basin in between Sonda and Lakhra coalfield. The field covers an area of about 218 km with small lenticular bodies or seams ranging in thickness of 0.2 to 1 meter at the depth of 50 meters in depth.

In Meting-Jhimpir areas, coal is associated with basal part of laterite where a sequence of lateritic clay and shale with beds of arenaceous sandstone of Laki Formation, named as Sonhari Member of Early Eocene age is found. However, the latter sequence of Laki Formation is mainly composed of nodular limestone with shale and sandstone. The Sonhari coal is of poor quality lignite with high Sulfur (Shah, 1987).

The generalized stratigraphic sequence is as follows:

Laki Formation

The formation consists of finely crystalline limestone, lateritic claystone, siltstone and shale. This formation is best developed in the southern part of Kirthar Province. It attains a thickness of 55 meters near Thatta (Fig. 5.2). The lower contact of the formation is unconformable with Lakhra Formation and is marked by Sonhari member. This is divided into members namely Sonhari bed member, Meting limestone and Shale member and Laki limestone member (Schweinfurth and Hussain, 1988).

Sonhari bed Member

The Sonhari Member, comprises of lateritic clays, sandstone and gypsiferous shales. Clays are of various colors ranging from violet to reddish brown, yellowish brown, bluesh grey, off white, grey brown, and buff and are silty, sandy, and highly ferruginous with local patches of fire clay and lenticular lignite beds.

Sandstones are yellowish brown to light brown and dark grey in color, fine to coarse grained and even gritty at places with rounded and subrounded grains and geological map are ferruginous and calcareous. Friable silica sand bands occur in sandstone with variable thickness which gradually passes into buff, reddish, ferruginous sand (Fig. 5.2). Shales are of variegated colours like blackish grey and dirty brown, containing carbonaceous shale with poorly developed lignitic material and pyrite crystals. Small bands of laterite occur on the middle part of the beds. Sonhari member varies in thickness from 10 to 30 meters.

Meting Limestone and Shale Member

It consists mainly of creamy white nodular limestone with subordinate sandstone in the upper part. The shale is grey, greenish yellow, weathering dark rusty brown, ferruginous and gypsiferous. The limestone is thin bedded and arenaceous where as the sandstone is commonly ferruginous (Fig. 5.2). The

Meting Member is about 70 meters thick at the type locality (Waheeduddin et al., 1988).

Laki limestone member

The limestone is light yellowish-grey, white and light-grey, stained yellow to brown and at places it is light grey. It is nodular, hard, resistant and massive and forms cliff containing foraminfera in upper part. It is characterized by steep scarps (Kazmi et al., 1990).

HEAVY, TRACE AND LIGHT ELEMENTS IN METING-JHIMPIR COAL

Thirteen representative samples (one from each coal mine) from Meting-Jhimpir coalfield have been analyzed for the heavy, trace and light elements such as Pb, Zn, Cu, Ni, Cr, Co, Cd, As, Fe, Mn, Sb, U, Mg, Ca, Na and K (see Appendix-I). The results have been shown in Table 5.1 and graphically presented in the Figures 5.3 and 5.4.

It is clear from the table 5.1 and Figure 5.3a that among the heavy and trace elements, the Pb is ranging from 7ppm to 39 ppm (average = 23 ppm), Zn from 12 ppm to 75 ppm (average = 40 ppm), Cu from 6 ppm to 49 ppm (average = 22 ppm), Ni from 8 ppm to 41ppm (average = 23 ppm), Cr from 8 ppm to 41 ppm (average = 12 ppm), Co from 0.05 ppm to 0.55 ppm (average = 0.25 ppm), Cd from 0.1 ppm to 0.4 ppm (average=0.24 ppm), Fe from 724 ppm

to 6834 ppm (average = 4500 ppm) and Mn from 0.02 ppm to 0.49 ppm (average = 0.09 ppm).

Among the light elements Mg varies from 40 ppm to 72 ppm (average= 60 ppm), Ca from 145 ppm to 390 ppm (average = 241ppm), Na from 321 ppm to 681 ppm (average = 515 ppm) and K from 104 ppm to 440 ppm (average = 252 ppm) (Table 5.1 & Fig. 5.3b).

By comparing the average concentration of heavy and trace elements in the Meting-Jhimpir coal (Figure 5.4a), the iron has the highest concentration with gradually decreasing trend towards manganese (i.e., Fe>Zn>Pb>Ni>Cu> Cr>Co>Cd>Mn) whereas among the light elements the sodium has highest concentration in average with gradually decreasing trend towards magnesium (Na>K>Ca>Mg) (Fig. 5.4b).

PROXIMATE ANALYSIS OF METING-JHIMPIR COALS

Among the proximate analyses, the fixed carbon and the ash contents in the Meting-Jhimpir coals have been determined and the results are presented in Table 5.2. It is clear from this table that the fixed carbon is ranging from 38.43 to 45.67% with an average amount of 41.11% and the ash contents are ranging from 9.52 to 12.42% with an average amount of 11.05% in the Meting-Jhimpir coalfield.

ULTIMATE ANALYSIS OF METING-JHIMPIR COALS

Among the ultimate constituents of coal, carbon, hydrogen, nitrogen and sulfur contents in the Meting-Jhimpir coals have been determined and the results are given in Table 5.2. It is clear from this table that the carbon varies from 54.78 to 66.23% (average = 60.20%), hydrogen varies from 5.34 to 7.34% (average = 6.82%), nitrogen varies from 0.29 to 0.40% (average = 0.32%) and sulfur varies from 2.00 to 5.20% (average = 3.65%) in the Meting-Jhimpir coalfield. The sulfur contents in the Meting-Jhimpir coalfield are less than the Sonda coalfield but much higher than the Thar coalfield.

COMBUSTION PROPERTIES OF METING-JHIMPIR COALS

Among the combustion properties of coal, the calorific values for the Meting Jhimpir coals have been determined and the results are shown in Table 5.2. It is clear from this table that the calorific values are ranging from 9640 to 11418 btu/lb with an average value of 10143 btu/lb in the Meting-Jhimpir coalfield.

Table 5.1 Heavy, Trace and light elements (in ppm) in the Meting-Jhimpir coalfield.

Sample No.	Location	Pb	Zn	Cu	Ni	Cr	Co	Cd	As	Fe	Mn	Sb	U	Mg	Ca	Na	K
MJ-1	Hidayatullah Coalmines-1	8	75	10	8	22	0.23	0.2	2.3	724	0.34	2.3	0.9	58	170	545	170
MJ-2	Hidayatullah Coalmines-2	29	70	38	9	16	0.09	0.4	3.4	4678	0.04	3.5	0.8	70	220	432	104
MJ-3	Hidayatullah Coalmines-3	32	35	40	22	12	0.05	0.3	1.8	5421	0.49	3.5	1.2	72	161	341	220
MJ-4	Amin coalmine-I	31	26	49	21	8	0.07	0.3	2.9	4301	0.06	5.2	1.8	68	170	574	110
MJ-5	Amin coalmine-II	27	28	51	28	13	0.26	0.4	1.9	4454	0.07	4.8	1.1	60	156	321	290
MJ-6	Amin coalmine-III	25	45	36	31	9	0.37	0.4	3.4	6834	0.07	6.1	1.6	63	230	681	415
MJ-a	Lucky coalmine-I	28	12	6	36	15	0.13	0.4	3.1	4201	BDL	4.3	0.9	59	270	576	302
MJ-D	Lucky coalmine-II	21	32	6	21	9	0.42	0.3	2.8	4451	BDL	3.8	1.2	68	365	601	232
MJ-F	Lucky coalmine-III	7	70	12	12	14	0.17	0.1	3.1	4761	BDL	4.1	1.4	65	315	515	315
MJ-G	Umaid Ali-I	9	13	11	15	16	0.16	0.1	1.9	3485	0.04	2.9	1.1	46	335	525	212
MJ-b	Umaid Ali-II	21	42	13	41	8	0.43	0.1	2.1	4901	BDL	2.7	1.5	42	145	469	201
MJ-c	Umaid Ali-III	39	57	9	37	8	0.31	0.1	---	5412	BDL	--	---	40	201	611	270
MJ-E	Umaid Ali-IV	22	12	8	21	9	0.55	00	--	4875	BDL	---	---	72	390	507	440
Average		**23**	**40**	**22**	**23**	**12**	**0.25**	**0.24**	**2.61**	**4500**	**0.09**	**3.93**	**1.23**	**60**	**241**	**515**	**252**

Table 5.2. Mean values of various proximate and ultimate analysis (in percent) and calorific values (btu/lb) of the Meting-Jhimpir coalfield.

S.No.	Fixed Carbon	Ash	Hydrogen	Carbon	Nitrogen	Sulfur	Calorific value
MJ-1	39.34	11.56	6.89	62.78	0.36	2.96	9835
MJ-2	41.34	10.23	6.34	64.12	0.34	2.90	10335
MJ-3	40.23	11.23	7.12	56.78	0.24	3.12	10058
MJ-4	45.67	10.34	7.20	66.23	0.39	2.00	11418
MJ-5	38.90	9.52	7.34	59.89	0.28	5.20	9725
MJ-6	41.46	9.67	7.11	58.23	0.35	4.50	10365
MJ-a	42.34	10.56	6.98	61.67	0.27	4.85	10585
MJ-D	38.56	12.42	6.56	54.78	0.32	2.80	9640
SND-F	42.17	9.87	5.85	57.34	0.29	4.55	10543
MJ-G	38.43	10.68	5.34	62.12	0.32	3.65	9608
MJ-b	40.12	12.13	6.57	59.56	0.35	5.00	10030
SND-c	38.56	11.49	6.34	60.15	0.40	3.52	9640
SND-E	40.34	10.34	5.89	62.34	0.39	4.00	10085
Average	**41.11**	**10.77**	**6.82**	**60.20**	**0.32**	**3.65**	**10143**

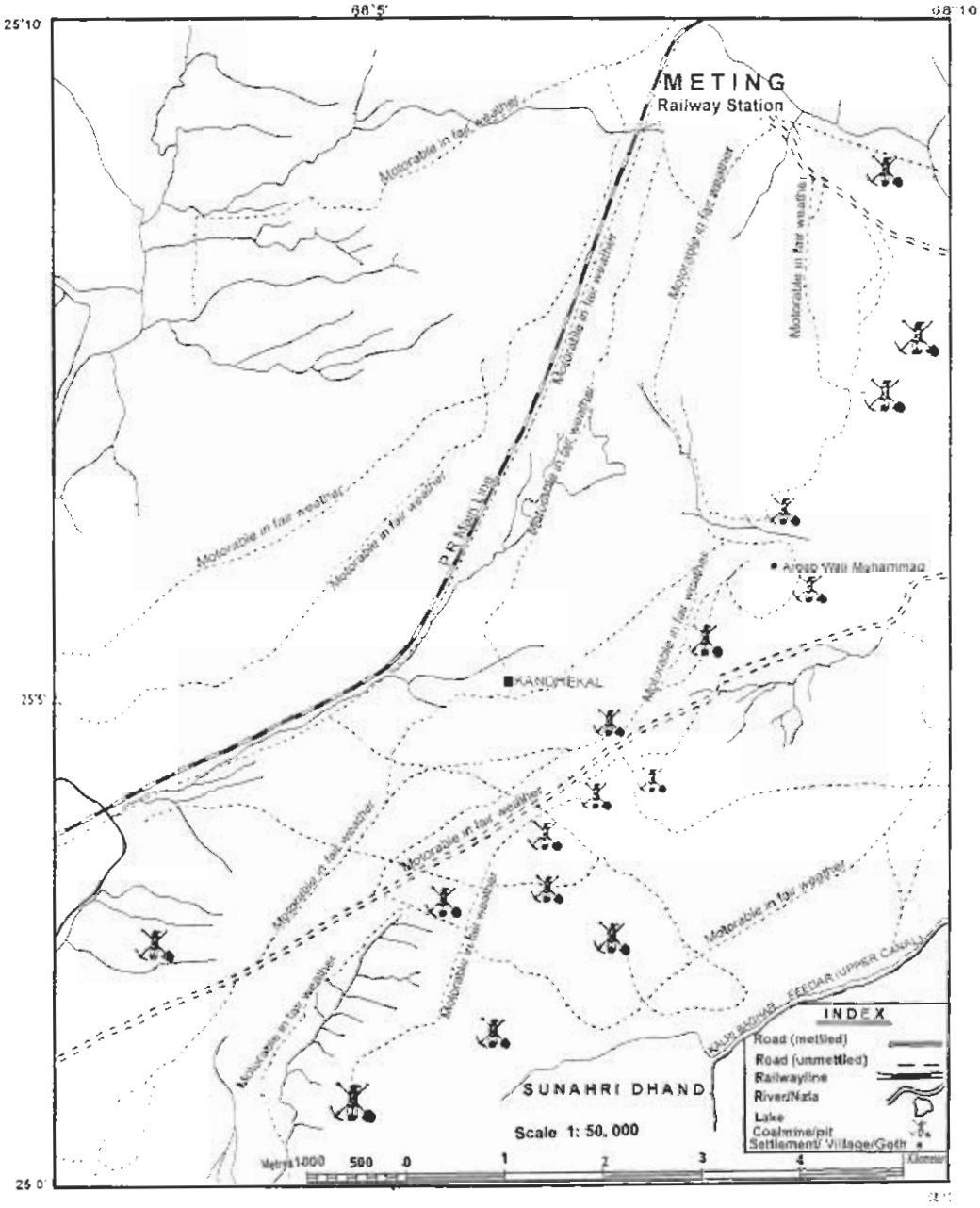

Fig. 5.1 Map of Meting-Jhimpir coalfield showing location and sampling site.

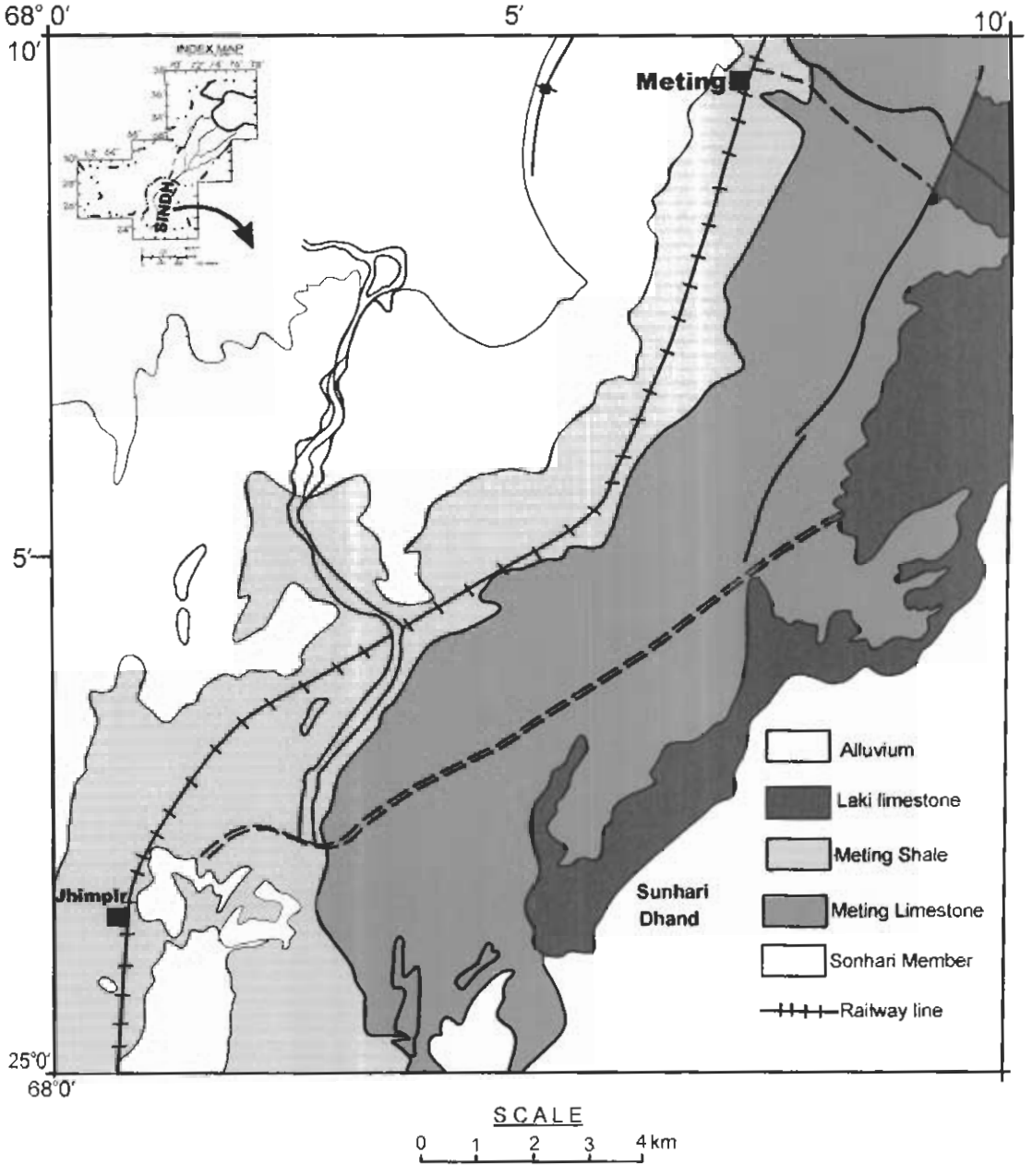

Fig. 5.2 Geological map of Meting-Jhimpir coalfield (Ahmed et al., 1986).

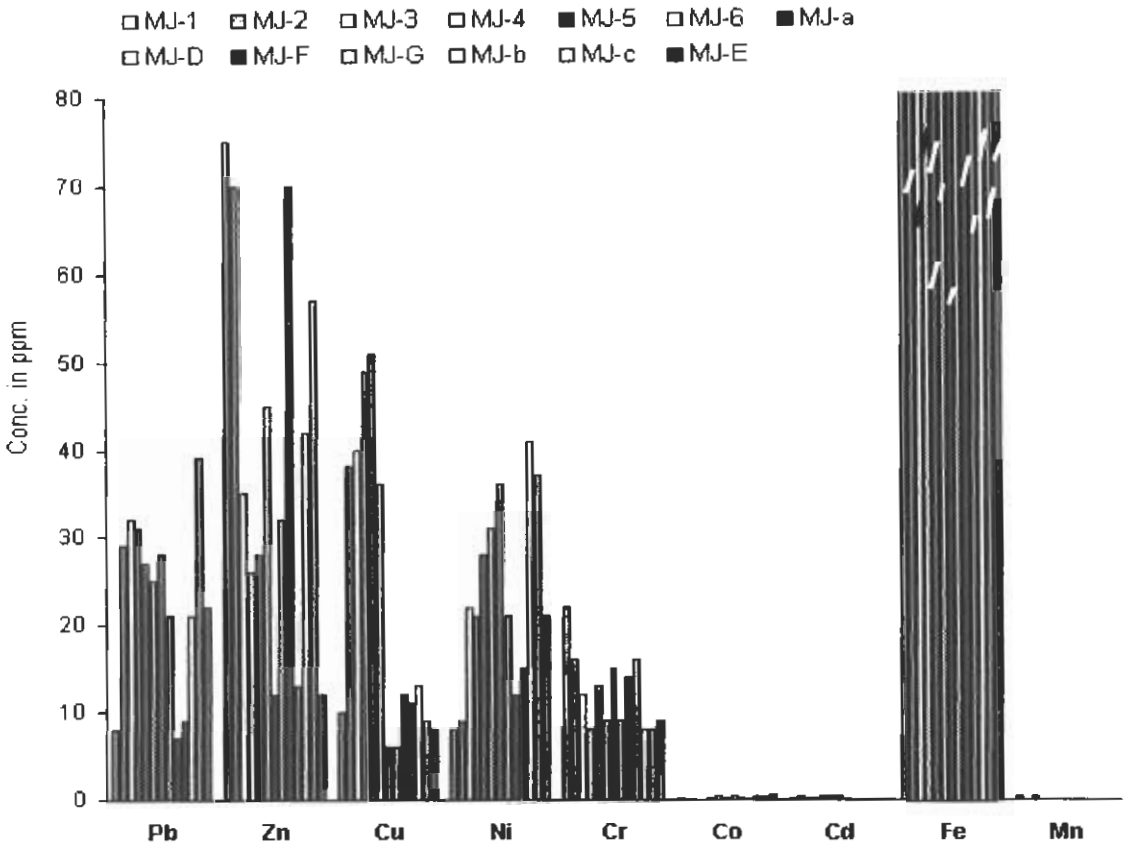

Fig. 5.3a. Variation of various heavy and trace elements in the Meting-Jhimpir coalfield.

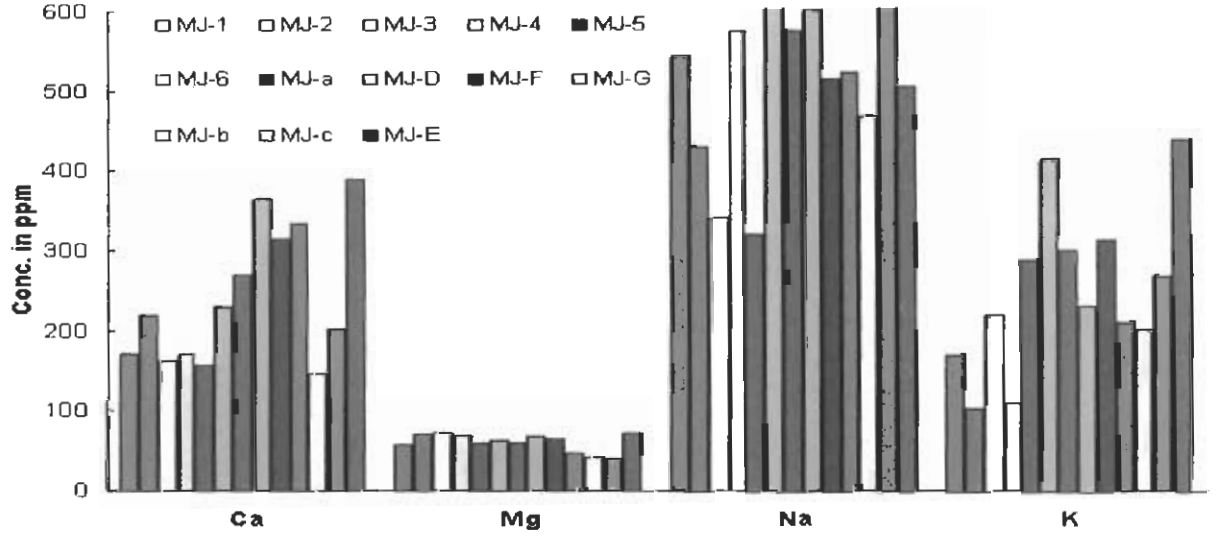

Fig. 5.3b. Variation of various light elements in the Meting-Jhimpir coalfield.

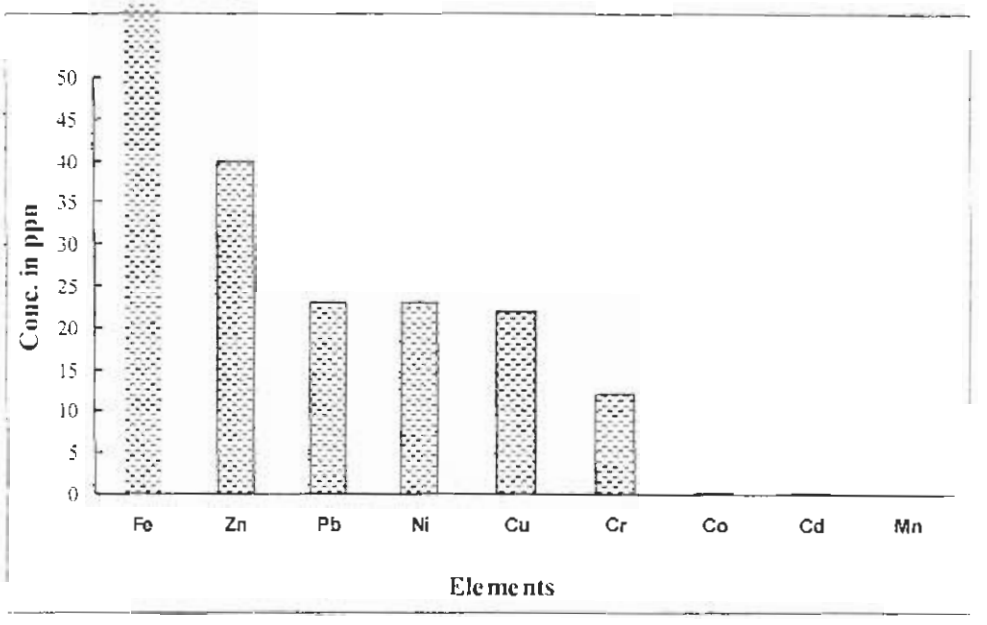

Fig. 5.4a. Inter-elemental comparison of heavy and trace elements in the Meting-Jhimpir coalfield.

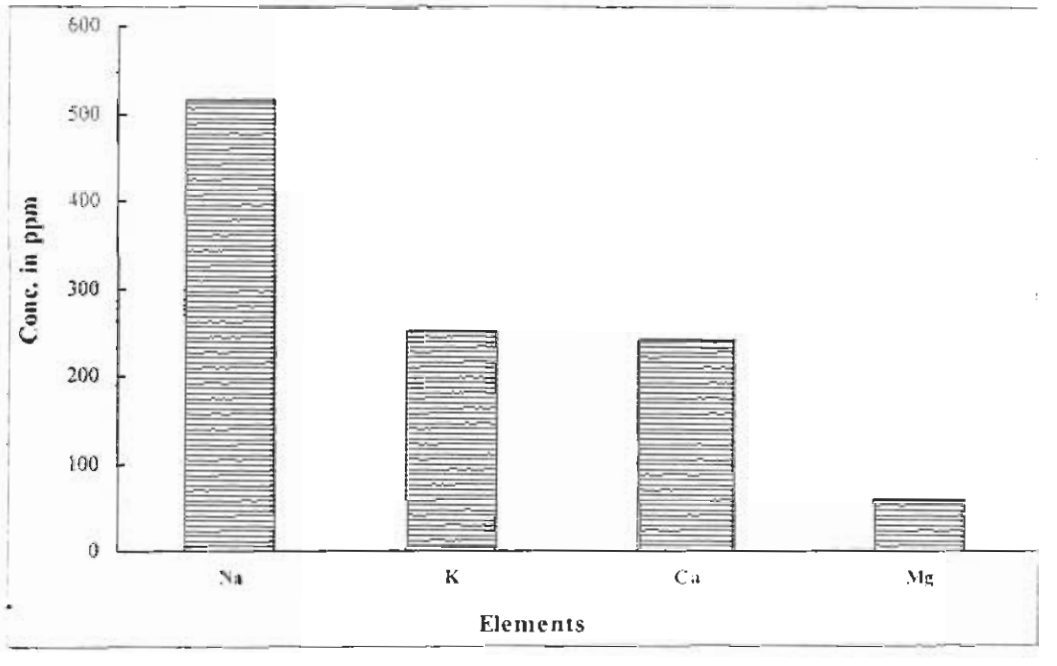

Fig. 5.4b. Inter-elemental comparison of light elements in the Meting-Jhimpir coalfield.