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GOVERNMENT OF RAJASTHAN

OFFICE OF SUPTDG. GEOLOGIST (PHOSPHATE) UDAIPUR.

DEPTT. OF MINES & GEOLOGY

UDAIPUR

FINAL REPORT

ON

"Prospecting for phosphate near village Lal-Madri, Matkeshwar Karoli-Ki-Dhani, Pasunia and Mal-Ka-Gura, tehsil Nathdwara district Rajsamand.

Project - UD-1

F.S. - 1997-99

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C O N T E N T S

A B S T R A C T

In the Matkeshwar area uraniferous phosphatic bands were located by Atomic Mineral Division. The phosphatic bands contain 5.50 to 32.50% P_2O_5 in form of secondary mineral. Therefore project with the heading "prospecting for phosphate near village Karoli-Ki-Dhani, Pasunia and Matkeshwar tehsil Nathdwara, district Rajsamand" was taken up in the field session 1997-98. Investigations comprises regional mineral survey in 205 sqkm. area, regional geological mapping in 8 sqkm. area and . Detailed geological mapping in 0.7 sqkm. area.

. Geologically the rocks of Lalmadri-Karoli area belongs to Aravalli Supergroup which represents by dolomite, quartzite, chert, phyllite, with intrusion of metavolcanics. General trend of bedding and foliation of lithount is NE-SW with 40° to 70° dips.

Phosphate mineralisation were found near Matkeshwar, Karoli-Ki-Dhani, Pasunia and Mal-Ka-Guda at the contact of dolomite and chert. The analysis result indicate that the phosphate in form of apatite, is associated with carbonate rock with gangue minerals like calcite, quartz and iron oxides phosphate is secondary in nature hence its grade is not uniform i.e. P_2O_5 varies from 2 to 25%.

On the basis of mapping and field chemical test an approximately 500 mt. long phosphate prognostic is indicated Its is width varies from 5 to 10 mts.

On the basis of chemical analysis result the phosphorite bands demarcated in to three zones

a) 25 mt. x 5 mt. - -- - - - - - - -Av. 10% P_2O_5

b) 100 mt. x 8 mt. - - - - - - - - - Av. 11.50% P_2O_5

c) 100 mt. x 5 to 10 mt.- - - - - Av. 8% P_2O_5

Regional mineral survey was also carried out in Bargula-Dabkuri area tehsil Kumbhalgarh. Phosphate was not found in the area.

1.00 INTRODUCTION

1.01 GENERAL:

In the Matkeshwar area uraniferous phosphorite bands were located by Atomic Mineral Division. Later the Department has carried out mineral survey for phosphate in the year 1992-93, indications of phosphate were found near Matkeshwar. Thus the area was taken up to review phosphate in the field session 1997-99. Investigation comprises regional mineral survey in 205 sqkm. Regional geological mapping in 8.0 sqkm. and detailed geological mapping in 0.7 sqkm. area. The investigations were done in four different blocks Viz Lalmadri -Matkeshwar, Bargula, Balicha-Semal and Sakroda blocks.

Targets and achievements made during the investigation are tabulated below.

S.No.	Nature of work	Target	Achievements
1.	RMS (Sqkm.)	150	205
2.	RGM (Sqkm.)	10	8
3.	DGM (Sqkm.)	1.0	0.7
4.	Trenching(Cum)	As req.	80 cumt.
5.	Sampling(Nos.)	,,	-

1.02 LOCATION AND APPROACH:

Lal-Madri -Matkeshwar block is situated about 40 km north of Udaipur and falls in toposheet no.45 H/9 and H/13. It is approchable from Udaipur by N.H.8 leading to Nathdwara.

Bargula block is situated about 75 km. north of Udaipur and falls in toposheet no. 45 G/12. It is approchable from Udaipur by Udaipur Iswal-Machind-Gaon Gura tar road.

Balicha-Samel block is situated about 30 km.north of Udaipur and falls in part of toposheet no. 45 H/9. It is approchable from Udaipur by Udaipur Iswal-Haldi-ghati tar road.

Sakroda block is situated about 20 km. ESE of Udaipur and falls in part of toposheet no. 45 H/14. It is approchable from Udaipur by Udaipur Debari-Kurabar road.

1.03 PHYSIOGRAPHY AND DRAINAGE:

Major part of the area is charcterised by rugged terrian due to either flat topped bare ridges or distinctly elevated rugged undulating plain. In Lal-madri-Matkeshwar block the general level of the area is about 600 MSL. Numerous small streams rising from the slope of the hills and merge ultimately in to river Banas.

In Bargula block western part is covered by high hills with height up to 1115 RL, while the eastern part is comparatively low topography.

In Balicha-Samel block the general level of the area is about 620 MSL. Numerous small streams flowing NE-SW direction finally merge in to Banas river.

1.04 VEGETATION AND CLIMATE:

In general the area falls in semi-arid region and covered by thin forest at places. Most of the area is either barren or covered by thorny bushes.

Main tree are Teak(Tectona grandis), Sal (shurea robusta), mango(mangifera indica), pipal(ficus religrosa Neem (Azadirachita indica), Thor(Enphorbia), Ber(Zizyphus nummularia), Jaamun(Syzygiaum Culni), Imli (Tamarian dus), Khakhra, Timru, Climate of the area is Semiarid with maximum temperature rising upto 45°C during may-June and the maximum temperature falls down upto 4 C° during Decembet- January. The average rain fall is 120 cms per annum.

1.05 PERVIOUS WORK:

The first systematic account of regional geology of the area was given by A.M.Heron(1953) in his classic memoirs 79 of the GSI and named as Aravalli systems and Railo series. Lateron GSI classify rocks of the area under Nathdwara group of Aravalli Supergroup.

Uraniferous phosphorite band was located by AMD in Karo li area of Rajsamand district. The uraniferous phosphorite extends from 2 km NW of Madri to east of Matkeshwar temple and beyond for over 2.5 km. The range of P_2O_5 content is 5.50% to 32.50%.

State department has also carried out geological investigation in the area during F.S. 1975-77 for basemetals. Mineralisation was not encountered in three bore holes and weak anomaly was found in geophysical survey. The department was also carried out investigation for phosphate in 1992-93 through regional mineral survey and regional geological mapping. In sampling phosphate was analysed about 1%.

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1.06 GENERAL GEOLOGY:

The Lal-Madri- Matkeshwar block and Balicha Senal block is a part of shallow inland basins developed successor to the first deformation of the Aravalli tectonic system. It, is belong to Nathdwara group of Aravalli Supergroup. It comprises mica schist, phyllite, dolomite and dolomitic marble with thin intercalatory bands of ferruginous chert breccia, quartzite, and basic metavolcanics. The entire sequence has undergone p'oly phase deformation and regional metamorphisum to green schist facies. Ferruginous chert with oxides of iron suggests a local oxidsing chemical environment during the moderately reducing environment of the carbonate precipitation.

Bargula block is occupied by rocks of Lohda Group of Aravalli Supergroup represented by dolomite. Amphibolite, biotite schist, garnetiferous biotite schist and migmatite alongwith intrusions of ultrabasic rocks. Ultrebasic rocks are further intruded by pegmatite and schort rocks that carried emerald at places. Sakroda block is predominantly occupied by the basal Delwara sequence of Aravalli Supergroup. Basement gneisses are exposed to the east and overlies Aravalli rocks with a distinct unconformity.

2.00 GEOLOGICAL WORK DONE:

The geological investigations comprises on this project are regional mineral survey in 205 sqkm. area, regional geological mapping in 8 sqkm. area and Detailed geological mapping in 0.7 sqkm. area besides. Trenching and sampling.

(7)

2.01 REGIONAL MINERAL SURVEY:

A total of 205 sqkm. regional mineral survey has been carried out in following four blocks.

A) Lal-Madri -Matkeshwar block.

B) Bargula block.

C) Balicha -Semal block.

D) Sakroda block.

Block wise details of RMS is as follows-

(A) Lal Madri-Matkeshwar Block:

An area of 100 sqkm. was covered under regional mineral survey around village Kesuli, Nerach, Madarda, Karoli, Lal-Madri, Mal-Ka-Gura, Pasunia etc of tehsil Nathdwara district Rajsamand.

Geologically the area comprises phyllite, biotite schist, dolomite, quartzite alongwith intrusion of Basic rocks belonging to Nathdwara Group of Aravalli Super-group. General strike of formations is NE-SW with 40° to 70° both north-westerly and south easterly dips.

Biotite schist and phyllite are exposed in southern and western part around Nerach, Juna Gura, Kesuli, Samel, Unwas, Pasunia. These are intruded by basic rocks and quartz veins. Biotite schist also contains muscovite & garnet at places.

Dolomite is exposed in the central part near Karoli Lal-Madri, Mal-Ka-Gura, etc. Its total width is up to 1.75 km. and it extends in either sides. It is fine to medium grained, fractured and grey to white coloured. Near Oden, Karoli, Asi Bavri, west of Samel, Noron the dolomite is fine grained, white and talcose in nature where mining for soapstone & dolomite is being done.

Chert is exposed within the dolomite in form of discontinous parallel bands having width up to 100 mts. Its is ferruginous, brecciated and yellow to brown in colour. Most of the chert bands are found along the western contact of dolomite near Madarda, Bharva, Karoli -Ki-Dhani, Matkeshwar and Mal-Ka-Guda. Quartzites are exposed in form of thin bands in west of Mandak-Ka-Gura and near Kesuli.

Intrusions of basic rocks (epidiorites) are seen near Kesuli, Karoli intruded in schist and phyllite. It is fine grained, fractured and dark greenish black coloured. At places it is vescicular in nature. Near Kesuli it is altered to chlorite and biotite schist which have mineralisation of barytes. The department has already done detail prospecting for barytes.

(B) BARGULA BLOCK:

An area of 55 sqkm. was covered around village Gaon Gura, Ballo-Ka-Gura, Dabkuriya, Sayon-Ka-Khera, Koyal, etc of tehsil Kumbhalgarh district Rajsamand. The area is situated about 75 km. north of Udaipur and falls in toposheet no. 45 G/12.

Geologically the area is occupied by rocks of Dovda Group of Aravalli Supergroup represented by quartzite, dolomite, amphibolite, biotite schist, garnetiferous biotite schist, biotite gneiss and migmatites. Besides intrusions (younger) of ultrabasics, pegmatites and [illegible] quartz veins. General strike of formation is NE-SW moderate southeasterly dips. In general the rocks undergone regional metamorphism to amphibolite facies followed by extensive migmatisation.

Quartzites are exposed in the western part forming high hills. It is light coloured and fractured in nature. Biotite schist is exposed on the eastern flank of these hills. It is gnenerally garnetiferous along the contact of gneisses. Biotite gneiss and migmatites are exposed in central and eastern part around Gaon Gura, east of Bargula, Koyal, Sayon-Ka-Khera, etc. Irregular bands of hornblende schist and biotite garnet schist are also found within the gneisses. Two dolomite bands are exposed 1 km. east and ½ km. north of Bargula and further extends in northeastern direction. It is medium grained, light grey to white coloured and at places mined for marble.

Intrusive bodies of ultrabasic rocks are exposed 1 km. west of Gaon Gura, 1 km. NW of Ballo-Ka-Gura and near Bargula. It is intruded into biotite schist along the foliation plane. Near Gaon Gura old mining pits for soapstone were seen. Here ultrabasic rocks are further intruded by pegmatite and schorl rocks(quartz-tourmaline rocks)Ultrabasics exposed near Ballo-Ka-Gura & Barula were mined for emerald. The pegmatite intersected the ultrabasic carries, emerald. At persent both the mines are not under operation.

(C) BALICHA-SEMAL BLOCK:

In Balicha-Semal block about 30 sqkm. area near village Rupji-Ka-Gura, Unwas, Semal-Ki-Bhagal, Balicha, Khamnor, Sagrun etc. of tehsil Nathdwara. The area falls in part of toposheet no. 45 H/9.

Geologically the area is comprised of phyllite, ~~of~~ physchist, dolomite, quartzite and chert belonging to Nathdwara Group of Aravalli Supergroup. General strike of formation is NE-SW with 40° to 70° north westerly dips.

Phyllites and schist are exposed extensively around Khamnor, Dabun etc. It is well foliated, buff coloured and intruded by thin quartz veins. Two band of dolomite are exposed between Kaloda in south to Badshah Bag in north with width upto 2 km. Dolomite is fine to medium grained, fractured, bedded, at places ferruginous and white to greyish white coloured. Near village Samel, Semal-Ki-Bhagal it is talcose in nature where mining for soapstone is being done. Chert is generally brecciated in nature and its discontinuous bands are exposed near Semal, Semal-Ki-Bhagal and north of Balicha. It is fine grained, fractured ferruginous and brownish red coloured At several places field test for phosphate were carried out but it could not be found.

(D) SAKRODA BLOCK:

A total of 20 sqkm. area was covered for carrying out field studies of reported mineralisation of barytes around Sakroda, Kargit and Haljia-Ka-Talai.

The area is predominatly occupied by the basal Delwara sequence of Aravalli Supergroup which contitutes metavolcanic, quartzite association. Basement gneisses are exposed to the east, overlying these rocks with a distinct unconformity. The Aravalli formation is as moderate to steeply dipping homoclinal sequence. General strike is NNW-SSE.

On the basis of field relationship of rocks following succession can be established:-

Age	Lithounit	Mineral
Aravalli Supergroup (Delwara Group	Chlorite schist, hornblende schist.	Barytes
	Metabasites, Garnet Mica schist, amphibolite	
	Quartzite	Pyrophyllite
	Gritt, Arkose	
. . . . .	Conglomerate	
..Erosional	Unconformity	
B.G.C.	Biotite gneiss	

Barytes occurs in a single vein in biotite schists The thickness of vein varies from 0.75 Ft. to 2 Ft. which is intermitently exposed over a strike length of about 500 mts. The area has been applied for P.L. by M/s Rajasthan Barytes, who have put 2 exploratory trenches.

2.01 REGIONAL GEOLOGICAL MAPPING:

Regional geological mapping was carried out in 8 sqkm. area between Karoli-Ki-Dhani and Mal-Ka-Guda in Lal-Madri-Matkeshwar block. The area is predominantly occupied by dolomite, phyllite, chert, ferruginous quartzites and brecciated quartz. General trend of rocks is NE-SW with broad, open warps along the strike.

Dolomite are exposed continuously in the central part of the mapped area, flanked by phyllites on both east and west. It is fine grained and pure white to creamish white in colour, but takes on greenish grey

shade along western contact with phyllite. The dolomite in the western part of the area is wholly devoid of soapstone mineralisation. Good soapstone mineralisation is observed in the eastern part. Partial to complete metasomatic replacement of dolomite by chert is seen.

A generalized stratigraphic succession in the area based on regional mapping is given below:-

Age		Lithology	Mineralisation
Lower Aravalli	3.	Cherts, brecciated & ferruginous quartzite	Phosphate?
	2.	Dolomite	Soapstone.
	1.	Phyllite	

On the basis of mapping and field chemical tests, an approximately 200 mt. long phosphate prognostic is indicated. It occurs about 500 mts. east of Matkeshwar Temple. Its width varied from 5 to 10 mts. How ever within the zone not all samples test positive. It occurs along the contact of chert and cherty dolomites. Since the zone comprises losse boulders, insitu weathering is indicated. Bed rock is not seen up to a depth of 1 meter.

2.02 DETAIL GEOLOGICAL MAPPING:

Detailed geological mapping was carried out in 0.7 sqkm. area near Matkeshwar in Lal-Madri-Matkeshwar block. The objective of detail geological mapping was to understand the lithostratigraphic and structural set up of the area in relation to phosphate mineralisation. The area is occupied by dolomite, followed by phyllites in term of aerial extention. A third lithounit comprising

an intimate association of cherty dolomite, chert, brecciated quartz and ferruginous quartzites. General strike of the formation is NE-SW with moderate to steep westerly dips. Two sets of mutually perpendicular joints(bedding plane joints and dip joints) are common in dolomite. Three zone of phosphorite were marked.

(A) 25 mt x 5 mt. - - - - - - - - - -10" P_2O_5

(B) 100 mt.x 8 mt. - - - - - - - - - -11.58% P_2O_5

(C) 100 mt.x 5 to 10 mt. - - - - - - - 8% P_2O_5

Description of lithounits have been given in the above section.

2.04 TRENCHING:

Two trenches of 30 and 50 mt length have been put near Matkeshwar and Karoli-Ki-Dhani to know the width of phosphorite. These were dug upto 1 mt. depth and a total of 80 Cu.mt. excavation has been done so far. Composite samples for every 3 mts. length has also been prepared to know the grade of deposit. In trench near village Matkshwar only 2 samples shows presence of phosphate.

2.05 SAMPLING AND ANALYSIS:

A total of 51 spot samples were sent for chemical analysis of phosphorite. Analysis results indicate presence of P_2O_5 from 1.11% to 30.60% with very high SiO_2 and CaO content(Appendix-I). This indicate silliceous and calcareous nature of host rock with unever distribution of P_2O_5 . This is all due to secondary nature of mineralsation form in sheared rock at the contact of chert and dolomite.

Analysis of 4 dolomite of different colour indicated to contain 2.84 to 20.44% SiO_2., 24.08 to 29.68% CaO 15.71 to 19.74% MgO. The white and light grey dolomite contain low silica in comparision to grey dolomite.

A total of 59 chip samples were also drawn in grid pattern (10 mt. along strike and 5 mt. acros the strike) on phosphate occurrence near Matkeshwar. on the basis of result three zones have been damarcated in the occurrence.

(A) 25 mt. x 5 mt. - - - - - -Av. 10% P_2O_5

(B) 100 mt. x 8 mt. - - - - - -Av. 11.50% P_2O_5

(C) 100 mt. x 5 to 10 mt.--- - Av. 8% P_2O_5

Besides 12 samples were sent for petrographic studies indicate presence of carbonate from 50 to 70% and quartz, from 15 to 25% carbonate minerals are calcite dolomite and siderite. Apatite occurs as accessory mineral in form of inclusion and colloform texture. It has affinities with quartz grains phosphate is secondary in nature (Appendix-II).

During investigation phosphate was found south of Karoli-Ki-Dhani, west of Matkeshwar area, Pasunia and Mal-Ka-Guda. All the occurrences are situated the western part of dolomite along the contact of chert and falls approximately in same strike. The chert is brecciated and ferruginous and the contact is sheared which carries phosphate mineralisation. At places chert also contains phosphate. In general the phosphate is secondary in nature which resulted uneven concentration of P_2O_5 from 1.11 to 30.60%. The main gangue minerals are calcite, dolomite, quartz and siderite. Under microscope it is found that apatite occurs as inclusions in quartz and as colloform texture. The occurrence found near Matkeshwar is prominant having strike about 150 mts. and width upto 10 mts. Thus sampling on grid pattern was only done in this occurrence and three zones of phosphorite have been demarcated.

(A) 25 mtx 5 mt. - - - - - - - -Av. 10% P_2O_5

(B) 100 mtx 8mt. - - - - - - - - Av. 11.50% P_2O_5

(C) 100mt x 5 to 10mt- - - - Av. 8% P_2O_5

3.00 Conclusion And Recommendation:

The investigation reveals the low grade deposit in Matkeshwar area which is not economically viable for mining in present condition. The phosphate is secondary in nature and it grade within the occurrences is not uniform. Other occurrences are of very small size thus not included in detail investigation programme. The further investigation is not required in the area, but reconnaissance can be taken up in northern and southern side along the contact of dolomite and chert to locate the phosphate mineralisation.

7.00 Acknowledgement:

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Appendix-I

Table, Chemical Analysis Results of Phosphorite

S.	Sample mark	Location	Radicals							
			SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	LOI	P_2O_5	Acid Ins.
	SG/Phos/MT/7	Matkeshwar	14.80	0.71	2.49	52.88	0.54	2.72	25.55	-
	,, /8	,,	33.68	0.71	2.99	34.72	1.35	11.92	14.44	-
	,, /9	,,	24.08	0.56	2.24	40.60	1.30	12.92	16.66	-
	,, /10	,,	46.04	0.56	2.14	27.58	1.69	15.64	5.64	-
	,, /11	,,	20.92	0.85	5.15	40.60	0.72	15.64	15.55	-
	/12	,,	45.32	0.42	1.48	23.56	1.11	11.84	10.90	-
	,, /13	,,	58.68	0.42	1.38	18.20	1.04	16.44	3.33	
	,, /14	,,	44.20	0.56	1.14	28.56	1.20	16.72	6.66	
	,, /15	Kardi-Ki-Dhani	93.34	0.42	0.58	2.58	0.40	1.04	1.11	
	,, /20	Matkeshwar	92.40	0.42	1.38	1.96	0.60	1.44	1.11	
	,, /21	Mal-Ka-Guda	55.00	0.42	0.18	23.50	1.26	19.00	0.50	
	,, /22	,,	22.20	2.10	0.70	40.00	1.20	5.60	27.00	
	,, /23	,,	93.30	0.28	0.22	1.50	1.00	2.70	0.88	
	,, /24	,,	20.70	1.12	0.48	42.75	1.00	2.40	30.60	
	,, /25	,,	44.80	1.40	0.60	26.25	1.35	21.50	3.50	
	,, /26	,,	6.30	0.84	0.36	33.50	15.12	43.10	0.50	
	/27	,,	91.92	2.80	1.00	1.40	0.60	1.76	A	
	,, /28	,,	47.54	8.46	2.30	21.00	2.00	16.00	2.24	
	,, /29	,,	78.80	8.28	1.88	3.08	3.20	2.84	1.20	
	,, /30	,,	-	-	-	-	-	-	-	
	,, /31	,,	89.24	4.20	1.20	1.96	0.20	2.18	A	
	,, /32	,,	4.64	1.30	1.10	27.44	20.02	43.70	A	
	,, /33	Pasunia	12.10	0.70	0.60	26.88	18.12	41.08	A	
	,, /34	,,	32.30	4.90	2.30	32.50	2.43	6.60	18.75	
	/35	,,	13.80	0.84	0.66	26.60	17.52	40.18	A	
	/39	,,	35.40	1.6	0.75	34.88	0.20	5.32	20.40	
	/40	,,	38.46	1.92	0.88	32.2	0.20	5.64	20.00	
	/41	,,	43.68	3.52	0.80	24.78	0.20	4.27	16.93	

1-	2-		3-	4-	5-	6-	7-	8-	9-	10-	11-
29.	SG/Phos/MT/42		Matkeshwar	16.80	3.20	0.70	43.96	0.20	3.82	30.40	
30.	,,	/43	,,	22.86	1.50	0.56	39.20	2.10	5.56	27.0	
31.	,,	/44	,,	36.40	5.60	1.20	30.10	1.40	18.76	4.00	
32.	,,	/45	,,	56.42	2.80	0.70	21.50	0.40	17.38	A	
33.	,,	/46	,,	57.58	2.80	0.20	20.16	1.40	17.38	A	
34.	,,	/47	,,	53.16	7.00	2.20	16.80	3.40	16.94	A	
35.	,,	/48	,,	23.70	7.28	2.22	36.96	0.20	29.26	A	
36.	,,	/49	,,	63.84	9.10	6.76	8.40	2.40	9.24	A	
37.	,,	/50	,,	70.00	1.10	0.40	15.40	0.40	12.54	A	
38.	,,	/51	,,	69.56	2.80	1.20	14.00	0.60	11.66	A	
39.	,,	/52	,,	64.70	2.80	1.90	15.40	1.40	13.64	A	
40.	Dolomite	/16	Pipaliya	4.88	0.56	0.34	28.56	19.74	42.56	-	2.4
41.	,,	/17	Karoli	2.84	0.42	0.22	29.68	19.74	43.46	-	2.64
42.	,,	/18	Karoli-Ki-Dhani	3.2	0.42	0.18	29.40	19.74	43.34	-	2.64
43.	,,	/19	,,	22.44	0.71	0.30	24.08	15.71	34.54	-	2.44

S.No.	Sample mark	Location	P_2O_5	SiO_2	Fe_2O_3 Al_2O_3	CaO	MgO	LOI	Remarks
1-	2-	3-	4-	5-	6-	7-	8-	9-	10-
44.	SG/Phos/MT/53	Matkeshwar	3.00	53.76	1.12	23.80	1.18	16.48	-
45.	,, /54		3.00	53.12	1.28	22.20	0.88	17.00	-
46.	,, /55		2.00	49.76	1.00	25.62	0.97	18.60	-
47.	,, /56		3.00	50.28	0.56	24.50	0.72	19.44	-
48.	,, /57		3.00	41.92	0.84	29.12	0.82	22.30	-
49.	,, /58		2.00	38.56	0.64	29.54	1.94	24.72	-
50.	,, /59		4.00	48.36	1.12	28.14	1.62	16.08	-
51.	,, /60		2.00	57.16	0.72	21.70	0.94	16.28	-
52.	,, /61		3.00	49.40	1.16	27.56	0.86	17.32	-
	,, /62		20.00	36.68	1.30	34.68	1.76	2.98	-
54.	,, /63		5.00	48.28	4.00	25.76	1.34	13.44	-
55.	,, /64		2.00	71.36	1.26	9.98	1.92	10.38	-
56.	,,00/W1/MT/65		16.66						
57.	,,00/W2/MT/66		4.31						
58.	,,00/W3/MT/67		T						
59.	,,00/W4/MT/68		T						
60.	,,00/E1/MT/69		15.49						
61.	,,10S/W1/MT-70		2.55						
62.	,,10S/E1/MT-71		13.33						
63.	,,20S/W1/MT-72		8.82						
64.	,,20S/W2/MT-73		0.98						
65.	,,30S/W1/MT-74		3.13						
66.	,,30S/W4/MT-75		1.42						
67.	,,30S/E3/MT-76		13.75						
68.	,,40S/W1/MT-77		3.39						
69.	,,40S/W3/MT-78		1.60						
70.	,,40S/E1/MT-79		4.46						
71.	,,40S/E2/MT-80		13.39						
72.	,,40S/E3/MT-81		1.96						
73.	,,60S/E1/MT-82		4.82						
74.	,,60S/E1/MT-83		7.14						

	Mark.	Location	P_2O_5	SiO_2	Fe_2O_3 / Al_2O_3	CaO	MgO	
2-	3-		4-	5-	6-	7-	8-	9-	10-
5.	SG/Phos/ 60S/E3/MT-84	Matkeshwar	12.50						
6.	,, 70S/E2/MT-85		6.00						
7.	,, 80S/W1/MT-86		9.00						
8.	,, 80S/E1/MT-87		9.00						
9.	,, 90S/W1/MT-88		14.00						
0.	,, 90S/W2/MT-89		4.00						
1.	,, 90S/W2/MT-90		3.00						
2.	,, 100S/W2/MT-91		7.00						
3.	,, 110S/W1/MT-92		5.00						
.	,, 120S/W1/MT-93		7.00						
	,, 120S/W2/MT-94		4.00						
.	,, 120S/W3/MT-95		6.00						
.	,, 130S/W2/MT-96		6.00						
.	,, 130S/W3/MT-97		6.00						
.	,, 10N/W1/MT-98		6.00						
.	,, 10N/W4/MT-99		2.00						
.	,, 10N/E1/MT-100		26.00						
.	,, 20N/E1/MT-101		7.00						
.	,, 20N/W1/MT-102		1.00						
	,, 20N/W4/MT-103		27.00						
.	,, 30N/W1/MT-104		6.00						
.	,, 30N/W2/MT-105		2.00						
.	,, NT-1/ MT-106		12.00						
.	,, NT-2/ MT-107		10.00						
.	,, 50S/W1/MT-108		3.00						
0.	,, 50S/E2/MT-109		11.00						
1.	,, 40N/W1/MT-110		7.20						
2.	,, 40N/W2/MT-111		4.30						
3.	,, 40N/E1/MT-112		5.20						
4.	,, 50N/W1/MT-113		6.40						
5.	,, 50N/W2/MT-114		2.30						
6.	50N/ 1/MT-115		16.20						

1-	2-	3-	4-	5-	6-	7-	8-	9-	10-
107		60N/W, 7MT-TIG	6.30						
108.	SG/Phos/	60N/E1/MT-117	Matkeshwar	6.20					
109.	,,	90N/W1/MT-118		3.40					
110.	,,	90N/E1/MT-119		9.20					
111.	,,	100N/W1/MT-120		1.10					
112.	,,	100N/E1/MT-121		7.30					
113.	,,	110N/W1/MT-122		14.20					
114.	,,	110N/E1/MT-123		2.30					

Appendix-2
Petrographic report

1. Sample Mark SG/Phos/MT/36 It is fine to medium grained pale yellowish coloured siliceous compact rock, which is producing the few fumings on persinces of acid test, which gives the little siliceous nature of assemblage.

Microscopic Observation Thin Section 13290 to 13292:

The prepared thin sections are studied under microscope in transmitted light, which show the allotrimorphic texture as the anhedral grains of quartz about 15 to 20% with dolomite (about 40%) is domineering over calcitic proporation of carbonate assemblage.

The hexagonal to subhedral crystlline, apatite aggregation of micro size in matrix, is observed. At some places, the apatite proportion is in the inclusion State in quartz. The orthoclase felspar are observed as few portion occasionally hornblende grains is seen. The apatite presence is meagre.

On basis of carbonate portion in matrix of minerological assemblage the petrographic observation is showing the nomenclature of rock as siliceous limestone.

2. Sample Mark SG/Phos/MT/37(Pasunia):

Megascopic Observation:

It is brownish grey to creamy, hard & compact rock is giving a few fumes when treated with Acid HCL. Hence it appears to be of siliceous portion.

Microsopic Observation-Thin section no.13293 to 13295:

The thin section of rock sample is composed of subhedrally granular carbonate assemblage. It contains the dolomite predominantly distributed with calcite. The granular masses are exhibiting two sets of cleavage pattern. It is nearly estimated 60° to 78% . The anhedral grains of quartz upto 15 to 20% are seen. The cherty banas of quartz & felspar observed.

The apatite is noticed accessarily as hexagonal granular out line. It also ~~in~~ bounded in quartz. The rounded to irregular colloaphane is in vicinity of carbonate rock.

On basis of petrographic observation it may be siliceous limestone.

3. Sample Mark SG/Phos/MT/38(Pasunia)

Megascopic Observation:- It is fine to medium grained yellowish brown coloured, compact rock with mild reactional on acid.

Microscopic Observation-Thin Section 13296 to 13298:

On microscopic observation in transmitted light is showing the prodominate carbonate portion which contain dolomite calcite, siderite. It is disributed 50 to 60% anhedral grains of quartz of varying size are upto 20 to 25% with minor felspar occasionally with apatite. The apatite is accessory persist in band paraller to quartz assemblage on such it may be siliceous, limestone.

4. Sample Mark-Pas/Petro/1/Thin Section no.13570:

Megascopic Observation:- It is fine grained dark brown coloured cherty rock it gives very weak effervences with Hcl acid, therefore rock appeared to be cherty dolomitic limestone.

Microsopic Observation:

Under transmitted light the thin section no.13570 was studied. The rock shows typical colloform texture of secondary phosphatee (apatite). On host roct bracciated cherty dolomite cherty cryptocrystalline silica & dolomite grains along with ferruginous impurities are seen. Thus on the basis of texture and mineral assemblage the rock may be termed as phosphate bearing cherty or dolomitic limestone.

The microphotograph of this section no. 13570 is enclosed with report. The phosphate is very much similar to F.& G.block sec phosphate of Jhamarkotra.

5. Sample Mark Pas/Petro/2: Thin Section no.13571-13574

It is fine grained rock, greyish brown coloured hard and compact rock in which micaceous & fine filament(soapstone) siliceous rock. It gives week effervences with Hcl acid therefore rock appeared to be dolomitic siliceous limestone.

Microscopic Observation:- Thin section no. 13571-13574

The following mineral were identified in the rock dolomite 60-70%, calcite 10 to 15% the dolomite & calcite are crystalline in nature & ortherhombic enhedral crystals, also shows. Twining minor development of fibrous filaments acicular crystal of soapstone 5-10%. The accessory apatite(1-2%) are also seen The dolomitisation & soapstone development is seen.

The thin section no. 13574-shows following mineralogical distribution-

Dolomite (80-90%) quartz 5 to 10% soapstone 10 to 15% apatite few grains (accessory). Development of soapstone in host rock dolomite is seen Secondary apatite (phosphate) along with quartz grain is seen. Thus rock may be termed as soapstone is bearing dolomite.

6. Sample Mark-Pas/Petro/3 Thin Section no. 13575 to 13578

Megascopic Observation:- The rock is fine grained, greyish brown coloured, hard & compact & also bracciated & cherty in nature.

Microscopic Observation:- Thin section no. 13575-13578

The thin section studied under microscope shows following mineral assemblage dolomite 10-15 crypto crystalline silica (quartz) 20-30% iron impurities 20-30%, secondary apatite 10 to 20% with pale golden yelow pyrochloere(uranium mineral).

The dolomite & cherty crypto crystalline silica grains are bracciated (anglular to sub-rounded) dolomite in the matrix is seen.

The typical collofirm texture in the secondary phosphate (apatite)is seen. It is dark greyish black in colour. Cherty in the core & surrounded by secondary phoshate. Iron impurities are largely seen. Thus rock may be termed as cherty phosphate bearing dolomitic limestone.

Note:- In this rock test for phosphate & atomic mineral is required as % of phosphate along with atomic mineral is observed.

7. Sample Mark-Mat/Petro/4-Thin Section no. 13579-13581

Microscopic Observation:-Thin Section no.13579-13581

The rock in thin section consisting about 80-90% quartz with minor felspar & secondary carbonate along with accessory apatite, sphene and zircon etc. Inclusion of apatite in the quartz is seen. The matrix is composed of fine grained cherty silica & carbonate with iron impurities. It is highly siliceous. Due to presence of minor felspar with high silica, the rock may be termed as felspathic quartzite or arkose.

8. Sample Mark-Mat/Perto/5 Thin Sec.no.13582-13584

Megascopic Observation:- It is fine grained hard & compact rock dark brownish grey coloured rock. It gives very weak acid reaction. The rock appeared to be siliceous ferruginous quartzite.

Microscopic Observation:- Thin Sec. no. 13582-13587

Under transmitted light in microscop following minerals were identified.

1) Quartz-80-90% angular to subhedral grains.
2) Iron impurities- Pale brown 15-20%
3) Secondary apatite(phosphate)

Matrix shows fine grained silica and carbonate with ferruginous material. The iron impurities are largely seen in patches & bands. Few apatite grains are seen in quartz as inclusion. The colloform texture at places is observed. The typical colloform texture is may be due to secondary phosphate. Thus rock may be termed as bracciated cherty phosphate bearing quartzite or cherty dolomitic limestone.

9. Sample Mark-Mat/Petro/6-Thin Sec. no. 13585-13587

Megascopic Observation:-It is medium to fine grained brown coloured siliceous friable rock.

Microscopic Observation-Thin Sec.No.13585-13587

Three thin sections were prepared from this rock sample and sections were studied under microscope in transmitted light and following mineral identified.

1) Dolomite - 40-50%

2) Quartz - 30 to 40%

3) Felspar - 25 to 30%

4) Apatite - 2 -5 %

Accessory - apatite, zircon & sphene.

The thin section no.13586 shows-bracciated chert ~~xxxxx~~ secondary phosphate, milonite(?) cherty silica(crypto crystalline quartz 30 to 40% with carbonate 20-30% iron impurites 10-15% and secondary phosphate 5 to 10%. The ground mass is composed of fine grained, crypto crystalline silica, dolomite & iron. Thus rock may be termed as siliceous cherty calcareous quartzite.

10. Sample Mark-Mat/Petro/7 Thin Sec.no.13583-13590

Megascopic Observation:- It is pale brown to creamish coloured, hard & compact siliceous calcareous rock.

Microscopic Observation:- Thin section no.13588-13590

Three thin section were prepared from this rock samples, and these sections were studied under microscope. The mineralogical, constituent in the rock are as follows:-

1) Quartz- grains are anhedral to subhedral to subrounded and constituted about 40 to 50%.

2) Secondary phosphate- dark greyish brown coloured phosphate is seen it shows high relief.

3) Dolomite- angular fragment of orthorhombic crystals of dolomite are seen nearly 20 to 30%. The phosphate at places shows collophane texture ground mass also composed of fine grained (anhedral) phosphate. Thus on the basis of microsotoc observation rock may be termed as cherty phosphatic bearing dolomtic limestone.

11. Sample Mark Mat/Perto/8/Thin Sec.no. 13591-93

Megascopic Observation:- It is fine grained, hard & compact brownish grey coloured cherty siliceous dolomitic limestone It gives very weak efferences with acid Hcl.

Microsopic Observation-Thin Sec.no.13591-93:

Three thin section were prepared & studies under microscope. The mineralogical constituants identified under microscope are as follows:- colloform texture is seen the sectondary phosphate (apatite), bracciated effect is seen and mineral grains are angular to subrounded. Silica(quartz)is seen as cryptocrystalline chert. ferruginous imprurities largely present. The mineralogical constituents more or less similar to the rock sample Mat/Phos/8. Thus on the basis of texture & mineralogical constituent the rock may be called as ferruginous cherty breccia.

12. Sample Mark-Mat/Petro/9

Megascopic Observation:- It is fine grained greyish coloured siliceous hard compact dolomitic limestone.

Microscopic Observation-Thin Sec.no.13594-13597:

Four thin section were prepared from the rock sample and these section were studied under transmitted light. The mineral identified are as-

1) Dolomite- 60-70% Orthorhombic crystal.

2) Soapstone- Fine fillament acicular. 10 to 15%

Note:- Recrystallisation & dolomitization is seen, soapstone development is seen in the hosst rock dolomite. Thus rock may be termed as soapstone bearing dolomite.

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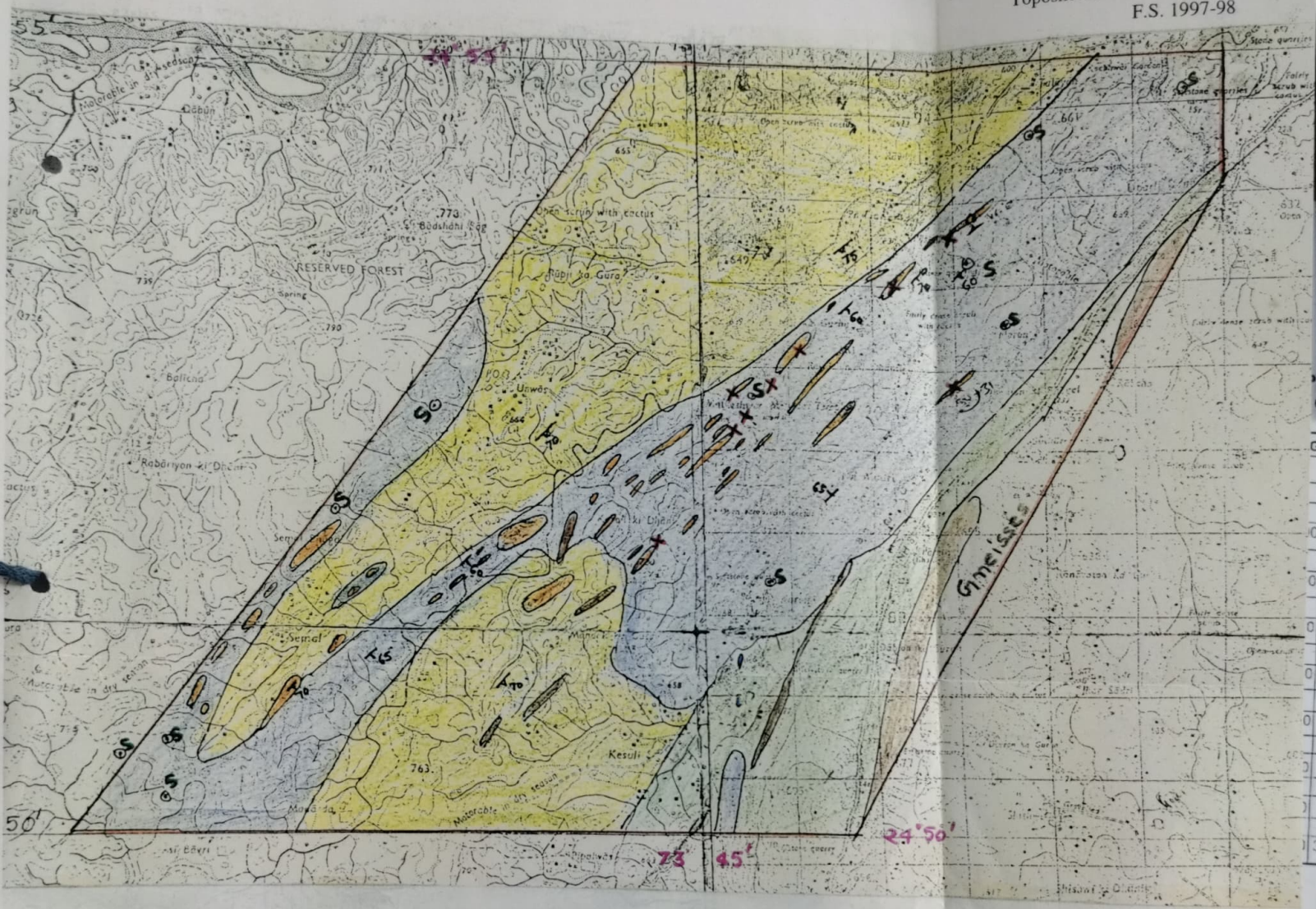
PLATE-1

MAP SHOWING THE REGIONAL MINERAL SURVEY FOR PHOSPHATE IN LAL MADRI AND MATKESHWAR AREA TEHSIL NATHDWARA DISTRICT RAJSAMAND

Scale 1:50,000

Toposheet No. 45H/9&H/13
F.S. 1997-98



Area covered under RMS = SqKm

INDEX

- Amphibolite (meta basics)
- Quartzite/Chert
- Dolomite
- Phyllite &Biotite schist
- S Soapstone occurrence
- X Indications of phosphate

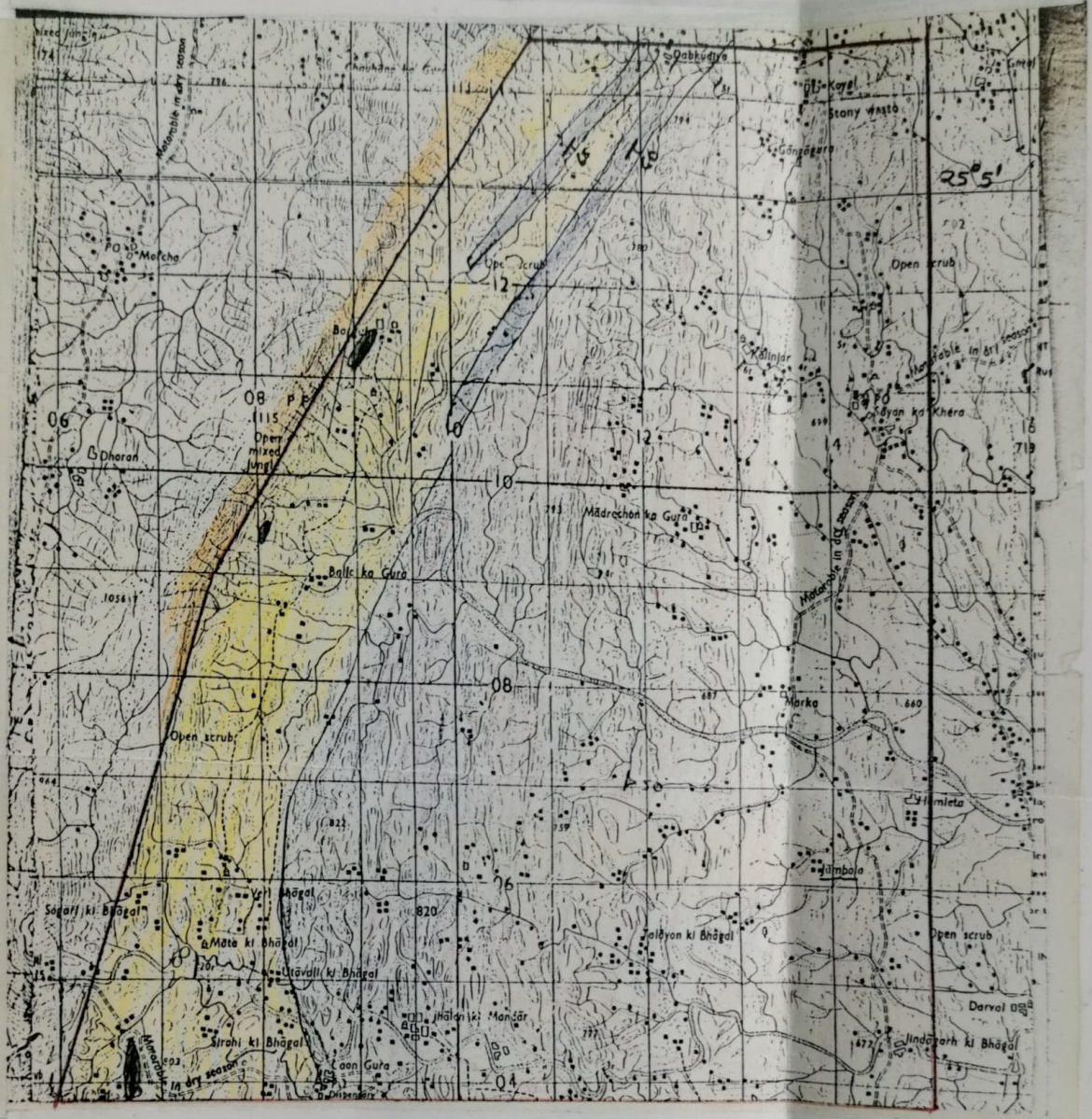
1747

PLATE-2

MAP SHOWING THE REGIONAL MINERAL SURVEY FOR PHOSPHATE IN BARGULA BLOCK TEHSIL NATHDWARA DISTRICT RAJSAMAND

Scale 1:50,000

Toposheet No. 45 G/12
F.S. 1997-98



Area covered under RMS =50 SqKm

INDEX

- Ultrabasic rocks
- Quartzite
- Biotite schist
- Dolomite
- Migmatized biotite schist and Gneisses

1747

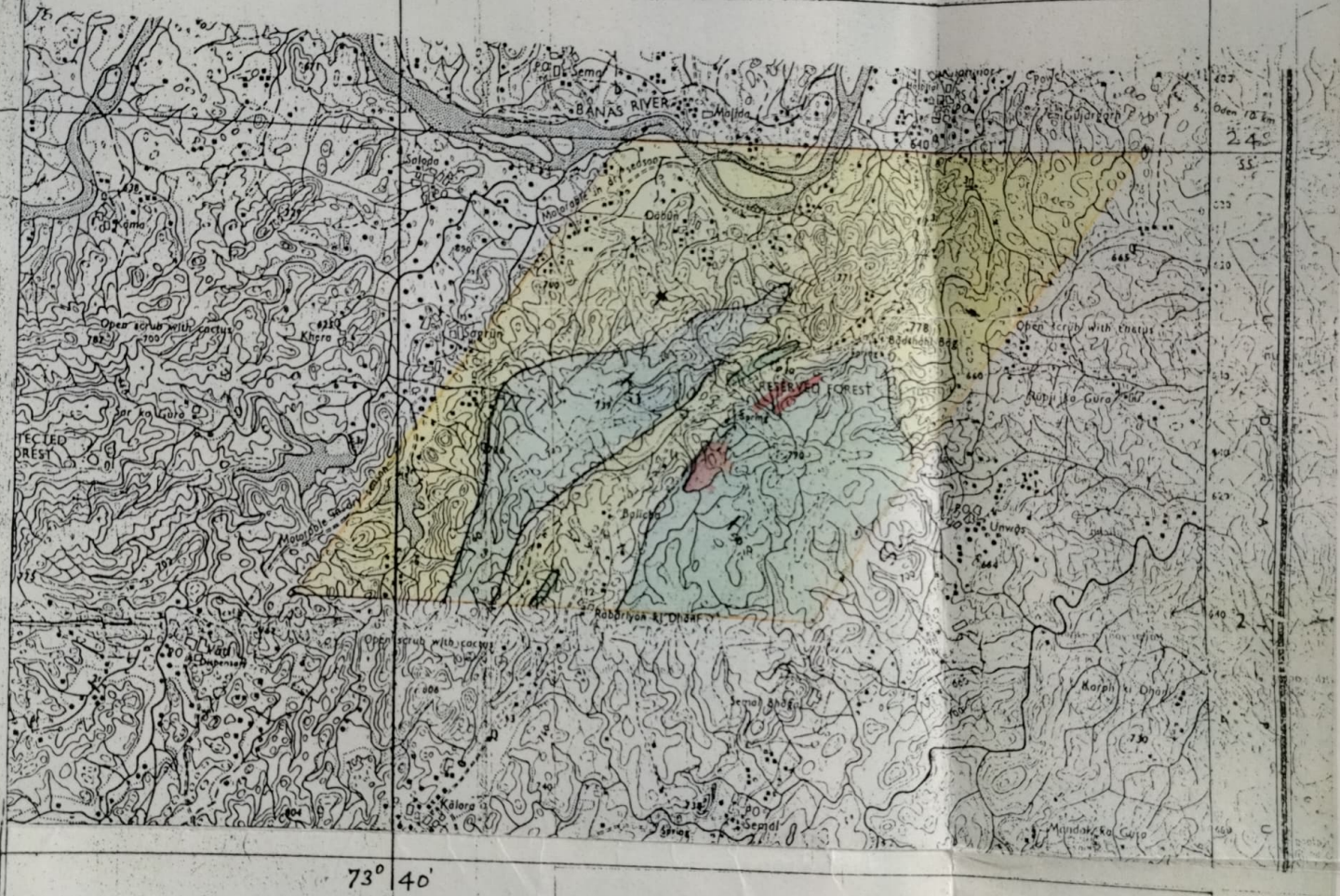
PLATE-3

REGIONAL MINERAL SURVEY FOR ROCK PHOSPHATE NEAR VILLAGE BALICHA, KALODA, SAGRUN, TEHSIL-NATHDWARA DISTRICT- RAJSAMAND

SCALE 1: 50,000

TOPO-SHEET NO. 45 H/9

F.S. 1998-99



INDEX:-

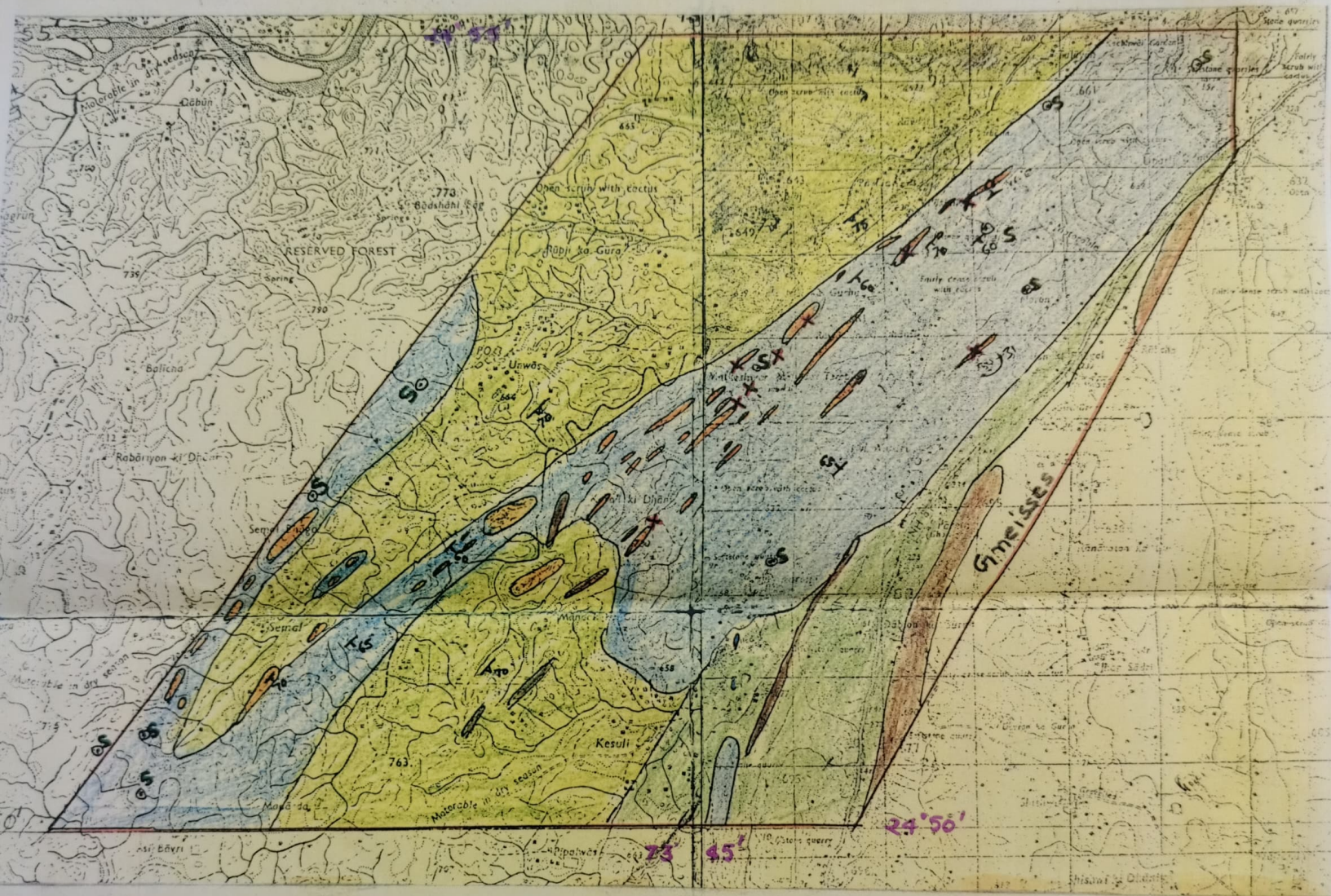
- AREA COVERED UNDER R.M.S.
- CHERT
- DOLOMITE
- PHYLLITE AND BIOTITE SCHIST
- OS SOAP STONE
- ATTITUDE OF BEDDING
- VERTICAL JOINTING

PLATE-1

MAP SHOWING THE REGIONAL MINERAL SURVEY FOR PHOSPHATE IN LAL MADRI AND MATKESHWAR AREA TEHSIL NATHDWARA DISTRICT RAJSAMAND

Scale 1:50,000

Toposheet No. 45H/9&H/13
F.S. 1997-98



Area covered under RMS = SqKm

INDEX

- Amphibolite (meta basics)
- Quartzite/Chert
- Dolomite
- Phyllite &Biotite schist
- S Soapstone occurrence
- X Indications of phosphate

PLATE-5

No SUPTDG/680/ 15-99

DETAL GEOLOGICAL MAPPING FOR ROCK PHOSPHATE NEAR VILLAGE LAL MADRI, MATKESHWAR TEH. NATHDWARA. DISTT. RAJSAMAND

SCALE :- 1CM = 20 MT.

F.S. 1998-99
TOPO SHEET NO 45 11/13

INDEX

- AREA COVERED UNDER D.G.M :-
- SOIL
- CHERT / QUARTZITE
- PHOSPHOLITE
- DOLOMITE
- PHYLLITE
- STRIKE AND DIP
- VERTICAL JOINT
- ELECTRIC POLE
- TEMPLE
- TRENCH
- WATER TANK
- MINE PIT

TRACED BY.			
DRAUGHTSMAN	GEOLOGIST	JT GEOLOGIST	SUPTDG. GEOLOGIST

Annexure VII

MATKESHWAR PHOSPHATE PROJECT
PHOSPHATE ZONE ON THE BASIS OF GRID SAMPLING

SCALE 1:500