FINAL REPORT with CD

GOVERNMENT OF RAJASTHAN

Location of Glauconite shale

SEARCH OF GLAUCCONITE (POTASH) BEARING SHALE & SANDSTONE IN CHITTORGARH & NIMBAHERA TEHSILS, DISTRICT CHITTORGARH.

FINAL REPORT OF IM/7 (F. S. 2013-14)

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ABSTRACT

Major part of Chittorgarh district covered by Vindhyan sediments is represented by sequence of sedimentary rocks comprising mainly conglomerate, sandstone, limestone & shale. The accessories in these rocks include glauconite, zircon, apatite and iron oxide.

Geologically the area comprises shales of Rewa, Khorip Group and sandstone of Kaimur Group of Vindhyan Super group.

The Glauconite bearing shale is observed in well mucks from Barkhera to Achalpura over strike length of about 4250 m. The Glauconitic shale contain low potash i.e. K_2O 2.13% to 2.49% and Na_2O 0.80% to 2.79%.

Quartzitic sandstone exposed in the east of Achalpura, Hansla is greyish, pinkish white & light brown in colour, generally thickly bedded, hard & compact, massive in nature and appears suitable for building stone/masonry stone. It is exposed about 2500 m in strike length with width varying from 300 to 400m.

In the west of Achalpura, Hansla quartzitic sandstone is exposed for about 2500 m in strike length and width varying from 100 to 300m but area falls in forest land.

CONTENT

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Annexure:- Copy of Chemical Analysis

1. INTRODUCTION :-

Major part of Chittorgarh district covered by Vindhyan sediments. The Vindhyan supergroup is represented by sequence of sedimentary rocks comprising mainly conglomerate, sandstone, limestone & shale. The accessories in these rocks include glauconite, zircon, apatite and iron oxide. The different age group of shale occurs in Vindhyan Supergroup which may content Glauconite, this is evident by analysis of one core samples of shale of borehole no. NBH-11 (Project LS-11 F.S. 2009-12) at about 15 to 16 m depth (n/v Gilund, tehsil Nimbahera) reveled 1.38% K_2O and SBH-12 (Project LS-11 F.S. 2012) at about 10 to 81 m depth (n/v Bherusinghji ka Khera, tehsil & district Chittorgarh) reveled 1.95% to 3.66% K_2O. As per Indian Bureau of Mines, the country has large reserves in form of Glauconitic sandstone in Rajasthan, M.P., and U.P. etc. Glauconitic sandstone or shale containing 4 to 6% K_2O, could directly used as slow acting potash fertilizer in agriculture fields. These conditions guided to take a project for locating potential areas of Glauconitic sandstone or shale.

The proposed area falls in survey of India G.T. Sheet No. 45 L /9. During the year regional mineral survey was carried out in 150 sq.km. area on R.F. 1:50,000 n/v Mayra, Galemal, Mataji ki ori, Gilund, Mangodra, Borkhera and Ambaveri etc. tehsil Nimbahera of Chittorgarh. Regional geological mapping was done in 10 sq.km.area in 2 blocks on R.F.1:10,000 n/v Barkhera, Bhimpuriya and and detailed geological mapping was done in 1.00 sq. km. area n/v Barkhera, Bhimpuriya and Achalpura tehsil and district Chittorgarh. Beside a total of 15 no. of spot samples of Glaucconotic shale were drawn from the area, out of which

12 samples (7 samples of SBH-12 and 5 spot samples from dug well muck) were analyzed.

The Glauconitic shale around this area has low potash value. (In which K_2O 2.13% to 2.49% and Na_2O 0.80% to 2.79%). The Glauconite bearing shale is observed in well mucks from Barkhera to Achalpura over strike length of about 4250 m.

2. LOCATION AND ACCESSIBILITY:-

The area is situated near village Abapur, Bhimpuriya and Achalpura of tehsil & district Chittaurgarh falls on toposheet No. 45 L/9 bounded between latitude 24^0 45′ 00″ to 24^0 57 ′48″ and Longitude 74^0 41′ 15″ to 74^0 45′ 00″. It is well connected with the network of roads, and is located at about 20 km east of Chittaurgarh town on Udaipur-Chittaurgarh-Kota National Highway. This connects N.H.No-79 on southern side towards Nimbahera and N.H.No-76 on western side towards Udaipur. District headquarter Chittaurgarh is about 20 Km away. Broadgauge railway line passes through Chittaurgarh and connects Udaipur, Delhi, Agra, Kota, Nimach etc. Nearest airport is known as Maharana Pratap Airport and is situated on Mangalwar-Udaipur N.H.No.76 near village Dabok which is 20 km. away from Udaipur city and 115 km away from the area.

3. PHYSIOGRAPHY:-

Topographically the area is hilly terrain, the sandstone forming high hills while shale is exposed in low lying area.

The maximum height at one place in the west of Abapur is 621 m above mean sea-level. The area is drained by nallas, which flowing from south

to north. In general drainage pattern is dendritic and watershed is towards northern side which ultimately merges into Berach river.

4. CLIMATE:-

The district has a dry climate with a hot summer a cold winter and a short monsoon season. The cold season start by about the middle of November and continues to about the beginning of March. It experiences with 4^0 C minimum temperatures in the cold season. The hot season follows there after and extends to the end of June. The south west monsoon is from mid June to mid September. The mean daily temperature (MDT) during May and June touches maximum 48^0C. The average rainfall for the district is 120 cm. The relative humidity during monsoon is generally over 70%. Summer is the driest part of the year.

5. FLORA & FAUNA:-

The area is rich in floral assemblage and are thinly distributed. According to champion's classification of the forest type, the anogeissus pendula forest comes under the subsidiary Eadaphic type of dry tropical forests. Trees like Pipal, Dhok, Babool, Neem, Baniyan etc. are mostly found in the area. Thorny bushes and shrubs are thriving in depression and valley. Wheat, barely, bajra, maize, mustard, gram and vegetable are the major crops of the area.

The district is rich in faunal assemblage. Wild animals like Jackal, Fox etc. inhabit in this region.

6. REGIONAL GEOLOGY:-

The stratigraphic succession of Chittorgarh district may be enumerated as below:-

ERA	SUPER GROUP	GROUP	FORMATION	LITHO UNITS
P	L	Rewa	Govindgarh sandstone	Sandstone
R	O		Jhiri Shale	Shale
O	W		Indergarh Sandstone	Sandstone
T	E		Panna Shale	Shale
E	R	Kaimur	Chittorgarh Fort (Kaimur sandstone)	Sandstone
R	V	Khorip	Suket Shale	Shale
O	I		Nimbahera	
Z	N		Limestone	
O	D	Laswaran	Binota shale	Shale
I	H		Kalmia Sandstone	Not exposed
C	Y A N			

The Vindhyan Supergroup overlies the basement rocks with a sharp angular unconformity referred to as the Great Eparchaean Unconformity. The Vindhyan Supergroup includes an alternating sequence of sandstone, shale, limestone with andesitic flows at the base. These are classified into the Satola, the Sand, the Lasrawan, the Khorip and the Kaimur Groups (Lower Vindhyans of Middle Proterozoic age.). The limestone of these assemblages at places, show algal structures, known as stromatolites. In the southern part of the district, the basement rocks and the Vindhyan rocks are covered by basaltic flows, geologically known as the Deccan

Traps(65 to 62 m.y. old) which form flat-topped hills. A total of nine flows have been recognized in Chittaurgarh- Pratapgarh sector between 308-350 m. In the northcentral part between (SW of) Chittaugarh and (west of) Parsoli, the Vindhyan rocks are truncated against Archaean rocks by the Great Boundary Fault.

7. GEOLOGY OF THE AREA:-

Geologically the area comprises Shales of Rewa, Khorip group and sandstone of Kaimur Group of Vindhyan Super group representing mainly by sandstone and shale. Panna shale rests conformably over the Kaimur sandstone and Kaimur sandstone is underlain by the Suket shale.

8. DETAILS OF THE WORK DONE:-

The statement showing target vis-à-vis achievements made are tabulated below:-

S. No.	Nature of work	Total work envisaged	Total work completed	% age
1.	R.M.S. (Sq. Km.)	150	150	100
2.	R.G.M. (Sq. Km.)	10	10	100
3.	D.G.M. (Sq. Km.)	1.00	1.00	100
4.	Sampling (Nos.)	As required	15	-

8.1.0 REGIONAL MINERAL SURVEY:

Regional mineral survey was carried out in 150 sq. km. area on R.F. 1:50,000 n/v Mayra, Galemal, Mataji ki ori, Gilund, Mangodra, Borkhera and Ambaveri etc. Tehsil Nimbahera & chittorgarh and district Chittorgarh.

Geologically the area comprises Shales of Rewa, Khorip group and sandstone of Kaimur group of Vindhyan Super Group Panna shale rests conformably over the Kaimur sandstone and Kaimur sandstone is underlain by the Suket shale.

The details of the areas is as follows-

8.1.1. Mangodra-Borkhera, Mataji ki ori- Gilund area-

Around village Mangodra & Borkhera Panna shale rest conformably over the Kaimur sandstone and Kaimur sandstone underlain by Suket shale. Kaimur sandstone form high hillock in the east & west of Mangodra & Borkhera village. Sandstone is grayish and pinkish white in colour, fine to medium grained and quartzitic in nature.

Sandstone is generally thickly bedded. Suket shale exposures are confined to flanks of the ridges, nalla, road cuttings & in low lying parts. It is greenish grey to blackish grey in colour, compact, fissile, jointed and thinly bedded in nature. The trend is almost N-S with easterly dips. At six places glauconitic shale were observed in well muck.

Mataji ki ori & Gilund area is grayish or pinkish white in colour, fine to medium grained and quartzitic in nature. No Glauconitic bearing shale & sandstone were observed in above area.

8.1.2. Netaval-Ghatiyavali ka khera & Gudhvara area-

Sandstone & shale exposed in the area, sandstone is grayish and pinkish white in colour, fine to medium grained, bedded and quartzitic in nature. Suket shale exposures are confined to flanks of the Kaimur sandstone ridges & in low lying parts. No Glauconitic bearing shale & sandstone were observed during traverses.

8.1.3. Bhilyakhera-Eklingpura-Shialkund area-

Sandstone & shale exposed in the area, sandstone is grayish or pinkish white in colour, fine to medium grained in texture and seems to be quartzitic in nature and is generally thickly bedded. Suket shale exposures are confined to flanks of the Kaimur sandstone ridges & in low lying parts. Gluconite bearing shale or sandstone were not observed during traverses.

8.1.4. Dhordiya- north of Mangodra, Abapur and Pachundal area-

Near village Dhordiya & Mangodra, Abapur and Pachundal Panna shales are conformably underlain by the Kaimur sandstone. Sandstone forming high hill north & south of village Mangodra and west of Pachundal. It is grayish or pinkish white in colour, fine to medium grained, thickly bedded and seems to be quartzitic in nature. Panna shale exposures found Mangodra, Abapur and Pachundal and confined to flanks of the Kaimur sandstone ridges in low lying parts. Gluconite bearing shale or sandstone were not observed during traverses.

8.1.5. Mayra-Galemal-Ambaveri area-

Sandstone & shale exposed in the area having same nature as described above.Gluconite bearing shale or sandstone were not observed during traverses.

8.2.0. REGIONAL GEOLOGICAL MAPPING :-

Regional geological mapping was done in 10 sq.km. area on R.F. 1:10,000 in two different blocks-

ACHALPURA, HANSLA BLOCK:

BARKHERA, BHIMPURIYA BLOCK:

8.2.1. ACHALPURA, HANSLA BLOCK:

Latitude: $24^0\ 50'\ 40''$ to $24^0\ 52'\ 05''$

Longitude: $74^0\ 43'\ 47''$ to $74^0\ 45'\ 00''$

About 05 sq.km. area was covered on N/V Achalpura, Hansla block

Geologically the area comprises Shales of Panna, Khorip group and sandstone of Kaimur group of Vindhyan Super group.

Around villages Achalpura, Hansla shale (Suket) is exposed between sandstone. Sandstone is grayish, pinkish white & light brown in colour, fine to medium grained in texture and seems to be quartzitic sandstone in nature.

A sandstone band exposed in the east of village Achalpura, Hansla is trending N-S and dips varying from 30^0 to 40^0 due east. This sandstone is generally thickly bedded, hard & compact, massive in nature. Thus it can be used as building stone/masonry stone. It is exposed for about 2500 m in strike length with width from 300 to 400m.

Another band of sandstone is exposed in the west of village Achalpura, Hansla trending almost N-S and dips varying from 20^0 to 25^0 due west. This sandstone is generally thickly bedded, hard & compact, massive in nature. Thus it can also be used as building stone/masonry stone. It is exposed for about 2500 m in strike length and width varying from 100 to 300m. This band is forming western contact with Panna shale.

Suket shale exposures (n/v Achalpura, Hansla) are confined to in low lying parts. It is greenish grey to blackish grey in color, fragile, jointed and thinly bedded in nature. The trend is almost N-S with 5^0 to 8^0 dips due easterly.

The glauconitic shales were also mapped, observed in well muck. It is exposed over strike length of about 900 m. The Glauconitic shale around this area has low potash value. (In which K_2O 2.13% to 2.49% and Na_2O 0.80% to 2.79%).

8.2.2. BARKHERA, BHIMPURIYA BLOCK:

Latitude: $24^0\ 52'\ 15''$ to $24^0\ 53'\ 35''$

Longitude: $74^0\ 43'\ 47''$ to $74^0\ 45'\ 00''$

About in 05 sq.km. area was mapped n/v Barkhera, Bhimpuriya tehsil & district Chittorgarh.

Geologically the area comprises Shales of Rewa, Khorip group and sandstone of Kaimur group of Vindhyan Super group. Panna shale rests conformably over the Kaimur sandstone and Kaimur sandstone is underlain by the Suket shale

Around village Barkhera glauconitic shales (Panna) was observed in well muck, named as G-1. Another glauconitic shales (suket) in well muck

were also seen near village Bhimpuriya, named as G-2. It is exposed over strike length of about 2100 m. Glauconite occurs in greenish grey to blackish grey color as peloids that are granular to subgranular, rounded to subrounded and moderately sorted. The Potash content is low as K_2O 2.13% to 2.49% and Na_2O 0.80% to 2.79%. The trend is almost N-S with 5^0 to 8^0 dips due easterly.

Around villages Barkhera shale is forming eastern contact with sandstone. It is exposed on high hills. It is grayish, pinkish white & light brown in colour, fine to medium grained in texture and seems to be quartzitic sandstone in nature.

This band of sandstone is trending N-S and dips varying from 20^0 to 25^0 due west. This sandstone is generally thickly bedded, hard & compact, massive in nature. Thus it can be used as building stone/masonry stone. It is exposed for about 2500 m in strike length and width is about 300 m.

The above mentioned sandstone band is further forming eastern contact with shale (suket shale) near village Bhimpuriya. It is greenish grey to blackish grey in color, fragile, jointed and thinly bedded in nature. The trend is almost N-S with 5^0 to 8^0 dips due easterly. This shale is forming eastern contact with sandstone. It is grayish, pinkish white & light brown in colour, fine to medium grained in texture and seems to be quartzitic sandstone in nature. It is is trending almost N-S and dips varying from 30^0 to 40^0 due east. This sandstone is generally thickly bedded, hard & compact, massive in nature. Thus it can be used as building stone/masonry stone. It is exposed for about 2500 m in strike length and width is varying from 300 m to 400 m.

8.3.0. DETAILED GEOLOGICAL MAPPING:-

Detailed geological mapping was done in 1.00 sq.km. area on R.F. 1:4,000 n/v Barkhera, Bhimpuriya and Achalpura tehsil and district Chittorgarh.

Geologically the area comprises Shales of Rewa, Khorip group and sandstone of Kaimur group of Vindhyan super group. It is representing mainly by sandstone and shale. Panna shale rests conformably over the Kaimur sandstone and Kaimur sandstone is underlain by the Suket shale. Around village Barkhera (Panna) to Achalpura (Suket) glauconitic shales (Panna) were mapped, observed in well muck, named as G-1 to G-5 The shales is exposed in the low lying area. It is greenish grey to blackish grey in color, fragile, jointed and thinly bedded in nature. In the north of village Bhimpuriya, shale mapped in the area (G-2) at places pyrite is also observed in well muck with shale. The trends of the shale is almost north-south with 5^0 to 8^0 dips due easterly. In the south of village Bhimpuriya shale (G-3) is forming eastern contact with sandstone. It is grayish, pinkish white & light brown in colour, fine to medium grained in texture and seems to be quartzitic sandstone in nature. It is is trending almost N-S and dips varying from 30^0 to 40^0 due east. This sandstone is generally thickly bedded, hard & compact, massive in nature. Thus it can be used as building stone/masonry stone.

The Glauconite minerals are mostly marine originated, they also found in terrestrial rock. They form either as cement or by the digenetic alteration of quartz, feldspar, calcite and micaceous minerals. The glauconitic shales are parrot green colour potash bearing rocks. Which are occurs in greenish grey to blackish grey color shale as peloids that are granular to

subgranular, rounded to subrounded and moderately sorted. TheGlauconitic shale around this area has low potash value. (In which K_2O 0.19% to 2.49% and Na_2O 0.80% to 2.79%).

The Glauconitic shale is observed from Barkhera to Achalpura over strike length of about 4250 m.

The other features like metalled road, kachchha roads, culvert and nalla directions were also mapped.

9. SAMPLING:-

During the year a total of 15 no. of spot samples of Glaucconotic shale were drawn from the area, out of which 12 samples (7 samples of SBH-12 and 5 spot samples from dug well muck) were chemically analyzed. The Glauconitic shale around this area has low potash value. (In which K_2O 2.13% to 2.49% and Na_2O 0.80% to 2.79%).

10. RESERVE:-

Tentative reserve could not be calculated as these were found only indication of Glaucconite.

11. EXPENDITURE :-

1. Project No. and Year – IM/7 (2013-14)
2. Expenditure on R.G.M. [@ Rs.15000 up to 10 sq. Km & 1500/1 sq. km. more than 10 sq. km.]

   10 Sq. Km. = Rs. 15,000
3. Expenditure on D.G.M. [@ Rs. 11,250 up to 50 Hect. and 250/hect more than 50 Hect

   1.00 Sq.km. = Rs. 23,750
4. Sampling charges @ Rs.10/sample

   15 No = Rs.150

   12 No chemical analysis = Rs.6,204

   (For K_2O& Na_2O Rs.460/sample & 12.36%Service tax)
5. Supervision charges (@ 10% of the expenditure =Rs. 4,510

   =Rs.49,614

Total expenditure incurred on project Rs. 49,614

(Rupees forty nine thousand six hundred fourteen only)

49,614
+ 14% Service Tax
+ 3% Sess tax.

8434.38

Total = 58.048

11. CONCLUSION & RECOMMENDATION :-

As per Indian Bureau of Mines, the country has large reserves in form of Glauconitic sandstone in Rajasthan, Glauconitic sandstone containing 4 to 6% K_2O, could directly used as slow acting potash fertilizer in agriculture fields. The Glauconitic shale of the area has low potash value, in which K_2O 2.13% to 2.49% and Na_2O 0.80% to 2.79%. The area doesn't require any detail work.

ACKNOWLEDGEMENT

The authors are highly grateful to ***Sh. V.K. Vaishnav***, and ***Sh. N.P. Singh*** Suptdg. Geologist, Bhilwara Circle, Bhilwara, and ***Sh. S.S. Jamrani,*** Addl. Director Geology, Udaipur Zone, Udaipur under their guidance geological studies were carried out. Authors extend thanks to ***Sh.T.S.Ranawat,*** Addl. Director Geology (HQ), Udaipur for going through the manuscript of the reports. Authors extend thanks to their colleagues and field staff, particularly to ***Sh. Vinod Kumar*** , Driver, who supported in many ways to complete this work.

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Mineral Laboratory

Chemical Analysis Report

Statement of chemical analysis of Rock Type Shale (Seven core sample & Five spot sample) samples received from N/V Bherusingh ka khera & Borkhera tehsil & जिला चित्तौड़ गढ़

Reference No. अमूवै / Ud/II(Tr.) / एफ– / 2011–12 / 356 Dated 05-06-2013

S. No	Reg. No.	Sample Mark	Content in percent	
			K_2O(Potash)	Na_2O
1	9436	IM-7/SBH-12/10m	2.54	1.52
2	9437	IM-7/SBH-12/11m	1.95	1.30
3	9438	IM-7/SBH-12/27m	3.66	1.34
4	9439	IM-7/SBH-12/30m	3.49	1.38
5	9440	IM-7/SBH-12/35m	2.67	1.52
6	9441	IM-7/SBH-12/76m	2.97	1.77
7	9442	IM-7/SBH-12/81m	2.29	1.09
8	9443	IM-7/564	0.19	0.80
9	9444	IM-7/566	2.37	0.91
10	9445	IM-7/567	2.13	0.91
11	9446	IM-7/568	2.49	2.35
12	9447	IM-7/569	2.15	2.79

S. No. DMG/Sr.Ch.(I)/Udaipur(T)/2013-14/ 361 dated : 13-11-2013.

Issued to- Suptdg. Geologist, Udaipur, region, Udaipur.

Copy to-
1-Additional Director (Geology), Udaipur.

(M.R.Bairwa)
SENIOR CHEMICA L ENGINEER

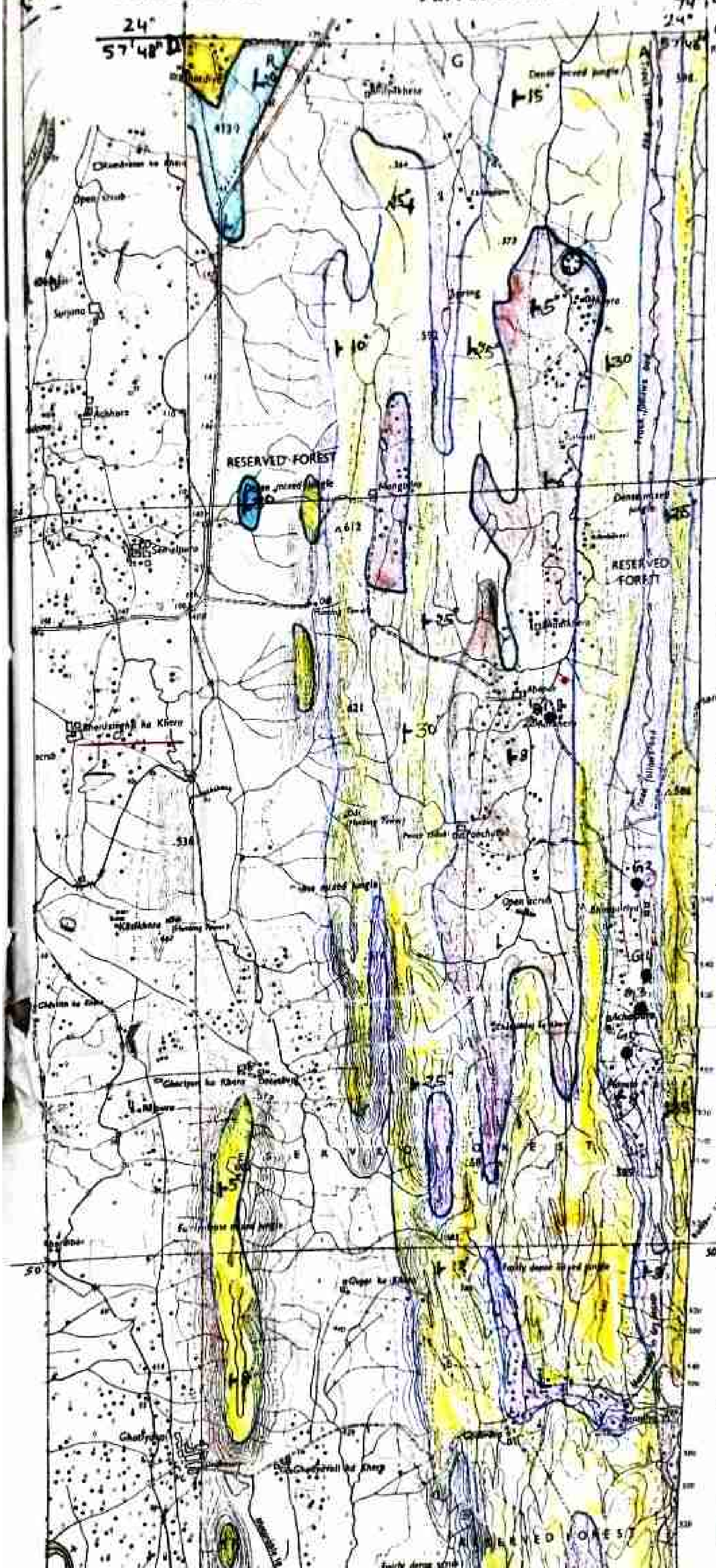
Tech./
13/11/13

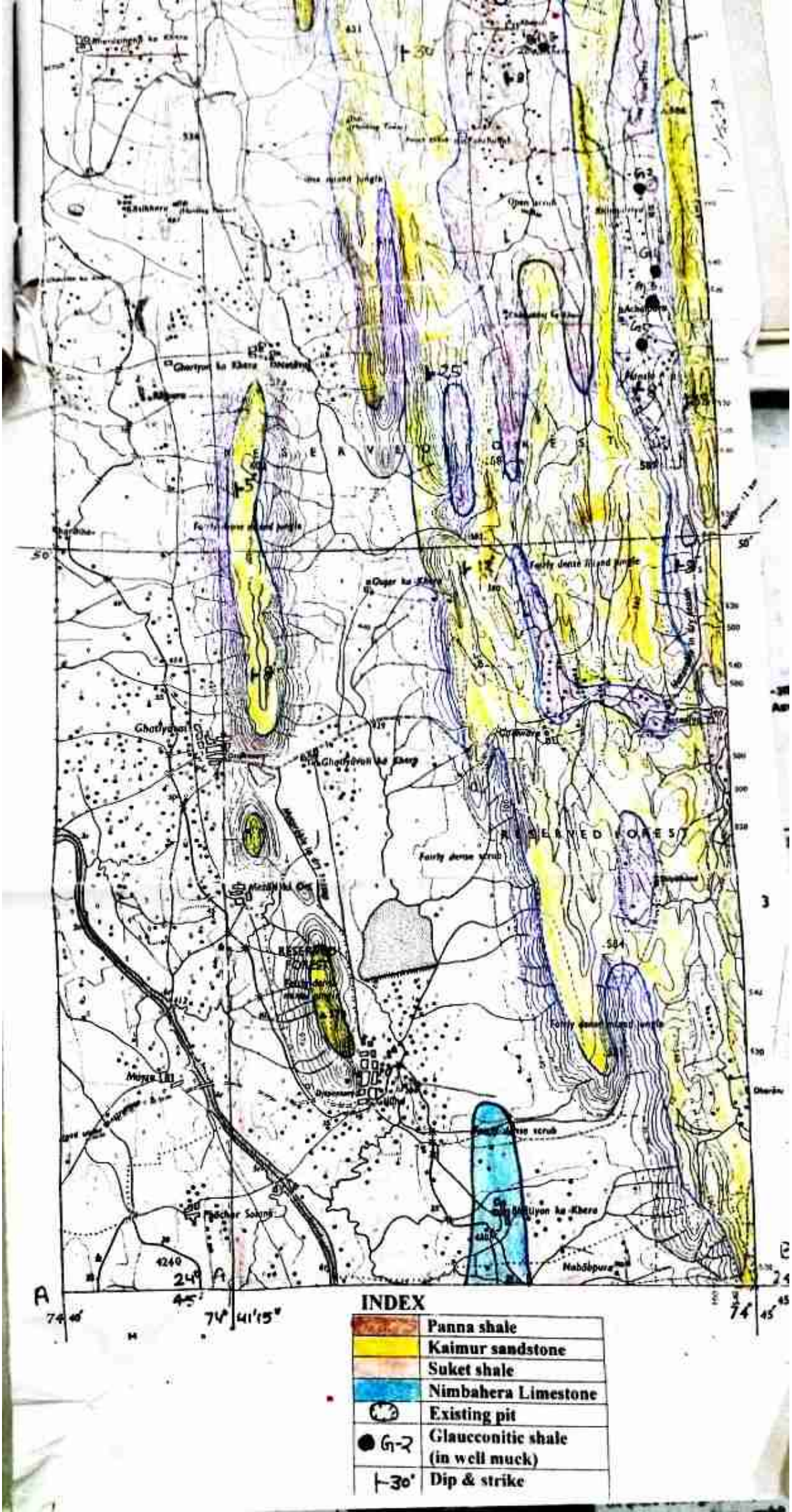
1361
14-11-2013

PROJECT NO- IM/7 (2013-14)

Search of Glaucconite (Potash) bearing shale & sandstone in Chittorgarh & Nimbahera tehsils, district Chittorgarh.

Scale-1:50,000 **Part of G.T.sheet no. 45 L/9**



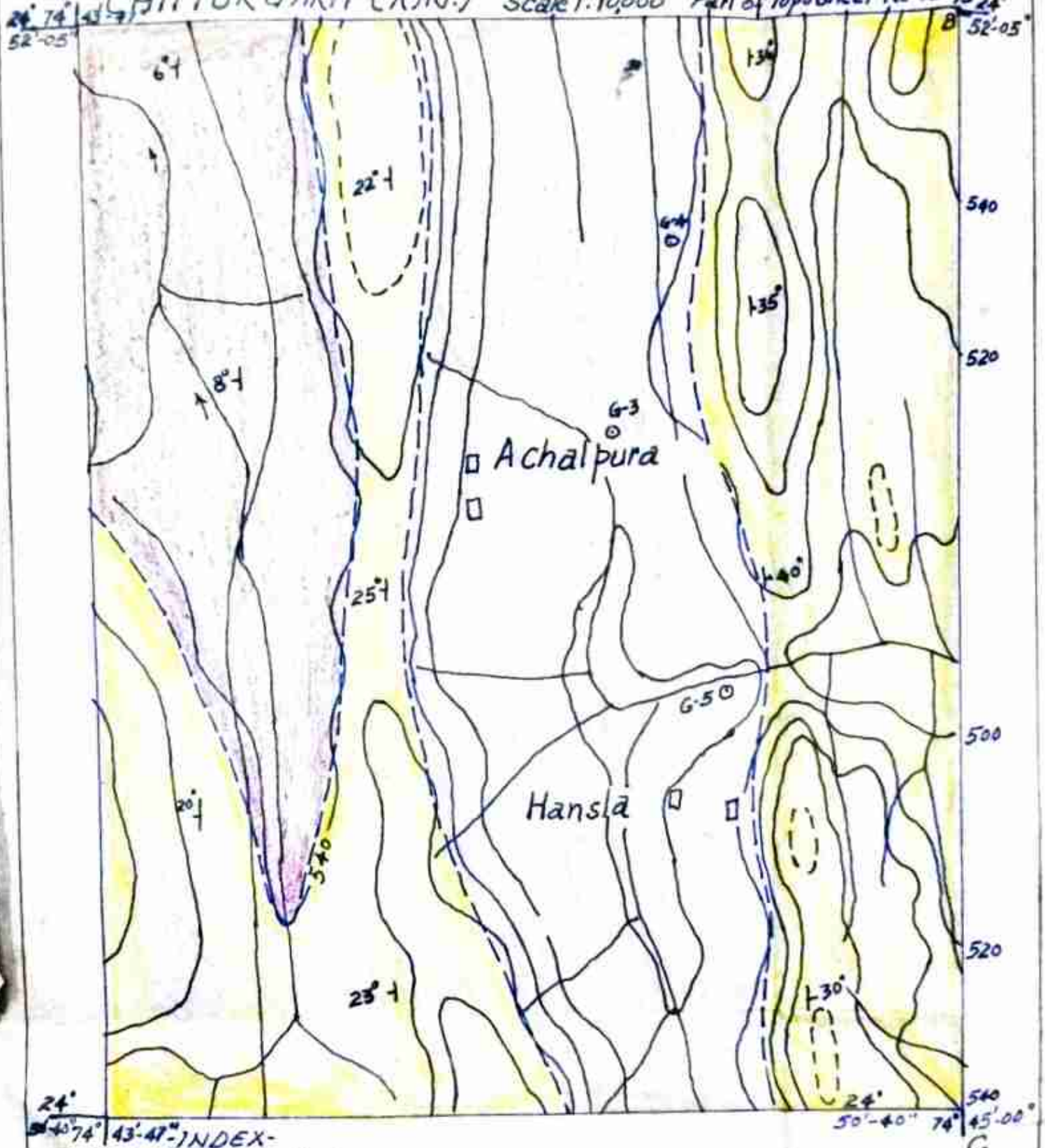

INDEX
Panna shale
Kaimur sandstone
Suket shale
Nimbahera Limestone
Existing pit
G-2
Glaucconitic shale (in well muck)
30°
Dip & strike
RESERVED FORESTS
Fairly dense mixed jungle
Fairly dense scrub
74° 41'15"
74° 45'

Sr. Geol Chit / 1 / 4-2014

Project No- IM-7/2013-2014

REGIONAL GEOLOGICAL MAP FOR GLAUCCONITIC SHALE N/V- ACHALPURA, HANSLA, TEH. & DISTRICT- CHITTORGARH-(RAJ.)

Scale 1:10,000 Part of Topo Sheet No 45 L/9



-INDEX-

- Panna Shale
- Kaimur Sandstone
- Suket Shale
- Glaucconitic Shale
- Dip & strike

Prepared by :-

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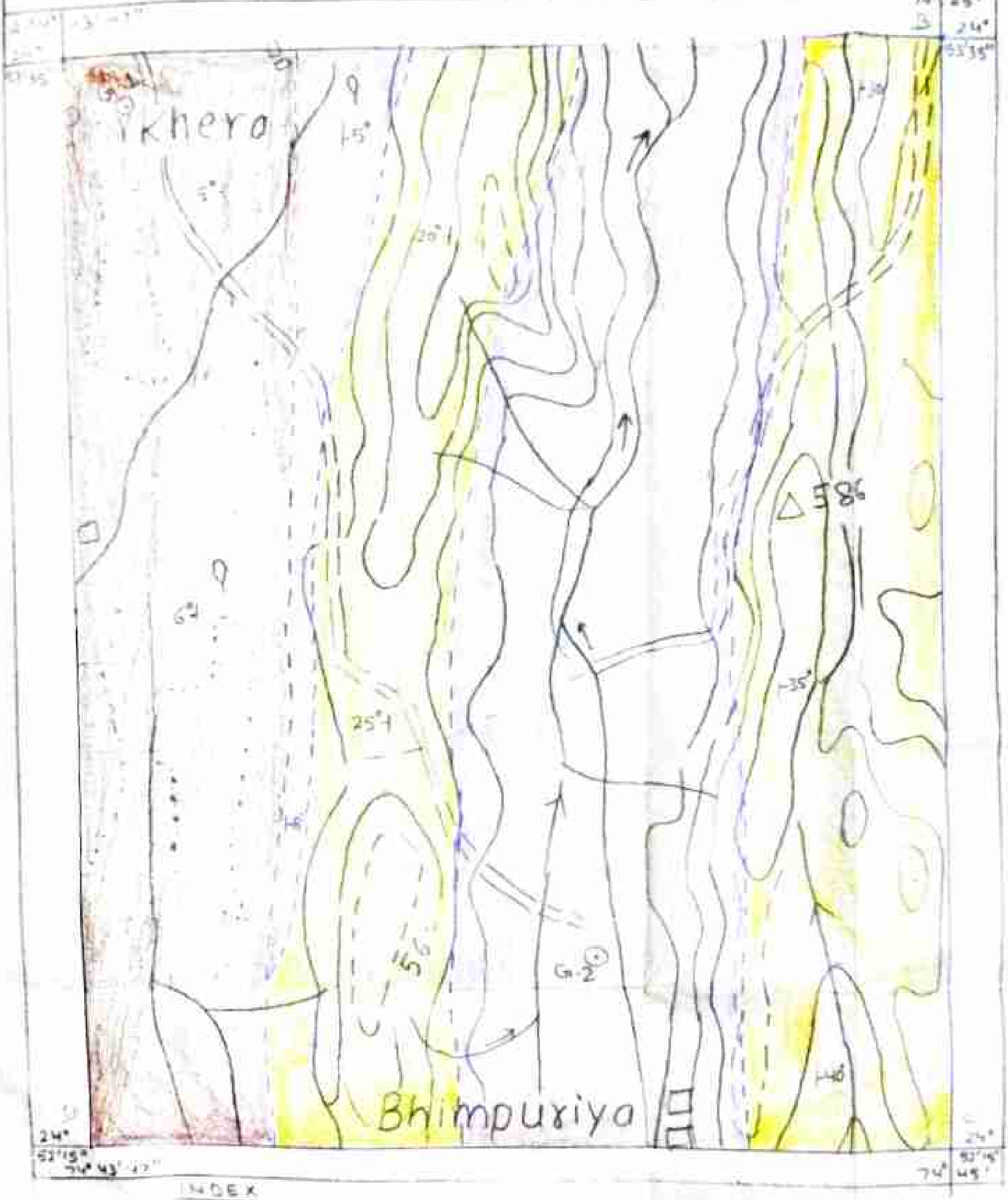
Sr. Geologist Chittorgarh

PROJECT NO IM17 (F S 2013-14)

REGIONAL GEOLOGICAL MAP FOR GLAUCONITIC SHALE N/V BARKHERA BHIMPURIYA TEHSIL & DISTT CHITTORGARH

Scale 1:10,000 Part of G T Sheet No 45 L/9



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	Pemma Shale
	Kaimur Sandstone
	Suket Shale
G-2	Glauconitic bearing siltmuck (shale)
40°	Dip & strike

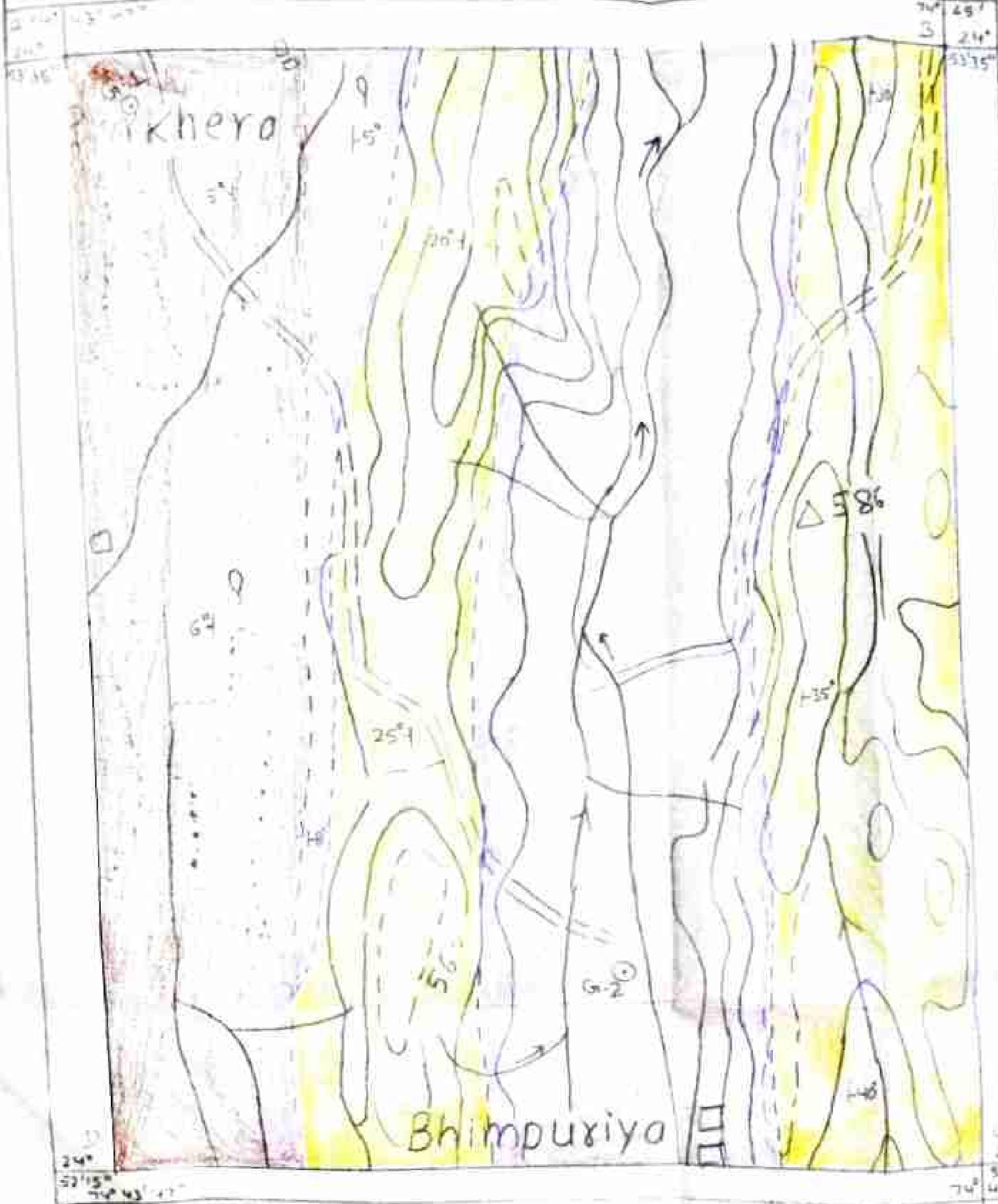
Senior Geologist
Chittorgarh

PROJECT NO. IM17 (F S 2013 14)

REGIONAL GEOLOGICAL MAP FOR GLAUCONITIC SHALE N/V BARKHERA BHIMPURIYA TEHSIL & DISTT CHITTORGARH

Scale 1:10,000

Part of G T sheet No. 45 L/9



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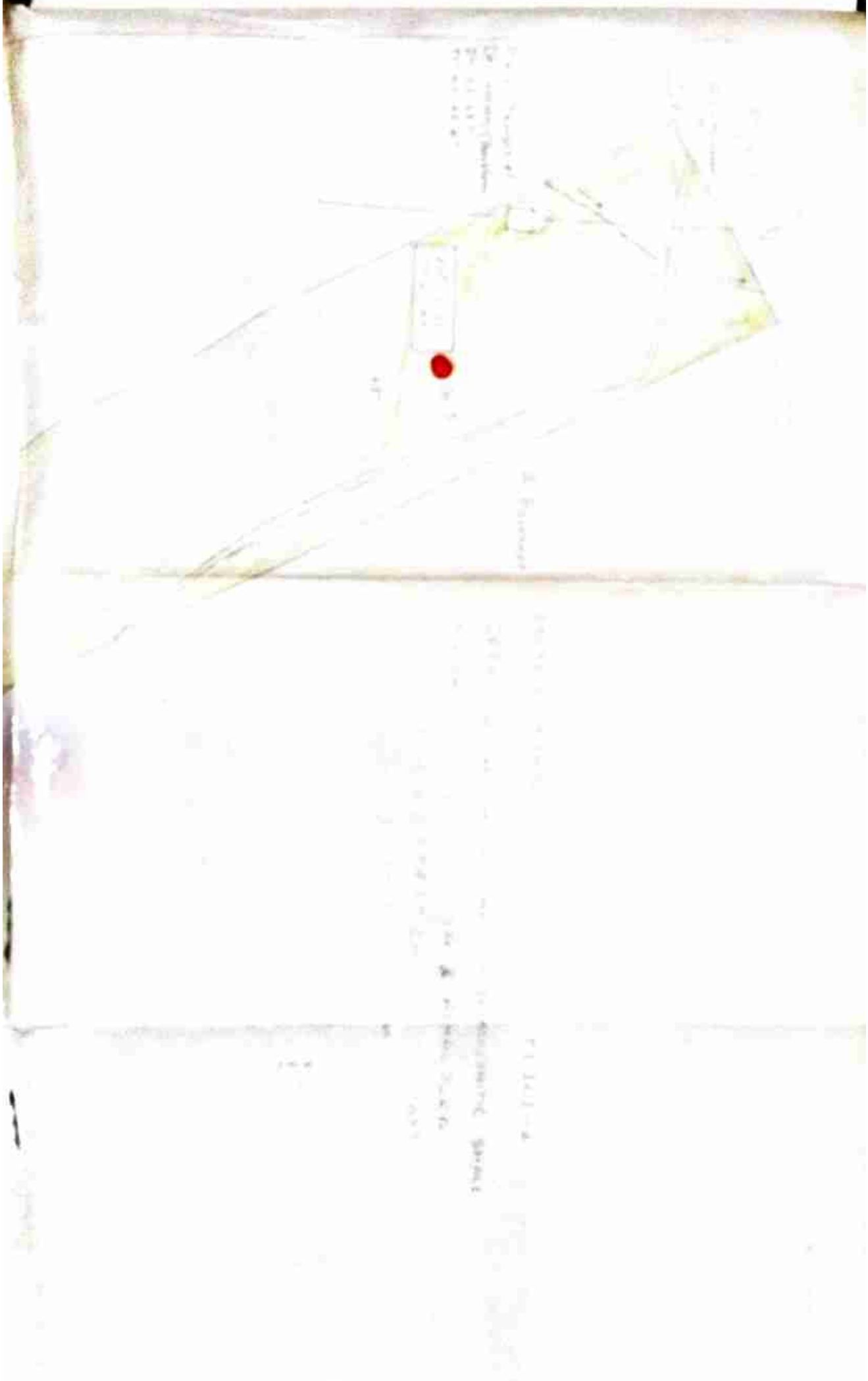
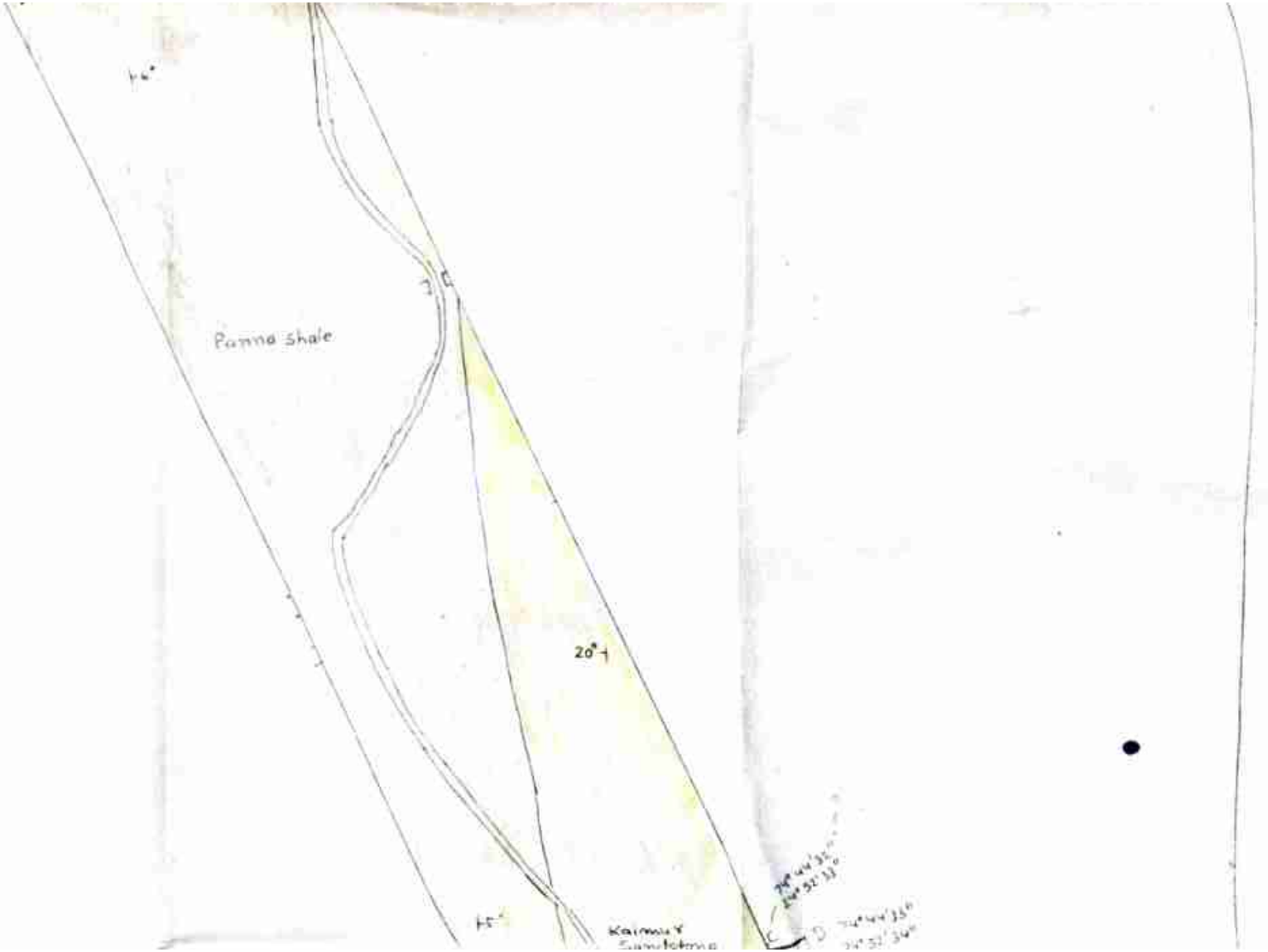
	Pamma Shale
	Kaimur Sandstone
	Suket Shale
G-2	Glauconitic bearing well mouth (Shale)
40°	Dip strike

Senior Geologist
Chittorgarh




Panna shale
20°


24°52'31.3"
14°44'30.4"
G-2
Suket Shale

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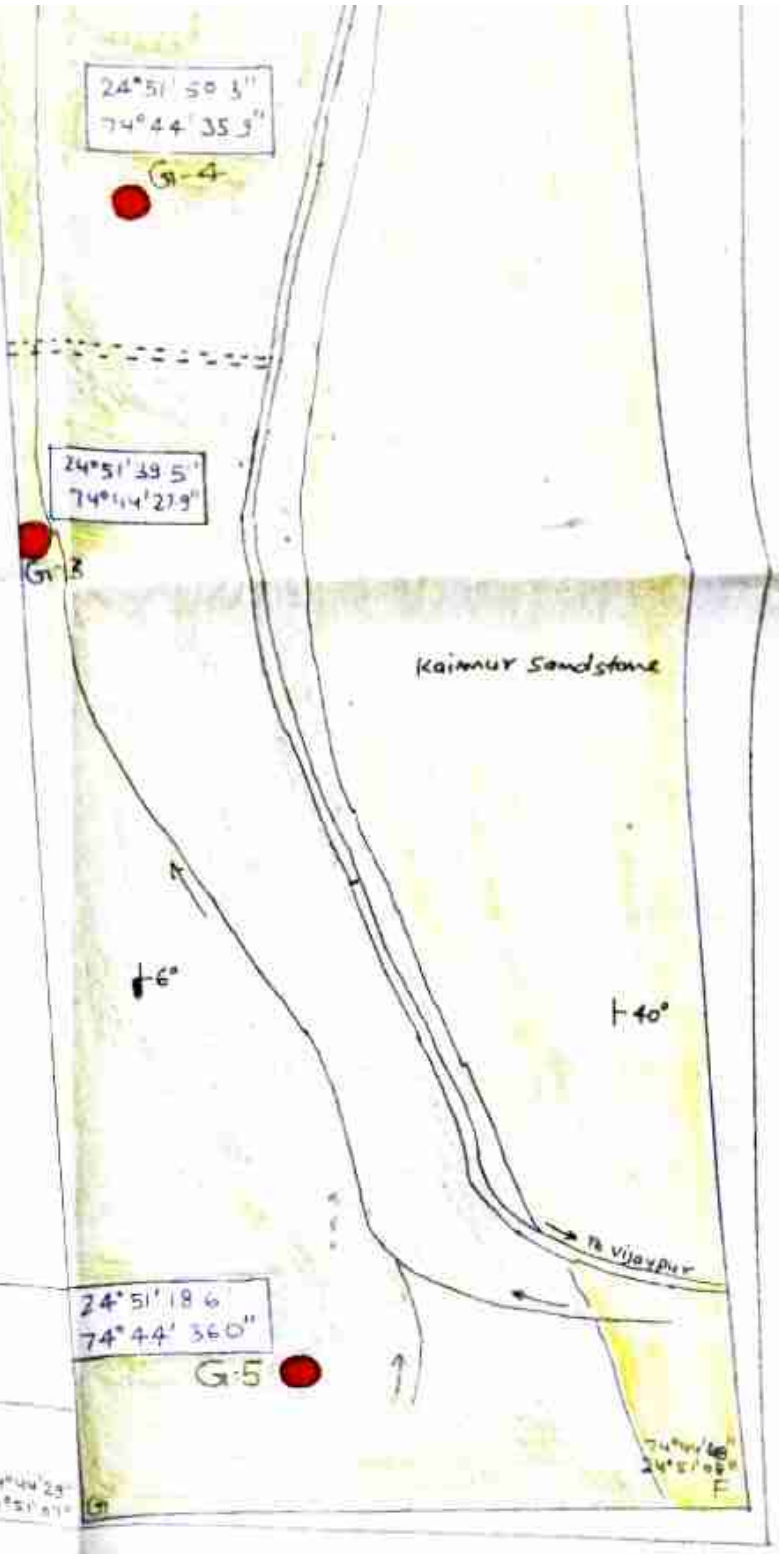
	Sandstone
	Shale
G-2	Glauconitic shale
	Metalled road
	Kachchha road
JC	Habitations
	Nala direction
	Road culvert
	F.R.P (Temple)
35°	Dip & strike



Zonal

Senior Geologist
Chitrangarh