

# Subsurface Resistivity of the Play Ground of LIET

Hussain Ahmed<sup>1</sup>, Junaid.T<sup>1</sup>, Nidhin.M<sup>1</sup>, G.Shiva Krishna<sup>1</sup>, Srikanth<sup>2</sup>, Rajesh Kanna<sup>3,\*</sup>

Undergraduate Student, Department of Petroleum Engineering, LORDS Institute of Engineering & Technology,  
Hyderabad, India.<sup>1</sup>

Associate Professor, Department of Petroleum Engineering, LORDS Institute of Engineering & Technology,  
Hyderabad, India.<sup>2</sup>

Professor & HOD, Department of Petroleum Engineering, LORDS Institute of Engineering & Technology,  
Hyderabad, India<sup>3</sup>

**ABSTRACT:** The main objective of this work is to know about the subsurface resistivity using electrical resistivity method. The study was conducted in the LIET (LORDS Institute of Engineering and Technology) campus (17.341698, 78.368758) using schlumbergers array configuration method where we studied different layers of subsurface of LIET .

**KEYWORDS:** Electrical Resistivity Meter, Electrodes, CUSO<sub>4</sub> Solution, Wire

## I.INTRODUCTION

1.1 Resistivity measurements are associated with varying depths depending on the separation of the current and potential electrodes in the survey, and can be interpreted in terms of a litho logic and geo hydrologic model of the subsurface. Measurement of resistivity is, in general, a measure of water saturation and connectivity of pore space. Air, with naturally high resistivity, results in the opposite, response compared to water when filling voids. Whereas the presence of water will reduce resistivity, the presence of air in voids will increase subsurface resistivity.

1.2 Electrical resistivity method

- The Resistivity method is used in the study of horizontal and vertical discontinuities in the electrical properties of the ground
- It utilizes direct currents or low frequency alternating currents to investigate the electrical properties (resistivity) of the subsurface



**Fig. 1: ELECTRICAL RESISTIVITY METER**

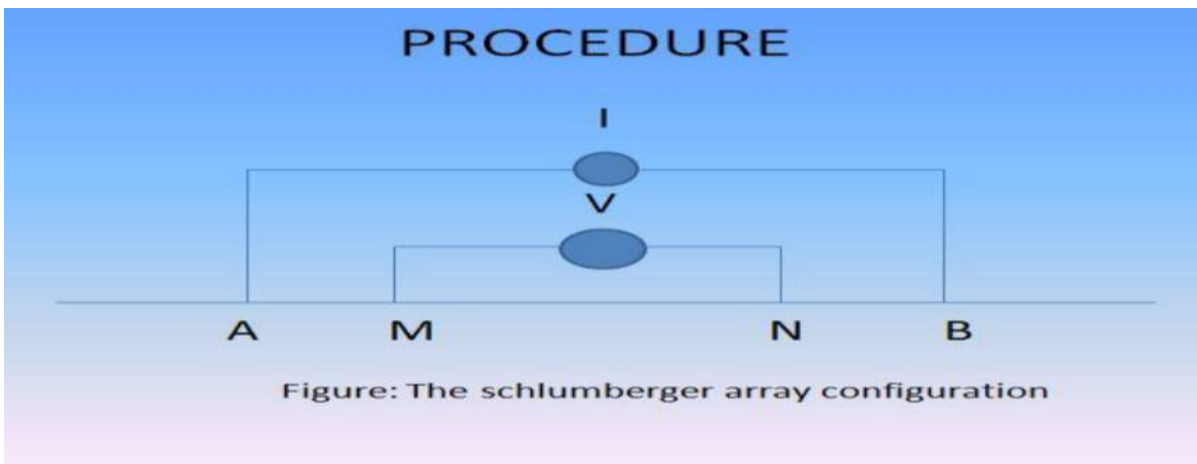
# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 4, April 2017

## II. PROCEDURE



- Figure shows the field arrangement of the Schulumberger. Four electrodes are arranged collinearly, the current electrodes A and B on the outside while the potential electrodes M and N on the inside. It may be of interest to note that, in virtue of Helmholt's reciprocity theorem in the theory of electric circuits, the resistivity value will be unaltered if AB and MN are interchanged.
- To change the depth range under investigation the distance AB is progressively moved outwards symmetrically, keeping MN fixed. However when the ratio AB/MN becomes too large the potential drop across MN too small to measured within accuracy.
- At any AB/2 , readings should be made at several MN/2 values in order to indicate the presence of lateral inhomogeneity

## III. TABLES AND GRAPH

S.NO	AB/2	MN/2	Direct		Reverse		Direct	Reverse	Averag
			$\Delta V$	$\Delta L$	$\Delta V$	$\Delta L$			
							$\rho_a = \pi \left[ \frac{(AB/2)^2 - (MN/2)^2}{2(MN/2)} \right] \{V/L\}$	$\rho_a = \pi \left[ \frac{(AB/2)^2 - (MN/2)^2}{2(MN/2)} \right] \{V/L\}$	$\Omega$ Meter
1	5	2	154	350	147	343	7.25	7.06	7.15
2	10	2	87	124	85	116	52.87	55.22	54.04
3	15	2	62	151	61	148	71.23	71.5	71.36
4	20	2	30	104	28	103	89.67	84.5	87.08
5	20	5	67	103	66	102	76.59	76.19	76.39
6	30	5	20	55	19	54	99.9	96.67	98.28
7	40	5	29	112	27	108	128.05	123.63	125.84
8	50	5	16	77	14	76	161.78	143.15	152.31

TABLE 1.1

## International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 4, April 2017

S.NO	AB/2	MN/2	Direct		Reverse		Direct	Reverse	Average
			$\Delta V$	$\Delta L$	$\Delta V$	$\Delta L$	$\rho_a = \pi \left[ \frac{\{AB/2\}^2 - \{MN/2\}^2}{2\{MN/2\}\{V/L\}} \right]$	$\rho_a = \pi \left[ \frac{\{AB/2\}^2 - \{MN/2\}^2}{2\{MN/2\}\{V/L\}} \right]$	
1	5	2	153	348	148	345	7.247	7.071	7.159
2	10	2	86	122	86	120	53.122	54.008	53.565
3	15	2	63	152	64	150	71.909	74.02	72.962
4	20	2	32	107	30	107	92.967	87.157	90.062
5	20	5	65	101	67	104	75.77	75.858	75.814
6	30	5	22	54	20	55	111.935	99.909	105.922
7	40	5	27	114	29	110	117.13	130.381	123.755
8	50	5	18	81	15	77	172.7	151.392	162.046

**Table 1.2**

S.NO	AB/2	MN/2	Direct		Reverse		Direct	Reverse	Average
			$\Delta V$	$\Delta L$	$\Delta V$	$\Delta L$	$\rho_a = \pi \left[ \frac{\{AB/2\}^2 - \{MN/2\}^2}{2\{MN/2\}\{V/L\}} \right]$	$\rho_a = \pi \left[ \frac{\{AB/2\}^2 - \{MN/2\}^2}{2\{MN/2\}\{V/L\}} \right]$	
1	5	2	150	347	149	345	7.126	7.119	7.125
2	10	2	84	120	87	118	52.752	55.562	54.151
3	15	2	63	152	63	152	71.904	71.904	71.906
4	20	2	29	104	30	105	86.682	88.817	87.765
5	20	5	68	105	68	104	76.257	76.99	76.623
6	30	5	29	54	20	56	106.847	98.125	102.486
7	40	5	31	115	29	110	113.313	130.381	121.857
8	50	5	17	79	15	78	167.234	149.451	158.342

**Table 1.3**

S.NO	AB/2	MN/2	Direct		Reverse		Direct	Reverse	Average
			$\Delta V$	$\Delta L$	$\Delta V$	$\Delta L$	$\rho_a = \pi \left[ \frac{\{AB/2\}^2 - \{MN/2\}^2}{2\{MN/2\}\{V/L\}} \right]$	$\rho_a = \pi \left[ \frac{\{AB/2\}^2 - \{MN/2\}^2}{2\{MN/2\}\{V/L\}} \right]$	
1	5	2	148	349	143	340	6.99	6.933	6.96
2	10	2	84	124	83	117	51.05	53.46	52.255
3	15	2	65	156	63	104	72.285	105.091	88.688
4	20	2	32	107	30	105	92.967	88.817	90.892
5	20	5	63	98	67	100	75.696	78.892	77.294
6	30	5	74	58	22	53	113.689	114.047	113.868
7	40	5	28	113	29	110	122.543	143.419	132.981
8	50	5	17	75	16	80	176.154	155.43	165.792

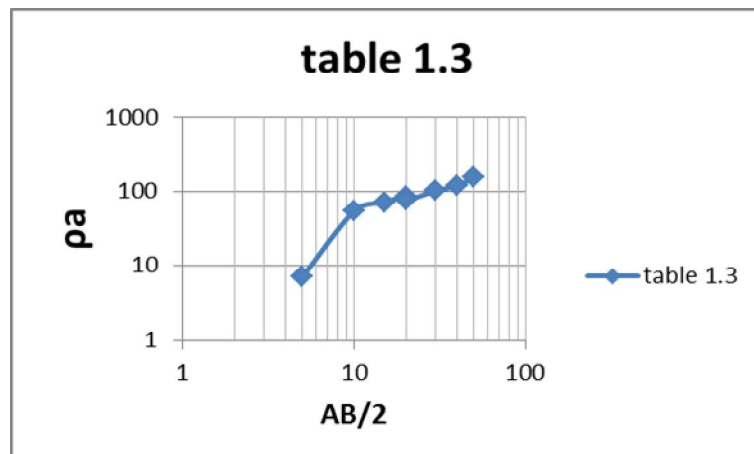
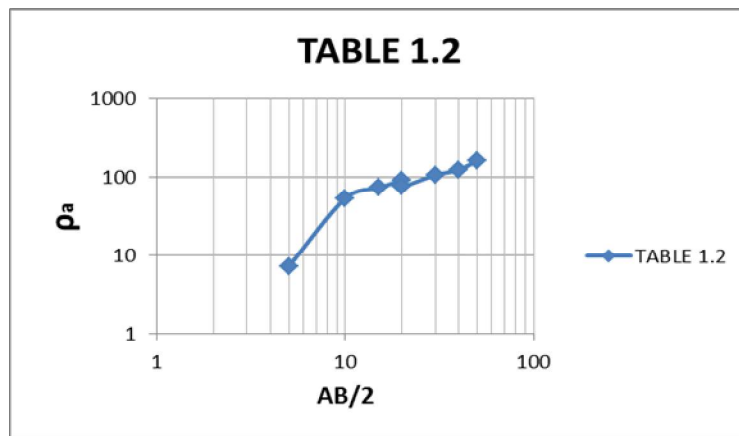
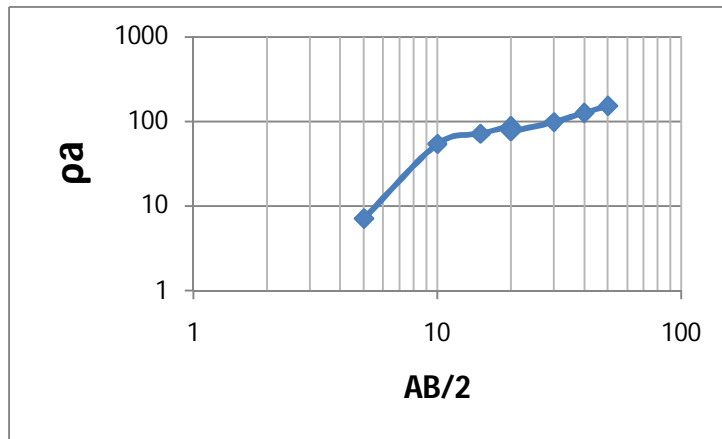
# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 4, April 2017

Graph. 1

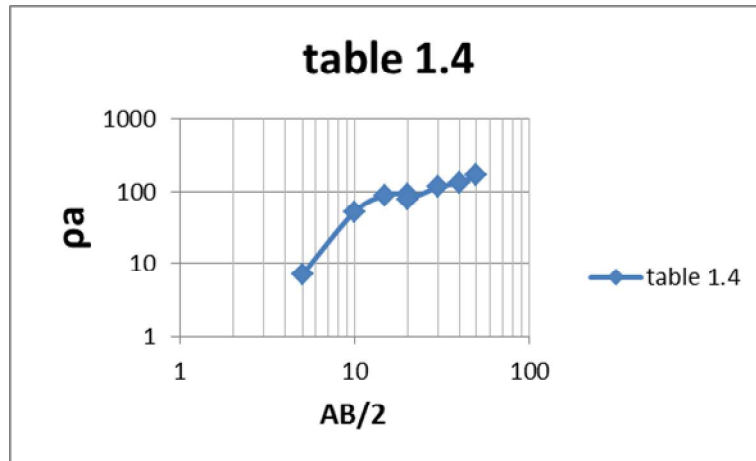


# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: [www.ijirset.com](http://www.ijirset.com)

Vol. 6, Issue 4, April 2017



## IV. CONCLUSION

layers	Thickness	resistivity	it may contain
1	graph 1	2	weathered soil
	graph 2	2	
	graph 3	2	
	graph 4	2	
2	graph 1	4	consolidated and weathered soil
	graph 2	4	
	graph 3	4	
	graph 4	4	
3	graph 1	4	solid granite
	graph 2	4	
	graph 3	4	
	graph 4	4	

From the graph three strata's are identified the resultant thickness and resistivity values are Found, the layers are weathered soil, consolidated and solid granite

## REFERENCES

- [1] <https://en.wikipedia.org/wiki/resistivity>
- [2] <http://petrowiki.org/electricalresistivitymeter>
- [3] <https://en.wikipedia.org/wiki/schlumbergerarrayconfiguration>