International Journal of Research
Available at https://edupediapublications.org/journals
p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 04 Issue 05
April 2017

To Study the Electrical Resistivity of Deccan Traps at Ranga-Reddy District

Shaik Abdul Waheed[1]; Syed Mansoor Ali [1]; Mohammed Ayaz[1]; Shaik Abdul Wahed[1]; Srikanth[2]& Rajesh Kanna[3,*]

[1]Undergraduate Student, Department of Petroleum Engineering, LORDS Institute of Engineering & Technology, Hyderabad, India.
[2]Associate Professor, Department of Petroleum Engineering, LORDS Institute of Engineering & Technology, Hyderabad, India.
[3,*] Professor & HOD, Department of Petroleum Engineering, LORDS Institute of Engineering & Technology, Hyderabad, India.
* Corresponding Author Email: rajeshkanna@lords.ac.in

Abstract :-*A geophysical investigation was carried out in* ***Ranga Reddy District****to assess the groundwater condition of the area. The method employed in this study was the Vertical Electrical Sounding (VES) technique. The data obtained were interpreted by computer iteration process and results when compared with litho logic log from existing borehole indicate four layered formation. The thickness of the aquifer was found to range between 12.0 and 14.9m while the depth was between 12.8 and 28.7m. Boreholes for potable groundwater are therefore Recommended within the forth layer.* .

Keywords: -Groundwater, Electrical Resistivity, Aquifer, Water formation

I. INTRODUCTION

Water is most important for any type of land development and conservation of groundwater is economically important. Geophysical methods has been used for a number of applications particularly groundwater potential zone identification. Accurate and reliable results has been obtained when these methods are proposed with thoroughly understanding of geological, geomorphologic and hydro geological environments, water table conditions and topography in a specific location. There are four important techniques like gravity, magnetic, seismic, and geo-electrical prospecting methods are available. Out of this electrical resistivity method plays solving groundwater problems through its highest resolving power and economical viability. Electrical resistivity methods are used to investigate the different litho logical formations, bed rock dispositions, the depth to water table or zone of saturated formations, thickness of weathered zones, detection of fissures, fractures, fault zones, establishment of their depths, thickness and lateral extent of aquifers, groundwater flow directions, valley fills, depth to basement in hard rocks, fresh and salt water intrusions, groundwater prospective zones, for locating ore deposits and archaeological studies. In this study area electrical resistivity method has been worked to analyses geoelectrical parameter identification. The Geo Sensors Resistivity Meter is a DC Resistivity Meter with several innovative features built into its design and is known for its high quality data acquisition capability as well as for its field worthiness. The Resistivity Meter is very compact, elegant and highly reliable equipment. This can be deployed for resistivity as well as self-potential investigations for a depth of investigation up to 250m.

1.2 Principles of Electrical Resistivity Survey

Electrical Resistivity Survey is performed by passing a known electric current into ground by means of two current electrodes and the potential differences between the other two potential electrodes is measured. The potential variations may be 127 changes due to size, shape and conducting capacity of the material in the subsurface and from the quantities of potential differences and the current applied the resistance is calculated.

1.3 Electrical Resistivity Survey (ERS)

Generally the prospecting of geophysical methods is fundamental to illustrate the physical character of the chosen sites. In the prospecting developments in geophysics, physical characteristics like density, magnetic susceptibility, elasticity, radioactivity and electrical resistivity (or electrical conductivity) are considered. Any geological formation is characterized by an electrical resistivity whose main factor is the ease

with which the electrical current passes through it. Electrical resistivity can be termed in ohm- meter of ohm-feet of ohm-centimeter and in electrical exploration ohm-meter is recorded as a standard unit.

1.4 Lithological Formations and Their Resistivity Value Ranges

The resistivity of geological subsurface formations differs very broadly not only from formation to formation but also within one litho logical unit and is related to (i) Size and shape of the aquifer materials, density, porosity, pore size of the material (ii) Quality of water, size, shape, pore space and density of the aquifer horizons (iii) Distribution of water in the rocks due to the structural and textural characteristics and (iv)The temperature of the subsurface of the water environment.

1.5 Representative Resistivity values of Regional Soil Resistivity

Waters

Soil water	1 to 100 ohm-meters
Rain water	30 to 1000 ohm-meters
Sea water	Order of 0.2 ohm-meters
Ice	105 to 108 Ohm-meters

1.6 Representative Resistivity values for Earth materials

Low resistivity material	Less than 100 ohm-meters
Medium resistivity material	100 to1000 ohm-meters
High resistivity material	Greater than 1000 ohm-meters

II. MATERIAL REQUIRED

Fig.1 Electrical Resistivity Meter DDR3

Electrical resistivity methods are very much successful in delineating lateral and vertical variation of subsurface geology. Detailed Geophysical investigations with electrical resistivity were carried out with DC resistivity meter IGIS DDR3. It

p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 04 Issue 05
April 2017

is an indigenous Digital resistivity meter with several innovative features built into its design and is known for its high quality data acquisition capability as well as for its field worthiness.

Fig.2 DDR3 analysis

DDR3 resistivity meter is a very compact, elegant and highly reliable equipment, which is used for resistivity investigations as shown in Figure (3.2). DDR3 resistivity meter consists of two units (i) Current unit (C unit), and (ii) Potential unit (P unit). This unit has the facility to measure the potential difference across the potential electrode as also the resistance values provide direct display over digital panel metre. While the current units serve the purpose of sending the required output of constant current, the potential unit provides an accurate measurement and display

2.Cathodic Rod (AB/2):-

When four electrodes are placed in a line, and a known current is passed through the two extreme electrodes, the potential difference measured between the two inner electrodes gives a measure of the resistivity of the ground. The value of resistivity ρ is determined by the formula:ρ= (V/I) x 2 Π a
where, V is the potential in volts measured between the two inner electrodes, and I is the current in amperes passed into the ground, 'a' is the distance between the successive electrodes and 2 Π, a constant. Since V/I = R, the resistance (in ohms), the formula may be expressed as: ρ = 2 Π a R, (in ohm-m)
In the above electrode arrangement, the two current electrodes are usually designated as C1 and C2, while the two inner electrodes, which pick up the potentials in the ground, are designated as P1 and P2, the potential electrodes or the measuring electrodes as shown in Fig. 3.

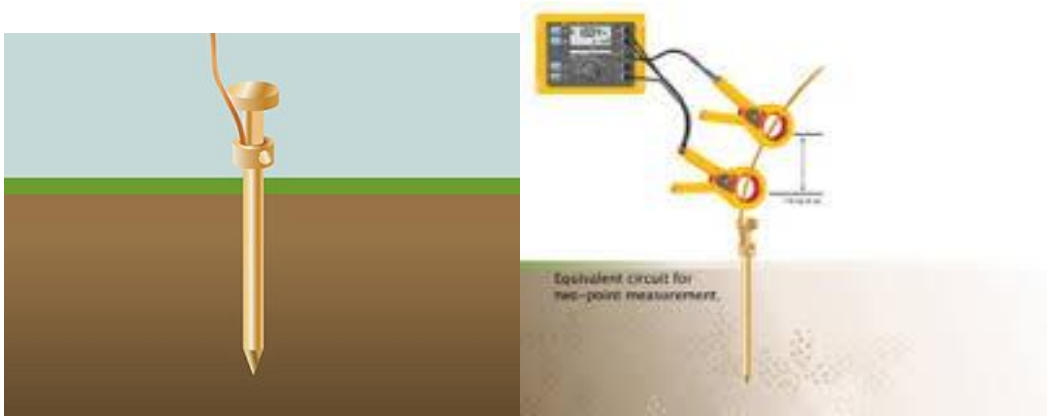


Fig.3 Electrodes for determining potential

p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 04 Issue 05
April 2017

3.Hammer:-

Fig.4 Hammer to hit electrodes

4. Resistance Of A Wire:-Distribution power systems may be solidly grounded, with one circuit conductor directly connected to an earth grounding electrode system. Alternatively, some amount of electrical impedance may be connected between the distribution system and ground, to limit the current that can flow to earth.

5. Copper Sulfate (MN/2):-Copper sulphite solution in order to generate the negative current ions.Electrodes are kept at every 5 Meters Distance order to take all the Specific Reading.This Instrument can give the Information of more than 250 m depth.

III. EXPERIMENTAL PROCEDURE

The field measurements for DC resistivity investigation basically involve sending a known current into the ground through the current electrodes and observing the resulting equipment has the facility to provide the operator the direct readout of these resistance values on liquid crystal display.

Fig 5 The operation of the Resistivity Meter equipment involves broadly cancellation of S.P by sending a known amount of current into the ground at appropriate voltages by adjusting the controls. Observing the readouts of the resistance value on the display to accomplish this, the following operational steps are to be followed systemically, observing the necessary precautions indicated

p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 04 Issue 05
April 2017

.

IV. CALCULATION

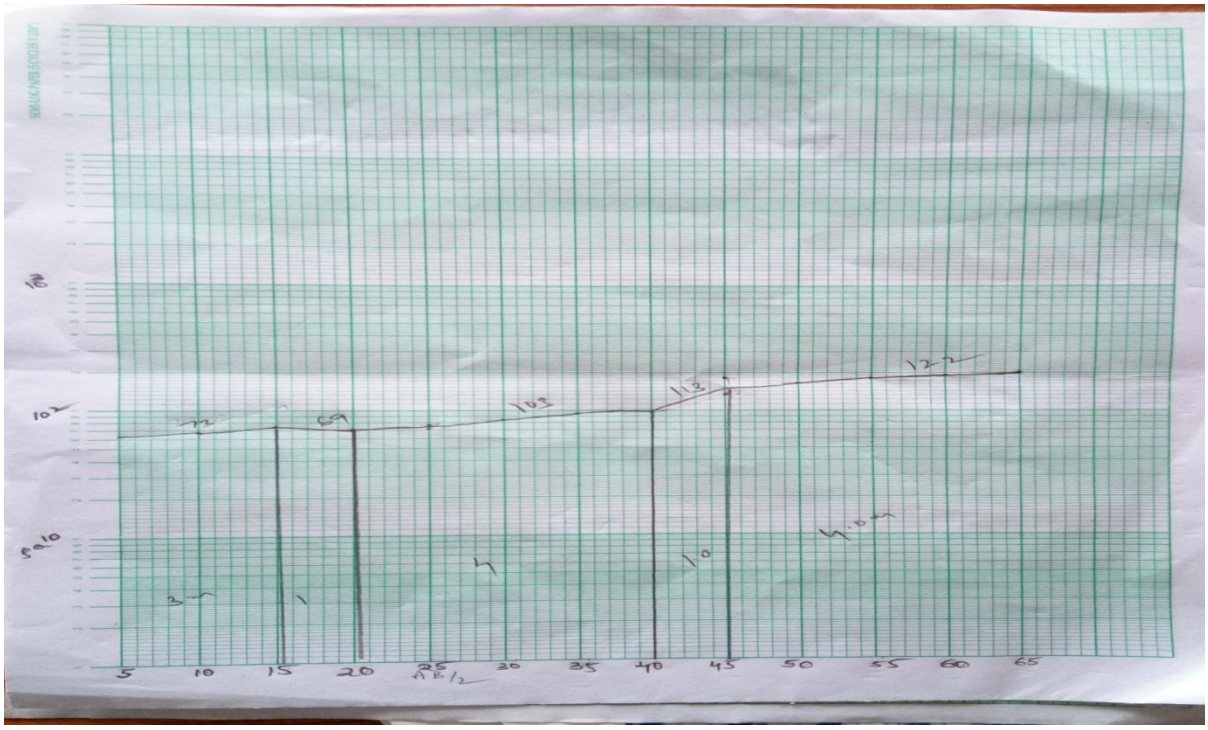
To calculate the resistivity we use following formulae

$$\rho_a = \pi \left[\frac{\left(\frac{AB}{2}\right)^2 - \left(\frac{MN}{2}\right)^2}{MN} \right] \frac{\Delta V}{I}$$

V. RESULT

S. No	MN/2	AB/2	V (DC)	I (DC)	ρA	V (I-DC)	I (I-DC)	ρB	ρA + ρB/2
1	2	5	263	116	37.39	264	117	37.21	47.69
2	2	10	63	95	50	62	97	48.19	49.09
3	2	15	32	100	55.54	34	101	58.43	56.98
4	5	20	85	100	53.40	86	101	53.50	53.45
5	5	25	44	78	66.45	45	79	67.106	66.77
6	5	30	32	77	78.33	33	76	81.84	80.08
7	5	35	30	87	94.78	31	88	96.83	95.80
8	5	40	8	29	103.99	9	30	113.09	108.54
9	5	45	8	36	109.95	9	36	123.70	116.82
10	5	50	12	38	198.41	13	40	204.20	201.30

p-ISSN: 2348-6848
e-ISSN: 2348-795X
Volume 04 Issue 05
April 2017



VI. CONCLUSION

Ranga Reddy District chevellaground have high resistivity 47.69 to 201.30. The resistivity of the absolute pure water is 18.2 million ohms x cm at 25°C. Hence it is concluded that the chevella ground contain less source of water.

REFERENCES

[1] https://en.wikipedia.org/wiki/Deccan_Traps

[2] www.arpapress.com/volumes/vol15issue1/ijrras

[3] www.labmanager.com/resistivity-conductivity-measurement-of-purified-water

[4] https://en.wikipedia.org/wiki/Ground (electricity)