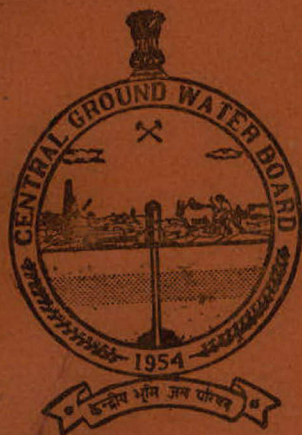




GOVERNMENT OF INDIA
Central Ground Water Board
Ministry of Water Resources

Central Ground Water Board	
Library, Faridkot	
Accession No.	19
Date.	18-3-88

REPORT ON THE SELECTION OF TUBEWELL SITES WITHIN THE
PREMISES OF TOWNSHIP AND REFINERY AREAS OF
INDIAN OIL CORPORATION LIMITED AT BARAUNI, DIST. BEGUSARAI, BIHAR

By

Dr. K. S. PANDEY

Junior Hydrogeologist

EASTERN REGION,
CALCUTTA
JANUARY, 1988

REPORT ON THE SELECTION OF TUBEWELL SITES WITHIN THE
PREMISES OF TOWNSHIP AND REFINERY AREAS OF INDIAN
OIL CORPORATION LIMITED AT BARAUNI, DISTRICT
BEGUSARAI, BIHAR

By

Dr. Krishna S. Pandey
Junior Hydrogeologist
Central Ground Water Board

CONTENT

	<u>TITLE</u>	<u>PAGE</u>
I	INTRODUCTION	1-2
II	HYDROGEOLOGY	2-3
III	CHEMICAL QUALITY OF GROUND WATER	3
IV	SELECTION OF SITES	3
V	CONCLUSIONS AND RECOMMENDATIONS	3-4

APPENDIX

- I Chemical Analysis results of water samples from existing tubewells in and around township area of I.O.C., Barauni, Begusarai district, Bihar.

PLATE

- I Map showing the area proposed for tubewell construction within the premises of Township of I.O.C., Barauni, Begusarai district, Bihar.

REPORT ON THE SELECTION OF TUBEWELL SITES WITHIN THE
PREMISES OF TOWNSHIP AND REFINERY AREAS OF INDIAN
OIL CORPORATION LIMITED AT BARAUNI, DISTRICT
BEGUSARAI, BIHAR

By

Dr. Krishna S. Pandey
Junior Hydrogeologist
Central Ground Water Board

I. INTRODUCTION

In response to a request of the Engineering Services Manager, Indian Oil Corporation limited, Barauni Refinery, Begusarai, vide his letter Nos. ES/2290/1505 dated 3-10-1986 and ES/45/DC/1904 dated 15-12-1986, the Officer-in-Charge, Central Ground Water Board, Bihar State Unit, Patna deputed the author to take up the investigation. Accordingly the author carried out the investigation on 15th and 16th July, 1987 for ascertaining the technical feasibility of tubewell sites located within the premises of Township and Refinery areas of Indian Oil Corporation Limited, Barauni.

Discussions were held with Mr. A.M. Prasad, Chief Technical Services Manager; Mr. Subash Chander, Engineering Services Manager and Mr. C. Bhattacharya, Sr. Engineer (Civil) who also accompanied the author to different proposed sites and collected all relevant data from the existing tubewells. Yields from the existing tubewells have gone down as reported by the authorities as they have already been more than 23 years old and have outlived their normal life. The present water supply requirements for Township are being met from the existing tubewells constructed within the premises. The present water supply from the existing tubewells is not adequate. In order to increase the water supply, the Indian Oil Corporation authorities requested to select suitable sites for construction of heavy duty larger diameter tubewell within the Township area and a large dia. tubewell near T.P.S. within Oil Refinery Area.

Location:

The factory area of the Indian Oil Corporation Limited, Barauni covering 1253.7 Acres with a few residential quarter is situated in the South-Western part of Begusarai Town, whereas Township area covering 393 Acres is situated about 3 KM ENE of the factory, near National Highway.

Acknowledgements:

The investigation was carried out under the immediate supervision of the Officer-in-Charge, Central Ground Water

Contd.....2

Board, Bihar State Unit, Patna and the report has been finalised under the guidance of the Director, Eastern Region, Central Ground Water Board, Calcutta. The author is thankful for the assistance given at the time of investigation by Mr. C. Bhattacharya, Sr. Engineer (Civil) and for useful discussions with Mr. Subash Chander, Engineering Services Manager, Indian Oil Corporation Limited, Barauni.

Scope and purpose:

The aim of the present investigation was to select site for larger dia. 600 mm/400 mm (24"/16") of tubewell within Township premises with discharge of about 600 m³/hour and another site for large diameter 350 mm/200 mm (14"/8") tubewell with discharge of 200 to 300 m³/hr. near T.P.S. within Refinery area of Indian Oil Corporation, Barauni. The present water supply from the existing tubewells is not adequate.

II. HYDROGEOLOGY

The area is a part of the Gangetic alluvial plain and is underlain by alluvial sediments of the Quaternary to Recent age. The Newer alluvium occupied the low-lying areas and is restricted to flood plains along the course of the Ganga. The Recent alluvium comprises fine to coarse grained sand, sandy clay, silt and with occasional gravel and Kankar.

From the strata logs of boreholes drilled in the area by the State and Private agencies, it is inferred that the alluvial sediments in the area composed of a sequence of fine, medium and coarse sand with occasional gravel interbedded with clay down to a depth of 160 metres below ground level. The top clay bed ranging in thickness from 2 to 10 metres is fairly persistent in the area. It is also observed that the cumulative thickness of granular formations varies from 60 metres to 80 metres of total alluvial sediments within a depth of 180 metres below ground level.

Ground Water:

Ground water occurs in the various grades of sand, moderately thick sandy horizon in the alluvial sediments which forms excellent and prolific aquifers in the area. The total thickness of the aquifers within a depth of 200 metres below ground level ranges from 60 to 80 metres.

Ground water occurs under water table conditions in both shallow and deep aquifers. The depth to water level in the area ranges from 2.50 to 5.00 metres below land surface. As the depth to water level in the area is less than 5 M. below land surface, it can be inferred that in the alluvial plain (north of Ganga) the highly thick saturated granular materials composed of fine to medium and coarse grained sand occurring within a depth of 180 m b.g.l. form highly potential aquifers.

Ground water is developed in the area by means of deep tubewells for domestic and industrial uses. During the time of investigation, the yield from the existing tubewells could not be measured as there were no such arrangements. However, it was reported that the yield of existing tubewells within Township area ranges from 152 m³/hr to 253 m³/hr for drawdown less than 1 metre. It was also reported that there is gradual decline in the yield of the existing tubewells.

III. CHEMICAL QUALITY OF GROUND WATER

In the course of investigation, water samples were collected from the existing tubewells located within Township and Refinery areas of I.O.C. The result of the Chemical analyses of water samples are appended in this report (Appendix-I). The results indicate that the chemical quality of ground water within the Township and factory areas is quite potable and suitable for domestic as well as industrial purposes.

IV. SELECTION OF SITES

Based on the findings of hydrogeological investigation, it is opined that it is feasible to construct heavy and medium duty tubewells within Township and near T.P.S. in the Factory of I.O.C. at Barauni. The yield from the tubewell tapping 60 to 80 metres of saturated granular zones within a drilled depth of 200 m is expected to be 600 m³/hr for economic drawdown of about 3 metres below land surface.

V. CONCLUSIONS AND RECOMMENDATIONS

The area of investigation is a part of the Gangetic alluvial plain and is underlain by the alluvial sediments of Quaternary to Recent age. The alluvial deposits are mainly composed of fine, medium and coarse grained sand with occasional gravel and Kankar and clay.

Ground water occurs in moderately thick sandy horizon within the alluvium which form excellent and prolific aquifers in the area. The depth to water level in the area ranges from 2.50 metres to 5.00 metres below land surface. Ground water is developed in the area by means of tubewells both for domestic and industrial uses.

The reported discharges from the existing tubewells vary from 150 m³/hr to 253 m³/hr for drawdown within 1 metre. The formation water is well within the permissible limits of drinking standard as adopted by I.C.M.R., NEW DELHI.

The hydrogeological studies indicate that the area is highly favourable for construction of heavy and medium duty

tubewells. It is therefore recommended that:

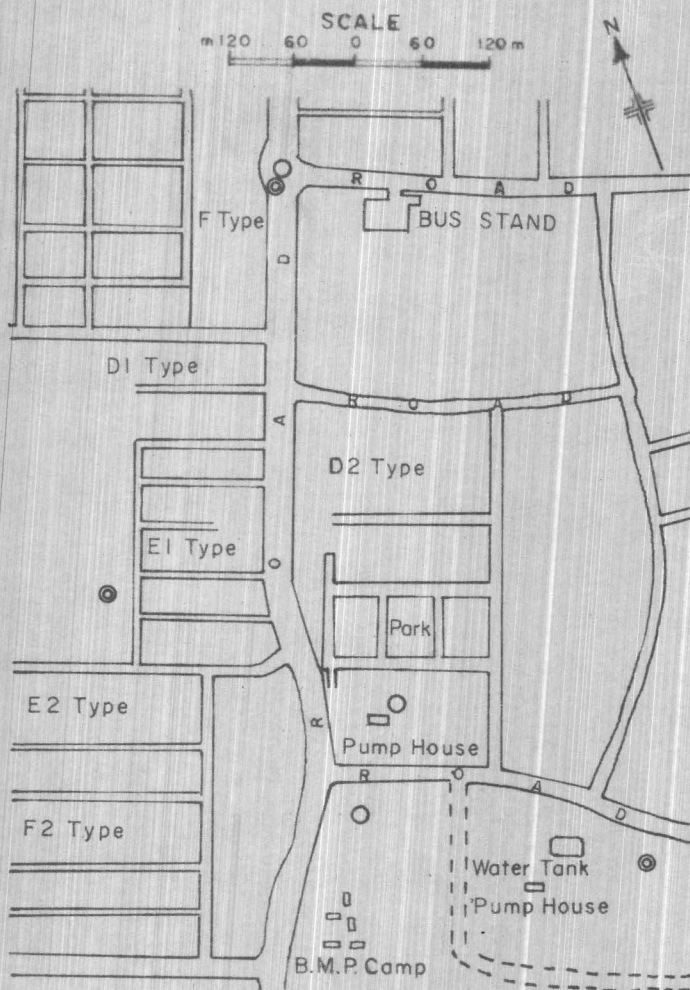
- i) Pilot borehole within Township area should be drilled down to a depth of 200 metres, whereas near T.P.S. in factory area should be drilled down to a depth of 160 metres.
- ii) Drill cuttings should carefully be collected and properly logged lithologically. Based on the examination of drill cuttings, 60 to 80 metres of saturated granular zones may be tapped.
- iii) Pilot boreholes if found suitable after testing may then be converted into production wells by providing 600 mm (24") dia. Housing and 16" (400 mm) dia. assembly for township, and for factory area near T.P.S. 14"/8" (350mm/200mm) dia. assembly.
- iv) Suitable slot sizes may be ascertained on the basis of grain size analysis of drill cuttings of aquifers to be tapped.
- v) To avoid mutual interference, spacing between each tubewells should be 300 metres approximately.

APPENDIX - I

Chemical Analysis results of water samples from existing tubewells in and around Township area of I.O.C., Barauni, Begusarai district, Bihar.

Chemical constituents (in ppm)	Township Area			Factory area Alternative T.W. of T.W.-8
	T.W.-1	T.W.-2	T.W.-3	
Sp. Conductance (micromhos/cm at at 25°C)	662	637	437	600
pH	7.6	7.6	8.2	7.7
Ca	64	50	28	46
Mg	34	38	29	39
Na	16	14	16	13
K	3.5	3	4	3
Total Iron (Fe)	0.24	0.55	0.51	0.36
Silica (SiO ₂)	35	33	35	35
HCO ₃	390	372	238	372
SO ₄	3	4	7	2
Cl	11	11	11	11
F	0.01	0.13	0.13	0.13
Total Hardness as CaCO ₃	300	280	190	275

MAP SHOWING THE AREA PROPOSED FOR TUBEWELL CONSTRUCTION WITHIN THE PREMISES OF TOWNSHIP OF INDIAN OIL CORPORATION BARAUNI, DISTRICT BEGUSARAI, BIHAR



INDEX

- ⊙ Site Proposed For Tubewell
- Existing Tubewell