

**ESTIMATES COMMITTEE  
1960-61**

**HUNDRED AND THIRTIETH REPORT**

**MINISTRY OF FOOD AND AGRICULTURE  
(Department of Agriculture)**

**EXPLORATORY TUBEWELLS ORGANISATION**



**LOK SABHA SECRETARIAT  
NEW DELHI**

***March, 1961***  
***Chaitra, 1883(Saka)***

*Price :Re. 0.60nP.*

## CORRIGENDA

Hundred and Thirtieth Report (Second Lok Sabha) of the Estimates Committee on the Ministry of Food & Agriculture (Department of Agriculture) — Exploratory Tubewells Organization.

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Page 17, heading of column 4, line 1; after 'No.' add 'of'

Page 22, Sl. No. 4, Remarks column, line 3; for 'furthe' read 'further'

Page 25, Sl. No. (2), line 1; for 'Tubewell' read 'Tubewells'

Page 30, line 4 from bottom; for 'Sauratgrah' read 'Suratgarh'

Page 32, para 1, line 3; for 'Bathinda' read 'Bhatinda'

Page 33, line 4; for '.' read ','

Page 33, Sl. No. (b), line 3; for '.' read ','

Page 34, Sl. No. 3, line 1; for 'gological' read 'geological'

Page 35, Sl. No. 8(b), line 1; for 'Acheivement' read 'Achievement'

Page 35, Sl. No. 11, line 5; for 'o coverage' read 'coverage'

Page 37, Sl. No. II-1, line 3; for 'correesponding' read 'corresponding'

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1960-61

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\*Elected with effect from 25th November, 1960 *vice* Shri Dinesh Singh resigned.

## INTRODUCTION

I, the Chairman, Estimates Committee, having been authorised by the Committee to submit the report on their behalf, present this Hundred and Thirtieth Report on the Ministry of Food and Agriculture (Department of Agriculture) on the subject "Exploratory Tubewells Organisation."

2. A statement showing an analysis of the recommendations contained in this report is also appended to the Report (Appendix XIII).

3. The Committee wish to express their thanks to the Secretary of the Ministry of Food and Agriculture (Department of Agriculture) and other officers of the Ministry for placing before them the material and information that they wanted in connection with the examination of the estimates.

NEW DELHI-1;  
*The 28th March, 1961.*  

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*The 7th Chaitra, 1883 (Saka).*

H. C. DASAPPA,  
*Chairman,*  
*Estimates Committee.*

# EXPLORATORY TUBEWELLS ORGANISATION

## I. INTRODUCTORY

### A. Introduction

The Exploratory Tubewells Organisation is of recent origin. With the object of gathering information on the available supplies of ground water in areas where surface irrigation facilities did not exist, a preliminary survey was made in August 1952 by two geologists, one of the Geological Survey of India and the other of the United States Geological Survey. They selected 15 such areas representing practically every State in India for purposes of exploration. In March 1953 the Government of India signed an agreement with the Government of United States of America represented by the Director, Technical Co-operation Mission for undertaking a nation-wide survey of the economic supplies of ground water. Under this agreement (Operational Agreement No. 12) the general responsibility for the execution of the project and its administrative and general supervision came to be vested in the Ministry of Food and Agriculture. The Geological Survey of India was to be associated for advice on technical aspects of the project.

Historical  
Background.

### B. Organisation

2. The Exploratory Division was created in October, 1953 to supervise the work of exploratory drilling which was decided to be undertaken through contractors. World-wide tenders were invited for selecting a suitable agency for this purpose but as it did not evoke satisfactory response it was decided in April 1954 to take up the project departmentally and to import the necessary equipment. It was also decided to engage a firm of foreign consultants with wide experience of deep water well drilling for technical advice and overall supervision of operations.

World-wide  
tenders for  
exploratory  
work.

3. In pursuance of the above decision, the Exploratory Division was expanded into the full-fledged Exploratory Tubewells Organisation in September 1954 with a Chief Engineer at its head and four field units, each under an Executive Engineer and Central Stores at Bhusaval. The Geological Survey of India was associated with this Organisation for testing and sampling in the field.

Departmental  
execution  
of Project.

A foreign consultant firm (Ralph M. Parsons Co. of U.S.A.) was engaged as expert technicians.

4. The Operational Agreement No. 12 expired on the 30th June, 1959 and the period covered by it and upto the 31st August, 1959 has been termed as Project I. It was decided to continue ground water exploration in areas not completed in Project I as well as in new areas suggested by

the State Governments during the remaining period of the Second Plan. The period from September 1959 to the end of the Second Plan has been termed as Project II.

Inter-Departmental Board of Management.

5. The Committee learnt that an inter-departmental Board of Management for exploratory tubewells was set up in July 1954 with the object of seeing to it that the project was implemented efficiently and expeditiously. They were informed that it functioned as a high-powered body for taking quick decisions on important questions arising from time to time in the implementation of the Project. The Board was reconstituted in March 1960 keeping in view the important changes made in the Organisation of the work since the expiry of Operational Agreement No. 12. The composition of the Board before and after its reconstitution is given at Appendix I.

It was stated that during the last three years the earlier Board met only once in February 1958. The reconstituted Board had also met only once so far in April 1960. The representative of the Ministry stated that since the Geological staff had become a part of the Exploratory Tubewells Organisation, there was hardly any need at present for the Board. *The Committee suggest that a review of the position may be undertaken early. Either the Board should function effectively or it should be wound up.*

### C. Geological and Hydrological Staff

Project I.

6. The Committee were given to understand that for Project I the Geological Survey of India was made responsible for the collection and interpretation of geological and hydrological data from the exploratory tubewells. While the staff of the Exploratory Tubewells Organisation was responsible for drilling, the staff of the Geological Survey of India worked along with them for collection of data and advised them on the depth to which the drilling was to be done, the tests to be performed and the possibility of getting sufficient quantities of water. It was stated that this division of responsibility between the Exploratory Tubewells Organisation and the Geological Survey of India led to delays in field operations as differences of opinion which arose in many cases between the field staff of the Geological Survey of India and the Exploratory Tubewells Organisation had to be resolved by reference to the respective headquarters at Calcutta and Delhi. The nature of differences were stated to be both organisational and technical. Details regarding the nature of differences and a few typical instances of dispute are enclosed as Appendix II.

Project II.

7. The Committee were informed that in view of this it was decided that for Project II the geological and hydrological staff working with the divisions should form part of

the Exploratory Tubewells Organisation and that a Senior Geologist, a Senior Hydrologist and a Junior Geologist should be provided at the headquarters of the Organisation to assist the Chief Engineer. It was stated that close collaboration with the Geological Survey of India would be maintained even under the revised arrangement and that the final report on any area prepared by the Exploratory Tubewells Organisation would be vetted by the Geological Survey of India. *While the Committee appreciate that the revised arrangement may prove more satisfactory from the point of view of unified administrative control, they do not consider it necessary that a temporary organisation such as Exploratory Tubewells should go in for recruitment of geologists, hydrologists etc., on its own through U.P.S.C. for it is doubtful whether with the limited scope for advancement it can attract the right type of persons. In their view a better arrangement would be for the Exploratory Tubewells Organisation to continue to have such staff on deputation from the Geological Survey of India as heretofore.*

8. *The Committee also hope that with the taking over of the geological and hydrological aspects of work by the Exploratory Tubewells Organisation, a corresponding reduction in strength has been effected in the establishment of the Geological Survey of India.*

9. The Committee were informed that equipment worth about Rs. 7.26 lakhs which was originally procured for the Ground Water Exploration Project by the T.C.M. was retained by the Geological Survey of India and not handed over to Exploratory Tubewells Organisation. The Exploratory Tubewells Organisation had a proposal to procure the equipment afresh. *The Committee feel that since the geological equipment had specifically been procured for exploratory tubewells work it may be made available to the Exploratory Tubewells Organisation, thus saving it from fresh expenditure on this account.*

10. The Committee understand that the proforma for writing consolidated report on the geology and ground water resources of a particular composite area had not so far been approved by the Board of Management though it was being provisionally acted upon. The representative of the Ministry stated that the proforma had been sent to the Geological Survey of India for comments which were still awaited. *The Committee recommend that the proforma should be approved early so that the consolidated reports on the result of exploration in an area could be more readily prepared and studied.*



## II. WORKING OF THE ORGANISATION

### A. Targets and achievements

**Target for Project I.**

11. The objective of Project I was to undertake a survey of the economic supplies of ground water in fifteen selected areas for purposes of irrigation and related uses. It was originally proposed to drill approximately 350 exploratory bores in these areas for the collection of the necessary geological and hydrological data. Subsequently in November, 1956 the Geological Survey of India advised re-allocation of the number of bores to each area, which resulted in increasing the total from 350 to 410.

**Revised target.**

12. The Committee further learnt that when the question was again considered in February, 1958 field work had been completed in the Purna basin, the Tapti valley, Saurashtra and Rajasthan and nearly completed in Bihar, Kutch and Kerala. The number of bores in these areas had to be adjusted according to the scientific requirements coming to light after the first few drillings. In addition to more experience being gained in this manner, it also came to notice that in the States like Andhra Pradesh and Orissa, surface irrigation to cover a part of some of the areas had since been provided or projected. In some other areas deep production tubewells had been constructed by the State Governments especially West Bengal and Uttar Pradesh and private parties which could provide some of the required data. It was, therefore, considered necessary to revise the delineation of exploration bores in areas still to be investigated. It was decided that approximately 287 bores would be sufficient to cover the project area. It was also proposed to drill additional 12 holes in West Bengal and 10 holes in Uttar Pradesh if time permitted. Thus the total number of exploratory bores was reduced to 309. Inclusive of an exploratory bore already drilled in Madras the total came to 310.

**Achievements.**

13. A statement showing the area-wise distribution of the revised target of 310 bore-holes for Project I and achievement is included as Appendix III. Out of the revised target, only 282 had been completed in Project I.

**Project II.**

14. The Committee were given to understand that under Project II it was proposed to drill 150 bores. Till the end of March, 1960, 43 bores were actually drilled. A statement showing the targets fixed for exploring wells in

Project II and wells actually drilled upto 31st March, 1960 is enclosed as Appendix IV.

During 1960-61 the Exploratory Tubewells Organisation envisaged drilling of about 108 bores in different areas. Only 47 (43.5 per cent) bores had been drilled upto the end of November, 1960. The Committee hope that speedier progress will be made during the remaining months in order to achieve the target, for 1960-61.

15. The Committee were informed that the project undertaken by the Organisation was conceived and planned as an important part of the Grow More Food Plan. A large part of the Indo-Gangetic plain was known to have substantial supplies of underground water that could be economically developed. The need for irrigation was urgent in other promising areas, but the existing information on the geological conditions was not adequate to justify the expense on immediate development. The Exploratory Project was essentially intended to supply the scientific information for such areas as soon as possible for undertaking development.

Part of the  
Grow More  
Food Plan.

16. When the Committee desired to know the area actually irrigated as a result of the Project, they were informed that no precise statistics regarding area so irrigated were available with the Organisation. Two statements later furnished to the Committee giving the estimates of acreage that could be brought under irrigation alongwith the possible extra produce therefrom in respect of successful wells and potentialities of bringing further areas under irrigation in different areas already explored are enclosed as Appendices V and VI. *The Committee feel that the Organisation should maintain accurate statistics of areas brought under perennial irrigation and the increase in agricultural production achieved as a result of the project. It need hardly be pointed out that such data is essential to assess whether successful wells have been able to irrigate land to such an extent as to justify expenditure on the Exploratory Tubewells Organisation.*

Area Irrigated.

17. The Committee learnt that it was proposed to continue the Exploratory Tubewells Organisation in the Third Five-Year Plan for groundwater exploration in suitable areas. A proposal was under consideration for strengthening the Organisation by the provision of four high-powered percussion drilling rigs and other ancillary equipment to be imported under foreign aid. The Organisation would then be capable of drilling 500 exploratory bores during the Third Plan period. In addition to its normal work, it was also proposed that the Organisation should tackle special problems met with in South Punjab and northern parts of Rajasthan where the bed rock was at a shallow depth.

Third Plan  
target.

18. It was also proposed that the Exploratory Tubewells Organisation should construct about 250 irrigation tubewells for State Governments during the Third Plan period. The representative of the Ministry stated that in addition to these the State Governments themselves would be constructing 3,000 production wells.

### B. Successful Wells

Criterion.

19. The Committee were informed that the criterion of a successful well was fixed somewhat arbitrarily at 20,000 imperial gallons per hour or more at a moderate drawdown of 20 feet. Wells producing smaller yields were not considered as failures but as less economical to run. The Committee were informed that Madras Government had accepted a bore for conversion into production well though it yielded only 4,000 imperial gallons per hour whereas certain other States viz., Punjab, U.P. and West Bengal did not accept bores yielding more than 10,000 imperial gallons because of the draw-down being more than 20 feet. *The Committee are of the view that the criterion fixed needs a careful review to see if even lower specification would do taking into account its economics. There may be special relaxation of the specification in the case of scarcity areas.*

Need for improving methods of exploration.

20. A statement showing the number of bore-holes drilled in Project I and those which proved successful is enclosed as Appendix VII. It is evident from this statement that though the overall percentage of successful borings is 55.71 per cent, in certain areas e.g., Purna Basin, Tapti Valley, Rajasthan and Kerala the percentage of success has been less than 20 per cent—in Purna Basin not a single bore-hole out of 14 was successful. The representative of the Organisation stated during evidence that the geological information only indicated the probability of striking water. He added that with the application of geophysical methods lately developed it might be possible to make better selection of areas for water exploration. *The Committee consider it imperative that the geological, hydrological and geophysical methods are fully pressed into service to assure reasonable chances of success of drilling operations.*

The Committee welcome in this connection the appointment of the Achievement Audit Committee headed by Dr. D. N. Wadia to review the working of the Organisation. *They hope that it would indicate improved techniques to be adopted by the Organisation which would appreciably increase the percentage of successful exploration.*

Delay by States in selecting bore holes.

21. The Committee were informed that prior acceptance of the State Governments was necessary for the development of bores into production wells. Delays by the State Governments in taking and communicating decision blocked the

progress of work of the Organisation since the equipment for drilling had to be detained at least for some days awaiting the decision. If the decision was unduly delayed, the auxiliary equipment was transferred to a new place to avoid the equipment remaining idle indefinitely, but in case the State Government subsequently rejected the bore hole, it had to be brought back to the same site to pull out the pipes. Another result, a more serious one, was that if the State authorities rejected the bore-holes after a lapse of time, the tubes imbedded in the bore were often a total loss since the interior parts dried in the meanwhile.

22. The representative of the Ministry stated during evidence that a loss of Rs. 70,000 had been incurred so far on account of non-recovery of imbedded pipes. The pipes lost as such were all imported and therefore it was difficult to obtain them in India. *The Committee recommend that effective steps should be taken to eliminate such loss.*

23. The Committee were informed that tubewells transferred to State Governments were classified into three categories viz.—

Mode of determination of cost of successful wells.

- (i) Tubewells giving discharge of 20,000 gallons per hour or more at 20 ft. draw down;
- (ii) Tubewells giving discharge of less than 20,000 gallons per hour but more than 15,000 gallons per hour; and
- (iii) Tubewells giving discharge of less than 15,000 gallons per hour.

The mode of determination of cost for these three categories is stated in detail at Appendix VIII.

The cost of the tubewells transferred to the State Governments was shown as a loan carrying 4½ per cent interest, repayable in fifteen annual instalments.

24. The Committee were informed of two instances where though the State Governments had refused to accept development of bore-holes into production wells, an individual person and a panchayat were prepared to bear the cost of tubewells. It was stated that Exploratory Tubewells Organisation was not empowered to convert boreholes into production wells on behalf of private persons and organisations. *The Committee recommend that where boreholes are not accepted by the State Governments, they may be handed over to cooperatives, private persons and organisations, if they are prepared to bear a reasonable proportion of the cost of tubewells so as to avoid the entire expenditure becoming infructuous.*

Wells not accepted by States may be handed over to private parties.

Utilisation  
of successful  
wells.

25. The Committee understand that little development has been made around the tubewell in Chandan (Rajasthan) and that it had not been utilised by the State Government though it was handed over to them in 1958. This was the only successful well out of ten boreholes drilled in Project I in Rajasthan. It gave a phenomenal discharge of 55,500 U.S. gallons per hour at a drawdown of 17.68 ft. It was stated that the Exploratory Tubewells Organisation was responsible only upto the stage of installation of a punipset and that it was for the State Government to arrange for the working of tubewells, distribution of water to the cultivators and fixing the water rate. The Committee understand that the real difficulty was that the Rajasthan Government had not considered it economically worthwhile to work only one production well and that the Exploratory Tubewells Organisation was now trying to locate some more successful borings round about Chandan. In this connection the Committee would like to draw attention to the following observations made in an article on 'Ground Water Exploration in India\*' published in November, 1959 in the Journal of the Institution of Engineers (India):

"If the drilling programme had been flexible with regard to field operations, a few more wells in the vicinity of the Chandan well could have been sunk to delineate the actual water bearing area and to ascertain whether we have struck upon an underground river or a lake. As it is further development has now been left to the State authorities and their results will be watched with keen interest."

*The Committee feel that it would have obviously been better if in the first instance more intensive exploration of the area near Chandan had been undertaken. It would be wasteful to stagger the period of work in an area. However desirable wide coverage under the scheme might be, it should not evidently be at the expense of adequate and essential intensive exploratory work.*

26. The Committee were informed that in the Third Plan it was proposed to advise the State Governments on the following lines in order to see that there was as little time lag as possible between the completion of a production tubewell and utilisation of its water:—

- (i) The sites for the tubewells should be selected in a compact area so that the tubewells could be run in groups, making for administrative convenience and economy.

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\*The article is written by Shri D. Mehta, Chief Engineer, Exploratory Tubewells Organisation

- (ii) A programme of civil works, i.e., construction of water channels, pump houses, operators' quarters etc. should be taken up in advance so that it may be completed simultaneously with the construction of the tubewells.
- (iii) Demonstration farms should be set up in the areas served by each tubewell to demonstrate methods and practices which cultivators should adopt to obtain the maximum advantage from tubewell irrigation. In particular, such methods as make for economy in the use of water should be demonstrated.

*The Committee hope that the above measures would curtail the time lag between the completion of a production well and its utilisation to a great extent.*

### C. Distribution of Work

27. As already stated, there were four field divisions in the Organisation each under an Executive Engineer. After completing the work in one area, the Division was moved to another area. A brief history of the four divisions is enclosed as Appendix IX. It would appear therefrom that even in Project I the work of drilling in West Bengal and Uttar Pradesh was handled by two divisions, and while Bombay and West Bengal were included in Division No. I, Saurashtra and Upper Assam were included in Division No. II. Further taking the Second Plan period as a whole the work was entrusted as under:

- (i) From May 1958 to August 1959 Division No. I worked in West Bengal, but from September 1959 to May 1960 this Division was sent to Saurashtra Coastal area;
- (ii) From April 1957 to August, 1958 Division No. II worked in Uttar Pradesh, from March 1959 to May 1960 in Upper Assam and since then in West Bengal;
- (iii) From November 1958 to June 1959 Division No. III worked in Orissa and since then in Rajasthan.

28. The Committee cannot help gathering from the above that the work of the four divisions in the Second Plan was not rationally distributed thus resulting in greater shifting charges, transit time etc. A statement showing the shifting done by each of the Divisions and expenses incurred thereon during each of the last four years is enclosed as Appendix X. It will be seen therefrom that shifting charges incurred upto the 31st March, 1960 amounted to

No Rational  
distribution  
of work.

Rs. 3,92,676 and one drill remained in transit for six months. The representative of the Ministry stated that it was because the work was taken up in two successive projects and the areas to be explored in Project II were not known during Project I.

*The Committee recommend that during the Third Plan period the work of boring in all the areas may be chalked out as a whole and rationally distributed so as to minimise the shifting charges and transit time. A perspective plan may be drawn up covering a sufficiently long period upto which the organisation is likely to exist and areas for exploration selected from time to time keeping this point in view.*

#### **D. Ground water Exploration for Domestic water supplies**

Requests  
by State  
Govern-  
ments.

29. The Committee were given to understand that some State Governments had desired that the Exploratory Tubewells Organisation might undertake exploration at certain places to find out groundwater potentialities for domestic purposes. It was stated that the proposal was considered by the inter-departmental Board of Management at its meeting held on the 25th April, 1960 in the light of the primary objective of the Organisation of exploration for irrigation purposes. A note considered by the Board in this connection is given at Appendix XI. The Board reached the following decisions at their meeting:

- (i) Ordinarily Exploratory Tubewells Organisation should not undertake exploratory drilling for domestic water supply purposes. However in cases where, there were large areas in which supply of drinking water was an acute problem, Exploratory Tubewells Organisation might assist by collecting, during the course of its work, information as might be useful to the State Government or to the people to undertake construction of wells for drinking and domestic purposes; and
- (ii) Where, however, State Government wished the Organisation to explore large compact areas for determining availability of water for drinking and other public health purposes, and was prepared to bear the entire cost of production wells yielding specified quantity, say 2,000 gallons per hour of potable water, the Organisation might take up the work. (Such an arrangement it was stated had been made with the Rajasthan East Canal authorities for exploring the Canal Zone.)

30. The representative of the Ministry stated in his evidence that the requirements of exploring sites for irrigation purposes and for domestic water supplies were different as the requirements of water differed in the two cases in quantity and quality and that they could not have both the objectives together.

31. *As one of the prime necessities of life is drinking water, the Committee are of the view that provision of potable water could not be a less worthy purpose to be served by the Organisation. Requests of State Governments for exploration of areas for domestic water supplies should merit sympathetic consideration. They are also of the view that an assessment may be made as to how far it would be useful to link the tubewells organisation with the "National Rural Water Supply Scheme" in view of the fact that in some parts of the country like the arid areas in Rajasthan, tubewells are the only answer for providing drinking water.*

#### E. Miscellaneous

32. The Committee understand that deep production tubewells have been constructed by some State Governments especially West Bengal and Uttar Pradesh and private parties. *They recommend that a comparative study of the cost of construction of deep production wells by the State Governments, leading firms and Exploratory Tubewells Organisation may be undertaken. The trend of cost incurred on bore-holes and on construction of production tubewells may be carefully watched to ensure that as the work progresses there is corresponding decrease in cost.*

Comparative  
study of  
cost.

33. The Committee were informed that as a major part of the equipment for the project was imported from abroad and the field divisions were scattered over different parts of the country, a Central Stores under an Executive Engineer was set up at Bhusaval. In addition to the essential spares for vehicles and equipment, all the piping required for the project, diesel engines, test pumps, pumping sets, gear-head drives, welding sets etc. were stored at Bhusaval for despatch to the divisions as and when required.

Central  
Stores,  
Bhusaval.

34. It was stated that the value of stores lying at Central Stores, Bhusaval as on the 31st March, 1960 was Rs. 33,95,900. The stock was verified at the end of every half year by the Officer-in-charge. A physical verification of the stores was made by an independent officer (Assistant Engineer-Headquarters) during February—March 1958.



No such verification was made subsequently. Since the stores lying at Bhusaval are of substantial value, the Committee recommend that the stores may be verified by an independent officer at least once a year.

NEW DELHI-1;  
The 29th March, 1961.  

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The 7th Chaitra, 1883 (Saka).

H. C. DASAPPA,  
Chairman,  
Estimates Committee.

## APPENDIX I

(Vide para 5)

### *Composition of the original and reconstituted Inter-Departmental Board of Management*

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#### *Composition of the original Board*

1. Secretary, Ministry of Food and Agriculture—Chairman
2. Production Commissioner.
3. Joint Secretary, Ministry of Finance, F. & A. Division.
4. Joint Secretary, Ministry of Finance, E.A. Department.
5. Irrigation Adviser.
6. Tubewell Projects Administrator.

#### *Composition of the reconstituted Board*

- |   |           |                   |
|---|-----------|-------------------|
| 1. Deputy Minister (Agriculture)  | · · · · · | Chairman          |
| 2. Financial Adviser, Ministry of Food and Agriculture or his representative. |           | Member            |
| 3. Deputy Secretary, Department of Mines and Fuel                             | ·         | Member            |
| 4. Superintending Geologist, Geological Survey of India                       | ·         | Member            |
| 5. Irrigation Adviser to the Government of India, Department of Agriculture   | · · · · · | Member            |
| 6. Chief Engineer, Exploratory Tubewells Organisation                         | ·         | Member            |
| 7. Tubewell Projects Administrator, Department of Agriculture                 | · · · · · | Member-Secretary. |

## APPENDIX II

(Vide para 6)

**Details regarding the nature of differences between the staff of the Exploratory Tubewells Organisation and Geological Survey of India and a few typical instances of dispute**

### NATURE OF DIFFERENCES

- (1) Delay on the part of the Geologists in resumption of field work after the recess period.
- (2) Closure of field camp of the Geological Survey of India when the work for the season was not completed in all respects.
- (3) Extremely theoretical attitude on the question of usage of natural pea gravel, involving transport of gravel over hundreds of miles.
- (4) Demanding elaborate individual aquifer performance tests purely from a research angle ignoring the requirements of the job and expediency.
- (5) Full sanctioned strength of Senior geologists not being made available in the field resulting in the Juniors, unable to take decisions on the spot, making frequent references to Calcutta for instructions.
- (6) Disregard of the suggestions given by the engineers both American and Indian.

### INSTANCES

#### 1. Soro (Orissa State)

Two Exploratory wells were drilled at this site, one to a depth of 971' and the other to 806' as desired by the Geological Survey of India. On completion of the first well which yielded 9,000 I.G.P.H. at 45:48' draw down, the Executive Engineer, III, vide his No. D.O. Div.III/0-4/58-525 dated 22nd January, 1959 informed the Superintending Geologist, Calcutta, that the reconstruction of the well at an adjoining site would not give better results. The Superintending Geologist was also addressed by Chief Engineer demi-officially vide No. 31-4/59/S&O/2986 dated 2nd February, 1959 confirming the above, but the Superintending Geologist, Geological Survey of India did not agree to Exploratory Tubewells Organisation's opinion and insisted on reconstruction of another well within 100 ft. or so of the first well. Consequently, another bore was drilled to a depth of 806' and a production well was completed to a depth of 728', but the discharge of the second well was found to be 10,500 I.G.P.H. @45' D.D. which was not much better than discharge from the first well. Both these wells were originally not acceptable to the State Government but later on these were accepted after protracted correspondence.

## 2. Nalya (Kutch)

Drilled to 700' (date 18th October, 1957. The water was found highly saline. The Exploratory Tubewells Organisation, and Geological Survey of India field officers at a meeting on 19th October, 1957 decided to abandon the hole on the basis of Electric logging results. But the Superintending Geologist, Geological Survey of India, Calcutta, instructed the field party by wire dated 21st October, 1957 to test the zones, 44—50; 109—126; 140—160; 250—262; 282—306; 416—445 and 456—480. Zones 44—306 for yield and quality, 416—480 for quality only.

The Superintending Geologist was requested by letter dated the 4th November, 1957 and telegram dated 8th November, 1957 to revise his decision to which he did not agree. Elaborate tests were therefore conducted which concluded on 18th November, 1957 and the hole was ultimately abandoned.

## 3. Alamgir (Punjab)

Drilling completed on 17th July, 1958 to a depth of 960'. The hole was electrically logged on 18th July, 1958. The Senior Geologist at site informed *vide* his letter No. P.N.B./288/58, dated 18th July, 1958 that due to non-conformity between the Electrical log and Lithological log, he had referred the matter to the Superintending Geologist at Calcutta for his advice. It was anticipated by the Asstt. Executive Engineer (IV) that it was doubtful if an aquifer of 26' thickness encountered would make a successful production well. The Superintending Geologist did not agree and *vide* their No. PNB/296/58, dated the 24th July, 1958, a production well was constructed which yielded only 10,000 I.G.P.H. at 65' draw down and this was not accepted by the State Government, being sub-standard.

## 4. Ditpur (West Bengal)

The construction of the tubewell at Ditpur started on the 27th July, 1958 and was completed on 28th July, 1958 but the Geologists left on 28th/29th July without attending to the tests, in spite of Executive Engineer's protests.

## 5. Punyakshetram (Andhra Pradesh)

On the 26th July, 1958, the well at site No. 5 (Punyakshetram) was nearing completion and rigs had been set up at site No. 1 (Perai-Ramchandrapuram) ready for drilling. The weather conditions were also favourable. The Geologists, however, wound up their camp and left. The Executive Engineer III sent a telegram on 26th July, 1958 to the Superintending Geologist, Calcutta protesting against this and requesting him to instruct the Geologists to stay on. This was of no avail.

## 6. Balana (Punjab)

Franks rig was shifted on 25th April, 1958, but the drilling could not start till the 17th of May, 1958, as Geological Survey of India insisted that last well in Hasanpur (Bhiwani area) should be completed first. Due to this 18 Rig days were lost.

Since the Geological Survey of India closed their camp on 29th July, test at Balana could not be carried out till 7th August, 1958 as no geological Survey of India personnel were present to conduct the test. On account of this 9 days were lost.

#### 7. Dholia (Rajasthan)

Digging of pits and mud mixing were completed on 17th February, 1957, but the drilling could not start before the 26th February, 1957, as there was only one party of Geological Survey of India and that party was busy at Star Rig Site and thus 9 days were lost.

#### 8. Palri (Punjab)

The hole was abandoned by the Geological Survey of India field party but as the Geological Survey of India headquarters (Calcutta) did not approve of the decision, the well had to be tested again on orders from Calcutta Office. The rig had to be shifted back from Nahar site for the tests.

#### 9. Bichhiya (Bihar)

Pilot hole drilling and Electric logging were completed at this site on 13th May, 1957. The Field Geologist could not recommend the assembly and gravel required for the borehole in the field. The recommendations were received from Geological Survey of India, Calcutta on 16th May, 1957 *vide* their letter No. 3680 dated 15th May, 1957. The gravel recommended for the borehole 1|16" to 1|8" grade was not available. Pending procurement of gravel the Field Geologists were requested to attend to the Rig at the next location for drilling pilot hole to ascertain the size and quantity of gravel for that site. But they refused to do so unless they were instructed by the Geological Survey of India, Calcutta. The Rig had to remain idle at the site from 13th May, 1957 to 25th May, 1957 waiting for instructions from the Geological Survey of India, Calcutta.

The above differences arose mainly because the two wings of the project were having parallel administrations and there was no unified control over the field operations. With the new set-up these delays have been obviated.

### APPENDIX III

(Vide para 13)

*Statement showing the target fixed for exploring wells in Project I and achievements thereof*

Sl. No.	Name of Area	Date of commencement	No. of sites completed		Date of completion	
			No. sites allotted for exploration	No. drilled		
				No. converted into production well.		
1	2	3	4	5	6	7
1	Narbada Basin (Madhya Pradesh)	January, 1955	30	30	16	March, 1956.
2	Tapti Valley (Bombay & M.P.)	May, 1956	18	18	2	Feb., 1957.
3	Purna Basin (Bombay)	Jan., 1957	14	14	Nil	April, 1957.
4	Saurashtra (Bombay)	Oct., 1956	9	9	2	April, 1957.
5	Rajasthan	Oct., 1956	10	10	1	August, 1957.
6	Kerala	Dec., 1957	5	5	1	Feb., 1958.
7	Madras	Oct., 1956	39	40*	27	April, 1958.

\*One additional bore done in Madras.

1	2	3	4	5	6	7	
8	Kutch (Bombay)	.	.	April, 1957	10	10	April, 1958.
9	Andhra	.	.	April, 1958	15	15	November, 1958.
10	Bihar	.	.	May, 1957	16	16	April, 1958.
11	Punjab	.	.	April, 1957	38	38	Dec., 1958.
12	Orissa	.	.	Nov., 1958	14	14	June, 1959.
13	Uttar Pradesh	.	.	April, 1957	39	30	Remaining 9 sites in the Bhabar areas transferred to Project II.
14	West Bengal	.	.	May, 1958	37	33	Remaining 4 sites (including one in the Bhabar area) transferred to Project II.
15	Assam	.	.	March, 1959	15	..	Only 4 pilot holes were drilled; remaining work transferred to Project II.
<b>TOTAL</b>					309	282	147

## APPENDIX IV

(Vide para 14)

*Statement showing the targets fixed for exploring wells in Project II and wells actually completed upto 31st March, 1960*

Sl. No.	Name of the area	Date of commencement	No. of sites completed upto the month of March, 1960		Date of completion
			No. of sites allotted for exploration	No. of sites drilled	
			No. drilled	No. converted into production wells	
<i>Second Project</i>					
1	Saurashtra Area	Nov., 1959	31	21	Nil
2	North Gujarat area	..	24	..	..
3	West Bengal	..	4 plus 2	4	4
4	Assam	Nov., 1959	15 plus 11	9	9
5	Rajasthan	Nov., 1959	15	6	1
6	Rajasthan Canal Area	..	12	..	..
7	U.P.	Nov., 1959	9 plus 1*	3	3
8	Punjab	..	8	..	..
9	Himachal Pradesh	..	5	..	..
10	Tripura	..	5	..	..
11	Other areas	..	8	..	..
<b>TOTAL</b>			<b>150**</b>	<b>43</b>	<b>17</b>

\*\*Sites allotted are on the basis of Programme approved at the Inter-Departmental Board of Management for Exploratory Tubewells and those carried forward from Project I.



**APPENDIX V**  
(Vide para 16)

*Statement showing the acreage that could be brought under irrigation and the possible extra produce therefrom in respect of successful wells*

Sl. No.	Area	State	No. of successful tube-wells irrigated (Estimated)	Acreage that can be irrigated (Estimated)	Possible additional production (estimated)	Remarks
1	2	3	4	5	6	7
				Acres	Tons	
1	Narbada Valley	Madhya Pradesh	16	4,800	960	
2	Tapti Valley	Maharashtra	2	600	120	
3	Saurashtra	Gujarat	2	100	20	One well used for salt works.
4	Rajasthan	Rajasthan	1	300	60	
5	Kerala	Kerala	1	150	30	
6	Madras	Madras	28	7,800	1,560	Two wells for drinking.
7	Kutch	Gujarat	4	1,200	240	
8	Andhra	Andhra Pradesh	11	3,000	600	
9	Bihar	Bihar	7	2,100	420	
10	Punjab	Punjab	11	2,100	420	Three wells yet unaccepted due to discharge and one for drinking

11	Orissa	.	.	.	.	13	3,600	720	One well for drinking.	
12	Uttar Pradesh	.	.	.	.	22	5,400	1,080	Three wells not accepted due to quality and 1 well due to low discharge.	
13	West Bengal	.	.	.	.	31	8,700	1,740	One well not accepted; another recently abandoned.	
TOTAL							149	39,850	7,970	

N.B.—Figures in Col. 5 & 6 are on a conservative side, as the majority of wells are yielding more than 20,000 gallons per hour particularly in West Bengal, Bihar, Assam and parts of Madras and are capable of irrigating bigger areas.

## APPENDIX VI

(Vide para 16)

*Potentialities of bringing further areas under irrigation in different areas already explored (Project I).*

Sl. No.	Area	State	Extent explored	No. of production wells possible	Acreage that can be irrigated	Possible additional production estimated	Remarks
			Sq. Mls.			Tops	
1	Narbada Valley	Madhya Pradesh	5,000	400	1,20,000	24,000	
2	Tapti Valley	Maharashtra	4,000	40	12,000	2,400	
3	Saurashtra	Gujarat	1,900		Large scale tubewell irrigation not possible.		
4	Rajasthan	Rajasthan	80,000	30	9,000	1,800	Ultimate potentialities being ascertained by further tests.
5	Kerala	Kerala	500	25	7,500	1,500	
6	Madras	Madras	2,600	400	1,20,000	24,000	
7	Kutch	Gujarat	5,760	200	60,000	12,000	
8	Purna Valley	Maharashtra	600	..	Large scale tubewell irrigation not possible.		

9	Bihar	.	.	.	.	7,000	500	1,50,000	30,000
10	Punjab	.	.	.	Punjab	6,800	100	30,000	6,000
11	Orissa	.	.	.	Orissa	304	100	30,000	6,000
12	Uttar Pradesh	.	.	.	Uttar Pradesh	8,320	1,000	3,00,000	60,000
13	West Bengal	.	.	.	West Bengal	7,000	1,000	3,00,000	60,000
14	Andhra	.	.	.	Andhra	404	200	60,000	12,000
15	Assam	.	.	.	Assam	6,100	300	90,000	18,000
TOTAL						1,36,388	4,295	12,88,500	2,57,700

## APPENDIX VII

(Vide para 20)

*Boreholes drilled in Project I and those which proved successful*

Area	Total No. of boreholes	Abandoned	Success- ful	% Success- ful
1	2	3	4	5
(1) Narbada Valley	25 + 5 slim holes	9	16	64
(2) Tapti Valley	14 + 4 slim holes (for de- lineation only)	12	2	14.3
(3) Purna Basin	14	14	..	..
(4) Saurashtra	9	7	2	22.2
(5) Madras	40	13	27	67.5
(6) Kerala	5	4	1	20
(7) Rajasthan	10	9	1	10
(8) Punjab	36	25	11	30.5
(9) Andhra	15	4	11	73.33
(10) Bihar	16	9	7	43.75
(11) Orissa	14	2	12	85.71
(12) U.P.	30	8	22	73.33
(13) Kutch	10	6	4	40
(14) West Bengal	33	2	31	94
	271 + 9 slim holes	124	147	54.2
(15) Upper Assam	15 (9 comp- leted)	..	9	100%
TOTAL		124	156	55.71%

## APPENDIX VIII

(Vide para 23)

### *Mode of determination of cost for successful wells transferred to the State Governments*

(1) *Tubewells giving discharge of 20,000 gallons per hour or more at 20 ft. depression*

(i) *Works Expenditure:*

- (a) Cost of all materials permanently installed on the tubewell. This will include the cost of blank pipes, strainers, engine, pump etc. plus cost of their installation.
- (b) Cost of developing and testing including cost of gravel laid in the bore.
- (c) Cost of Drilling and reaming.
- (d) Depreciation charges on the Machinery used on the construction of well.

(ii) Overheads @100 per cent of (i) on account of establishment and supervision charges.

(2) *Tubewell giving discharges of less than 20,000 gallons per hour but more than 15,000 gallons per hour*

- (a) Cost of all materials permanently installed on the tubewell. This will include the cost of blank pipes, strainers, engine, pump etc. plus cost of their installation.
- (b) Cost of developing and testing including cost of gravel laid in the bore.
- (c) Cost of reaming done after the stage of abandonment of bore as unsuccessful; and
- (d) Depreciation charges [as in i(d) above] on the depth of reaming done.

(3) *Tubewells giving discharge less than 15,000 gallons per hour*

The bare cost of pipes installed in the bore minus the cost of extraction of the pipes likely to have been incurred if the tubewell had not been accepted by the State Government.

## APPENDIX IX

(Vide para 27)

### Brief history of the four divisions of the Exploratory Tubewells Organisation

#### Division No. I

Division No. I started on 1st June, 1956 and has covered the following areas:—

- |   |   |  |
|---|---|--|
| (i) Purna Valley in Bombay State from January, 1957 to April, 1957                      | } | Under Project I completed in August, 1959.     |
| (ii) Tapti Valley (Bombay State) now Maharashtra State from May, 1956 to February, 1957 |   |  |
| (iii) Bihar State, from May, 1957 to April, 1958.                                       |   |  |
| (iv) West Bengal, from May, 1958 to August, 1959  |   |  |
| (v) Saurashtra—Coastal area from September, 1959 to May, 1960.                          |   | Under Project II started from September, 1959. |

Work in other areas of Gujarat and Kutch is being taken up.

#### Division No. II

Division No. II started on 1st December, 1956 (before December, 1956, Division II was a sub-division under the Headquarters Division). It has covered the following areas:—

- |   |   |                  |
|---|---|------------------|
| (i) Zalawad district of Saurashtra from October, 1956 to April, 1957.               | } | Under Project I. |
| (ii) Kutch from April, 1957 to April, 1958.   |   |                  |
| (iii) Uttar Pradesh, from April, 1957 to August, 1959.                              |   |                  |
| (iv) Upper Assam (work carried over from Project I), from March, 1959 to May, 1960. |   |                  |
| (v) West Bengal—Work under Project II is in progress.                               |   |                  |

*Division No. III*

Started in December, 1956 (Before December, 1956 it was working as a Sub-Division of the Headquarters Division). It has covered the following areas:

- |  |   |  |
|--|---|--|
| <ul style="list-style-type: none"> <li>(i) Madras State, from October, 1956 to April, 1958.</li> <li>(ii) Andhra Pradesh, from April, 1958 to March, 1959.</li> <li>(iii) Kerala, from December, 1957 to February, 1958.</li> <li>(iv) Orissa, from November, 1958 to June, 1959.</li> <li>(v) Rajasthan—Jaisalmer and Barmer area.</li> </ul> | } | <p>Project I.</p> <p>Work under Project II is in progress.</p> |
|--|---|--|

*Division No. IV (Formerly known as Division Headquarters)*

After the closure of the Central Ground Water Organisation in 1948, a Sub-Division was retained in Delhi to carry on the work of construction of tubewells around Delhi on deposit work basis. When the Exploratory Tubewells Organisation was started, this Sub-Division was expanded into a Division with Headquarters at Delhi. This Division has covered the following area:

- |   |   |  |
|---|---|--|
| <ul style="list-style-type: none"> <li>(i) Narmada Valley in Madhya Pradesh, from January, 1955 to March, 1956.</li> <li>(ii) Rajasthan, from October, 1956 to August, 1957.</li> <li>(iii) Punjab, from April, 1957 to December, 1958.</li> <li>(iv) U.P. Bhabar area: In progress.</li> </ul> | } | <p>Project I.</p> <p>In continuation of Project I.</p> |
|---|---|--|



## APPENDIX X

(Vide para 28)

*Statement showing the shifting done by each of the Divisions and expenses incurred therefor during each of the last four years*

Shifting from and to	Expenditure incurred during the year					Total
	1956-57	1957-58	1958-59	1959-60	1960-61	
I	2	3	4	5	6	
	<b>DIVISION I</b>					
Pipariya to Itarsi and Bhusawal(*)	1,500.72 4,946.06	..	..		6,446.78	
Pipariya to Dharangadhra	1,396.91	..	..		1,396.91	
Pipariya to Madras	2,104.19	..	..	553.73	2,657.92	
Bhusawal to Akola	3,141.78	..	17.25		3,165.31	
Akola to Aurangabad (South Bihar)	208.03	..	..		24,519.31	
South Bihar to West Bengal	..	1,451.54	5,278.95	..	6,719.49	
Bankura to Krishnagar	..	..	4,381.99	268.00	4,649.99	
<i>Shifting of—</i>						
Reverse Rig from Div. I to New Delhi.		..	1,377.65	14.50	1,392.15	
Krishnagar to Raiganj			18,302.85	3,004.18	21,324.68@	
Raiganj to Rajkot			..	70,745.70	70,745.70	
<i>Shifting of—</i>						
Mayhew Rig to Assam Division II		..	10.31	1,132.90	1,143.21	

*Shifting of—*

Frank Rig FD 4 from Division I to Division III

	197-94	197-94	197-94
TOTAL	13,297.69	25,769.10	29,369.00
		75,905.95	1,46,218.69
			2,057.24

DIVISION II

Pipariya to Dharangadhra (Saurashtra)*	1,391.57	..	..	1,391.57
Pipariya to Dharangadhra (Saurashtra)	791.75	..	(-)-791.75	Nil
Dharangadhra to Kutch (Bhuj)	Nil	2,692.01	..	2,872.01
Dharangadhra to Mathura	Nil	14,052.08	(-)-4.00	13,868.75
Bhuj to Mathura	Nil	4,653.00	21,004.44	25,576.40
Mathura to Bankura	..	..	10,811.99	10,811.99
Mathura to Nainital	..	..	7,722.00	7,722.00
Mathura to Ranibagh and Jaunpur	..	..	17,250.62	17,310.47
Jaunpur to Rangiya (Assam)	..	..	6,448.93	15,742.11

*Shifting of—*

One Rig from Division II to Division I  
Rajkot

	..	..	..	6,664.74
TOTAL	2,183.32	21,397.09	62,442.23	1,05,243.78

*Shifting of—*

One Rig from Jaunpur to West Bengal

	..	..	..	3,283.74
TOTAL	..	..	..	3,283.74

(\* ) Adjusted by late Headquarter Division now division IV.

(@) A sum of Rs. 17.65 has been booked during 5/60.

(£) A sum of Rs. 1,859.30 has been booked during 1960-61.

1	2	3	4	5	6
DIVISION III					
Pudukkottai to Dhowleshwaram (Andhra)	Nil	1,695.25	23,824.17	Nil	25,519.42
Dhowleshwaram to Balasore (Orissa)	Nil	Nil	21,705.62	Nil	21,705.62
Balasore to Cooch Bihar	Nil	Nil	87.72	8,447.69	8,535.41
Cooch Bihar to Balasore (Orissa)	Nil	Nil	Nil	10,286.09	10,286.09
Balasore to Jodhpur (Rajasthan)	Nil	Nil	Nil	30,834.44	30,834.44
<i>Shifting of—</i>					
Falling Rig from Division III to Division I	Nil	Nil	Nil	4,531.55	4,531.55
Balasore to Rangiya	Nil	Nil	Nil	1,933.42	1,933.42
<i>Shifting of—</i>					
Rig from Bezwada to Bhusawal	Nil	Nil	Nil	15.33	15.33
<i>Shifting of—</i>					
Rig from Bhusawal to Sauratgrah via Delhi	Nil	Nil	Nil	93.38	93.38
Pipariya to Madras*	553.73	Nil	Nil	Nil	553.73
TOTAL	553.73	1,695.25	15,617.51	56,141.90	1,04,008.39

	DIVISION IV					
Pokran to Rewari	.	Nil	11,754.66	4,573.55	Nil	16,328.21
Rewari to Bhiwani	.	Nil	1,272.33	31.50	410.88	1,714.71
Bhiwani to Ambala	.	Nil	Nil	963.82	Nil	963.82
Ambala to Ranibagh	.	Nil	Nil	10,868.13	7,185.83	18,053.96
Delhi to Ranibagh	.	Nil	Nil	Nil	144.77	144.77
<b>TOTAL</b>	.	Nil	13,026.99	16,437.00	7,741.48	37,205.47

\* adjusted by late Headquarter Division now Division IV.

## APPENDIX XI

(Vide para 29)

### *Note considered by the inter-departmental Board of Management on Groundwater Exploration for Domestic water supplies*

The Punjab Government have requested that the Exploratory Tubewells Organisation may be asked to undertake exploration at 12 sites in the Districts of Rohtak, Hissar, Mohindergarh, Bathinda, Ferozepur and Ambala to find out groundwater potentialities of the areas for domestic purposes. The Rajasthan Government are also keen on similar exploration for providing water supplies to towns like Jaisalmer, Barmer and Jodhpur.

2. The primary function of the Exploratory Tubewells Organisation is to ascertain groundwater potentialities for the purpose of irrigation and related uses. Originally, the criterion for selection of areas for exploration was whether there was reasonable possibility of obtaining a minimum discharge of 20,000 gallons per hour. This criterion has since been made flexible and even less promising areas are being taken up for exploration if the State Government concerned considers that tubewells with a lower discharge could also be utilised. For domestic water supply, however, even a still lower discharge might be sufficient but areas with such poor prospects are not being selected for exploration at present.

3. Water supply for domestic purposes is the responsibility of the Ministry of Health. That Ministry has, however, no Organisation for carrying out exploration to ascertain the possibility of water supply from groundwater resources. The matter has, therefore, been left to the State Governments concerned, but they also are not equipped with necessary rigs and technical personnel for this kind of work. The problem is acute in areas such as Rajasthan and the contiguous areas of the Punjab where there is great shortage of water which can only be relieved by sinking deep wells. In such areas it may be desirable that Exploratory Tubewells Organisation should carry out exploration to enable the State Governments to formulate schemes for village and town water supplies. However, there are practical difficulties in taking up such exploration. Such exploration if confined to certain places and not to an area, for example a municipal town, would be in scattered places and will involve considerable waste of time in movement of rigs from one distant point to another. Supervision would also be difficult. Moreover, there are private firms available to take up tubewells of this kind and it seems that the only reason why Exploratory Tubewells Organisation is being asked to do this work is that Exploratory Tubewells Organisation does not charge for unsuccessful wells. There seems to be no reason why Government of India should bear the risk and cost of failure in order to assist a particular municipality or local board to carry out its water supply scheme. It is, therefore suggested that

the Exploratory Tubewells Organisation should not undertake exploratory drilling for domestic water supply in such cases, where however there are large areas in which supply of drinking water is an acute problem. Exploratory Tubewells Organisation may assist in the following manner:—

- (a) if in such an area Exploratory Tubewells Organisation has undertaken exploration, Exploratory Tubewells Organisation should collect all information as may be useful to the State Government or to the people to undertake construction of wells for drinking and domestic purposes. It may be necessary in such areas to have complete tests of each individual aquifer both as to the quality and quantity of water; and
- (b) if a State Government wishes to explore large compact areas for determining availability of water for drinking and other public health purposes. Exploratory Tubewells Organisation may take up exploration provided the State Government agree to accept wells and bear the entire cost of production wells yielding specified quantity say 2,000 g.p.h. of potable water. Such arrangement has been made with the Rajasthan East Canal authorities for exploring the canal zone.

## APPENDIX XII

### *Summary of Recommendations/Conclusions contained in the Report*

Serial No.	Reference to Paragraph No. of the Report	Summary of recommendations/conclusions
1	2	3
1	5	The Committee feel that either the Board of Management should function effectively or it should be wound up.
2	7	While the Committee appreciate that the revised arrangement of having geological and hydrological staff as a part of the Exploratory Tubewells Organisation may prove more satisfactory from the point of view of unified administrative control, they do not consider it necessary that a temporary organisation such as Exploratory Tubewells should go in for recruitment of geologists, hydrologists etc. on its own through U.P.S.C. for it is doubtful whether with the limited scope for advancement it can attract the right type of persons. In their view a better arrangement would be for the Exploratory Tubewells Organisation to continue to have such staff on deputation from the Geological Survey of India as heretofore.
3	8	The Committee hope that with taking over of the geological and hydrological aspects of work by the Exploratory Tubewells Organisation, a corresponding reduction in strength has been effected in the establishment of the Geological Survey of India.
4	9	The Committee feel that since the geological equipment had specifically been procured for exploratory tubewells work it may be made available to the Exploratory Tubewells Organisation, thus saving it from fresh expenditure on this account.
5	10	The Committee recommend that the proforma for writing consolidated report on the geology and ground-water resources of a particular composite area should be approved early so that such reports could be more readily prepared and studied.

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1	2	3
---	---	---

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- |    |    |   |
|----|----|---|
| 6  | 16 | The Committee feel that the Organisation should maintain accurate statistics of areas brought under perennial irrigation and the increase in agricultural production achieved as a result of the project. It need hardly be pointed out that such data is essential to assess whether successful wells have been able to irrigate land to such an extent as to justify expenditure on the Exploratory Tubewells Organisation. |
| 7  | 19 | The Committee are of the view that the criterion fixed for a successful well needs a careful review to see if even lower specifications would do, taking into account its economics. There may be special relaxation of the specification in the case of scarcity areas.  |
| 8  | 20 | <p>(a) The Committee consider it imperative that the geological, hydrological and geophysical methods are fully pressed into service to assure reasonable chances of success of drilling operations.</p> <p>(b) The Committee hope that the Achievement Audit Committee would indicate improved techniques to be adopted by the Organisation so as to appreciably increase the percentage of successful exploration.</p>      |
| 9  | 21 | The Committee recommend that effective steps should be taken to eliminate the loss incurred on account of non-recovery of imbedded pipes.   |
| 10 | 24 | The Committee recommend that where boreholes are not accepted by the State Governments, they may be handed over to cooperatives, private persons and organisations, if they are prepared to bear a reasonable proportion of the cost of the tube-wells so as to avoid the entire expenditure becoming infructuous.  |
| 11 | 25 | The Committee feel that it would have obviously been better if in the first instance more intensive exploration of the area near Chandan (Rajasthan) had been undertaken. It would be wasteful to stagger the period of work in an area. However desirable wide coverage under the scheme might be, it should not evidently be at the expense of adequate and essential intensive exploratory work.                           |
| 12 | 26 | The Committee hope that the measures (mentioned in para 25) would curtail the time lag between the completion of a production well and its utilisation to a great extent.   |



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1	2	3
13	28	The Committee recommend that during the Third Plan period the work of boring in all the areas may be chalked out as a whole and rationally distributed so as to minimise the shifting charges and transit time. A perspective plan may be drawn up covering a sufficiently long period upto which the organisation is likely to exist and areas for exploration selected from time to time keeping this point in view.
14	31	As one of the prime necessities of life is drinking water, the Committee are of the view that provision of potable water could not be a less worthy purpose to be served by the Organisation. Requests of State Governments for exploration of areas for domestic water supplies should merit sympathetic consideration. They are also of the view that an assessment may be made as to how far it would be useful to link the Tubewells Organisation with the "National Rural Water Supply Scheme" in view of the fact that in some parts of the country like the arid areas in Rajasthan, tubewells are the only answer for providing drinking water.
15	32	The Committee recommend that a comparative study of the cost of construction of deep production wells by the State Governments, leading firms and Exploratory Tubewells Organisation may be undertaken. The trend of cost incurred on bore-holes and on construction of production tubewells may be carefully watched to ensure that as the work progresses there is corresponding decrease in cost.
16	34	Since the stores lying at Bhusaval are of substantial value, the Committee recommend that the stores may be verified by an independent officer at least once a year.

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## APPENDIX XIII

### *Analysis of recommendations contained in the Report*

#### I. CLASSIFICATION OF RECOMMENDATIONS

A. Recommendations for improving the organisation and working		
S. Nos. 1,2,5, 8, 11,12, 16	.	= 7
B. Recommendations for effecting economy		
S. Nos. 3, 4, 9, 10, 13, 15	.	= 6
C. Miscellaneous		
S. Nos. 6, 7, 14		= 3

#### II. ANALYSIS OF THE MORE IMPORTANT RECOMMENDATIONS DIRECTED TOWARDS ECONOMY

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Serial No.	No. as per Summary of recommendation	Particulars
1	3	With the taking over of the geological and hydrological aspects of work by the Exploratory Tubewells Organisation, a corresponding reduction in strength should be effected in the establishment of the Geological Survey of India.
2	4	Geological equipment specifically procured for exploratory tubewells work to be made available to the Exploratory Tubewells Organisation, thus saving fresh expenditure on this account.
3	9	Effective steps to be taken to eliminate the loss incurred on account of non-recovery of imbedded pipes.
4	10	Boreholes not accepted by the State Governments to be handed over to cooperatives, private persons and organisations so as to avoid the entire expenditure becoming infructuous.
5	13	Work of boring in all the areas to be chalked out as a whole and rationally distributed in the Third Plan period so as to minimise the shifting charges and transit time.
6	15	The trend of cost incurred on boreholes and on construction of production tubewells to be carefully watched to ensure that as the work progresses there is corresponding decrease in the cost.

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