E. C. No. 656

ESTIMATES COMMITTEE (1969-70)

(FOURTH LOK SABHA)

HUNDRED AND TWENTY-SIXTH REPORT

MINISTRY OF PETROLEUM & CHEMICALS AND MINES & METALS (DEPARTMENT OF MINES & METALS)

Geological Survey of India

LOK SABHA SECRETARIAT
NEW DELHI

April, 1970/Chaitra, 1892 (Saka)

Price : Rs. 1·25

LIST OF AUTHORISED AGENTS FOR THE SALE OF LOK SABHA SECRETARIAT PUBLICATIONS

Sl. No.	Name of Agent	Agency No.
	ANDHRA PRADESH	
1.	Andhra University General Cooperative Stores Ltd., Waltair (Visakhapatnam).	8
2.	G.R. Lakshmipathy Chetty and Sons, General Merchants and News Agents, Newpet, Chandragiri, Chittoor District.	94
	ASSAM	
3.	Western Book Depot, Pan Bazar, Gauhart.	7
	BIHAR	
4.	Amar Kitab Ghar, Post Box 78, Diagonal Road, Jamshedpur.	37
	GUJARAT	
5.	Vijay Stores, Station Road, Anand.	35
6.	The New Order Book Company, Ellis Bridge, Ahmedabad-6.	63
	HARYANA	
7.	M/s. Prabhu Book Service, Nai Subzimandi, Gurgaon, (Haryana).	14
	MADHYA PRADESH	
8.	Modern Book House, Shiv Vilas Palace, Indore City.	13
	MAHARASHTRA	
9.	M/s. Sunderdas Gianchand, 601, Girgaum Road, Near Princess Street, Bombay-2.	6
10.	The International Book House (Private) Limited, 9 Ash Lane, Mahatma Gandhi Road, Bombay-1.	22
11.	The International Book Service, Deccan Gymkhana, Poona-4.	26
12.	Charles Lambert & Company, 101, Mahatma Gandhi Road, Opposite Clock Tower, Fort, Bombay.	30
13.	The Current Book House, Maruti Lane, Raghunath Dadaji Street, Bombay-1	60
14.	Deccan Book Stall, Ferguson College Road, Poona-4.	65
15	M/s. Usha Book Depot, 585/A, Chira Bazar, Khan House, Girgaum Road, Bombay-2 BR.	5
	MYSORE	
16.	M/s. Peoples Book House Opp. Jaganmohan Palace, Mysore-1.	1
	RAJASTHAN	
17.	Information Centre, Government of Rajasthan, Tripolia, Jaipur City.	38
	UTTAR PRADESH	
18.	Swastik Industrial Works, 59, Holi Street, Meerut City.	2
19.	Law Book Company, Sardar Patel Marg, Allahabad-1.	48
	WEST BENGAL	
20.	Granthaloka, 5/1, Ambica Mookherjee Road, Belgharia, 24 Parganas.	10
21.	W. Newman & Company Ltd., 3, Old Court House Street, Calcutta.	44
22.	Firma K.L. Mukhopadhyay, 6/1A, Banchharam Akrur Lane, Calcutta-12.	82
23.	M/s. Mukherji Book House, 8B, Duff Lane, Calcutta-6.	4

CORRIGENDA

To

126th Report of the Estimates Committee (Fourth Lok Sabha) on the Ministry of Petroleum & Chemicals and Mines & Metals (Department of Mines & Metals)— Geological Survey of India.

Page (iii) (contents page) Line 3	For "INTRODUCTION" read "INTRODUCTORY"
Page (iii) (contents page) Line 24 under the Heading Appendices	For "iron ferrous" read "non-ferrous"
Page 11, para 1.46 line 35	For "Atonic Energy" read "Atomic Energy"
Page 12, para 1.48 line 22	For "concreted" read "concerted"
Page 22, para 2.24 line 19	For "P_2O" read "P_2O_5"
Page 29, para 3.11, line 3	For "targetted" read "targeted"
Page 29, para 3.14, line 8	For "targetted" read "targeted"
Page 33, para 3.26, line 4	For "stated" read "started"
Page 38, line 13	For "carised" read "carried"

CONTENTS

ESTIMATES COMMITTEE

(1969-70)

CHAIRMAN

Shri M. Thirumala Rao.

MEMBERS

2. Shri K. M. Abraham.
3. Shri S. A. Agadi.
4. Shri B. Anjanappa.
5. Shri R. S. Arumugam
6. Shri Bedabrata Barua
7. Shri Brijraj Singh Kotah
8. Shri Dalbir Singh Choudhari
9. Shri Hem Raj
10. Shri Hukam Chand Kachwai
11. Shri M. Kamalanathan
12. Shri Bhanudas Ramchandra Kavade
13. Shri H. Ajmal Khan
14. Shri Zulfiquar Ali Khan*
15. Shri Samarendra Kundu
16. Shri Mahindra Bahadur Raja Kamakhya Prasad Singh Deo
17. Shri Masuriya Din
18. Shri Kartik Oraon
19. Shri Sarjoo Pandey
20. Shri Manubhai Patel
21. Shri Shashi Bhushan
22. Shri Ramavatar Shastri
23. Shri Shiv Kumar Shastri
24. Shri Nuggehalli Shivappa
25. Shri Arangil Sreedharan

---

*Elected w.e.f. 22-12-69 *vice* Shri G. G. Swell resigned.

26. Shri S. Supakar
27. Shri K. N. Tewari
28. Shri Gunanand Thakur
29. Shri Tula Ram
30. Shri Ramesh Chandra Vyas.

SECRETARIAT

Shri Avtar Singh Rikhy—*Joint Secretary.*
Shri M. S. Sundaresan—*Deputy Secretary.*
Shri T. N. Dhar—*Under Secretary.*

INTRODUCTION

I, the Chairman, Estimates Committee having been authorised by the Committee to submit the Report on their behalf, present this Hundred and Twenty-sixth Report on the Ministry of Petroleum and Chemicals and Mines and Metals (Department of Mines and Metals)—Geological Survey of India.

2. The Committee took evidence of the representatives of the Ministry of Petroleum and Chemicals and Mines and Metals (Department of Mines and Metals) on the 27th and 28th January, 1970. The Committee wish to express their thanks to the Secretary of the Department of Mines and Metals and other officers of the Department for placing before them material and information they wanted in connection with the examination of the estimates.

3. They also wish to express their thanks to Dr. B. C. Roy, former Director General of the Geological Survey of India, for giving evidence and making valuable suggestions to the Committee on the 24th November, 1969. The Committee also wish to thank other non-official organisations for furnishing memoranda to the Committee.

4. The Report was considered and adopted by the Committee on the 10th April, 1970.

5. A summary of conclusions/recommendations contained in the Report is appended (Appendix IV).

6. A statement showing the analysis of recommendations contained in the Report is also appended to the Report (Appendix V).

NEW DELHI;
April 20, 1970.
Chaitra 30, 1892 (*Saka*).

M. THIRUMALA RAO,
Chairman,
Estimates Committee.

CHAPTER I

INTRODUCTORY

A. Historical Background

The Geological Survey of India is a survey and research organization doing both field surveys and fundamental and applied research. The year 1840 marks the beginning of modern geological work in India when the Government established a Museum of Geology in Calcutta.

However, since the 4th March, 1851, there has been an uninterrupted geological survey in the country and in 1856 Geological Survey was established as a regular Government Department.

1.2. As a part of the reorganization in 1856, the Director of the Geological Survey was also made the Director of the Museum of Geology in Calcutta. Later, in 1875, the Museum Section of the Department was moved to the galleries of the newly constructed Indian Museum.

1.3. In 1892, the Geological Survey of India undertook the additional responsibility of imparting education in geology by permitting one of its officers to function as a part-time Professor of Geology in the Presidency College, Calcutta.

1.4. An important addition to the cadre of the Department made in 1894, was the appointment of several mining officers. Early, in 1902, this mining section was separated and in due course, became the Department of Mines.

1.5. During 1903—1910, the Geological Survey of India was made responsible for advising the Government on policies relating to mineral concessions, including oil, in India and Burma.

1.6. With the transfer of mineral rights by 1937 to the Provincial Governments, the States evinced active interest in mineral development and sought the services of the Geological Survey of India.

1.7. By 1940, eighty-five years after its establishment, the Geological Survey of India had only a strength of 25 officers, who surveyed the length and breadth of the vast country that constituted unpartitioned India with pioneering zeal and enthusiasm and under extremely trying conditions.

1.8. When the World War II broke out, the resources of the Department were at once geared to the activities related to defence needs. A series of memoranda dealing with the utilisation of the Survey in time of war, was prepared and submitted to the Government. The Utilisation Branch was set up in 1942 as a wing of the Survey.

1.9. During the war-time evacuation of Calcutta in 1942, the most valuable records, stores and laboratory equipment of the Geological Survey of India along with the officers were dispersed to the various Provinces. These local centres later developed into the Circle offices which are now established in different States. Towards the end of 1944, the Mineral Development and Engineering Geology and Ground-water Circles were set up to cope up with the increasing number of mineral investigations and problems relating to engineering geology and groundwater. Later, each of these was reconstituted into three separate Circles. In 1945, a new section for geophysics was started. A Drilling Section was also organized for the sub-surface exploration and assessment of mineral deposits and for planning their economic exploration. A Mineral Information Bureau was opened to disseminate mineral information in a non-technical language and to cater to the enquiries from industries and the public.

1.10. With the attainment of Independence in 1947, the Union Government, in keeping with the national policy of development of basic industries for stabilising the economy of the country, recognised the need for proper assessment and exploitation of mineral raw materials. Accordingly, the activities of the Geological Survey increased considerably and with the additional strength of personnel, the work of the Survey was reorientated to suit the growing demands.

1.11. With the growing activities in diverse fields, the Government decided to establish separate organizations to carry out specialised aspects of work. Thus, the Rare Minerals Section for carrying out field and laboratory invetigations on radioactive minerals started by the Department, was latter handed over to the Atomic Energy Commission.

1.12. In 1949, the Government of India set up the Indian Bureau of Mines to deal with certain aspects of mining, mineral conservation, mineral beneficiation, etc.

1.13. The Survey celebrated its Centenary in 1951.

1.14. It has been stated that the urgent need for speedy industrialisation of the country resulted in large-scale expansion of the

Department by the Union Government with a view to making an assessment of the potentialities of the mineral resources. As a result, the strength of the Survey rose to 116 officers towards the end of 1947, 282 in 1955 and 519 by 1962. By the end of the Third Five Year Plan in 1966, the strength of technical officers rose to 1376.

1.15. For about a century, the Geological Survey of India was manned almost entirely by European geologists. The first Indian to serve the Department in a graded post was Shri P. N. Bose, the well-known discoverer of the large iron-ore deposits in Mayurbhanj, Orissa. The first appointment of an Indian to the post of Director was made in 1951, when the Department entered second century of its existence. The last of the British Officers left the Geological Survey of India in 1955.

B. Organizational set up and Functions

(1) *Organisational Set-up*

1.16. The Department of Geological Survey is headed by a Director General and functions now under a reorganized set-up with five Regional Offices each in turn under a Deputy Director General. A chart showing the present organizational set-up of the Geological Survey of India is at Appendix I.

1.17. The work of the Geological Survey has been decentralised to the circle level. The Directors of Circles have been delegated necessary powers for effective control of field operations. As a measure of further decentralisation and effective cooperation with State Governments, 21 district units have been set up recently.

1.18. Consequent on the reorganization of the Geological Survey of India and setting up of Regional Offices in 1961 the posts of Director and three of the posts of Chief Geologists, who were actually holding the charge of the Regional Offices, were redesignated as Director General and Regional Directors respectively, for administrative convenience. Such redesignation, it is stated, did not involve any change in duties or classification or scale of pay. It has been stated by the Ministry that after the merger of the Exploration Wing of the Indian Bureau of Mines with the Geological Survey of India the scale of these posts were upgraded in April, 1966 from Rs. 1800—100—2000 to Rs. 2250—125—2500 and from Rs. 1600—100—1800 to Rs. 1800—100—2000, respectively after taking into account the additional responsibilities attached to the posts.

1.19. Again in November, 1967, the posts of Regional Director and the Superintending Geologist-in-Charge of Circle/Division were re-designated as Deputy Director General and Director respectively. It has been stated that such re-designation did not involve any change in the scale of pay or terms of appointment or in the duties and responsibilities attached to the posts.

1.20. The Director General, Deputy Directors General and Directors of Circles besides concentrating on technical programmes and supervision have also to attend to matters involving general administration being the Administrative Heads and Head of Offices. The Director-in-Charge of other Divisions at Central Headquarters not having been declared as Head of Offices are to attend to such administrative matters relating to general administration of their respective Divisions.

1.21. It has been stated that normally other technical officers are not required to assist in discharging duties pertaining to general administration. But in the absence of administrative components necessarily, help is required to be taken as and when found unavoidable from technical officers.

1.22. It has further been stated by the Ministry that the Department of Geological Survey of India being a scientific organization, necessarily, the scientific work and the administrative work have to be coordinated. Separation of work relating to administration may disrupt the liaison between technical work and administrative work, besides involving the necessity of creation of administrative posts of adequate status.

1.23. It was represented to the Committee that the Director General of the Geological Survey of India besides concentrating on technical programmes and supervision had also to attend to matters involving general administration which practice was detrimental to technical supervision and output of work.

1.24. Asked what was the need of an administrative Officer of 'adequate status' when in a scientific department, the administrative officer works under the control of the Head of Department who happened to be a scientist, the representative of the Ministry has informed the Committee during evidence that at present the problems of housekeeping in a big department like the Geological Survey of India are being looked after by the Director General who is a technical man and he is not quite *au fait* with mundane matters which are nonetheless very important for keeping the whole outfit in good form. "It is better to put up an administrator there" and that there was room for both without there being any question of "constant tug of war going on between the technical officials and

the administrative officials" in regard to superiority in official status.

1.25. In view of the fact that there is a shortage of scientific and other technical incumbents in Geological Survey of India dealt with in para 4·47 and proper supervision of technical work referred to in paras 4·58 to 4·60 of the Report, the Committee feel that if adequate administrative assistance is made available to the Director General and other Directors of the G.S.I., it will relieve them to some extent from attending to administrative problems and enable them to concentrate on scientific work.

(2) *Functions of the Geological Survey of India*

1.26. Entrusted with the responsibility of advising the Government on all geological matters including those on development of the country's mineral resources, the main functions of the Geological Survey of India include:—

(a) Systematic geological mapping of the total land surface of India on suitable scales. This involves systematic traverses over the area; measurement of stratigraphic sections; identification of rock types; ploting of the distribution of rock types and their attitude; collection of representative samples; microscopic and chemical analysis in the laboratory, establishing the inter-relationship among rock types; locating possible mineral deposits; preparation of a report on the area; finalising of the geological map of the area.

(b) Preliminary and detailed mineral investigation for preparation of an inventory of available mineral resources including off-shore exploration for mineral resources. This involves detailed geological mapping of the area to identify promising sectors; large scale geological mapping; laboratory analysis; systematic geochemical and geophysical traverses over the promising blocks; drilling in target areas to determine the nature and extent of the mineral deposits; systematic chemical analysis for determining the grade of the mineral deposit; mining to establish the amount of departure between drill hole projections and the actual shape and grade of the mineral deposit.

(c) Systematic basin-wise Geohydrological and water supply investigations for rational use of the country's underground water resources. These investigations involve systematic measurement of the underground water table; classification of behaviour of ground water in different

geological domains; chemical analysis to determine quality of ground water; draw-down and other tests to determine the rate of recharge and delineation of the recharge areas; determination of the direction of ground water flow; establishing the optimum yield of a ground water basin.

(d) Geotechnical investigation for dams, tunnels, power houses etc., flood control measures, studies on suitability of hill slope for border roads and seismological studies. This involves detailed lithological and structural mapping to find out the physical characteristics of the foundation and to recommend suitable measures for consolidating the foundation; Micro-relief and geomorphologic analysis; exploration for construction materials in the neighbouring areas; determination of the physical properties of the rocks.

(e) Fundamental research on various sub-disciplines of the earth sciences. Identification of existing problems in various disciplines and laboratory and field investigation in a detailed fashion for their resolution.

(f) Publication of maps which involves integration and processing of data on standard levels and publication of scientific journals which involves screening and editing of papers; arranging for their printing.

(g) Dissemination of information on geological and mineral matters to the Government, public and private parties. The Mineral Information Section of the Geological Survey of India is engaged in dissemination of information relating to distribution of minerals, their resources and use in industry; advising the Central Government, State Governments, Public Sector Undertakings, business and industry and members of general public on theoretical and applied aspects of geology.

(h) Imparting field training to graduates, post-graduates and other technical and scientific personnel from outside and from the Geological Survey of India itself by organising courses and providing necessary facilities.

1.27. Besides the technical and scientific functions mentioned above, the Geological Survey of India has also to undertake administrative processes for extending financial and logistic facilities.

1.28. As already stated Geological mapping of the country is one of the main function of the Geological Survey of India. It has been

stated that preparation of geological maps in revised forms and in increasing detail as well as larger scale, being a continuous process, the Department is laying emphasis on covering the entire country on a scale of 1:63,360 (1"=1 mile) in the first instance. Till September, 1969 a total area of 14·25 lakh sq. km. have been covered on 1:63,360 scale leaving a balance of about 18·43 lakh sq. km. Of the remaining area nearly 3·89 lakh sq. km. are covered by the alluvial tracts of the Ganga and the Brahmputra plains. Total area of about 9·67 lakh sq. km. covered by Deccan traps have also lower priorities and can also be taken up in stages.

1.29. In "Revised Report on Geological Survey of India of the Sub-Group on Geological surveys and investigations, exploration, prospecting etc., December, 1968", it has been observed as follows:

> "The low priority given to systematic mapping was severely criticised at the Central Programming Board held on 14th October, 1968 where the department has been reminded about its primary function of mapping."

1.30. During evidence the Committee were informed that out of the remaining area of 18·43 lakh sq. km. which comes roughly to 56 per cent, it is proposed to cover 2.9 lakh sq. km. and 4.85 lakh sq. km. during the Fourth and Fifth Plan periods respectively leaving a gap of 34 per cent to be covered at the end of 1978-79.

1.31. The Committee were also informed that the Geological Survey of India "have already one-fifth of the numbers of geologists working for systematic mapping alone."

1.32. The Committee are pained to note that low priority is given to systematic mapping which is its primary function and that it has taken more than a century for the Geological Survey of India to systematically map on 1:63,360 (1 =1 mile) scale only 44 per cent of the total area of the country leaving a balance of 56 per cent (about 18·43 lakhs sq. km.) still to be covered. As the geological maps form the very basis of further work in the various fields of earth science including mineral exploration, geotechnical and geohydrological investigations etc., the Committee suggest that the G.S.I. should make a concerted effort for covering the remaining area.

The Committee are unhappy to note that during the Fourth and Fifth Five Year Plan periods only about 39 per cent of the remaining 18.43 lakh sq. km. unmapped area is targetted to be covered still leaving a balance of 34 per cent of the total area. It will certainly be a sad reflection on the part of the G.S.I.'s performance

if the whole country will not have been mapped geologically even at the end of Fifth Five Year Plan.

1.33. The Committee have been given to understand that the Map Production Division of the Geological Survey of India has not published any geological map of the country during the last four years because of printing difficulties. In view of the fact that mapping is the prime function of the G.S.I., the Committee recommend that the Government should ensure that the publication of geological survey is not delayed on account of printing difficulties.

1.34. Next to the systematic geological mapping of the country, the other important function of the Geological Survey of India is prospecting, exploration and assessment of mineral resources in the country. However, besides the G.S.I. various other Government agencies belonging to the different Central and State Ministries are also engaged in the work of exploration and location of mineral deposits in the country.

1.35. It has been stated that in addition to the Geological Survey, State Departments of Geology and Mining are conducting exploration for minerals. Exploration to a limited extent is being carried out by public sector undertakings like National Mineral Development Corporation, Fertilizer Corporation of India, Cement Corporation of India, National Coal Development Corporation etc.

1.36. When asked whether it does not result in duplication of efforts and wastage of manpower the Ministry have stated that some organisations are doing exploration necessary for developmental work. Programmes of the other agencies are generally discussed and coordinated either in the State Programming Board meetings or by mutual discussion to avoid duplication. It has been further stated that formulation of State and Central Programming Boards are sufficient to coordinate the programme to avoid any duplication.

1.37. However, in another written note made available to the Estimate Committee it has been stated that "Recently, it has been felt that there has been duplication of work sometimes resulting in unnecessary infructuous expenditure for the same item of work and what is worse is that sometime the exploitation agencies doubt the results of exploration carried out earlier by other agencies."

1.38. While explaining the contradictory statements the representative of the Ministry stated as follows:

> ".....On the question of actual exploitation by another agency in which the previous work has been done by the Geological Survey of India, very often, the line of demar-

cation at which the Geological Survey should stop their exploitation work and pass it on to the commercial exploiting agency is a matter of some controversy. The reason is, on the one hand, with due regard to the professional reputation, my friend in the Geological Survey would like to drill as much as possible, 200 holes or even 500 holes, and make sure of the results more accurately and, on the other hand, the point is that the cost of all that drilling is finally put on to the commercial agency which will take up exploitation work. Supposing the overall drilling cost comes to a crore of rupees—in many cases the expenditure is that much—that will be the first charge on the commercial agency. Very often, the commercial agency later on comes up and says, 'All that is not necessary for my actual purpose. All I want is broad idea as to in an area of so many kilometres there is so much reserve. And I would have done a little bit of drilling and started my work. The proving of resources would have gone side by side with exploitation'. Now, this is always a matter of argument. This is a point on which the Planning Commission was also exercised. We are also trying to find out an answer to this as to whether, firstly, the cost of this drilling could not be minimised; secondly, at what point you should stop drilling and pass on the work to the exploitation agency and thirdly, how the expenditure incurred upto that stage should be divided partly as development expenditure and partly as commercial take over. These are all the points that are being looked into separately. It is against this background that this note (referred to in para 1·37 above) was prepared in the Planning Commission. Very often, as you know, even in presenting a reasonable point of view statements are sometimes made in strengthening that case with various extravagancies. I am afraid, this is one example of that."

1.39. Subsequently the Ministry furnished another note stating that the words quoted in para 1.37 above, did not represent the views of the Department of Mines and Metals but formed part of a note prepared by the Planning Commission in connection with discussion at a meeting with the Minister of Petroleum and Chemicals and Mines and Metals on the 23rd July, 1969.

1.40. It has been further stated that the activities of mineral exploration can broadly be classified into three categories. The first

category includes geological mapping, geochemical and geophysical work and structural drilling with a view to delineate the ore body. The second category of work includes detailed surveying, aditing shafting, etc. with a view to open the deposits, under-ground drilling ore dressing, etc. The third category of activities which follows the second, consists of extraction of the ore from underground and recovery of the metal. The first category of work is under the purview of the Geological Survey of India. The remaining two activities were being dealt with by separate organisations *i.e.* Indian Bureau of Mines and exploiting corporations until 1965. Before taking an investment decision, the exploiting organisations are naturally keen to collect all relevant data, which at times calls for additional work. This, however, does not amount to doubting the results of the work done by the G.S.I. Such additional work also does not strictly amount to duplication. Some amount of duplication between State Departments of Geology who are equally interested in the search for minerals as the G.S.I. is, however, unavoidable. In order to avoid overlapping of work to the extent possible, the work which falls under second category *i.e.* the work which was being done by the I.B.M., was partly transferred to the G.S.I. and partly to the exploiting corporations under reorganisation of 1965.

1.41. The Committee are of the view that duplication stands in the way of effective and rational utilisation of scientific manpower and adds to the over-head costs of mineral exploration/exploitation. The Committee, therefore, suggest that the functions of the Geological Survey of India vis-a-vis the public undertakings engaged in exploitation and development of minerals should be defined clearly so that there is no avoidable overlapping of work.

(3) *Geological Survey of India and State Departments of Geology and Mining*

1.42. In addition to the Geological Survey of India, State Departments of Geology and Mining are also conducting exploration for minerals. The functions of the Survey *vis-a-vis* the counter-part departments in the States have not, however, been defined. It has been stated that the Survey being a National Organisation its functions cannot be defined as in view of rapid advancement of science, new fields of study are being taken up as they develop.

1.43. With regard to functions of State Departments it has been stated that these departments were organised to look after the mineral leases, collection of revenue and carry out limited exploration for minor minerals in the State and guide the small mine-

owners in the development of mines. In recent years some State Departments have also taken up mapping and exploration for major minerals.

1.44. It has been stated that this over-lapping of functions does not result in duplication of efforts and wastage of manpower and other resources as programmes of State Departments are generally discussed and coordinated either in the State Programming Board meetings or by mutual discussion. Further, formulation of State and Central Programming Boards are sufficient to coordinate the programmes to avoid any duplication.

1.45. Asked how coordination was effected when the State Departments of Mining and Geology had also taken up mapping and exploration for major minerals, the representative of the Ministry has stated during evidence "there is a great deal of geological survey work to be done in this vast country. It is a concurrent subject. The Geological Survey of India is a much older establishment. We cannot stop the State Governments from setting up their own agencies for geological survey." However, ".....there is close coordination between the State Geological Departments and the Geological Survey of India."

1.46. Elucidating the point further the representative of the Ministry stated that "The Central Programming Board was conceived to coordinate the activities of the State Geological and Mining Departments and the Central Geological Survey. Normally, the GSI officers go out in field duties in September-October, after the monsoon. What is the scheme of work to be done in the coming field season, as it is called, is discussed at the State level at the State Geological Programming Board, and they come to certain tentative conclusions, and all this is brought up at the Central Geological Programming Board which meets sometime in June or July before the field season starts in October. The plan of action is chalked out and a large measure of coordination is arrived at not only between the GSI and the State Geological Departments but also with certain exploiting agencies which have geological programmes like the Oil and Natural Gas Commission, Atonic Energy Commission and so on, who are also members of the Board."

1.47. The Committee feel that the functions of the Geological Survey of India and the State Departments of Mining and Geology should be demarcated clearly and precisely through the Central Programming Board where all interests are represented.

(4) *Central Geological Programming Board*

1.48. As a sequel to the decision of State Secretaries and Directors of Mining and Geology held at New Delhi in March, 1966 the

Central Geological Programming Board was set up by the Department of Mines and Metals *vide* its Resolution No. 1/73/66-MI, dated the 27th July, 1966. The resolution showing the composition, functions and powers of the Board and other details is reproduced below:

Resolution

The Geological Survey of India has a vitally important role to play in the development of the mineral resources of the country. To meet the rapidly increasing demands in respect of minerals, the Geological Survey of India has to intensify its activity and increase its resources of technical manpower and equipment. At the same time, it had become apparent that this national organisation would have to share its responsibility in regard to the work of prospecting, exploration and exploitation of minerals with other agencies such as the Geological Departments of the State Governments and the Government undertakings engaged in mineral development. The Conference of State Secretaries and Directors of Mining and Geology convened by the Minister of Mines and Metals in March, 1966 recognised the need for setting up of a central agency which would coordinate the work at the national level of all the different agencies and draw up plans for concreted and unified action aiming at acceleration of prospecting and exploration of minerals.

2. The establishment of this central coordinating agency was envisaged primarily with reference to the implementation of mineral investigation programmes and to determine their respective priorities. This question has been further considered and the Ministry of Mines and Metals has now decided to constitute a Geological Programming Board which will ensure that the efforts in the field of geology proceed in a co-ordinated way to realise well defined national objectives. Besides drawing up of priorities *inter se* among various schemes of investigations of mineral deposits in different parts of the country, the Board will also pay attention to such matters as training of personnel.

3. The Board will pay special attention to the following matters.

   (i) Coordination and evaluation of programmes of various departments and organisations engaged in geological activities.

   (ii) Definition of priorities of exploration projects in relation to national development plans.

(iii) Arrangements for the training of Geologists, Drilling Engineers, Mining Engineers, etc.

(iv) Reviewing and advising Government on various steps which would lead to speedier exploration of essential minerals.

4. The composition of Geological Programming Board will be as follows:—

(i) Secretary, Ministry of Mines and Metals—Chairman.

(ii) Director General, Geological Survey of India.

(iii) Representatives of the Department of Agriculture, Planning Commission, Central Water and Power Commission, Oil and Natural Gas Commission and Atomic Energy Commission.

(iv) Secretaries of Department of Mining and Geology of State Governments.

(v) Director of Mining and Geology of State Governments.

(vi) Controller, Indian Bureau of Mines.

(vii) National Metallurgical Laboratory, Jamshedpur.

(viii) Central Fuel Research Institute, Dhanbad.

(ix) Central Geophysical Laboratory, Hyderabad.

(x) Four members to be nominated by Government as representatives of public sector mining undertakings.

(vi) Four members to represent private sector mining industries.

(xii) Representative of Geological Mining and Metallurgical Institute.

5. The Geological Programming Board will meet every six months or more frequently as may be considered necessary. The Secretary of the Board will be an officer of the Geological Survey of India.

1.49. As against the provision that the Central Geological Programming Board will meet every six months or more frequently as may be considered necessary, the Board has so far held four meetings, one each during 1966, 1967, 1968 and 1969. The first, second and fourth meetings were held at New Delhi and the third meeting was held at Lucknow.

1.50. During evidence also the representative of the Ministry informed the Committee that the Board meets "once a year. But it does not mean that in between nothing is done."

1.51. The Committee feel that meeting once a year does not do any justice to the Resolution of the Government of India.

As against the provision of the meetings of the Central Geological Programming Board after every six months or more frequently, it has so far held only four meetings one each during the last four years. The Committee hope that in future the Board meetings will be held at least once in six months.

CHAPTER II

A. Financial Matters

(1) *Charges for prospecting and exploratory work*

A study Group of the Estimates Committee visited *inter alia* the headquarters of the Geological Survey of India, Calcutta in September, 1969. They were informed that an amount of Rs. 79.96 lakhs was due to be paid to the Geological Survey of India and the Indian Bureau of Mines for prospecting and exploratory work done for some of the public sector corporations. A statement showing the names of such Public Undertakings and amount outstanding against each as on 18th September, 1969 is as under:

Sl. No.	Name of the Party	As per Audit Report, Civil 1968	Paid or adjusted as on 18-9-69	Outstanding as on 18-9-69	Remissions pending with Government
		in lakhs	in lakhs	in lakhs	in lakhs
1.	National Coal Development Corporation	164·74	63·45	0·78	100·51
2.	(i) Hindustan Copper Ltd.	209·03	134·87	74·16	
	(ii) National Mineral Development Corpn.	6·84	3·70	..	3·14
3.	P.C.D.C. (now P.P.C. Ltd.)	5·17	0·15	5·02	..
4.	Cement Corporatin of India	3·62	3·62	..	..
	TOTAL	389·40	205·79	79·96	103·65

2.2. The reasons put forward by the parties for non-payment of the dues are:

(1) National Coal Development Corporation (N.C.D.C.) have urged that the following points should be considered by the Geological Survey of India for finalising the claims:

(i) prospecting work done during the period September 1955 to December 1959 should be settled on the basis of the original claim preferred by the Exploration

Wing and not as revised in accordance with the Schedule of Charges finalised in April, 1962 i.e. after the completion of the work.

(ii) the N.C.D.C. claimed a remission of 50 per cent on depreciation.

(iii) corresponding remission on interest amount also.

(2) It has been argued by the N.M.D.C. that the Meghadatburn Operation has not so far been assigned to them to be worked as a project and as such the amount already paid by them on this account may be adjusted against dues to G.S.I.

(3) Hindustan Copper Ltd. have alleged non-approval of the schedule of charges.

(4) Pyrites, Phosphates and Chemicals Ltd. sought certain changes in the original bill on depreciation and interest etc.

2.3. Amount awaiting realisation by the Geological Survey of India and Indian Bureau of Mines for services rendered to Public Sector Organisations, other Departments, State Governments etc. was as high as Rs. 4.32 crores in March, 1969.

2.4. By the end of November, 1969, the Ministry had settled claims amounting to Rs. 4.09 crores—claims amounting to Rs. 2.23 crores by adjustment (payments) and Rs. 1.86 crores by withdrawal of claims originally preferred.

2.5. In this connection the Committee would like to invite the attention of the Government to the observations of Public Accounts Committee contained in paras 1.8, 1.9 and 1.10 of their 89th Report (Fourth Lok Sabha). The Committee suggest that the schedule of charges should be revised and finalised speedily and further action taken to recover the balance of dues from the parties concerned.

The Committee would also urge that the Government should take suitable steps to avoid accumulation of such realizations in future.

(2) *Expenditure on Administration*

2.6. The percentages of expenditure on administration to the total expenditure on Geological Survey of India during the last three years has been as follows:—

1967-68	11·5% (approx.)
1968-69	12% (approx.)
1969-70	11% (approx.)

2.7. During evidence the representative of the Ministry informed the Committee that this 11 per cent of expenditure on administration had been reduced to 8 per cent currently. He further stated that "We will keep a careful watch and see if that could be further reduced. But it looks difficult to reduce it below 8 per cent." because in most of the work there was need for good deal of non-technical staff of many descriptions at many levels."

2.8. The Committee note that the percentage of expenditure on administration to the total expenditure on the Geological Survey of India which on an average was 11 per cent during the last three years has been brought down to 8 per cent during the current financial year. They, however, hope that the Government will keep a careful watch and will continue its efforts to bring down further the percentage of expenditure on administration.

B. Geological Programmes and Investigations

2.9. The mineral exploration programme of the Geological Survey of India is drawn up with the following objectives:—

(i) To provide the basic geological and mineral exploration data of different areas in the country to form the basis for planning mineral based industries and programmes of development in these areas, and

(ii) To prove enough reserves to sustain the production of mineral based industries during the different plan periods.

2.10. Mineral exploration is a continuous process. However, for convenience sake it may be classified into three stages before actual exploitation is taken up.... (1) the preliminary mineral assessment, (2) the follow up or regional mineral assessment, and (3) the detailed mineral assessment.

2.11. It has been stated that during the preliminary mineral assessment airborne geophysical surveys, photo geological methods, regional geochemical surveys and regional mapping surveys will be undertaken to delineate areas of interest for follow up surveys. As the results of the preliminary mineral assessment from time to time are available, areas (targets) for follow up exploration will be revealed. It has further been stated that the target areas may have been precisely defined by the preliminary surveys or the results may

only indicate the wider zones or areas of interest. The physical size of area of the target or zones will dictate the type of methods of exploration to be deployed and their quantum.

2.12. After the regional (follow up) mineral assessment programme has been carried out, an attempt can be made to apply the principle of converging evidence for selection of projects for detailed exploration based on the results of the preliminary and follow up surveys. Preliminary appraisal will also have to be made whether detailed proving operations are justified and if so, how much and what kind of exploratory work will be needed. Here mining consideration will be constantly kept in view. The detailed geological, drilling and exploratory mining operations on these projects will aim at discovering whether exploitation is economically feasible and if so, what are the best methods to be used.

2.13. The Committee have been informed that the programmes of mineral and other investigations are drawn in advance by the Director General, Geological Survey of India in consultation with the Deputy Directors General and Directors who in turn consult the Field Officers, after taking into consideration the priorities fixed from time to time, funds finally made available to the Geological Survey of India, and the results of the investigations carried out in the previous year.

2.14. The Committee are of the view that mineral production has a direct bearing on industrial production. Even a small increase in mineral production has an important bearing on the total volume of industrial production and that unless there is a proper development of mineral industries there will be an imbalance in the other sectors of the economy. The Committee feel that the exploration and proving of mineral deposits should be kept well ahead of the current requirements. As the actual investment involved in mineral exploration is very small in comparison to the investment in exploitation, the Committee suggest that the maximum tempo feasible should be kept up in mineral exploration if rapid progress is to be achieved in the industrial development.

2.15. It has been stated that Annual Programmes of State Departments and Geological Survey of India are discussed and coordinated in the State Programming Boards (which include a member from the Planning Commission) and priorities are drawn for different mineral investigations depending upon their importance and resources available. Sometime, however, at a later date, requests are made by State Governments and other organizations to take up some

investigations on priority/emergency basis e.g. ground water investigations in drought affected areas, of land slides, earthquakes etc. and these are taken up by diverting personnel and equipment from investigations of lesser priority.

2.16. The Annual Field Programme of the Survey thus finalised, is placed before the Geological Programming Board which accords priorities for exploration for certain minerals before it is finally approved by the Government for implementation by the Director General, Geological Survey of India.

2.17. As mentioned in para 1.51 of the Report the Central Geological Programming Board meets only for a day in a year. This shows that the question of allocation of priorities to various programmes of mineral and other geological investigations has not been given the serious consideration that it deserved.

The Committee feel that keeping in view the growing industrial requirements of the Fourth Plan and future Plans, the investigational priorities in the matter of proving mineral resources particularly those which are in short supply in our country both qualitatively and quantitatively should be reviewed by the Government.

C. Achievements

2.18. Important achievements made by the Geological Survey of India during the years 1966—1969 (Post Third Five Year Plan period) in the field of mineral exploration, as furnished by the Ministry, are given at Appendix II.

2.19. As regards survey of the country done by the Geological Survey of India for (1) the preliminary mineral assessment, (2) the follow up or regional mineral assessment, and (3) detailed mineral assessment, it has been stated by the Ministry that a complete survey of the country has not yet been made. In fact, no country in the world has yet achieved this stage. Various kinds of geological work will continue for all times to come concurrent with varied progress in technology and science.

2.20. It has further been stated that the Geological Survey of India, has, however, been able to obtain a general idea about the distribution of different mineral deposits within the Indian Union. A statement showing the data regarding major deposits of non-ferrous metals in the country is at Appendix III.

2.21. The proposed activities of the Geological Survey of India to be carried out from 1969 to 1979 under (1) Systematic mapping and preliminary mineral assessment, (2) Regional Mineral assessment,

and (3) Detailed mineral assessment are given in the following statement:—

Systematic mapping and Preliminary Mineral Assessment

Regions	I Phase 1969-70 to 1973-74		II Phase 1974-75 to 1978-79		Total (1969-70 to 1979)	
	Geological mapping (sq. km.)	Geologist years	Geological mapping (sq. km.)	Geologist years	Geological mapping	Geologist years
Southern . .	85,795	250	1,38,880	358	2,24,675	608
Western . .	36,250	180	43,250	210	79,500	390
Northern .	37,300	388	71,625	883	1,08,925	1,271
Eastern . . .	62,560	260	69,100	310	1,31,660	570
Central . . .	69,120	122	1,12,080	194	1,81,200	316
TOTAL .	2,91,025	1,200	4,34,935	1,955	7,25,960	3,155

Regional Mineral Assessment

Regions	I Phase 1969-70 to 1973-74		II Phases 1974-75 to 1978-79		Total (1969 to 1979)	
	Large-scale mapping (sq. km.)	Geologist Year	Large-scale mapping (sq. km.)	Geologist Year	Large-scale mapping (sq. km.)	Geologist Year
Southern . .	29,519	300	24,800	168	54,319	468
Western .	1,500	278	1,250	258	2,750	536
Northern .	12,540	744	16,230	1,096	28,770	1,840
Eastern .	10,203	337	6,260	272	16,463	609
Central . . .	1,390	300	597	333	1,987	633
	55,152	1,959	49,137	2,127	1,04,289	4,086
Coal Dn. . .	9,600	259	9,850	244	19,450	503
TOTAL .	64,752	2,218	58,987	2,371	1,23,739	4,589

Detailed Mineral Assessment

Regions	I Phase (1969-70 to 1973-74)			II Phase (1974-75 to 1978-79)			Total (1969-79)		
	Mining (m)	Drilling (m)	G/ME Year	Mining (m)	Drilling (m)	G/ME Year	Mining (m)	Drilling (m)	G/ME Year
Southern . . .	16,490	34,000	117/34	16,160	69,200	132/48	32,650	103,200	249/82
Western . .	9,000	[60,000	95/105	3,000	20,000	34/90	12,100	80,000	129/195
Central . . .	23,975	[,15,575	400/105	23,075	1,14,075	380/105	47,050	2,29,650	780/210
Eastern . . .	11,650	50,000	125/145	as necy.	as necy.	125/145	[11,600	0,000	250/290
Northern . . .	2,000	20,000	as necy.	-do-	-do-	as necy.	2,000	20,000	as necy.
	63,215	2,79,575	737/389	42,235	2,03,275	671/388	[105,450	[4,82,850	1408/777

G/ME—Geologist/Mining Engineer

2.22. When further asked as to what percentage of total work would still remain to be done at the end of 1979, the Ministry have stated in reply that at the end of 1979, 34 per cent of the total area of the country will remain to be covered by systematic geological mapping on the scale of 1:63,360.

2.23. Since large scale mapping under Regional Mineral Assessment and Detailed Mineral Assessment will depend on the number of prospective areas that would be brought to light during the systematic mapping, air borne surveys, regional geochemical work etc., it would be difficult to assess the total amount of work that would remain to be done at the end of 1979. Similarly, the amount of exploratory mining and exploratory drilling that has to be done after 1979 would be difficult to assess.

2.24. Giving details of the achievements made by the Geological Survey of India, the representative of the Ministry informed the Committee during evidence that in the field of iron ore and manganese ore considerable reserves have been established in the country. Iron ore "is something where Providence has been more than kind to us. We have very large resources of iron ore in many parts of the country and in many cases at convenient locations." He also stated that "there is no saying today that we will not strike as much metal or mineral ore in the country as we need..... Until very recently, we have been depending upon imported rock phosphate in respect of fertilizers. But we have now struck rock phosphate in three different areas; Mussoorie and Dehra Dun in Uttar Pradesh and in much bigger way in Rajasthan in two different areas. One of them is Jamarkotra where the deposits are quite rich and plentiful. We have a wonderful deposit there running to the extent of 43 million tonnes with a fairly high phosphorous content—about 20 per cent of P_2O_5...In Mussoorie, in the hill area, as well as in Dehra Dun, in the plain below they are not so plentiful, for their P_2O_5 content is rather poor."

2.25. The Committee note that the Geological Survey of India have been able to make some contribution to the economy of the country by way of exploring ores like iron, manganese etc. which are essential for many industries in the country and which also earn foreign exchange. In view of the fact that India is currently importing all its phosphate rock requirements at an annual foreign exchange cost estimated to reach $ 75—100 million by 1971, the Committee are glad that substantial quantities of rock phosphate have been located by G.S.I. The Committee hope that the Government will not become complacent on account of this discovery and will continue its efforts not only to locate more such reserves of rock

phosphate but expedite exploitation to make the country self-sufficient in fertilizer minerals which are likely to play a vital role in the agricultural revolution.

D. Review and Assessment of work done

2.26. The Committee have been informed that periodical technical evaluation of the performance of the Geological Survey of India is made in the following stages:

The progress of work is technically evaluated and supervised by the

(1) Party Chiefs during the course of the investigations,

(2) by the Directors during the field season by detailed discussion and giving guidance during the course of their inspection tours and preparation of reports.

(3) by the Deputy Directors General during their inspection visits and during preparation of reports.

2.27. It has been stated that many times the field officers are called for technical discussions. The reports submitted by the officers on the various investigations are, in turn scrutinised by the Directors of the Circle and the Deputy Directors General of the concerned Regions. The Directors of the Circles/Divisions prepare the future programme of work in consultation with the field officers based on the results of the previous years investigations and these are discussed threadbare by the Directors before forwarding to the Deputy Director General for discussion at Regional Advisory Council meetings. The results of the work carried out by the different regions and steps to be taken are reviewed and further discussed at the Central Headquarter's Advisory Council meetings held once in every four months during February, June and October.

2.28. The progress of individual investigations and results achieved are reviewed in the State Programming Board meetings. The reports submitted by the field officers are scrutinised and evaluated by the Director of the Circle who gives his recommendations while forwarding the same to the Regional Deputy Director General. The report is again scrutinised by the experts in the Regional Office and after the approval of the Deputy Director General, it is sent to the Director General. In Director General's Office the reports are evaluated and after approval these are circulated to concerned organisations.

2.29. An expert and well infromed non-official witness stated during evidence that geology being purely technical and applied science the Ministry of Petroleum and Chemicals and Mines and

Metals with then present administrative set up were not competent to make any technical scrutiny of the Geological Survey of India's performance and that the Department could not be relied for evaluation of its own performance.

2.30. The witness further informed the Committee that "They (Ministry) have got no technical personnel for scrutiny there" and that the advice of the Director General of the G.S.I. was not binding. The administrative officers (of the Ministry) could over-rule such an advice. In reply to a specific question as to why the Ministry were not competent the witness cited an example "Suppose they (GSI) have to survey an area of 25 sq. miles or 100 sq. miles, the Ministry will not know whether that would take five months or one month. It is very complex problem depending on terrain, scale of mapping, geological peculiarities etc. It is very difficult for the Ministry to assess the quantum and quality of work of the Geological Survey of India."

2.31. The non-official witness also informed the Committee that during the long number of years no expert evaluation of the performances of the G.S.I. had been done in spite of repeated requests to the Ministry.

2.32. During official evidence, the representative of the Ministry stated; "I beg to differ from this statement because one can enter into a long argument over this sort of thing."

He, however, admitted that "So far no such review has been made apart from the annual reports of the performance of the Geological Survey of India. From time to time, we meet and there are many opportunities to review the work of the G.S.I. When the work programme is drawn up we try to find out what has been done last year and what exactly are going to be the important things to be done in the course of the coming year."

2.33. Asked whether any review Committee had been set up consisting of administrative and technical personnel to assess what work the G.S.I. had done from its inception the witness informed the Committee during evidence that "the Cabinet Committee on Science and Technology—COST—are looking into the whole matter —the organisational set up of many scientific organisations including the G.S.I. ..... I should submit that we could wait and see what they come out with before appointing another committee to go over the same ground."

2.34. In a subsequent note, the Ministry have stated that the Committtee on Organisation of Scientific Research (COSR) was

constituted in December, 1968 by the Cabinet Secretariat for a term of two years to:

(a) examine and report on the scientific work being done in the country; and

(b) indicate the steps that should be taken to enable the work to be carried on effectively, consistent with such economies as might be possible.

The COSR which has already visited the Headquarters of the Geological Survey of India in August. 1969 have not so far submitted any report.

2.35. The Committee regret to note that so far no independent assessment and technical scrutiny of the performance of the Geological Survey of India has been made by the Government and that reliance is placed on whatever reports are submitted by the technical officers of the Survey.

2.36. It is not yet known when the Committee on Organisation of Scientific Research (COSR), appointed by the Cabinet Secretariat, will submit their report on the scientific work being done in the country. The Committee, therefore, feel that meanwhile it is necessary to have a periodical technical evaluation of the performances of the Geological Survey of India. They recommend that the Government may consider the appointment of an independent technical team to review and assess the achievements made by the Geological Survey of India covering all its functions with special reference to the field of mineral exploration.

CHAPTER III

A. Requirements of non-ferrous metals

Non-ferrous metals play a vital role in the industrial structure of any country. The most important non-ferrous metals are copper, lead, zinc and aluminium which are required for a number of important industries and are essential for defence purposes.

3.2. A review of the production and import of these metals during the last decade indicates certain striking features. The production of copper has remained almost static at around 9,000 tonnes during the last decade while the import increased from 31,800 tonnes in 1956 to 38,900 tonnes in 1967-68. In case of lead, the import increased from 8063 tonnes in 1951 to 38,093 tonnes in 1955-56 while the domestic production has remained static at 3000 tonnes per annum. Prior to 1967-68 there was no production of zinc at all in India and the entire requirement was being met through imports. The position is different in case of aluminium, where the indigenous industry has taken rapid strides since 1952. It is expected that there will be a marginal surplus of aluminium from the end of Fourth Plan onwards.

3.3. The trend in the import figures, it has been stated, alone does not reflect the actual demand pattern of the corresponding metals in the country due to the constraints on availability of foreign exchange. Consequently a decline in the import figures does not indicate corresponding lack of ability on the part of the consuming industries to utilise additional quantity. The import of non-ferrous metals during 1966-67 had cost the nation Rs. 85·5 crores while the import bill for 1967-68 is estimated to be about Rs. 130·60 crores

3.4. The current production and the anticipated demand and production of copper, lead and zinc by the end of 1973-74, as esti-

mated by the Planning Group is given in the following table:—

Metal	Anticipated Production (in tonnes)		Estimated Demand (in tonnes)	
	1969-70	1973-74	1969-70	1973-74
Copper	9,200	50,250*	84,920	124,330
Lead	16,655**	50,375@	66,550	97,430
Zinc	38,000	106,000	96,800	141,725

The demand for aluminium is estimated at 305,000 tonnes.

*Indigenous	37,500	tonnes	Scrap 12,750	tonnes
Indigenous	9,400	„	Scrap 9,800	„
**Indigenous	5,000	„	Scrap 11,655	„
@Indigenous	35,000	„	Scrap 15,375	„

Assuming that one lead smelter of 30,000 tonnes capacity will be commissioned by 1973-74

3.5. It has been stated that the Geological Survey of India, has shouldered the responsibility of locating and proving of base metals ore deposits by intensifying its exploratory activities. Due to these efforts during the past decade the present resource position in respect of copper, lead and zinc has improved considerably. The Survey has already proved more than 240 million tonnes of low grade copper ore, about 50 million tonnes of lead-zinc ore and more than 11 million tonnes of lead ore in parts of Bihar, Rajasthan and Andhra Pradesh.

3.6. It has also been stated that the quantum of work and the expenditure involved in the exploration of base metal deposits cannot be visualised in their entirety in advance. The exploratory programme has to be flexible and reviewed from time to time based on the results obtained during the operations in progress. This procedure necessarily involves certain time which cannot be reduced still further for converting a prospect into a mine. The principle of diminishing results may also play a part and unless a number of prospects are tackled simultaneously, locating minable deposits is not possible.

3.7. A statement showing major deposits of non-ferrous metals in the country is at Appendix III.

Import of non-ferrous metals

3.8. In reply to a recent question, Lok Sabha was informed by the Minister of Petroleum and Chemicals and Mines and Metals that except aluminium and cadmium and to some extent zinc and copper, the requirements of all the non-ferrous metals are being met by imports.

3.9. A statement showing import of some of the important non-ferrous metals from 1966 to 1968 (quantity and value) is given below:—

(Quantity in tonnes) (Value in Rs. '000)

Metal	YEAR					
	1966		1967		1968	
	Quantity	Value	Quantity	Value	Quantity	Value
Copper .	27,498	282,491	46,900	447,118	36,429	326,203
Zinc . .	37,925	77,316	74,356	169,600	106,663	219,017
Tine . . .	5,714	51,559	7,073	111,998	6,271	99,119
Lead . . .	38,093	76,712	41,147	72,439	35,221	67,193
Aluminium . .	22,678	88,775	48,401	224,019	13,302	60,279

Future Import Programme of Non-ferrous Metals

Copper

3.10. During the year 1968 indigenous production of copper was of the order of 9,300 tonnes. This quantity meets about 10 per cent of the total requirements. During the Fourth Five Year Plan substantial increase in the requirements of copper metals is anticipated. The Planning Group on minerals have estimated the requirements of copper metal in the year 1973-74 at 124,300 tonnes per annum. As against the above requirements the anticipated internal production by 1973-74 is likely to be of the order of 50,000 tonnes per annum as per the draft Fourth Five Year Plan. Thus the balance requirements will have to be met by the imports from other countries.

Zinc

3.11. During the year 1969 the internal production of zinc was of the order of 20,700 tonnes, which met about 19 per cent of the total requirements. The requirements of zinc metals as per the

estimates of the Planning Group on minerals, are likely to be 142,000 tonnes per annum by the period 1973-74. As against this demand the internal production is targetted to be of the order of 76,000 tonnes per annum only, thus leaving a substantial gap to be met by imports.

Tin

3.12. There is no production of tin metal in the country, and hence the entire requirements are met by imports. During the year 1968 a total quantity of 6,271 tonnes were imported valued at Rs. 99 million. The present estimated demand of 6,500 tonnes per annum is expected to go up to 8,000 tonnes per annum by 1973-74. As no economic deposit of tin has so far been located in the country, nor there is any indigenous production based on tin concentrates, the country would remain dependant on imports for quite sometime.

Lead

3.13. During the year 1968, a total quantity of 1638 tonnes of lead metal was produced in the country which met about 2 per cent of demand, and the balance requirements was met by imports. According to the Planning Group on Minerals, the requirements of lead by the end of the Fourth Five Year Plan period are likely to increase to 97,400 tonnes per annum. Anticipated indigenous production by the end of the Fourth Plan will be about 5,000 tonnes per annum.

Aluminium

3.14. As regards aluminium the present production is able to meet bulk of the requirements. The production during 1968 was 120,000 tonnes which met the bulk of indigenous requirements besides making available some quantity for exports. During the Fourth Five Year Plan considerable expansion in the Aluminium industry is envisaged which, it is expected, will take care of domestic requirements and also contribute to exports of metal and fabricated products. The targetted production of aluminium by 1973-74 is of the order of 2,78,000 tonnes per annum.

3.15. It has been stated by the Ministry that although a complete survey of the country is not yet made, the Geological Survey of India has been able to obtain a general idea about the distribution of different mineral deposits within the country.

3.16. Asked by what time the country would be in a position to meet its requirements of non-ferrous metals like copper, zinc and

lead, the Ministry have stated that indigenous production depends not only on the availability of the raw material but also on the tempo of follow-up work in mining and metallurgical processing. Given all necessary incentives and funds it is expected that the current shortage in copper, zinc and lead may be appreciably reduced by the Fifth Plan period.

3.17. During evidence, the representative of the Ministry stated "Our main purpose is to look down for the various minerals and metals that are in demand for the economy of the country amongst which in today's context the most important will be the non-ferrous metals, that is Aluminium, Zinc and Copper." While discussing the measures taken to bridge the wide gap between the demand and supply of these non-ferrous metals in the country the representative of the Ministry analysed the position as follows:—

In regard to aluminium he stated, "We are, by and large, at the present moment, only marginally short of our requirements of aluminium. .....I think, we should be able to achieve not only near self-sufficiency by the end of the Fourth Plan period but also establish firm potential for continuous exports. .....We are, in fact, in a more or less comfortable position as compared to some other countries in the West."

Referring to acute shortage of copper in the country the representative of the Ministry stated, ".....the only production of copper in the country today is in the private sector, that is, the Indian Copper Corporation. They are doing it to the tune of something like 10,000 tonnes of copper.....We need for the current year about 83,000 tonnes of copper whereas the availability is very much less. The major copper project (Khetri Project) is in the public sector which will produce about 31,000 tonnes of copper in the Fourth Plan period. By the end of the Fourth Plan period, our availability of copper will thus be somewhere in the region of 50,000 tonnes by which time, of course, the demand will have gone up much further. Luckily, at Khetri and at certain other locations like Rakha in Bihar and Agnigundala in Andhra, the Geological Survey and the recent 'Operation Hardrock' have substantially helped. It looks as if, as far as the minerals reserves underground are concerned, they are considerable and we can go ahead with exploitation in a planned way during the next two plan periods."

In regard to zinc the representative of the Ministry informed the Committee during evidence that the requirements of the country "are greatly in excess of our current production." "The demand for zinc is about 125,000 tonnes today. .....Our production is merely 40,000 tonnes which will increase to 60,000 tonnes

by the end of the Fourth Plan." A unit in the public sector near Udaipur was producing 18,000 tonnes of zinc per annum. "Our object is to double the production by the end of Fourth Plan." He further stated that "the reserves available in the vicinity are very large and it is capable of progressive expansion to much greater capacities in course of time. .....On the basis of work done so far there is enough ore there to carry the production ultimately to about 90,000 to 1,00,000 tonnes even of metal."

3.18. The Indian Copper Corporation are already working in the three copper mines, *viz.* Mosabani, Surda and Patharghora in Singhbhum district, Bihar. The Hindustan Copper Ltd. have taken up the development of the Khetri-Kolihan copper deposits for the production of 31,000 tonnes of copper metal per annum. The Copper Circuit excluding the acid and fertiliser plant and township is estimated to cost Rs. 68·79 crores and the project is now in the construction stage. Government have also approved in principle the scheme for the development of Rakha Copper Prospect (Phase I) in Bihar. The mine based on Rakha Mines Block is estimated to cost Rs. 7·41 crores. This is estimated to yield 3500 tonnes of copper metal per annum. It has been stated by the Ministry that in regard to the development of other prospects, the question of the development of other adjoining deposits in Rakha (Remsideshwar and Tamapahar block), Akwali, etc. in Rajasthan, Agnigundala Copper-lead prospects in Andhra Pradesh will be considered after their feasibility has been established.

3.19. The Committee note that the Geological Survey of India has been able to obtain a general idea about the distribution of different mineral deposits within the country and has already proved more than 240 million tonnes of low grade copper ore, about 50 million tonnes of lead-zinc ore and more than 11 million tonnes of lead ore in various parts of Bihar, Rajasthan and Andhra Pradesh. The Committee, however, regret to note that although existence of mineral deposits in the country was known quite early, the number of mines developed since attainment of independence is very few. The Committee are unhappy to note that the domestic production of copper and lead has remained static at around 9,000 tonnes and 3,000 tonnes a year respectively during the last decade. This not only reflects lack of interest and absence of coordination between exploring and exploiting agencies but tells upon the meagre foreign exchange resources of the country in as much as the import of non-ferrous metals during 1966-67 and 1967-68 has cost the nation Rs. 85.5 crores and Rs. 130.60 crores respectively.

3.20. The Committee have been apprised that with the necessary incentive and funds it is expected that the current shortage in

copper, zinc and lead may be appreciably reduced by the Fifth Plan period. The Committee are of the view that with satisfactory availability position of necessary reserves, particularly of copper ore, Government should have undertaken crash programme much earlier to reduce appreciably imports of non-ferrous metals.

3.21. The Committee feel that in view of strides that are made in the industrial growth of the country the wide gaps existing between demand and supply of non-ferrous metals will go on becoming wider and wider in coming years. Unless concerted efforts are made now it may not be possible to fill the gaps with the abruptly increasing demands in future.

Gap between discovery of new metals and their commercial exploitation

3.22. Asked what is the average time taken between the discovery of new source of minerals, estimation of its quality and quantity and the commercial exploitation and what steps have been taken to reduce the time-lag to a minimum it has been stated by the Ministry that the time taken between the discovery of new source of minerals, estimation of its quality and quantity and the commercial exploitation depends on various major factors of which the important ones are:—

(i) The mineability and economics of working of the deposit at the particular time.

(ii) The national importance of the mineral-metal concerned at particular period.

(iii) The availability of resources in capital, equipment and trained personnel.

3.23. The real effort towards development of mineral deposits by indigenous means have commenced only after the independence. The number of important mines developed since then is very few and it is difficult to arrive at any workable average. Moreover, in all these efforts, beginning had to be made from almost a scratch and the time taken in the initial stages would be considerable compared to other developed countries.

3.24. Available information on copper deposits which are planned to be exploited is given below:

Deposits	Date of Discovery	Period of exploitation	Date of starting of commercial exploitation
Copper			
Bhotong Mines, Rangpo Sikkim.	Known quite early this century.	February, 1957 to December, 1959.	Started production at the end of 1969.
Dariba Copper Deposits Rajasthan.	Do.	May, 1956 to March, 1963.	No commercial production yet.
Khetri Copper Deposit Madhan Kundhan Section.	Do.	1957 to 1966	Do.
Khetri-Copper deposits, Kolihan Section.			
Rakha Copper Deposit.	Do.	December, 1961 to Dec. 1966, report submitted in 1967.	Do.
Agnigundala copper - lead deposits.	1959—61	Started in March, 1963. First Phase, completed in 1967. 2nd phase in progress.	Do.

3.25. In order to reduce the time-lag to a minimum the Geological Survey invites the concerned public sector exploitation agency to examine the deposits as soon as the deposit is found to be economically promising.

3.26. It will be seen from the statement given above that availability of copper reserves in various belts of the country were "Known quite early this century" but excepting Bhotong Mines, Rangpo, Sikkim, where the production has only stated "at the end of 1969" no commercial production has commenced as yet at any place where there are copper reserves.

3.27. Explaining the reasons the Ministry have stated in a written note that the commercial production from a deposit has to be preceded by location of economically workable deposits, establishment of the feasibility, economic viability etc. of its development, preparation of detailed product report/estimates for the project and its approval, and the commissioning of the mine and plant.

3.28. Discussing about considerable gap of time between knowledge of ore reserves on the one hand and the successful exploitation on the other, the representative of the Ministry informed the Committee during evidence that "the various processes which take the metal to the factories are time consuming because..... finding and proving up have got to be done very carefully." "....the mining has to go deeper and deeper and it has got to be studied very carefully before the priorities are finalised....for non-ferrous metals ores we have to go out of the country for assistance....that is not always an easy thing to choose. Sometimes, the best of it you want is not available. Then there is the cost element. The sum total of all this does add upto a considerable time-lag. We are trying our best to shorten it. .....I am not trying to maintain that everything possible is being done. We could have done better."

3.29. In a subsequent note to the Committee, analysing the reasons for delays in commercial expoitation of mineral reserves after those have been established the Ministry has stated that the policy of the Government of India regarding mining industry is outlined in the Industrial Policy Resolution of 30th April, 1956 according to which the future development of under-mentioned minerals is the exclusive responsibility of the State:—

(i) Coal and Lignite.

(ii) Mining of Iron ore, manganese ore, chrome ore, gypsum, sulphur, gold and diamond.

(iii) Mining and processing of copper, lead, zinc, tin, molybdenum and wolfram.

(iv) Minerals specified in the Schedule of the Atomic Energy Control of Production and Use Order, 1953.

(v) Mineral Oils.

3.30. The Resolution, however, does not preclude the expansion of the existing privately owned units, or the possibility of the State securing the cooperation of private enterprise in the establishment of new units, when national interests so require. Whenever cooperation with private enterprise is necessary the State will ensure, either through majority participation in the capital or otherwise, that it has the requisite powers to guide the policy and control the operations of the undertaking. The Resolution further provides that there will be no ban on small privately owned units in undertaking small scale mining.

3.31. As regards the remaining minerals included in Schedule 'B' of the Resolution, the State is expected to increase its praticipa-

tion in their working progressively. At the same time, private enterprise has full opportunity to develop in this field, either on its own or with State participation.

3.32. Pursuant to the policy outlined in the Industrial Policy Resolution the Central Government have to ensure that the results of the survey/investigation of the Geological Survey of India are made available to the private sector as well as public sector so that, depending upon the potentiality of the area concerned and the mineral concerned, steps be taken by the public sector or private sector to undertake detailed prospecting or mining of the area. Therefore, reports of the Geological Survey of India are published and circulated to all agencies. In case the area is potentially rich and the mineral is included in Schedule 'A' of the Industrial Policy Resolution it is invariably entrusted to some Central Government undertaking or some State Government undertaking as may be considered expedient in the public interest. In case the report of the Geological Survey of India reveals that the area concerned is a small patch or is otherwise not fit for exploitation in the public sector, the State Government notify its availability in the State Gazette inviting the private entrepreneurs to work the area.

3.33. In short, the basic policy followed in this regard is to assess, after the receipt of the reports of the Geological Survey of India, the total requirements of important minerals like coal, iron ore etc. in the national economy and then apportion responsibility between the private and public sector to achieve the targets of production, the main object to produce all such minerals that are needed on the basis of the capacity of each sector and the requirements of the Resolution referred to above. A sizable public sector has come up in the mining field to mine the important and strategic minerals included in Schedule 'A' of the Industrial Policy Resolution.

3.34. Commercial exploitation of non-ferrous ores in some cases has not started owing to the following reasons:—

(i) the time required for collection of full information about the size, nature grade of the ore, involving additional drilling and exploratory mining.

(ii) absence of indigenous 'know-how' and the time required for obtaining the assistance of foreign collaborators/ consultants.

(iii) the long gestation period of mining of non-ferrous ores etc.

3.35. The Committee cannot but conclude that there is considerable time-lag between the discovery of a new source of mineral

deposit and its commercial exploitation. They, therefore, recommend that in order to reduce the time-lag to the minimum extent possible the last phase of exploration by the Geological Survey of India should synchronise with the initial operations of the exploiting agency so as to maintain continuity of efforts. This is not difficult to achieve as both exploring and exploitation agencies are under the administrative control of the Department of Mines and Metals.

B. (a) "Operation Hardrock" Project with US AID

(i) *Genesis*

3.36. The development of the industrial potential of the country is directly related to the speed with which the exploration of the mineral wealth of the country proceeds. This work is currently being carried out by the Geological Survey of India and the Indian Bureau of Mines. However, knowledge of possible location of mineral deposits of non-ferrous base metals like copper, lead and zinc is still incomplete. At present the country is spending more than Rs. 45 crores of foreign exchange for importing non-ferrous metals like copper, zinc, lead, tin, nickel and aluminium of which copper alone accounts for about Rs. 22 crores.

3.37. The Department of Mines and Metals decided in June, 1965 to embark on a crash programme known as "Operation Hardrock" for location of base metals mineral deposits by adopting the latest technique viz. Airborne Geophysical Surveys in potential areas to be followed by ground exploration where warranted.

3.38. With a view to using the latest techniques of airborne geophysical surveys, employed in western countries for accelerating the search for metalliferous minerals, a subordinate office under the Ministry of Steel and Mines known as "AIRBORNE MINERAL SURVEYS AND EXPLORATION" was opened *vide* Government of India, Ministry of Steel and Mines (Department of Mines and Metals) sanction No. 8/8/65-MI, dated the 24th September, 1965 for quick mineral survey.

3.39. Explaining circumstances leading to entering into collaboration with foreign firms and giving the reasons therefor, the Ministry have stated that the work in other countries has demonstrated efficacy and importance of airborne geophysical surveys. In a vast country like ours with large areas still to be surveyed in careful detail, the importance of such airborne surveys need no emphasis. Airborne geophysical surveys particularly using an electromagnetic system and the instrument technology required has not reached a stage in this country permitting us to organise such surveys on

our own. There was, therefore, no alternative but to seek external assistance from those who have the necessary experience and sophisticated equipment required for this particular field of activity.

3.40. Referring to the consideration which led the Government of India to undertake "Operation Hardrock" project with United States Agency for International Development (USAID) in July, 1967, the Ministry have stated that the USAID mooted a proposal some time in 1965 to adopt the latest and most sophisticated methods of airborne geophysics over possible ore bearing terrain in this country in order to locate deposits of base metals such as copper, lead and zinc. This was examined by the Ministry of Mines and Metals and finally a scheme was drawn up in consultation with the USAID called "Operation Hardrock" which envisaged airborne geophysical surveys over a total area of 90,000 sq. km. in parts of Andhra Pradesh, Bihar-West Bengal and Rajasthan in order to locate zones for intentive ground exploration. The project envisaged also ground follow up of such zones by detailed ground geochemistry, geophysics and geology to be followed up by diamond drilling on targets of promise. The main object, therefore, of taking up this project "Operation Hardrock" was to intensify and accelerate the location and discovery of exploitable base metal deposits of copper, lead, zinc, molybdenum, nickel etc.

3.41. **The Committee are of the view that the pace of investigations of base metals should be considerably accelerated if the production of these metals is to keep pace with the tempo of industrialisation in the country.**

(ii) *Expenditure involved in the Project*

3.42. Details of expenditure involved in the project and the basis on which the amount allowed against each item have been arrived at are furnished below:—

I. *Contract Cost.*		
(i) Contractor's cost.	120·39	lakhs.
(ii) Areos Sub-Contract.	152·11	„
(iii) Equipment	56·27	„
(iv) Fixed Fee	15·00	„
Rs.	343·82	„ *

*(Includes foreign exchange component of dollars 3,300,000 to be met out out of US AID loan).

II. *Government of India Cost.*		
(i) Pay & Allowances of Govt. of India Staff	42·09	lakhs
(ii) Equipment	41·00	,,
(iii) Other recurring charges of Govt. of India.	95·96	,,
Rs.	179·05	,,
TOTAL I + II Rs.	522·87	,,

Contract Cost

(a) Contract cost includes the Contractor's cost towards salaries of US personnel, transportation, travel per diem cost, basic furnishings and the salary of ministerial Indian staff appointed by the Project Manager.

(b) Provision for equipment was made by the Contractor taking into account the aerial surveys, ground follow up work and drilling work to be carired out in terms of the Contract and the analysis required to be done in the Laboratory.

(c) The Sub-contractor's cost was arrived at on the actual line kilometers flown including that of mobilisation and demobilisation charges for the aircraft and for furnishing the final map data compilation report at a fixed rate for each line km.

(d) The Contractor's fixed fee represents the element of profit.

Government of India Cost

The pay and allowances of Government of India staff have been arrived at based on the actuals so far incurred and the likely expenditure to be incurred upto the completion of the Project.

Equipment

At the time of sanctioning the Project, it was contemplated to have only five field parties but on actual appraisal of the anomaly zones, it was considered absolutely essential to increase the field parties from five to tweleve. Consequent on this increase, additional vehicles, tents, furniture, survey and drawing equipment and other stores for the successful execution of the project were required on the pattern followed by the Government of India.

Other Recurring Charges

Other recurring charges include expenses incurred by field parties for investigations and for diamond drilling including propulsion charges for vehicles used, the rent of office buildings, water and electricity charges, installation of telephones etc. which do not fall in any of the above three categories based on the actual expenditure so far incurred and the likely expendiutre to be incurred for the rest of the Project.

The procedure and the agency for the follow up action

4.43. The airborne geophysical survey was carried out by sub-contractors Messrs Aero Service Corporation, USA. The follow up involving Phase II and Phase III, namely, ground evaluation of aeroanomalies and diamond core drilling was entrusted to Parsons Corporation, Los Angeles. In terms of the Contract all the work was done in close association with the officers of the Government of India.—Airborne Mineral Surveys and Exploration Organisation under the Department of Mines and Metals.

3.44. All the geophysical aeroanomalies in terms of the physical parameters were categorised taking into consideration the geological environment. After classification a priority was evolved and 3000 such aeroanomaly intercepts were chosen for ground exploration adopting an initial reconnaissance to be followed by integrated geophysical, geochemical, geological and photogeological evaluation of intercepts of promise. Based on such detailed evaluation targets have been chosen for diamond drilling.

3.45. It has been stated by the Ministry that the airborne geophysical surveys effectively help in localising areas for search for base metal deposits. Many of the targets which have emerged in new areas are at—

Rajasthan: Ajit Nagar, Fathepur, Singhana, Makri, Nalpura, Dedwas and Bhopal Sagar;

Bihar W. Bengal: Churku, Tamakhun, Porapahar, Jharia and Dharkula; and

Andhra Pradesh: Papayapalam, Ontimitta and Emaluru.

The above anomalies have been chosen for test drilling based on positive results obtained by ground geochemistry and geophysics. Drill holes located at Ajit Nagar, Fathepur Singhana, Makri in Rajasthan; Churku and Tamakhun, in Purulia district, West Bengal and Papayepalem in Guntur district in Andhra Pradesh have encountered zones of sulphido mineralisation with minor values of

copper and in one or two cases Molybdenum. Further drilling is in progress in the Ajit Sagar area to trace the lateral and vertical extent of a zone analysing over 1·5 per cent copper encountered in one of the drill holes. The drill hole at Papayapalem in Andhra Pradesh has disclosed 56 cms of lead sulphide mineralisation with minor copper sulphides.

Details of progess made and the time by which the project is likely to be completed

3·46 Aerial Geophysical flying completed. . 144,000 line kms equivalent to 90,395 sq. kms.

Progress of ground follow-up

3.47. After a detailed evaluation of the aeroanomalies based on their magnetic, electro-magnetic characteristics and geological association, 3000 anomalies were selected for follow up by reconnaissance evaluation. At least 10 per cent of those anomalies may require detailed ground evaluation adopting geological, geophysical and geochemical techniques. This target is anticipated to be achieved by the end of work season 1970.

3.48. One of the primary objects of this programme is to test by means of drill holes aeroanomalies which on ground examination point to a conductive body of sulphides. Wire line drilling, which is time saving, has been introduced for the first time in this country to drill angle holes, in contrast to the conventional methods.

3.49. The following statement shows the progress of ground follow-up as on the 31st December, 1969:

	Reconnaissance Survey (Targets)	Detailed Survey	Drilling (Metre)
Andhra Pradesh	532 (1,000)	82	4·00
Bihar-West Bengal .	193 (800)	56	176·31
Rajasthan .	555 (1,200)	137	2633·98
	1280 (1720*)	275(25*)	2814·29

*Remaining target to be covered by September, 1970.

3.50. Over 5,000 samples of ores and samples collected in the field have been analysed quantitatively and semi-quantitatively in the Laboratory. Several thousand samples have been geo-chemically tested in the field by rapid methods. 3 new sophisticated instruments have been received as a gift from Australia which will facilitate quick and accurate determination of elements present in core, rock and soil samples.

3.51. A target of 16,000 metres of diamond drilling was envisaged based on what would be possible by deploying 4 drills equipped with wire line equipment.

3.52. There has been a short fall in the drilling achievement due to the following reasons:—

(i) Procedural delays in procurement of drills.

(ii) Limited supply of wire line equipment in India.

3.53. As on date (31st December, 1969) nearly 3,000 metres have been drilled against 16,000 metres of drilling envisaged. About 10,000 metres may be achieved during the project period. It was stated that the following action has been taken:—

(i) In addition to the 4 heavy drills envisaged under the project, 3 Mindrills have been obtained to accelerate test drilling.

(ii) At present 4 heavy drills and 1 light drill are in position in Rajasthan; 1 light drill in Bihar-West Bengal and 1 light drill in Andhra Pradesh.

(iii) 1 heavy drill each will be shortly moved to Andhra Pradesh and West Bengal based on results obtained by test drilling.

(iv) Drilling has commenced in Andhra Pradesh near Papayapale in Guntur District.

3.54. It has also been stated by the Ministry that the project has gone on satisfactorily and the airborne geophysical surveys were completed on schedule. Ground follow up work is going on as per schedule including test drilling in some areas. The ground reconnaissance is going on an accelerated basis on a larger scale than envisaged under the original contract as more field parties have been deployed.

3.55. Of the 3000 Grade-I anomalies selected, 1300 have been covered by reconnaissance and the remaining 1700 are likely to be

covered by August. 1970. 275 of the 1300 such anomalies have been covered by detailed ground surveys and 15 zones selected for drilling so far. Detailed examination of points meriting further work will continue after August, 1970.

3.56. Explaining the techniques involved in airborne geophysical survey and as to what is meant by aero-anomalies, representative of the Ministry informed the Committee during evidence as follows:—

> "During the last 15 or 20 years, airborne geophysical techniques have been in vogue in order to locate inconsistencies in physical properties in terrain over which a specially equipped aircraft flies. The aircraft carries a magnetic system to measure magnetism along the flight path, an electro-magnetic system to measure electro-magnetic conductivity and a radiometric system to measure radio-activity. The aircraft flies along pre-determined paths 1 or ½ km. apart maintaining low heights of 100 to 150 metres above the ground. The instruments maintain a continuous record of the magnetic, electro-magnetic and radiometric responses during the flight and departures from the normal called "anomalies" can be plotted on a map. An electro-magnetic anomaly is caused by conductive body which may be an ore body of sulphides or iron or copepr or lead. Such conductivity is also caused by shallow sources of saline water and bodies of conductive minerals like graphite. Photographs of the terrain over which these flights are operated are available from the Indian Air Forces. The path for the flight of the aircraft are marked on these photos. All instrumental records are recorded on special charts; a small camera to photograph the flight path is also carried in aircraft. These photos are developed and compared with the flight lines marked on air photographs, supplied to determine the amount of deviation. All anomalies are checked on the ground in great detail by geophysical, geo-chemical and geological techniques."

3.57. In regard to importance of the "Operation Hardrock" project, the Secretary of the Ministry informed the Committee during evidence that "considering the enormous amount of work (growing of mineral resources) to be done, we have been fortunate in getting, the assistance for 'Operation Hardrock' for the location of what is called the anomalies on ground.....This (Operation Hardrock) is to survey from the air, what are the promising locations where you had better concentrate first. The major advantage

in this scheme is to cut out large areas to which attention need not be paid. Having done that, both literally and figuratively, we come down to earth to the actual anomaly areas and then start the follow up action. Already we have had one or two stricking results in the field of copper ores, in the vicinity of Khetri.....So far this work of operation Hardrock has been carried out in three areas in the country as a contract operation in Bihar, in some areas in Rajasthan and in Andhra".....''These surveys will enable us to do initial spotting work in a much more rapid way. Then, we can take up the more important areas on the ground. It is very promising situation on the whole for the location and consequently for the exploitation of mineral resources in the country in the years to come."

3.58. **The Committee are distressed to note that under the 'Operation Hardrock' project there has been a shortfall in the ground follow up drilling in as much as against 16,000 metres of drilling envisaged, only 3,000 metres have been drilled. This has been stated to be due to (i) procedural delays in procurement of drills and (ii) limited supply of wire line equipment.**

3.59. **The Committee fail to understand why the procedural difficulties could not be overcome and why supply of wire line equipment could not be increased. The Committee cannot help coming to the conclusion that the project has not been properly planned. They, however, trust that the procedural hurdles will be removed by stream-lining the methods and the process of drilling will be accelerated after more drills are acquired to achieve the targets well in time.**

3.60. **The Committee are unhappy to note that practically no drilling has been undertaken in Andhra Pradesh and in Bihar-Bengal only about 175 metres of aero-anomalies areas have been drilled.**

3.61. **The Committee are also unhappy to note that while 144,000 line kms (equivalent to 90,395 sq. kms) aerial geophysical flying as envisaged in the agreement with the United States Agency for International Development has been completed, the follow up work has been insignificant and lagging far behind schedule. There cannot be two opinions that 'follow up' action is the operative part of the project and unless the schedule is adhered to, the anomalies are likely to pile up further. The Committee, therefore, recommend that Government should take all possible steps to ensure that the momentum of the work is not lost in the promising areas.**

(b) Airborne Geophysical Surveys with French and Russian Collaborations

French Programme:

3.62. From the "Revised Report on 'Geological Survey of India' of the sub-Group on Geological Surveys and Investigations, Exploration Prospecting etc. (December 1968)" it is observed that a proposal has been received from a French firm for undertaking aero-magnetic survey (First phase) and spectrometric (raido-active) and electromagnetic survey (Second phase). Government of India may take help from the French for a combined electro-magnetic, spectrometric and magnetic survey for covering a total of about 190,000 line kilometres in Mysore (with some adjoining areas in Tamil Nadu and Andhra Pradesh), Gujarat, Rajasthan and Madhya Pradesh covering 99,250 sq. kms. The foreign collaboration does not envisage ground follow up work and drilling, which will be conducted by Government of India organisations.

3.63. The aerial survey cost is estimated to be as follows:—

Foreign exchange .	15,000,000 French Francs—Rs. 2·25 crores.
Rupee Expenditure (Including cost of aerial photo mesaics and personnel etc.	Rs. 1·67 crores.

USSR Programme:

3.64. It is also stated in the report of the Sub-Group referred to above that Soviet assistance has been accepted for undertaking airborne magnetometric survey over an area of 131.400 sq. kms. in Dandakaranya (Madhya Pradesh, Orissa and Andhra Pradesh) and Sambalpur-Bolangir (Madhya Pradesh and Orissa) areas involving a total flying of about 170,800 line kms. of production flying. Soviet collaboration is restricted to airborne survey alone. The cost is estimated to be Rs. 11,52,900/- as shown below—

Foreign Exchange .	Rs. 78,86,000 (in equivalent roubles)
Rupee Expenditure .	Rs. 38,43,000

3.65. During evidence the Committee were informed that "(for) French and Russian scheme (for airborne geophysical surveys), for future operations we intend to acquire even aerial flying equipment through Canadian assistance so that our technicians who will be trained in these operations under contract can ultimately take up this job elsewhere in the country."

3.66. The Committee note that the proposed French and USSR programmes are restricted to airborne surveys alone and do not envisage ground follow-up work and drilling which will be conducted by Government of India organisations.

3.67. The Committee also note that as the technical know-how within the country has not been developed to an extent that it would have been possible to undertake such surveys ourselves, it is imperative to take the help of foreign countries who have experts in this field. The Committee, however, stress that Government should take all possible steps to ensure that indigenous know-how is developed within the country and dependence on foreign assistance is done away with as early as possible.

CHAPTER IV

A. Publications

4.1. The publications of the Department deal with Geology and allied Science and comprise Records, Memoirs, Bulletin Series A (Economic Geology) Bulletin Series B (Engineering Geology and Groundwater) Palaeontologia Indica, Indian Minerals (a quarterly Journal) and miscellaneous publications such as Symposia, Bibliographies, Research Papers and Manuals of Geology:—

Records:—These are issued in two parts making up one volume. The first part contains the Annual General Reports while the second part contains short scientific papers.

Memoirs:—These comprise larger papers and monographs relating to Regional Geology, mineral resources, Petrology and other special subjects.

Bulletin Series A:—Cover papers relating to mineral resources and Economic Geology.

Bulletin Series B:—Cater to papers relating to Engineering Geology and groundwater and Geophysics.

Indian Minerals:—It is a semipopular quarterly Journal containing articles and notes on Geological Sciences, mineral economics, Geophysical and Geochemical Problems reviews of important publications etc.

Palaeontologia Indica:—These are monographs relating to Palaeontology dealing with detailed descriptions of Fossil collections.

4.2. Some pamphlets on the mineral resources of the different States of India were prepared, in several regional languages, under a scheme for making "the Layman Mineral Conscious" launched by the G.S.I. In view of the recent economy drive publication of these pamphlets has been abandoned.

4.3. The Committee note that publication of some pamphlets on the mineral resources of different States of India prepared in several regional languages, under a scheme for making "the Layman Mineral Conscious" launched by the Geological Survey of India has been abandoned.

4.4. The Committee, however, feel that in view of the utility and importance of the above mentioned scheme Government may examine the desirability of reviving the publication of pamphlets in regional languages in co-operation with the State Governments concerned.

Delay in publications

4.5. It has been stated by the Ministry that printing difficulty is one of the major reasons that contributed to the delay in the ultimate release of G.S.I. publications. As per rules the publications of the Department were required to be printed in Government of India presses only which were too busy to attend to G.S.I. work with the required speed. The delay in releasing the General Reports of G.S.I. for the year 1964-65, in the year 1967, is stated to be due to this situation.

4.6. To avoid the delays it has been stated by the Ministry that as a result of sustained efforts made to overcome the printing difficulties, they have recently relaxed the rigid printing rules to some extent and have delegated powers within certain limitations, to the Director General Geological Survey of India to have scientific publications printed through private presses at the approved rates of the Chief Controller of Printing and Stationery. It has further been stated that in exercise of such powers the Department has already got some of its old publications printed off very expeditiously through private agencies.

4.7. It has also been stated that in order to place the results of some of the more important investigations carried out by the G.S.I. at the disposal of the State Governments and others interested, at the earliest possible time (before printing in report form), a new feature has been introduced recently *e.g.*, the OPEN FILE REPORTS. These reports in mineographed form are distributed to all the State Government Departments, G.S.I., Regional/Circle Offices etc., for affording opportunities to interested people to consult them. The first issue of the above report contains an abridged edition of the General Report of the G.S.I. for the year 1966-67. The General Report for 1967-68 has also been released as an open-file report.

4.8. Referring to delay in G.S.I. publications, the representative of the Ministry informed the Committee during evidence that "We have to depend on Government press and there is not enough facility. If they allow us to go to the private press that takes time even in getting such a permission."

4.9. When suggested to have a press of their own, the witness stated: "We shall have to go to the Finance for having a common press—for G.S.I. and I.B.M.—not an independent press for each. Some of the publications are in the nature of special publications which cannot be done here. We have to get the Finance's concurrence as also that of the W.H.S. Ministry (Controller of Printing and Stationery) for setting up a separate press of our own—common press for both G.S.I. and for I.B.M. at some suitable place."

4.10. The Ministry have stated that the new procedure has no doubt helped G.S.I. appreciably in getting a few publications printed in private presses/agencies as expeditiously as possible. As against about 6,000 pages printing during 1965—1968, above 3,400 pages were printed during 1969 alone (January—November). But it does not solve all the problems as detailed below:—

(i) The scheduled rates, as the CCPS himself agrees, are obsolete and even after permissible enhancement do not reflect the current market rates of well equipped presses that are capable of undertaking printing of scientific publications containing text figures, illustrations and maps. As an immediate consequence such work have to be entrusted to smaller, ill-equipped presses (on lowest tender basis) who are neither able to work to time schedules nor to attain the high standard of the Geological Survey of India publications which are distributed to institutions and scientists all over the world.

(ii) The monetary limits in respect of publications (with paper) are not conducive to expeditious printing as the average cost of printing of medium sized Geological Survey of India publications generally exceeds them.

(iii) Under the existing arrangements the Geological Survey of India has to await from the Manager of Publications the "symbol number" and the "sale price" for each and every Geological Survey of India publication. This entails a great delay in the release of publications.

(iv) Printing and cover paper are to be obtained from the Central Stationery Office, Calcutta, with the approval of the C.C.P.S., and Geological Survey of India is not empowered to procure its requirement from the open market. As a consequence printing of some of the bigger volumes has to be withheld.

4.11. The Committee note with concern that there have been considerable delays in early release of Geological Survey of India publications viz., 'Records', 'Memoirs', Bulletin (Series 'A' and 'B') and Indian Minerals, etc. and sometime even 2 to 3 years have been taken to release some of these publications.

4.12. The Committee are of the view that information obtained by the Geological Survey of India should be freely and fully disseminated to all concerned with the least possible delay. The Committee need hardly point out that delayed publication of results of scientific investigations reduce their utility.

4.13. The Committee hope that the delegation of powers in November, 1968 to the Director General, Geological Survey of India to farm out printing jobs to private presses will help the Department in clearing the past arrears and become current.

4.14. The Committee have also been apprised that the Department has not been able to make full use of these powers on account of the limitations enumerated in para 4.10. The Committee, therefore, would like Government to immediately look into these difficulties and take suitable remedial measures.

B. Geological Survey of India Libraries

4.15. As the oldest and biggest of such libraries in the East, the Central Library of the Geological Survey of India with over 2,00,000 volumes of books, periodicals and a very large collection of reprints, reports, pamphlets and maps, relating to geology and allied sciences, receives in exchange or by purchase over one thousand different scientific journals, including almost all the geological publications issued throughout the world. The library is used by the officers of the Department, research workers, professors, students from various universities and the general public.

4.16. Apart from the Central Library, there are branch libraries attached to the different Regional/Circle offices of the Geological Survey of India.

4.17. The Committee are glad to note that the Central Library of the Geological Survey of India is the oldest and biggest of such libraries in the East and contains over 2,00,000 volumes of books, periodicals, etc. on geology and other allied sciences. The Committee appreciate that the Library caters to the needs of research workers, professors, students from various universities and members of general public.

4.18. The Committee would, however, like the Geological Survey of India to ensure that the Library continues to maintain its eminent position.

C. Stores and Equipments

4.19. The Geological Survey of India requires drilling and mining machinery, sophisticated geophysical instruments and laboratory equipment for its petrological, palaeontological, geo-hydrological, rock mechanisms and chemical laboratories besides the various ancillary and accessory stores like, vehicles, tents and camp equipment etc. Further for maintenance and repair of existing machinery and equipment as well as to fabricate special tools and instruments, there are three workshops viz., the Geophysical Workshop, the Automobile and Mechanical Workshop at Calcutta and the Central Mechanical Workshop (for drills, vehicles, traction and other heavy equipment) at Nagpur. There are also smaller workshops at the regional headquarters mainly for minor repairs and maintenance service for vehicles, drills, etc. These workshops are provided with requisite machinery and working tools.

4.20. Most of the items of stores are indigenously procured. Only such stores which are not available in the country are imported after obtaining due clearance of the Director General of Technical Development, Government of India. These include geophysical equipment and sophisticated laboratory equipment, Heavy duty drills and drilling accessories, certain categories of hydrological survey equipment, cameras, binoculars and certain categories of survey equipment.

4.21. It has been stated by the Ministry that in the field of geophysical instrumentation there have been noteable achievements in the Geological Survey of India. More than half of geophysical field instruments used by the geophysical parties of the G.S.I. in field exploration for minerals have been designed and constructed in the Geophysical Laboratory of the G.S.I., which include resistivity and spontaneous polarisation potentiometers, nuclear magnetometers, electromagnetic inductive prospecting units, induced polarisation prospecting instruments, magnetic susceptibility meters, geothermal probe etc.

Requirement of equipment during the Fourth Five Year Plan

4.22. The Ministry have made an approximate assessment regarding the requirement of different types of equipment required during the Fourth Five Year Plan period. A general outline of the

different types of equipment along with the financial outlay proposed are given below:—

	Outlay (in lakhs)	
Drills	321·32	Dominantly indigenous except for some heavy duty and/or components not manufactured in India.
Vehicles	192·68	Indigenous
Petrological Palaeontological laboratory equipment.	38·34	Imported.
Tools & Appliances used in marine geological studies	62·79	Imported and indigenous
Geophysical equipment	138·08	Imported as well as indigenous
Mining equpiment	71·70	Mostly indigenous; few items not available in India to be imported.
Photogeology photo-process, Survey and Drawing equipment	35·59	Partly imported and partly indigenous.
Aero-Magnetic Survey equipment.	19·05	Imported

4.23. The Committee feel that unless expeditious action is taken to get drills, vehicles, geophysical equipment, mining equipment, laboratory equipment, etc. in time, the Department will not be able to realise the targets laid down in the plan.

Maintenance and Verification of Stores accounts

4.24. It has been stated by the Ministry that as the Geological Survey of India is a service Department and no proforma account of any branch of its operation is required to be maintained, the value accounts of stores, in the strict sense of terms, is not maintained. The numerical ledger is only maintained in the form of register. In the posting of receipts against purchase, the rate is also indicated.

4.25. The postings are checked by a gazetted officer, who puts his initials against every posting. In addition to this, at the time of physical verification of stores, the internal audit party, who are deputed for the job, also check the entries made on the receipt and issue side of stock ledger. Cent percent physical check of quantity in stock is made and compared with the book balance. In case any discrepancy is noticed, the books are immediately corrected to tally with the ground balance and a report is submitted indicating the discrepancy.

4.26. It has also been stated that to minimise pilferage and thefts, stores depots are enclosed by suitable boundary walls or are situated in closed godowns. There is arrangement for keeping watch at the

gate by the security department. All out-going stores have to accompany a gate pass issued by competent authority, whose specimen signature is kept with the security department. The gate pass is deposited at the gate. All godowns are properly locked and sealed by competent authority everyday after working hours. While opening the godown on the next working day proper checking is maintained to see that the seal has been in tact.

Overstocking of Stores

4.27. To avoid overstocking and unnecessary accumulation of stores, it has been stated by the Ministry that the stores are provisioned on the basis of the annual programme of operation of G.S.I. The stores available in stock and those expected against indent/order already placed are taken into consideration, while estimating the quantity for a fresh procurement. Every provisioning proposal is examined by proper authority whose administrative approval is necessary for placing indent. If the estimated cost of a proposal is Rs. 500 or above, it is scrutinised by a purchase committee.

4.28. At the time of physical verification of stock, any item which has got no issue for a considerable period is brought to the notice of the store holding authorities, who examine the requirement of this item in other regions and circles and issue instructions for transfer and re-distribution to the regions or circles wherever this is needed.

Procurement of Stores

4.29. It has been stated by the Ministry that the procurement of stores required for use by the Geological Survey of India is made through Central Purchase Organisation i.e., Directorate General of Supplies and Disposals except in cases where value of stores is less than Rs. 25,000. These are procured departmentally observing the approved purchase procedure of the Government of India.

4.30. While commenting upon the present arrangement of centralisation of procurement of scientific equipment through the Director General of Supplies and Disposals, the Ministry have stated:—

> ".....in many cases, operations have at times been held up due to delay in procurement through D.G.S.&D. When the failure becomes apparent, it becomes too late to approach D.G.S.&D. for obtaining clearance of those items for local purchase. To avoid situations, D.G., G.S.I. is of the view that he should be vested with some emergency power for direct purchase of stores so that when emergency arises, he is able to procure such items by applying

quickest method of procurement locally and record proper justification for taking such action. This proposal is under examination of the Government."

4.31. The Ministry have cited examples stating that the diamond bits are essential items for exploratory rock drilling. These are very costly items and G.S.I. uses approximately Rupees one crore worth of diamond bits every year. When there is failure on the part of the D.G.S.&D. to procure the material in time and the stock position become very acute the ceiling of Rs. 25,000 does not permit G.S.I. to procure its requirement even for a period of one month.

4.32. Similarly tent is an essential item for the field parties to work in the fields. The Ministry have stated that recently there have been short supply of tents against D.G.S.&D. contract and the situation has become very critical but it cannot be avoided by direct purchases as the power of Director General is very limited.

4.33. During evidence, the representative of the Ministry informed the Committee that "we are taking up this question of delegation of financial powers. Internally we can do a great deal more, without going to Finance.....Very often what happens is this. At the top delegation is there; but unless it travels down all along the line, full utilisation of the delegation is lost. G.S.I. has got so many laboratories in so many places. There must be powers with them to procure certain things, in emergencies, so that they need not wait for the whole thing."

He further stated that "I am not blaming financial procedure. Good deal can be done within existing provisions which is not done....Powers are given and there is an understandable reluctance to face certain situations. Public servants are also human."

4.34. **The Committee have been apprised that the present arrangement of centralisation of procurement of scientific equipment through the Director General of Supplies and Disposals sometimes stands in the way of timely procurement of equipment thus resulting in delay in execution of priority investigations.**

4.35. **The Committee note that stores valued less than Rs. 25,000 can be procured departmentally observing the approved purchase procedure and that "good deal can be done within existing provisions which is not done."**

4.36. **The Committee feel that within the ceiling limit of Rs. 25,000 and with sufficient fore-sight and anticipation in placing indents with the D.G.S.&D. much in advance of the requirements of various types of stores and equipment, bottle-neck in respect of**

timely procurement of such items can be removed to a great extent. However, under exceptional circumstances and in cases of emergencies and where the Director General of Supplies and Disposals has specifically expressed his inability to procure certain types of stores within the stipulated time, the Government may examine the desirability of suitably raising the limit subject to the condition that the maximum quantity to be purchased should be just sufficient to meet the emergency or to cover the requirement for the exact period during which supply from D.G.S.&D. is not likely to come.

D. Staff Matters

Manpower Requirement

4.37. It has been stated that the total number of scientific and technical personnel in G.S.I. had increased from 300 in 1957-58 to 1438 in 1968-69.

4.38. The estimated requirement of personnel of different cadres for implementing various geological investigational programmes during the Fourth Five Year Plan have been assessed by the Ministry as under:

Personnel	Sanctioned	Add. proposed during IV Plan 1969-74	Total
(*a*) Scientific	1,473	1,108	2,581
(*b*) Technical	3,712	6,090	9,802
(*c*) Ministerial	1,370	1,376	2,746
(*d*) Class IV	2,035	1,913	3,948
TOTAL .	8,590	10,487	19,077

4.39. The total expenditure on pay and allowances for the above additional manpower proposed during the Fourth Plan is estimated to be Rs. 10·22 crores.

4.40. The Committee have been informed by the Ministry that there is a wide gap between the sanctioned strength and personnel in position, as per statement reproduced below :

Category	Sanctioned as on 30-9-69	In position as on 30-9-1969	Gap
Geologists	1,030	832	198
Geophysicists	137	80	57
Chemists	160	116	44
Mining Engineers	42	27	15
TOTAL	1,369	1,055	314

As a result of this gap some activities of the Geological Survey of India, *i.e.*, ground-water engineering geology, systematic mapping including preliminary mineral assessment, marine geology, petrology, paleonotology, have been given lower priority.

4.41. It has further been stated that due to non-availability of personnel in time there has been a lag in systematic mapping and preliminary assessment, the rate of finding new prospects for detailed work is diminishing. The Geological Survey of India is also not able to increase its primary function of mapping particularly in Himalayas due to lack of personnel.

4.42. Certain imbalances both in equipment and personnel are stated to have arisen due to partial sanction and cuts. In regard to steps taken to meet the situation, the Ministry have stated that measures have been taken to hasten the process of recruitment and procurement of equipment and anticipate such time lags in determining the targets of work. Imbalances in equipment and personnel are being progressively removed by providing for additional men and material in the annual plans.

4.43. The Committee have been informed during evidence that no difficulties were expected to be faced in getting the desired number of geologists etc. with requisite qualifications, but there were some procedural difficulties in regard to the agencies that deal with the recruitment.

4.44. It has also been stated during evidence that "the sanctions are given with due regard to the requirements of work. Sometime it does happen that when the posts are sanctioned, the financial

sanction is not available; mostly it is due to difficulty in finding the persons immediately. This is partly due to procedural difficulties which are outside the scope of the G.S.I. as sometimes the DPC or the UPSC are involved." The representative of the Ministry also informed the Committee that, "The Headquarters of G.S.I. is in Calcutta. They often rely on recruitment locally. I have suggested that one way of stepping up recruitment is to delegate the powers of recruitment to the regional offices. It should be more easy for the regional office to recruit. I hope all this put together will make a substantial difference to the pace of recruitment and the filling up of vacancies."

4.45. Explaining the procedural difficulties referred to above, the Ministry have furnished a note as follows:

> "The intake of Geologists is in the cadres of Junior Class I and Class II through competitive examination held once each year, some time in August, or thereafter. From the date of commencement of examination, it takes about 6 months to receive recommendations from UPSC. On receipt of recommendations, the character and antecedents of the candidates have got to be verified from the Police authorities. This procedural requirement takes on an average 3 to 4 months. Thereafter the candidates are given offers of appointment and asked to intimate their place of choice for medical examination. Subject to acceptance of the offer and on receipt of the intimation, the medical examination of the candidates have to be arranged and on receipt of satisfactory medical reports the candidates are asked to join. This takes about 2 months more. The candidates by this time are mostly employed elsewhere or are engaged in some research work whereby another 2 months or more goes before they are actually in position. This takes about a year before the nominees of the UPSC joined the Geological Survey of India."

4.46. In regard to remedial measures it has been stated by the Ministry that a proposal is under consideration to make conditional appointments subject to the character and antecedents being verified and found satisfactory and their being found medically fit. The Government is also considering delegation of power to Director General, Geological Survey of India for making appointment to Junior Class I posts.

4.47. The Committee are constrained to note that due to non-availability of personnel in time not only some activities of the

Geological Survey have been given lower priorities but the Department has not been able to give proper and full attention to its primary function of mapping particularly in Himalayas. The Committee are surprised that although requisite number of qualified personnel is available in the country, the procedural difficulties have been allowed to stand in the way of early recruitment of such personnel.

4.48. **The Committee, therefore, suggest that Government should consider ways and means of eliminating procedural delays in the matter of recruitment of requisite number of scientific/technical personnel with necessary qualifications.**

4.49. **The Committee also urge that with a view to put an end to the unsatisfactory state of affairs in the matter of recruitment of scientific/technical personnel there should be advanced planning and the question of setting up an adequate machinery and procedure should be considered and brought into operation before long.**

Standard Norms of Working

4.50. A set of broad norms are fixed for different activities of work undertaken by Geological Survey of India and for personnel employed in research etc.

4.51. It has been stated by the Ministry that norms are part of self-imposed discipline and have to be treated as flexible. These are, however, adhered to as far as possible.

4.52. The standard norms set for the different types of geological investigations are given below:

Systematic Mapping	380-400 sq. km. per Officer/season in normal terrain.
	200—250 sq. km./Officer/season in hilly terrain.
	100—150 sq. km./Officer/season in larger scale.
Large scale mapping	20—25 sq. km./Officer as Airphotos (2"=1 mile) 0·5 sq. km. /Officer/season in plane Table (together with sampling pitting etc. where needed).
Groundwater Survey	One Geologist will be able to cover about 1500 sq. km/season for only water table mapping.
Drilling	750 metres/drill/year.
Mining	Major—750 m. per unit/year Minor—200—250 m. per unit/year.

As for the officers in the laboratories, there are no standard norms as such but the number of officers in the laboratory is based on the work-load assessed for each research investigation to be taken up.

4.53. The Committee have been informed that adequate supervision of technical work can be ensured when the ratio of supervisory officers to that of other is fixed on a rational basis. It has been further stated that each supervisory officer can effectively supervise about 15 officers, but at present they have on the average 25 officers to supervise. When a 1:15 ratio between supervisory officers and others is attained, there will be a marked improvement in the supervision and guidance which the supervising officers can exercise.

4.54. Asked as to how this norms of 1:15 has been reached and when this norm is likely to be attained, the Ministry have stated in a written note that the norm of 1:15 for supervisory *vs.* Junior Officers has been arrived at by the GSI from the past experience as well as minimum time required for the supervisory officers to guide and effectively direct the field officers.

4.55. Most of the officers engaged on systematic geological mapping and preliminary and regional mineral assessment work have to spend about six to seven months in the field. The Director supervising such work has to visit the officers in the field and spend sufficient time to give them proper guidance and directions. A Director is expected to tour roughly 15 to 20 days during a month. It has been stated by the Ministry that it would be, therefore, seen if a Director spends only about 8 days with each Junior Officer, during the whole field season of six months he will be devoting approximately 120 days by supervising 15 officers only.

4.56. Even a minimum eight days period is considered insufficient by the Ministry to effectively guide and direct the field officers. Hence, as a first step, they have proposed to bring the ratio to 1:15 and later reduce the ratio progressively to enable the supervisory officers to spend more time with field officers.

4.57. The Ministry have further stated that efforts will be made to achieve the norm by the end of Fourth Plan or during the Fifth Plan period.

4.58. The Committee note that at present each supervisory officer in the Geological Survey of India has to supervise, on an average, 25 junior officers.

4.59. The Committee also note that each supervisory officer can effectively supervise about 15 junior officers and that this norm is

likely to be achieved either by the end of the Fourth Plan period or during the Fifth Five Year Plan.

4.60. The Committee, however, hope that till such time the norm of 1:15 is attained the technical work at various levels will not be allowed to deteriorate in quality.

Nature of duties and facilities provided to the Geologists

4.61. Geologists working in the different circle offices and laboratories of the Geological Survey of India go to the fields for various periods depending upon the nature of the investigations. The Committee understand that the officers engaged in research in the laboratories generally go to the field for period of upto four months whereas officers engaged in systematic mapping and mineral investigation are required to go to the field for a period varying from six to seven months and in the case of detailed mineral assessment by drilling and exploratory mining remain in the field for the whole year.

4.62. When asked what arrangements are made to see to the normal comforts and other facilities like provision of accommodation, schooling, medical aid etc. to the families of such geologists in their absence, the Ministry have stated that the GSI officers posted in circle offices have to make their own arrangements for accommodation, schooling of their children etc. The officers, before going out for the field duties are supposed to ensure the continuity of the facilities to the members of their families in their absence.

4.63. When further asked whether any special allowance is paid to the field staff of the GSI, it has been stated by the Ministry that the Geological Survey of India officers are granted Field Establishment Allowance @Rs. 75/- per month for field work extending 30 days at a time, subject to fulfilment of certain conditions. They are also paid retaining fee @Rs. 25/- p.m. for the period of their recess, at Headquarters on completion of atleast 5 months continuous field duty on either side of the recess period. Preparatory Field Establishment Allowance of Rs. 75/- is also paid to Geological Survey of India officers where the officer concerned is likely to be on field duty for a continuous period of 5 months or more.

Promotions

4.64. Promotions are effected on the basis of recruitment rules for such posts, which duly provide for intake of direct recruits also upto the Junior Class I Cadres and Senior Class I Cadres (scale Rs. 700—1,250) in the Geophysical and Chemical Divisions. In

effecting promotions the procedures as laid under Ministry of Home Affairs O.M. No. 911/11/55 RPS, dated 22nd December, 1969, as amended from time to time covering special representations are duly followed. In formulating such recruitment rules the Government takes into account the procedure followed in regard to the scientists employed in other departments of Government of India and research organisations.

4.65. During evidence the Committee were informed that "The life of a geologist is very difficult.....they live in completely lonely places without any amenities."

4.66. When asked as to what incentives and inducements are offered to the young scientists to attract them to take up geology as a career, the Ministry have stated in a written note as follows:

> "Since direct appointments to the Junior Class I and Class II cadres are made through competitive examination, the higher posts in Senior Class I grade (Rs. 700—1250) are filled by promotion ('Non-selection') whereas the promotions to other Senior grades (Rs. 1300—1600, Rs. 1600—1800, Rs. 1800—2000 and Rs. 2000—2500) are made on 'Selection basis'. Thus it provides incentives to really competent officers to go to higher grades. Advance increments are also sanctioned on the basis of the merits."

4.67. The Committee were informed by the Director General, G.S.I. during evidence that "We have approached the Government for revision of their (Geologists) pay scales."

4.68. When asked as to what are the details of such proposals and at what stage the matter stands the Ministry have furnished the following reply:

> "In connection with the creation of the Indian Geological Service an integrated scale of pay on the line of the Indian Administrative Service was suggested by the D.G., G.S.I. but the proposal is not being pursued as some of the States are not in favour of the scheme."

4.69. **Keeping in view the nature of the duties of the scientists/technicians working with the Geological Survey of India, the Committee suggest that the feasibility of giving some incentives to such personnel may be examined by the Government.**

4.70. **It may also be ensured that suitable chances of promotion are available to the scientific and technical incumbents of Geological Survey of India to attract the right type of persons.**

CHAPTER V

A. Geological Survey of India Laboratories

5.1. Petrological, palaeontological and Chemical laboratories are located at the Central Headquarters of the G.S.I. in Calcutta, as also at the headquarters of the Regional and Circle Offices. Whereas the Circle and Regional laboratories are mainly engaged in routine analytical work and identification of minerals, rocks and fossils to assist the officers and attend to enquiries from the public, the Central laboratories, besides undertaking similar routine work, also carry out research which involves even field work projects, such as, study of battery grade managanese-ore, plantinum group of metals, and study of Indian coals with special reference to their coking properties, are also taken up by the different laboratories.

(a) *Petrological Laboratories*

5.2. Routine work carried in the laboratories, includes identification of rocks and minerals, testing gem stones for the public, determination of ore constituents and physical properties of clays. The laboratories prepare thin sections, grain mounts, polished sections of ore minerals and of coal.

5.3. The Central Petrological laboratories constitute the following sections:

(1) Mineralogy and Petrology laboratories.

(2) Ore Mineralogy laboratory.

(3) Clay Mineralogy laboratory.

(4) Coal Petrology laboratory.

(5) Mineral Physics laboratory.

5.4. Besides microscopes and other usual instruments used in optical mineralogy, there are scintillometers, electromagnetic separators, differential thermal analysis apparatus (Delttherm), high temperature furnace, flame photometer, *Ph* meter, Berman density balance, Wilfley table, superpanner, flotation cell, X-ray units, diffractometer, emission spectrograph etc.

5.5. The Committee was informed that research projects on selected petrological problems arising out of geological field work,

aimed at the understanding of fundamental geological processes in ore formation, paragenesis of minerals, origin of special suites of rocks, such as charnockites and alkaline rocks, and establishing petrological and mineralogical criteria for deciphering the origin of rocks, are undertaken. Work on these research projects includes field studies of critical sections and collection of material, and laboratory studies of a detailed and comprehensive nature to include physical determinations, petrography, optical determinations, X-Ray mineralogy and spectroscopy, complete and partial chemical analysis of rocks and minerals, trace element studies, etc.

(b) *Palaentological Laboratories*

5.6. Routine work includes study of fossil collection submitted by the officers. The Central Palaeontological laboratories constitute the following:

(1) Invertebrate laboratory.

(2) Vertebrate laboratory.

(3) Micropalaeontology laboratory.

(4) Palaeobotany laboratory.

(5) Palynology laboratory.

(6) Sculpturing Section

5.7. It has been stated that the laboratories are fully equipped for carrying out all aspects of palaeontological work. Research projects undertaken by these laboratories, involving both field and laboratory work, are directed mainly towards establishing stratigraphic history, sequence-correlation, and faunal and floral evolution.

Restorations of extinct animals, construction of dioramas and preparation of plaster casts of fossils are made in the Sculpturing Section which has qualified modellers. Plaster casts are also supplied to universities both in India and abroad on payment, thereby earning foreign exchange.

(c) *Chemical Laboratories*

5.8. Routine analysis form the principal work-load in the Central, Regional and Circle Chemical laboratories, as admittedly, such analysis are indispensable in the assessment of mineral deposits. The laboratories also play an important role in geochemical prospecting and in ground water studies.

5.9. The Central Chemical laboratories consist of the following:

(1) General Analytical laboratory.

(2) Trade Element laboratory.

(3) Fire-assay Analysis laboratory.

(4) Water-analysis laboratory.

(5) Rapid Analysis laboratory.

(6) Coal and Gas Analysis laboratory.

5.10. The Central Chemical laboratories are fully equipped with all standard equipment required for carrying out accurate analysis Equipments for spectrophotometry, chromatography, polarography, flamephotometry, etc. are also available.

5.11. Researches carried out in the Central laboratories are integrated with the other research projects undertaken by the GSI and include, besides fundamental problems in geochemistry, studies on the utilisation of particular minerals.

(d) *Geophysical Laboratory and Workshop*

5.12. The Geophysical Workshop assembles and fabricates geophysical field instruments. It also repairs and undertakes the servicing of geophysical and other instruments. Electrical prospecting instruments, such as, spontaneous polarisation potentiometers, electrical resistivity potentiometers and other measuring instruments, like conductivity bridge, metal detectors, etc. are designed and constructed.

5.13. The electronic laboratory which has a number of oscillographs, audio-frequency oscillators, radiofrequency signal generators, a Q-meter, Universal low frequency impedance bridge, vacuum-tube voltmeters etc., undertakes construction of components for various geophysical instruments. Research and instrumentation work, connected with geophysical field exploration are also carried out. A Mathematical unit helps in computations.

5.14. At the time of on-the spot visit of Geological Survey of India headquarters in Calcutta in September, 1969, the Members of the Study Group of the Estimates Committee were informed that the G.S.I. Central Headquarters laboratories continue to be housed in different Government owned buildings in Calcutta. This accommodation was stated to be too inadequate to permit these laboratories to function to their optimum capacity. The Members were also apprised about the structural inadequacy of the accommodation available. It was stated that the Workshop at various units of laboratories *viz.*, Rock Mechanics Laboratory, Mineral Physics Laboratory, High Temperature Chemical Laboratory etc. should ordinarily be housed in the ground floor with flooring of requisite specifications.

5.15. Members of the Study Group were also informed that a proposal for the construction of multi-storied laboratory building estimated to cost Rs. 1·79 crores is pending consideration with the Government.

5.16. **With a view to ensuring that research and analytical work carried out in the Geological Survey of India laboratories is of practical use and is in keeping with the advances made in technical field in other countries of the world, the Committee would urge the Government to properly develop and modernise existing laboratories of the Geological Survey of India by making necessary arrangements for providing all facilities including proper buildings.**

B. Buildings of Geological Survey of India

5.17. In regard to accommodation occupied by the Geological Survey of India offices in Calcutta, the following information was given in July, 1969:

Sl. No.	Name of the building	Effective floor space in sft.	Rent per month (Rs.)	Remarks
1	2	3	4	5
1.	No. 27, J. L. Nehru Road, Calcutta.	53,780	Nil	GSI is the statutory occupant of the building owned by the Trustees of the Indian Museum, Calcutta. No rent is payable
2.	No. 29, J. L. Nehru Road, Calcutta.	34,300	Nil	Govt. owned.
3.	No. 15A & B Kyd. Street, Calcutta.	6,273	Nil	Govt. owned.
4.	No. 77B, Park Street, Clacutta.	4,100	660	Allocated by the Estate Manager from his general pool of accommodation and rent paid by him.
5.	No. 5/1, Khagendra Chatterjee Road, Clacutta.	74,712	17,077	Do.
6.	No. 38/1, Panditiya Road, Calcutta.	23,000	1,845	Do.
7.	No. 2, Justice Chandra Madhab Road, Calcutta.	22,881	8,000	Do.
8.	No. 5, Middleton Street, Calcutta.	20,564	4,000	Do.
9.	Ratnakar Building, 4, Chowringhee Lane, Calcutta-16.	95,579	95,579	Directly hired by the Deptt. and rent paid from the Deptt. fund.

5.18. From the statement reproduced above, it is ovserved that a rent of Rs. 95,579 per month is paid from the departmental funds of the G.S.I. for one building only *viz.* Ratnakar Building.

5.19. Givng justification for paying such a huge amount as rent for one building only, it has been stated that "the multi-storied building for which a rent of Rs. 95,579 is being paid monthly was hired against entitlement of accommodation in Calcutta which was screened by the Estate Manager, who is the competent authority for such purpose. The rate of rent of the building was assessed by the Hiring Committee in Calcutta. This building was found suitable for our purpose as it is situated within the Museum compound where the three other Central Headquarters offices are located."

5.20. Asked whether the question of housing the offices of the G.S.I. in Government buildings has ever been considered, the Ministry in reply have stated as follows:

> "With a view to housing the offices of the GSI in Government owned buildings it was agreed in the Conference of States Ministers of Mining and Geology held on 29th September 1967 at Srinagar that the State Governments concerned would kindly arrange to allot suitable plots of land free of cost to the Geological Survey of India for construction of office buildings and residential quarters for officers/staff for the Regional/Circle offices in the States. Since then vigorous efforts have been made to procure land in various places in India where our Regional/Circle offices are located. It can now be stated that although the State Governments are willing to render all possible assistance in the procurement of suitable land for the GSI, they are not willing to allot land free of cost. The result in this direction has not been according to our expectation. However, efforts are being made to provide Government buildings for the various offices of the Geological Survey of India."

5.21. In a subsequent note the Ministry have informed the Committee that in pursuance of the decision arrived at the Conference of the State Ministers of Mining and Geology held in Srinagar on 29th September, 1967, all the State Governments were requested by the then Ministry of Steel, Mines and Metals under their letter No. 19(35)/67-M-III dated 26th October, 1967 to allot land free of cost to the Geological Survey of India offices located at the different State Capitals for construction of office building and residential quarters for officers and staff. The matter was pursued at the Ministry's level and also by the local officers of the Geological Survey of India with

the concerned State Government officials for allotment of land on the terms indicated in the Ministry's circular.

5.22. In spite of adequate efforts made in this regard, no State Government has offered land free of cost so far on the grounds that suitable State-Government land is not available for allotment free of cost or at a nominal cost. Some of the State Governments, however, indicated that they are prepared to acquire private land for the Department under the Land Acquisition Proceedings against payment of suitable compensation to the private owners."

5.23. The Ministry have also stated that although the State Governments failed to make available suitable land at the terms agreed to at the Srinagar Conference, efforts were made to procure land against payment through State Governments. In fact land has already been allotted to the department for construction of office/ laboratories by the Government of Orissa against payment of Rs. 15,000 for 3.02 acres of land. At Shillong 9 acres of land has been procured free of cost by transfer from the Ministry of Home Affairs, Government of India, which acquired the same originally at Shillong from the State Government for the NEFA Administration. At Chandigarh land has been offered by the Chandigarh Administration against payment. In this connection Government have already sanctioned Rs. 7.26 lakhs for 1 acre of land which was considered inadequate for our purpose. Accordingly, a proposal for acquisition of 2.4 acres of land at a cost of Rs. 17.424 lakhs has subsequently been sent to the Government for approval and with the request for the issue of a revised financial sanction. State Government have offered land in Jammu on lease terms basis. At Srinagar, they have offered to acquire suitable land under the Land Acquisition Act at a cost of Rs. 3 lakhs. At Jaipur Government have offered suitable plot of land belonging to the Urban Improvement Trust against payment. For land at Ahmedabad, Ministry of Petroleum and Chemicals and Mines and Metals requested Directorate of Estates, New Delhi for the allotment of 16 acres of land from the Central Pool at Gandhinagar (the new capital of Gujarat). At Bhopal, in Madhya Pradesh, the State Government have offered 4 acres of land in the capital project area against payment. The Government of Tamil Nadu have offered 4.61 acres of land for Tamil Nadu Circle Office against payment of Rs. 4.61 lakhs. In Mysore, no suitable Government land was available so private offer for purchase of land with building is under negotiation.

5.24. In other areas no tangible offer has yet been received. As for land at Nagpur for the Central Regional Office, the local State Government has yet to respond to the request of the Ministry for the allotment of 15/16 acres of land at Seminary Hills. For the

Southern Regional Office, suitable land has not yet been located by the Andhra Pradesh Government at Hyderabad.

5.25. In Calcutta where the Central Headquarters and the Eastern Regional Offices are located and where suitable land for construction of office/laboratories is available, a proposal for construction of a multi-storeyed building at an estimated cost of Rs. 1.79 crores is receiving consideration of the Government at present. The State Government of West Bengal is yet to make available suitable land which is required for the construction of workshop and storage accommodation.

5.26. When attention of the representative of the Ministry was drawn to the fact that over Rs. 11 lakhs per year was being paid by the Department as rent for Ratnakar building in Calcutta from the 1st November, 1967 to a private person, he stated during evidence that "it is moderate rent. In places like Calcutta it cannot be helped".

5.27. Asked why the Department did not take steps to acquire land and put up buildings of its own in various big cities, the Secretary to the Ministry replied that "it is a very big problem. It does not apply to buildings of this Department alone.....Certainly it would have been much better to buy the land and construct buildings."

5.28. He further stated "During the last five or six years, there has been sever cut by Government in expenditure in this regard. Some progress has been made by organising common place in Government Departments in Bombay, Calcutta etc. but there is shortage of accommodation still. I think we will have to be selective in these places."

5.29. In regard to dispersal of G.S.I. offices to other places, the representative of the Ministry informed the Committee during evidence that "today they are not in a position to shift to any other place."

5.30. **The Committee note that it has not been possible for the Central Government to persuade various State Governments to allot land free of cost or at a nominal cost to the Geological Survey of India for construction of office buildings and residential quarters for officer/staff for the Regional/Circle offices in the States.**

5.31. **The Committee also note that some of the State Governments have indicated their willingness to acquire private land for the Geological Survey of India offices/buildings under the Land Acquisition rules against payment of suitable compensation to the private owners.**

5.32. Taking economy into consideration, the Committee suggest that Government may examine the desirability of housing various offices of the Geological Survey of India at various State headquarters and other big cities in their own buildings instead of paying huge rents to private parties.

C. Scheme of giving Rewards

5.33. It has been stated by the Ministry that a scheme for giving rewards to the public who may give information regarding new deposits of minerals is in vogue from 1961. According to the scheme, the minerals have been divided into 3 groups and for information of a new discovery, rewards of Rs. 500 for Group I, Rs. 100 for Group II and Rs. 200 for Group III minerals are given. If the deposits warrant detailed exploration, a further sum, twice the amount indicated above is paid and if the detailed exploration proves the deposit economically workable, an additional reward upto Rs. 10,000 is given. No reward, however, is given for any deposit which does not hold promise of commercial value.

5.34. The Committee have, however, been informed that so far no reward has been given to anybody since the inception of the scheme in 1961.

5.35. During evidence, the representative of the Ministry has informed the Committee that no individual has come forward.

5.36. **The Committee note that the scheme of giving rewards to the public who may give information about the location of mineral ores etc. is in vogue since 1961 but no reward has so far been given under the scheme. The Committee, therefore, suggest that the whole scheme may be got re-examined to find out the reasons for its failure and make it attractive.**

M. THIRUMALA RAO,
Chairman,
Estimates Committee.

NEW DELHI;
April 20, 1970.
Chaitra 30, 1892 (*Saka*)

5.32. **Taking economy into consideration, the Committee suggest that Government may examine the desirability of housing various offices of the Geological Survey of India at various State headquarters and other big cities in their own buildings instead of paying huge rents to private parties.**

C. Scheme of giving Rewards

5.33. It has been stated by the Ministry that a scheme for giving rewards to the public who may give information regarding new deposits of minerals is in vogue from 1961. According to the scheme, the minerals have been divided into 3 groups and for information of a new discovery, rewards of Rs. 500 for Group I, Rs. 100 for Group II and Rs. 200 for Group III minerals are given. If the deposits warrant detailed exploration, a further sum, twice the amount indicated above is paid and if the detailed exploration proves the deposit economically workable, an additional reward upto Rs. 10,000 is given. No reward, however, is given for any deposit which does not hold promise of commercial value.

5.34. The Committee have, however, been informed that so far no reward has been given to anybody since the inception of the scheme in 1961.

5.35. During evidence, the representative of the Ministry has informed the Committee that no individual has come forward.

5.36. **The Committee note that the scheme of giving rewards to the public who may give information about the location of mineral ores etc. is in vogue since 1961 but no reward has so far been given under the scheme. The Committee, therefore, suggest that the whole scheme may be got re-examined to find out the reasons for its failure and make it attractive.**

M. THIRUMALA RAO,
Chairman,
Estimates Committee.

NEW DELHI;
April 20, 1970.
Chaitra 30, 1892 (*Saka*)

APPENDIX II

(*Vide* para 2.18.)

Achievement of G.S.I. during the years 1966-69

Geological Mapping:

Total areas of about 15,1760 sq. km. and 23550 sq. km. were covered by geological mapping on 1,63,360 scale, and larger scales respectively in different States of the Country till the end of 1968.

Mineral Investigation:

Achievements during the last 3 years (1966—69) in respect of the following important investigations are detailed below:—

Copper.—Detailed exploration of the Rakha mines-Rom-Sidheswar block in the Singhbhum copper belt was completed and a reserve of .63 million tonnes of ore (1·5 per cent copper) was estimated. Exploration in the adjacent block *e.g.* Tamapahar Turamdhi, Ramchandra Pahar and Namdup was continued during the period and a reserve of 18m tonnes of ore in Tamapahar and 9·68 million tonnes of ore in Turamdhi has so far been estimated. In the Khetri Copper belt, exploration in Madhankudhan, Kolihan (central, south and north-central blocks), Akwali (north and south blocks), Satkui, Kalapahar, Papurna and Intervening Block were in progress. In Akwali (north) a reserve of 1 million tonnes of copper ore (2 per cent copper) has so far been estimated while in Satkui, the reserves are likely to be a little larger. In the Dariba belt, exploration in Bhagoni and Pur-Dariba was continued. At Bhagoni the reserve is expected to be of the order of 2 to 4 million tonnes (1 per cent copper). The exploration in the extension blocks of Madhan-Kudhan is oriented towards supplementing the ore production as well as for sweetening the ore raised from the Madhan-Kudhan mines, so that the targetted production of 31,000 tonnes of copper metal per year from the Khetri smelter could be ultimately achieved. In Andhra Pradesh, exploration in Nallakonda and Dhukonda blocks has been completed and a reserve of 2·1m tonnes (1·5 per cent copper) in Dhukonda and 3·1m tonnes (1·8 per cent copper) in Nallakonda has been estimated. Exploration in Block I of the Mailaram belt is in progress and a small copper deposit of fairly good grade (2·04 per cent copper) is expected

In Pular-Parsoni area, Nagpur district, Maharashtra promising (about 4m thick) mineralised inter sections have been encountered in 4 boreholes covering a strike length of 1500m.

Preliminary exploration for copper ore deposits by mapping and drilling was also carried out in Kalyadi, Mysore, Baraganda, Hazaribagh district, Bihar, Umpyrtha Assam, Malankhand, Balaghat district, Madhya Pradesh etc.

Lead-Zinc.—The most significant achievement in the field of lead-zinc exploration during the period was establishment of sizeable reserve (20 to 40m tonnes of ore analysing 6 to 7 per cent combined lead-zinc) of ore in the Dariba-Rajpura belt in Udaipur district, Rajasthan. The exploration of the Bandalamottu block in Agnigundala belt, Andhra Pradesh was completed and a reserve of the order of 11·46m tonnes of ore, analysing around 6 per cent lead has been estimated. The block has been handed over to Hindustan Copper Limited for exploitation. Another significant lead-zinc field, located during the period under review is the Ambamata prospect where a reserve of 2·3 million tonnes of lead-zinc ore with an average total metal content of 9·5 per cent has so far been estimated in the central part of the prospect.

A small lead deposit has also been located by preliminary drilling in Sargipalli, Sundargarh district, Orissa where mineralisation over a strike length of 900 metres has so far been proved.

Some of the other fields of lead-zinc mineralization, where the Department took up exploration during the period under review are: Chelima, Kurnool district and Varikunta-Zangamrajupalle, Cuddapah district, Andhra Pradesh; Zawar, Ajmer district, Rajasthan; Baroi, Mogra and Zawar Mine, Rajasthan Subansiri district, NEFA; Khandia, Baroda district, Gujarat; Uchich, Kulu district, Himachal Pradesh; Sersandu, Udhampur district, Jammu & Kashmir; Joga, Hosangabad district and Bhelai-Dhorpur, Surguja district, M.P. etc.

Nickel.—During the period, exploration of the Sukinda ultramafic field in Cuttack district Orissa by drilling and exploratory mining established a reserve of the order of 15 million tonnes of Nickel ore analysing 0·8 to 1 per cent nickel in the Kansa block. Comparable tonnages of low grade ore are also expected in the adjacent Saruabil sector where exploration has so far delineated a potential nickel-rich area measuring 0·8 sq. km.

The polymetallic belt in Mirzapur district, Uttar Pradesh was also explored during the period.

Bauxite.—Exploration in Amarkantak area, Shahdol, Bilaspur and Mandala districts, M.P. was carried out during the period and a reserve of the order of 10m tonnes of bauxite containing more than 45 per cent alumina was estimated. In Dhangarwadi, Kolhapur district, Maharashtra, detailed exploration for bauxite was taken up for the Koyna smelter and 15m tonnes of high grade ore were estimated, Bulk samples were also collected for beneficiation tests by the Bharat Aluminium Company.

In addition, exploration for bauxite was contained in Aleppy, Quilon and Ernakulam districts, Kerala and in the freehold areas of Goa; in Goa, promising patches of aluminous concentrations have been delineated for detailed exploration.

Phosphorite.—A massive programme was launched in 1966 to locate need deposits as well as to investigate details earlier known occurrences in Mussorie, U.P. Since 1st August, 1967, with the assistance of USAID, a phosphorite exploration and resources appraisal project has been established to investigate the Mussorie deposit. Simultaneously, need deposits have been located near Udaipur, Rajasthan and a few large phosphorite horizons have also been located in U.P. (other than Mussoorie area), in Himachal Pradesh, Punjab, Jammu & Kashmir and in Assam. The deposit at Kanpur, Maton, Karbaria-ka-Garha and Dakan Kotra in Udaipur district Rajasthan and the Mussoorie deposits in Dehra Dun contain a sizeable reserve.

Coal.—Till the end of 1968, a total reserve of around 3665 million tonnes of coal of all grades were estimated in Andhra Pradesh (Godawari Valley coalfield), Assam (Siji, Langrin and Makum coalfields) Bihar (Jharia, North Karampura, Ramgarh, East and West Bokaro coalfields), Jammu and Kashmir (Metka and Mahogala coalfields) Madhya Pradesh (Jhilmila-Sonnat, Pench-Kannan, Fawa Valley and Mohpanl coalfields), NEFA (Namehik-Namphik coalfields) and West Bengal (Raniganj coalfield).

Iron Ore.—Detailed investigations were carried out in Malangtoli block in Keonjhar and Sundergarh district, Orissa. The reserves here stand at 163·00 million tonnes with Fe content 63 per cent and above. Bailadila deposits in Baster district, Madhya Pradesh were investigated and the tentative reserves estimated are 52.5 million tonnes with expected Fe content of about 64 per cent in deposit No. 11A, 121·12 million tonnes in deposit No. 11B, (out of which 77·69 million tonnes, including float ore, are recoverable reserves with expected Fe content of about 64 per cent) and 67·25 million tonnes with expected Fe content of about 64 per cent in deposit No. 13.

Investigations were carried out at Donimalia, Bellary district Mysore. In the south block in Deposit No. 1 & 1A tentative reserves of 55·76 and 14·17 million tonnes respectively have been estimated.

Investigations have also been taken up at Kumaraswamy, Bellary district, Mysore, Cheruppa Hill, Kozhikode district, Kerala and at Chiplata in Sikar district, Rajasthan.

Pyrite.—At Amjhore in Shahabad district, Bihar by detailed investigation an indicated reserve of 20 million tonnes has been estimated containing sulphur 30 per cent and above.

Pyrite Pyrrhotite.—At Saladipura, Sikar district, Rajasthan by detailed investigations indicated and inferred reserve totalling 85·54 million tonnes have been estimated of which 43:49 million tonnes contain 25 to 30 per cent sulphur and 42·05 million tonnes contain 15 per cent sulphur.

Gold.—Investigations for gold have been carried out in Ramagiri gold deposits in Anantapur district, Andhra Pradesh, Gadag in Dharwar district, Mysore, Hutti in Raichur district, Mysore, Lawa, Kundrakocha and Bhardari in Singhbhum district, Bihar and at Kotagiri in Nilgiri district, Tamil Nadu.

Graphite.—Graphite occurrences have been investigated in Ernakulam district Kerala and also in Andhra Pradesh, Bihar, Madhya Pradesh, NEFA and Orissa.

Tungsten.—Investigations for tungsten ore have been carried out in Nagaur district, Rajasthan, Nagpur district, Maharashtra, Bankura district, West Bengal and KGF area Kolar district, Mysore.

Bentonite.—A reserve of 19·8 million tonnes of low to moderately swelling type of Bentonite has been estimated in Barmer and Jaisalmer districts of Rajasthan.

Limestone.—Important investigations were carried out at the following places:—

Jaggayapeta area, Krishna district, Andhra Pradesh. Measured indicated and inferred reserves of mainly flux grade limestone of 24·76, 45 and 15 million tonnes respectively were estimated.

Dechapalli area, Guntur district, Andhra Pradesh reserves of mainly flux grade limestone of 25 million tonnes have been estimated. Tentative inferred reserves of 10.0 million tonnes of limestone have been estimated at Dharamkot, Kangra district, H.P. In Chilhati, Bilaspur district, M.P. a tentative reserve of 500 million tonnes of flux and cement grade has been estimated. In Akhaltara Bilaspur district, M.P. indicated reserve of flux grade limestone is

116 million tonnes in the eastern sector. Indicated reserves of cement grade limestone in eastern and western sectors are 100 million tonnes. In Niwar area, Jabalpur district, M.P. in blocks A, B and C a reserve of 52.06 million tonnes of SMS grade limestone has been estimated.

In Kalaskop-Ankalgi, Bijapur district, Mysore, 14 million tonnes of SMS grade, 35 million tonnes of BF grade and 19 million tonnes of blendable BF grade limestone has been estimated.

Limestone occurrences have also been investigated in Pondicherry and Tamil Nadu, Uttar Pradesh, Maharashtra, Andhra Pradesh, Mysore.

Molybdenite.—Occurrence of molybdenite have been investigated in Karimnagar, Medak, Nizamabad and Mahbub Nagar district of Andhra Pradesh.

Diamond.—At Wajra Karur in Anantapur district and in Kurnool district, Andhra Pradesh systematic detailed appraisal work were carried out.

Other minerals.—Investigations were also carried out for antimony ore asbestos arsenophrite barytes, emerlad, quartz and feldspar, glass sand, kyonite, sillimanite, mica, talc and steatite, dolomite, and clay etc.

APPENDIX III

(*Vide* paras 2·20 and 3·17)

Major Deposits of Non-Ferrous Metals (Data upto 1969)

State	Locality	Indicated and Inferred Reserve (in million tonnes)	Grade percent	
1	2	3	4	
COPPER ORE				
Bihar	*Singhbhum belt*			
	(1) Rakha & Roam-Sidheswar	63·91	1·5% Cu.	
	(2) Ramchandra Pahar	1·71	1.48% Cu	
	(3) Tamapahar	18·00	1·49% Cu	
	(4) Turamdih	9·68	1·49% Cu	
	(5) Nandup	1·50	1-2·30% Cu	
	(6) Miosabani (including Badia)	3·27	2·32	Data as per the I.C.C. Ltd.
	(7) Surda	0·57	2·20	
	(8) Pathargora	0·17	1·71	
	(9) Kendadih	0·005	2·74	
Rajasthan	(A) *Khetri belt*			
	(1) Kolihan (Central)	(*a*) 12·31	2·4% Cu	
		(*b*) 11·81	0·6% Cu	
		140·20	0·8% Cu	
	(2) Madhan-Kudhan			
	(Alternatively	70·00 million tonnes with	1·17% Cu	
	(3) Akwali (North)	0·77	2% Cu	
	(4) Kolihan (South)	4·10	1% Cu	
	(5) Kolihan (North)	1·00	1% Cu	
	(6) Satkui	0·66	1% Cu	

Deposits where promising indications have been obtained

State	Locality	Strike length of deposits	Thickness & Grade
1	2	3	4
COPPER ORE			
Rajasthan	(1) *Khetri belt* Akwali (South)	300 m.	3-5 m. 1% Cu.
	(2) Pur-Dariba, Bailwara district	200 m.	2-10 m. 1-2% Cu
Maharashtra	Pular-Parsori, Nagpur district	1,100m.	4 m.
LEAD ZINC ORE			
Rajasthan	(*a*) Lohakhan, Ajmer district	1,250 m.	3% Pb & Zn
	(*b*) Sawar, Ajmer district	350 m.	0·6-5·1 m. 4% Pb & Zn
COPPER ZINC ORE			
Assam	Umpyrtha, United Khasi and Jaintia Hills district	2,200 m.	20 m. 0·8-1% Cu & 1·5% Zn.

State	Locality	Indicated and Inferred Reserve (In million tonnes)	Grade
1	2	3	4
BAUXITE			
Gujarat	(1) Kutch dt.	5·88	Metal grade
	(2) Jamnagar dt.	7·06	,,
	(3) Bhavnagar and Junagadh dts.	0·146	,,
Goa	Betul (Leasehold of S. Kusaldas)	7·1	,,
Bihar	Bagru Hills	3·97	,,
	Serangdag	1·50	,,
	Palharpat	2·16	,,
M.P.	(1) Amarkantak area	20·62	,,
	(2) Phutkapahar	3·00	,,
	(3) Amarkantak (Leasehold of Hindalco)	3·00	,,
	(4) Jubbalpore and Katni dts.	2·03	Refractory and Metal grade
Orissa	Sandhmardar Plateau	12·00	Metal grade
Maharashtra	(1) Dhangerwadi	13·74	,,
	(2) Ringewadi	4·57	,,
	(3) Udgiri	9·10	,,

	(4) Inderganj			10·01	„
	(5) Radhanagari			8·35	„
	(6) Tasarada-Amboli			13·32	„
	(7) Deokhol, Kolaba			7·40	„
Tamil Nadu	Sheavaroy			1·31	„
	Kolli Hills			2·64	„
	Zawar Belt				
	(1) Mochia			21·85	1·5 (Pb) 3·7(Zn)
	(2) Balaria			6·51	1·7(Pb) 6·7 (Zn
	(3) Zewar Nala			7·72	3·3 (Pb) 4·6 (Zn) } Data as per the H.Z.L.
	(4) Baroi Magra			20·32	1·5 Pb) 3·7 (Zn
Tamil Nadu	Mamanaur, South Arcot district			0·90	2% Pb & 2·73% Zn.
LEAD ORE					
Andhra Pradesh	*Agnigundala Belt*				
	(1) Bandalamottu		(*a*)	10·06	6·59% Pb
			(*b*)	1·40	3·10% Pb
	(2) Dhukonda			0·46	8·98% Pb
Orissa	Sargipalli, Sundergarh district			1·00	6% Pb
	(B) *Kho-Dariba belt*				
	(1) Dariba Mine			0·36	2·39 %Cu
	(2) Dariba Nala			0·20	2·58% Cu
	(C) *Dariba belt*				
	Bhagoni			1·50	1% Cu

1	2	3	4
Andhra Pradesh	*Agnigundala belt*		
	(1) Nallakonda	3·144	1·82% Cu
	(2) Dhukonda	2·154	1·51% Cu
	(3) Bandalamottu	1·087	1·38% Cu
	Mailaram belt		
	Mailaram	0·843	2·04% Cu
Mysore	Kalyadi, Hassan district	1·23	1·27% Cu
LEAD ZINC ORE			
Gujarat	(1) Ambanata, Banaskantha district	2·31	9·8% Pb & Zn
	(2) Khandia, Baroda district	0·22	4·5% Pb & Zn
Rajasthan	*Dariba-Rajpura Belt*		
	Dariba-Rajpura	40·00	6-7% Pb & Zn

APPENDIX IV

(*Vide* para 5 of Introduction)

Summary of Conclusions/Recommendations in the Report

Sl. No.	Reference to para number of the Report	Summary of Conclusions/ Recommendations
1	2	3
1	1·25	In view of the fact that there is a shortage of scientific and other technical incumbents in Geological Survey of India dealt with in para 4·47 and proper supervision of technical work referred to in paras 4·58 to 4·60 of the Report, the Committee feel that if adequate administrative assistance is made available to the Director General and other Directors of the G.S.I., it will relieve them to some extent from attending to administrative problems and enable them to concentrate on scientific work.
2	1·32	The Committee are pained to note that low priority is given to systematic mapping which is its primary function and that it has taken more than a century for the Geological Survey of India to systematically map on 1,63,360 (1"=1 mile) scale only 44% of the total area of the country leaving a balance of 56% (about 18·43 lakhs sq. km.) still to be covered. As the geological maps from the very basis of further work in the various fields of earth science including mineral exploration, geotechnical and geo-hydrological investigations etc., the Committee suggest that the G.S.I. should make a concerted effort for covering the remaining area. The Committee are unhappy to note that during the Fourth and Fifth Five Year Plan periods only about 39% of the remaining 18·43 lakh sq. km. unmapped area is targetted to be covered still leaving a balance of 34% of the total area. It will certainly be a sad reflection on the part of the G.S.I.'s performance if the whole country will not have been mapped geologically even at the end of Fifth Five Year Plan.
3	1·33	The Committee have been given to understand that the Map Production Division of the Geological Survey of India has not published any geological map of the country during the last four years because of printing difficulties. In view of the fact that mapping is the prime function of the G.S.I., the Committee recommend that the Government should ensure that the publication of geological survey is not delayed on account of printing difficulties.
4	1·41	The Committee are of the view that duplication stands in the way of effective and rational utilisation of scientific manpower and adds to the over-head costs of mineral exploration/exploitation. The Committee, therefore, suggest that the functions of the Geological Survey of India *vis-a-vis* the public undertakings engaged in exploitation and development of minerals should be defined clearly so that there is no avoidable overlapping of work.

1	2	3
5	1·47	The Committee feel that the functions of the Geological Survey of India and the State Departments of Mining and Geology should be demarcated clearly and precisely through the Central Programming Board where all interests are represented.
6	1·51	The Committee feel that meeting once a year does not do any justice to the resolution of the Government of india. As against the provision of the meetings of the Central Geologica Programming Board after every six months or more frequently it has so far held only four meetings one each during the last four years. The Committee hope that in future the Board meetings will be held at least once in six months.
7	2·5	In this connection the Committee would like to invite the attention of the Government to the observations of Public Accounts Committee contained in paras 1·8, 1·9 and 1·10 of their 89th Report (Fourth Lok Sabha). The Committee suggest that the schedule of charges should be revised and finalised speedily and further action taken to recover the balance of dues from the parties concerned. The Committee would also urge that the Government should take suitable steps to avoid accumulation of such realizations in future.
8	2·8	The Cojmittee note that the percentage of expenditure on administration to the total expenditure on the Geological Survey of India which on an average was 11% during the last three years has been brought down to 8% during the current financial year. They, however, hope that the Government will keep a careful watch and will continue its efforts to bring down further the percentage of xpenditure on administration.
9	2·14	The Committee are of the view that mineral production has a direct bearing on industrial production. Even a small increase in mineral production has an important bearing on the total volume of industrial production and that unless there is a proper development of mineral industries there will be an imbalance in the other sectors of the economy. The Committee feel that the exploration and Proving of mineral deposit should be kept well ahead of the current requirements. As the actual investment in olved in mineral exploration is very small in comparison to the investment in exploitation, the Committee suggest that the maximum tempo feasible should be kept up in mineral exploration if rapid progress is to be achieved in the industrial development.
10	2·17	As mentioned in para 1·51 of the Report the Central Geological Programming Board meets only for a day in a year. This shows that the question of allocation of priorities to various programmes of mineral and other geological investigations has not been given the serious consideration that it deserved. The Committee feel that keeping in view the growing industrial requirements of the Fourth Plan and future Plans, the investigational priorities in the matter of proving mineral resources particularly those which are in short supply in our country both qualitatively and quantitatively should be reviewed by the Government.

1	2	3
11	2·25	The Committee note that the Geological Survey of India have been able to make some contribution to the economy of the country by way of exploring ores like iron, manganese etc. which are essential for many industries in the country and which also earn foreign exchange. In view of the fact that India is currently importing all its phosphate rock requirements at an annual foreign exchange cost estimated to reach $75—100 million by 1971, the Committee are glad that substantial quantities of rock phosphate have been located by G.S.I. The Committee hope that the Government will not become complacent on account of this discovery and will continue its efforts not only to locate more such reserves of rock phosphate but expedite exploitation to make the country self-sufficient in fertilizer minerals which are likely to play a vital role in the agricultural revolution.
12	2·35	The Committee regret to note that so far no independent assessment and technical scrutiny of the performance of the Geological Survey of India has been made by the Government and that reliance is placed on whatever reports are submitted by the technical officers of the Survey.
	2·36	It is not yet known when the Committee on Organisation of Scientific Research (COSR), appointed by the Cabinet Secretariat, will submit their report on the scientific work being done in the country. The Committee, therefore, feel that meanwhile it is necessary to have a periodical technical evaluation of the performances of the Geological Survey of India. They recommend that the Government may consider the appointment of an independent technical team to review and assess the achievements made by the Geological Survey of India covering all its functions with special reference to the field of mineral exploration.
13	3·19	The Committee note that the Geological Survey of India has been able to obtain a general idea about the distribution of different mineral deposits within the country and has already proved more than 240 million tonnes of low grade copper ore, about 50 million tonnes of lead-zinc ore and more than 11 million tonnes of lead ore in various parts of Bihar, Rajasthan and Andhra Pradesh. The Committee, however, regret to note that although existence of mineral deposits in the country was known quite early, the number of mines developed since attainment of independence is very few. The Committee are unhappy to note that the domestic production of copper and lead has remained static at around 9,000 tonnes and 3,000 tonnes a year respectively during the last decade. This not only reflects lack of interest and absence of co-ordination between exploring and exploiting agencies but tells upon the meagre foreign exchange resources of the country in as much as the import of non-ferrous metals during 1966-67 and 1967-68 has cost the nation Rs. 85·5 crores and Rs. 130·60 crores respectively.
	3·20	The Committee have been apprised that with the necessary incentive and funds it is expected that the current shortage in copper, zinc and lead may be appreciably reduced by the Fifth Plan period. The Committee are of the view that with satisfactory availability position of necessary reserves, particularly of copper ore, Government should have undertaken crash programme much earlier to reduce appreciably imports of non-ferrous metals.
	3·21	The Committee feel that in view of strides that are made in the industrial growth of the country the wide gaps existing between demand and supply of non-ferrous metals will go on becoming wider and wider in coming years. Unless concerted efforts are made now it may not be possible to fill the gaps with the abruptly increasing demands in future.

1	2	3
14.	3·35	The Committee cannot but conclude that there is considerable time-lag between the discovery of a new source of mineral deposit and its commercial exploitation. They, therefore, recommend that in order to reduce the time-lag to the minimum extent possible the last phase of exploration by the Geological Survey of India should synchronise with the initial operations of the exploiting agency so as to maintain continuity of efforts. This is not difficult to achieve as both exploring and exploitation agencies are under the administrative control of the Department of Mines and Metals.
15.	3·41	The Committee are of the view that the pace of investigations of base metals should be considerably accelerated if the production of these metals is to keep pace with the tempo of industrialisation in the country.
16.	3·58	The Committee are distressed to note that under the 'Operation Hardrock' project there has been a shortfall in the ground follow up drilling in as much as against 16,0000 metres of drilling envisaged, only 3,000 metres have been drilled. This has been stated to be due to (i) procedural delays in procurement of drills and (ii) limited supply of wire line equipment.
	3·59	The Committee fail to understand why the procedural difficulties could not be overcome and why supply of wire line equipment could not be increased. The Committee cannot help coming to the conclusion that the project has not been properly planned. They, however, trust that the procedural haurdles will be removed by stream-lining the methods and the process of drilling will be accelerated after more drills are acquired to achieve the targets well in time.
17.	3·60	The Committee are unhappy to note that practically no driling has been undertaken in Andhra Pradesh and in Bihar-West Bengal only about 175 metres of aero-anomalies areas have been drilled.
	3·61	The Committee are also unhappy to note that while 144,000 line kms (equivalent to 90,395 sq. kms) aerial geophysical flying as envisaged in the agreement with the United States Agency for International Development has been completed, the follow up work has been insignificant and lagging far behind schedule. There cannot be two opinions that "follow up' action is the operative part of the project and unless the schedule is adhered to, the anomalies are likely to pile up further. The Committee, therefore, recommend that Government should take all possible steps to ensure that the momentum of the work is not lost in the promissing areas.
18.	3·66	The Committee note that the proposed French and USSR programmes are restricted to airborne surveys alone and do not envisage ground follow-up work and drilling which will be conducted by Government of India organisations.
	3·67	The Committee also note that as the technical know-how within the country has not been developed to an extent that it would have been possible to undertake such surveys ourselves, it is imperative to take the help of foreign countries who have experts in this field. The Committee, however, stress that Government should take all possible steps to ensure that indigenous know-how is developed within the country and dependence on foreign assistance is done away with as early as possible.

1	2	3
19.	4.3	The Committee note that publication of some pamphlets on the mineral resources of different States of India prepared in several regional languages, under a scheme for making "the Layman Mineral Conscious" launched by the Geological Survey of India has been abandoned.
	4.4	The Committee, however, feel that in view of the utility and importance of the above mentioned scheme Government may examine the desirability of reviving the publication of pamphlets in regional languages in cooperation with the State Governments concerned.
20.	4.11	The Committee note with concern that there have been considerable delays in early release of Geological Survey of India publications *viz.*, 'Records', 'Memoirs', Bulletin (Series 'A' and 'B') and Indian Minerals, etc., and sometime even 2 to 3 years have been taken to release some of these publications.
	4·12	The Committee are of the view that information obtained by the Geological Survey of India should be freely and fully disseminated to all concerned with the least possible delay. The Committee need hardly point out that delayed publication of results of scientific investigations reduce their utility.
21.	4·13	The Committee hope that the delegation of powers in November, 1968 to the Director General Geological Survey of India to farm out printing jobs to private presses will help the Department in clearing the past arrears and become current.
	4·14	The Committee have also been apprised that the Depatment has not been able to make full use of these powers on account of the limitations enumerated in para 4·10 The Committee, therefore, would like Government to immediately look into these difficulties and take suitable remedial measures.
22.	4·17	The Committee are glad to note that the Central Library of the Geological Survey of India is the oldest and biggest of such libraries in the East and contains ove 2,00,000 volumes of books, periodicals, etc. on geology and other allied sciences. The Committee appreciate that the Library caters to the needs of research workers, professors, students from various universities and members of general public.
	418	The Committee would, however, like the Geological Survey of India to ensure that the Library continues to maintain its eminent position.
23,	4·23	The Committee feel that unless expeditious action is taken to get drills, vehicles, geophysical equipment, mining equipment laboratory equipment, etc. in time, the Department will not be able to realise the targets laid down in the plan.
24.	4·34	The Committee have been apprised that the present arrangement of centralisation of procurement of scientific equipment through the Director General of Supplies and Disposals sometimes stands in the way of timely procurement of equipment thus resulting in delay in execution of priority investigations.
	4·35	The Committee note that stores valued less than Rs. 25,000 can be pocured departmentally observing the approved purchase procedure and that "good deal can be done within existing provisions which is not done."

1	2	3
	4.36	The Committee feel that within the ceiling limit of Rs. 25,000 and with Sufficient for sight and anticipation in placing indents with the D. G. S. & D. much in advance of the requirements of various types of stores and equipment, bottle-neck in respect of timely procurement of such items can be removed to a great extent. However, under exceptional circumstances and in cases of emergencies and where the Director General of Supplies and Disposals has specifically expressed his inability to procure certain types of stores within the stipulated time, the Government may examine the desirability of suitably raising the limit subject to the condition that the maximum quantity to be purchased should be just sufficient to meet the emergency or to cover the requirement for the exact period during which supply from D.G.S. & D. is not likely to come.
25	4.47	The Committee are constrained to note that due to non-availability of personnel in time not only some activities of the Geological Survey have been given lower priorities but the Department has not been able to give proper and full attention to its primary function of mapping particularly in Himalayas. The Committee are suprised that although requisite number of qualified personnel is available in the country, the procedural difficulties have been allowed to stand in the way of early recruitment of such personnel.
	4.48	The Committee, therefore, suggest that Government should consider ways and means of eliminating procedural delays in the matter of recuitment of requisite number of scientific/techincal personnel with necessary qualificaions.
26	4.49	The Committee urge that with a view to put an end to the unsatisfactory state of affairs in the matter of recruitment of scienific/technical personnel there should be advanced planning and the question of setting up an adequate machinery and procedure should be considered and brought into operation before long.
27	4.58	The Committee note that at present each supervisory officer in the Geological Survey of India has to supervise, on an average, 25 junior officers.
	4.59	The Committee also note that each supervisory officer can effectively supervise about 15 junior officers and that this norm is likely to be achieved either by the end of the Fourth Plan period or during the Fifth Five Year Plan.
	4.60	The Committee, however, hope that till such time the norm of 1:15 is attained the technical work at various levels will not be allowed to deteriorate in quality.
28.	4.69	Keeping in view the nature of the duties of the scientists/technicians working with the Geological Survey of India, the Committee suggest that the feasibility of giving ome incentives to such personnel may be examined by the Government.
29	4.70	It may be ensured that suitable chances of promotion are available to the scientific and techinical incumbents of Geological survey of India to attract the right type of persons.

1	2	3
30	5.16	With a view to ensuring that research and analytical work carried out in the Geological Survey of India laboratories is of practical use and is in keeping with the advances made in technical field in other countries of the world, the Committee would urge the Government to properly develop and modernise existing laboratories of the Geological Survey of India by making necessary arrangements for providing all facilities including proper buildings.
31	5.30	The Committee note that it has not been possible for the Central Government to persuade various State Governments to allot land free of cost or at a nominal cost to the Geological Survey of India for construction of office buildings and residential quarters for officers/staff for the Regional/Circle offices in the States.
	5.31	The Committee also note that some of the State Governments have indicated their willingness to acquire private land for the Geological Survey of India offices/buildings under the Land Acquisition rules against payment of suitable compensation to the private owners.
	5.32	Taking economy into consideration, the Committee suggest that Government may examine the desirability of housing various offices of the Geological Survey of India at various State headquarters and other big cities in their own buildings instead of paying huge rents to private parties.
32	5.36	The Committee note that the scheme of giving rewards to the public who may give information about the location of mineral ores etc. is in vogue since 1961 but no reward has so far been given under the scheme. The Committee, therefore, suggest that the whole scheme may be got re-examined to find out the reasons for its failure and make it attractive.

APPENDIX V

(*vide* para 6 of Introduction)

Analysis of Conclusions /Recommendations contained in the Report

I. CLASSIFICATION OF RECOMMENDATIONS

A. Recommendations of improving the Organisation and working.

Sl. Nos. : 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 21, 23, 24, 25, 26, 27, 28 and 29.

B. Recommendations for effecting economy.
Sl. No. 8

C. Miscellaneous Recommendations :

Sl. Nos. : 19, 20, 22, 30, 31 and 32.

II. ANALYSIS OF THE RECOMMENDATIONS DIRECTED TOWARDS ECONOMY.

Sl. No.	Sl. No. as per summary of recommendations (Appendix IV)	Particulars
1	2	3
1	8	The Committee hope that the Government will keep a careful watch and will continue its efforts to bring down further the percentage of expenditure on administration.

GMGIPND—L—264LS—26-4-70—1135.

Sl. No.	Name of Agent	Agency No.
	DELHI	
24.	Jain Book Agency, Connaught Place, New Delhi.	11
25.	Sat Narain & Sons, 3141, Mohd. Ali Bazar, Mori Gate, Delhi.	3
26.	Atma Ram & Sons, Kashmere Gate, Delhi-6.	9
27.	J. M. Jaina & Brothers, Mori Gate, Delhi.	11
28.	The Central News Agency, 23/90, Connaught Place, New Delhi.	15
29.	The English Book Store, 7-L, Connaught Circus, New Delhi.	20
30.	Lakshmi Book Store, 42, Municipal Market, Janpath, New Delhi.	23
31.	Bahree Brothers, 188 Lajpatrai Market, Delhi-6.	27
32.	Jayana Book Depot, Chapparwala Kuan, Karol Bagh, New Delhi.	66
33.	Oxford Book & Stationery Company, Scindia House, Connaught Place, New Delhi-1.	68
34.	People's Publishing House, Rani Jhansi Road, New Delhi.	76
35.	The United Book Agency, 48, Amrit Kaur Market, Pahar Ganj, New Delhi.	88
36.	Hind Book House, 82, Janpath, New Delhi.	95
37.	Bookwell, 4, Sant Narankari Colony, Kingsway Camp, Delhi-9.	96
	MANIPUR	
38.	Shri N. Chaoba Singh, News Agent, Ramlal Paul High School Annexe, Imphal.	77
	AGENTS IN FOREIGN COUNTRIES	
39.	The Secretary, Establishment Department, The High Commission of India, India House, Aldwych, LONDON, W.C.—2.	59

Pubished under Rule 382 of the Rules of Procedure and Conduct of Business in Lok Sabha (Fifth Edition) and printed by the General Manager, Government of India Press, Minto Road, New Delhi.