TWENTIETH REPORT

ESTIMATES COMMITTEE (1985-86)

(EIGHTH LOK SABHA)

DEPARTMENT OF ATOMIC ENERGY

[Action Taken by Government on the Recommendations contained in the Eighty Second Report of Estimates Committee (Seventh Lok Sabha) on the Department of Atomic Energy—Generation of Electricity.]

Presented to Lok Sabha on 11 December, 1985

LOK SABHA SECRETARIAT
NEW DELHI

December, 1985/Agrahayana, 1907 (Saka)

Price : Rs. 2.05

CONTENTS

ESTIMATES COMMITTEE
(1985-86)

CHAIRMAN

Shri Chintamani Panigrahi

MEMBERS

2. Shri Jai Parkash Agarwal
3. Shri Sarfaraz Ahmed
4. Shri T. Basheer
5. Shri Manoranjan Bhakta
6. Shri Birinder Singh
7. Shri Saifuddin Chowdary
8. Shri Somjibhai Damor
9. Prof. Madhu Dandavate
10. Shri N. Dennis
11. Shrimati Sheila Dikshit
12. Shri G. L. Dogra
13. Shri H. N. Nanje Gowda
14. Shri M. R. Janardhanan
15. Shri Keyur Bhushan
16. Shri Lal Duhoma
17. Shri Mahavir Prasad
18. Shri Hannan Mollah
19. Shri Ajay Narayan Mushran
20. Shri Ram Pyare Panika
21. Shri Uttamrao Patil
22. Shri Jagannath Patnaik
23. Shri B. B. Ramaiah

24. Shri Navin Ravani
25. Shri Bhola Nath Sen
26. Prof. Nirmala Kumari Shaktawat
27. Shri Satyendra Narain Sinha
28. Shri P. K. Thungon
29. Shri Nissankara Rao Venkataratnam
30. Shri D. P. Yadav

SECRETARIAT

1. Shri N. N. Mehra—*Joint Secretary.*
2. Shri Bipin Behari—*Chief Financial Committee Officer.*
3. Shri Ram Kishore—*Senior Financial Committee Officer.*

STUDY GROUP ON ACTION TAKEN REPORTS
ESTIMATES COMMITTEE
(1985-86)

1. Shri Chintamani Panigrahi—*Chairman*
2. Prof. Madhu Dandavate—*Convener*
3. Shri G. L. Dogra
4. Smt. Sheila Dikshit
5. Shri D. P. Yadav
6. Shri Manoranjan Bhakta
7. Shri M. R. Janardhanan
8. Shri Hannan Mollah
9. Shri B. B. Ramaiah

INTRODUCTION

I, the Chairman of the Estimates Committee having been authorised by the Committee to submit the Report on their behalf, present this Twentieth Report on Action Taken by Government on the recommendations contained in the Eighty-second Report of Estimates Committee (7th Lok Sabha) on the Department of Atomic Energy-Generation of Electricity.

2. The 82nd Report was presented to Lok Sabha on 25th April, 1984. Government furnished their replies indicating action taken on the recommendations contained in that Report by 12th June, 1985. The draft Report was adopted by the Committee at their sitting held on 5th December, 1985.

3. The Report has been divided into the following Chapters :

I. Report

II. Recommendations/Observations that have been accepted by Government

III. Recommendations/Observations which the Committee do not desire to pursue in view of Government's replies

IV. Recommendations/Observations in respect of which replies of Government have not been accepted by the Committee

V. Recommendations/Observations in respect of which replies of Government are awaited.

4. An analysis of action taken by Government on the recommendations contained in the 82nd Report of Estimates Committee is given in the Appendix. It would be observed therefrom that out of 20 recommendations made in the Report, 13 recommendations i.e. 65 per cent have been accepted by Government. Replies of Government in respect of 3 recommendations .ie. about 15 per cent have not been

accepted by the Committee. The Committee do not desire to pursue one recommendation i. e. 5 per cent in view of Government's reply. Final] replies of Government in respect of 3 recommendations i. e. 15 per cent are still awaited.

NEW DELHI ;
December 10, 1985
Agrahayana 19, 1907 (S)

CHINTAMANI PANIGRAHI,
Chairman,
Estimates Committee.

REPORT

CHAPTER I

1.1 This Report of the Estimates Committee deals with action taken by Government on the recommendations contained in their 82nd Report (7th Lok Sabha) on the Department of Atomic Energy-Generation of Electricity, which was presented to Lok Sabha on 25 April, 1894.

1.2 Action Taken Notes have been received in respect of 17 out of 20 recommendations contained in the Report. These Action Taken Notes have been categorised as follows :

(i) Recommendations/Observations which have been accepted by the Government :

2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15, and 18

(Total 13—Chapter II)

(ii) Recommendations/Observations which the Committee do not desire to pursue in view of Government replies.

1 (Total 1—Chapter III)

(iii) Recommendations/Observations in respect of which Government's replies have not been accepted by the Committee.

14, 19 and 20

(Total 3—Chapter IV)

(iv) Recommendations/Observations in respect of which final replies are still awaited :

13, 16 and 17

(Total 3—Chapter V)

1.3 The Committee will now deal with action taken by Government on some of the recommendations.

Integrated Power Grid

Recommendation (Serial No. 14, Para 3.16)

1.4 In their Original (82nd Report, 7th Lok Sabha) Report the

Committee had recommended that the feasibility and the advisibility of setting up an integrated power grid for the entire country might be examined in consultation with the State Governments.

1.5 In their reply, the Deptt. of Atomic Energy have stated as follows :

"After independence, the first step towards integration of power systems was enabled by the Electricity (Supply) Act, 1948. This Act provided for the creation of State Electricity Boards responsible for generation, supply and distribution of electric power in their respective States and also for development of grid systems within each State under the aegis of State Electricity Boards. Thus the process of rationalising power develoment by integration of power systems at the special level of each State was initiated just after independence. The Industrial Policy Resolution of 1956 reserve generation and transmission of electricity exclusively to the State Sector and this ledt o a gradual nationalisation of the power supply industry and State Electricity Boards got established in most of the States. The first and the second Plan periods witnessed gradual consolidation of power systems in most of the States. It was in the early sixties that the limitation of the State as a spatial unit for power Planning and Operation was felt due to uneven distribution of power resources among States. The advantage of integration of power systems at the regional level was then recognized. The need for extending the spatial limit for power development from individual States to Regions was thereby recognized and the country was divided into five Regions, namely, Northern, Western. Southern, Eastern and North-Eastern, for the purpose of power systems planning and operation.

The Regional Electricity Boards (REBs) as associations of the constituent State Electricity Boards and other power organisations in the region were set up with a view to coordinating the operation of the constituent power systems. Thus the regional concept in power planning and system operation was introduced in the third plan.

From the Fourth Plan onwards, as a first step, stress was given for integration of State power systems to regional grids by establishing Inter-State transmission lines. In order to accelerate the process for formation of regional grids, 100 per cent loan assistance to the States was given by treating Inter-State ties as centrally sponsored schemes. Under this programme, so far 21 Nos. 220 KV lines involving 3252 ckt. Kms. and 16 Nos. 132 KV and 66 KV lines of 1517 ckt Kms. have been added. This includes six 220 KV inter-regional lines of 795 ckt Kms. length. This has helped in unification of power systems within a region and linking the different regions.

In mid seventies, it was decided to enlarge the scope of central power generation and establish regional power plants under the ownership and operation of Central Government. For this purpose, two corporations, namely, National Thermal Power Corporation and National Hydel Electric Power Corporation, were created. The participation in power development by the Central Government was mainly with a view to promoting regional concept to optimise power development and take care of the needs of States which were not so well endowed with energy resources.

The central generation and power transmission facilities have made significant headway and their successful operation would depend on the effective integration of the regional power systems and exchanging power according to the allocated shares. with a view to achieving integrated operation of State/System and regional grids facilities for communication systems and control systems by way of setting up of State Load Despatch Centres (SLDCs) in many States and Interim Regional Load Despatch Centres (RLDCs) in all the five regions have been established. In the Southern Region, permanent Load Despatch Centre has already started functioning at Bangalore. This is being further strengthened and made sophisticated. Three Regional Load Despatch Centres with modern computer and telemetry equipment data processing and LFC equipment are being set up at Bombay, Delhi and Calcutta.

One of the strategies for improving power availability in the near future would be by way of effective integrated operation of power systems in the various regions. To ensure optimum utilisation of resources in the country and to promote integrated operation and

transfer of power from one system to another, ultimate aim is to form National Power Grid. In this context, it may be mentioned that the principle of centrally owned National Power Grid has since been accepted by the Union Cabinet. In addition to 400 KV transmission system being constructed by Central Government Corporations, 400KV inter-State and inter-regional transmission lines, 400 KV transmission lines of individual States and Central Power Transmission Project-I, which includes as HVDC back-to-back station of 2 × 250 MW capacity located at Vindhyachal interposed on a 400 KV inter-regional link between the Northern and Western Regional Grids and Central Transmission Project-II covering 400 KV lines and sub-stations have been approved. These EHV network would form the backbone of the power system in the various regions would ultimately from part of the National Power Grid. Similarly, setting up of National Load Despatch Centre located at Delhi would be taken up during the Seventh Plan. These facilities would pave the way for the formation of National Power Grid. However, this is an evolutionary process and will take time to evolve."

1.6 The Committee are happy to note that the principle of centrally owned National Power Grid has since been accepted by the Union Government so as to ensure optimum utilisation of resources in the country and to promote integrated operation and transfer of power from one system to another.

1.7 The Committee recommend that serious efforts should be made in this direction by the Department of Atomic Energy in consultation with the other authorities concerned with generation and supply of electricity so that an integrated National Power Grid for the entire country becomes a reality during the Seventh Five Year-Plan period.

Extrusion Press at Nuclear Fuel Complex, Hyderabad

Recommendation (Sl. No. 19, Para 5.25)

1.8 Having noted that the Tubes Division of the Nuclear Fuel Complex, Hyderabad had undertaken manufacture of stainless steel tubes and ball-bearing tubes as a commercial activity of the Complex and as an import substitution venture, the Committee had expressed concern at the gross under-utilisation of the capacity of the Division. They had also noted that the stainless steel tubes Plants had suffered

losses of Rs. 1.2 crores in 1980-81 and Rs. 2.3 crores in 1981-82. In the case of ball-bearing tubes plant the low production was stated to have resulted in losses to the extent of Rs. 6.70 lakhs and Rs. 84 lakhs respectively during that period. The representative of the Department of Atomic Energy had during evidence, revealed to the Committee that this commercial venture had been taken up by them at the instance of the Ministry of Industry. He was of the view that unless high import duty was imposed by Government on the import of such tubes it would not be possible for the Tubes Division to be commercially viable. According to him, the reason for the indigenous tubes being costlier was the high costs of billets in India which want into the production of tubes.

1.9 The Committee had felt that the Nuclear Fuel Complex should not be made to suffer losses year after year on production of these tubes on the plea that they had developed the technology for such manufacture. The basic question posed by the Committee was as to how spare capacity arose in the extrusion press of the Nuclear Fuel Complex, Hyderabad and how far the Department had been economically, if not financially, justified in deciding to make use of this capacity to produce stainless steel tubes and ball-bearing tubes. While desiring an answer to this question, the Committee suggested that it should be examined whether by adjustment in fiscal levies the unit could be made viable or whether the spare capacity could be used for some other productive purpose profitably.

1.10 In their reply the Department of Atomic Energy have stated as follows : "the spare capacity of extrusion press arose primarily due to the difference between the rated capacity of the press and total workload of zircaloy. The capacity of the press (pressure) is, however, dictated by the size of the zircaloy materials—most critical components for power reactors. Although diversification is taken up for utilisation of the extrusion press spare capacity, for production of seamless steel and ball bearing tubes at the instance of the Ministry of Industry anticipated output could not be achieved even in the past few years. The reasons are primarily attributed to one or more of the following :—

(a) Availability of fully acceptable indigenous raw material in form of stainless steel or ball bearing billets.

(b) Very high cost of indigenous raw material which in turn has a large bearing on the final product cost and due to which the orders are not forthcoming as envisaged.

(c) *Liberalised policy of the Government for promoting import of tubes.* Stainless Steel tubes are included in Appendix 3 of the import policy as a restricted item of import. But for project requirements the ban under Appendix 3 does not apply and the project authorities are allowed imports of fabrication equipment like heat exchangers containing stainless steel tubes at a very low rate of import duty (40%). In case of ball bearing tubes, the duty on imported tubes is only 110%. In respect of raw material however there is a strong restriction on import of S S. and B.B. rounds as both are canalised items controlled by SAIL. This, therefore, results in a situation where the finished tube imported from foreign manufacturers will have the same price as that of an indigenous billet supplied by the steel manufacturers. This anomaly in the import duty structure is resulting in the pricing out of NFC tubes in the indigenous market.

(d) *Time taken for optimizing the most critical parameters for extrusion/oilgeting/heat treatment*: Originally as indicated in the Engineer Report a good number of sizes of tubes/pipes were supposed to be produced as hot extruded product. In actual practice it was found that many of the sizes could not be supplied as hot extruded product because the surface finish achievable was not acceptable to the customers. Secondly the sizes of blanks to be extruded had to be increased (for further cold rolling to smaller sizes on the pilger mills) resulting in higher number of pilgering passes and consequent reduction in capacity.

Steps have already been taken to improve the surface finish.

The extrusion process involves a large number of steps/operations, major ones being heating the mechined billets in horizontal induction furnaces, lubricating the billets, transporting the heated billets, expansion of the billets in the

vertical piercing press, transfer of the expanded hot billets to vertical furnaces for further heating, transfer of hot billets to horizontal extrusion press after glass lubrication, and extrusion of the billets to the required size.

For a steady rate of production, the equipment/controls at various stages have to work without fail and reliably. This could not be achieved to the desired level and steps are under way to improve the availability of the installation as a whole.

A review is under way to determine the capacities of various equipment taking into consideration the past experience.

(c) *Maintenance problems, as a system as a whole* : The extrusion press was originally procured only for Zircaloy extrusion but subsequently modified for S.S. and ball bearings production which load is much more than for Zircaloy requirement. Because of the complex nature of the equipment every sub-system has to be kept in good working condition. There were many components whose failure during operatian require immediate attention. To achieve the same the production and maintenance group were integrated into the single task force for this installation. Since then, the output from the press could be substantially increased. Further, revamping of the equipment by replacing many worn out parts due to the long usage has also been taken up. In this connection, one high pressure emulsion pump and high pressure compressors had already been over-hauled.

It should, however, be said that all the above points are being attended to increase the production, thereby minimizing the under utilization of the press capacity."

1.11 The Committee are not satisfied with the reply of the Department of Atomic Energy. The Committee have serious doubts whether the causes that have led to losses in the commercial activity undertaken by the Nuclear Fuel Complex, Hyderabad could be eliminated altogether or even substantially reduced. The Committee would like to raise the following issues which need investigation :—

(i) Why was the Extrusion Press of a rated capacity substantially higher than that required for the primary purpose of fabrication

of zircaloy elements at all put up resulting in substantial under-utilisation of capacity for the original purpose;

(ii) Why did the Department of Atomic Energy agree to set up seamless Stainless Steel Tube Plant and Ball-bearing Tube Plant at substantial capital cost to utilise the spare capacity of the Extrusion Press, even though it might have been at the instance of the Ministry of Industry, without themselves closely examining the economic feasibility of the proposed commercial activity. The problems being encountered and cited as the major cause for losses are not such as could not have been foreseen at the planning stage itself;

(iii) The Ministry of Industry may not have found it justifiable in the larger public interest to modify the prevailing policy in regard to import of stainless steel. Similarly, the prices of indigenously produced steel are fixed on the basis of certain factors and these are the same for all consumers whether in the public or private sector.

(iv) Why is the Department of Atomic Energy continuing with the commercial activity of producing Stainless Steel and Ball-bearing Tubes despite substantial losses which have to be met out of the resources of the Department when these could be better deployed in fields within the domain of the Department; and

(v) Would it not be on balance, more economic and in the interest of the Department to shed this commercial activity, rather than sustain losses in making futile attempt to put the Plant to diversified use ?

1.12 The Committee desire that a high-powered Committee consisting *inter alia* of experts drawn from outside the Department may be constituted to go into these questions and submit their findings and recommendations to the Department within a specified time frame. The report of this Expert Committee should provide guidance to the Department for future and enable them to take decisions in regard to the continuance or otherwise of their commercial venture.

Heavy Water Plants

Recommendation (Sl. No. 20, Para 6, 7)

1.13 The Committee found that the Heavy Water Plants at Titicorin and Baroda, which were commissioned in July, 1978 and in July, 1980 with an installed capacity of 67.2 MT and 71.3 MT respectively, had not been working at full capacity because of technical problems. The Committee had been informed that some of these problems had already been overcome while measures had been thought of for solving the rest of the problems in a phased manner to achieve optimum production of 45 tonnes per year based on irremedial constraints. The Committee expressed serious concern at the under-utilisation of capacities in these plants because any shortfall between demand and indigenous production had to be made good by the import of heavy water. During the last 3 years ending 1982 the total quantity of 131 tonnes of the total CIF value of Rs. 30.79 crores had to be imported from USSR. The Committee had, therefore, recommended that the technical problems confronting the two heavy water projects at Tuticorin and Baroda might be examined in depth by a Technical Committee who might be asked to suggest solutions to the problems within a specified period. The Committee were of the firm view that when the demand for heavy water to support the neclear energy programme was picking up so fact, we could not afford to let the existing heavy water plants languish. If, however, the constraints of the plants were really found 'irremediable' augmenting of the available capacity for production of Heavy Water should be considered forthwith.

1.14 In their reply the Department have stated as follows :

"A Technical Committee was constituted by the Board of Management of Heavy Water Projects to recommend measures for improving the Heavy water Plants at Tuticorin and Baroda and the recommendations are being implemented progressively. Already there has been very significant improvement in the steam factor i. e. the number of days the plants have been in continuous operation. The performance of the heavy-water plant at Tuticorin had not been satisfactory in the initial stages. There were a number of internal and external constraints which were responsible for such performance. The external constraints

related to (1) frequent interruption in the plant due to voltage dips, frequency variations and non-availability of power; (2) low feed gas availability from the fertilizer unit of SPIC with which the plant is integrated; (3) lower deuterium, content in the feed gas to the heavy water plant and 4) ingress of excessive impurities thorugh the feed gas from SPIC fertilizer plant. The Internal constraints that had effected the performance of the Tuticorin plant related to (1) limitation in the booster compressor in handling the rated quantity of gas; (2) poor recovery due to reduced ammonia reflux and (3) restriction on the temperature of the ammonia cracker subsequent to failure of some cracker tubes. Most of the remedial measures suggested by the Technical Committee have already been incorporated while a few that need long time are being incorporated. The power position in the region has shown significant improvement ever since the commissioning of the Madras Atomic Power Station. Since, then, the State Electricity Board has also not imposed any power cut on the heavy water plant and the fertilizer plant with which it ts integrated. As a result, there has been a steady improvement in the performance of this plant. During 1984-85, the performance of the Tuticorin plant was nearly 70% of the effective capacity which is 45% with monthly capacity utilisation reaching 90% in some instance.

The Baroda plant which was commissioned in 1977 was shut down following an explosion and was restarted in the year 1980. The performance of the plant had not been satisfactory also for reasons of external and internal constraints. The external constraints were (1) low deuterium content in the feed gas and (2) higher temperature of the incoming feed gas. The internal constraints relate to (1) higher skin temperature of the ammonia converter restricting the gas throughout of the plant; (2) inadequacy of refrigeration capacity for handling the higher inlet temperature of the feed gas; (3) frequent failure of syn gas compressors and (4) interruption on the plant operation due to leakages from special high pressure valves. Many of these problems have been solved. The remedial measures suggested by the committee referred to above are also being incorporated in a phased manner. With the modifications so far incorpo-

rated, the performance of the plant has shown a significant improvement in the availability of the plant and when all the modifications are completed, the performance is expected to improve further. The performance during 1984-85 was however, only 40% of the effective capacity of 45 Te per year.

A similar study was undertaken with respect to the Talcher plant and the Technical Committee has submitted its report in this regard. The Commissioning of the Talcher Plant was delayed due to the compounded effect of many external and internal factors. The external factors relate to : (1) long power cuts on the fertilizer plant extending upto 3-4 months in a year along with a deleterious effect of such long idling of the plant leading to deterioration/damage of equipment and machinery and (2) unsatisfactory performance of the fertilizer plant both due to equipment and machinery as well as poor quality of coal. The internal problems in the heavy water plant relate to some equipment and machinery as well as the process related problems. While the problem of power cut still persists, it is not as severe as before due to setting up of a captive power plant in the fertilizer unit. With certain modifications incorporated in the fertilizer plant as also better quality of coal now available, the performance of the fertilizer plant has, to some extent, improved. The problems encountered in some of the mechanical units like the canned motor pumps, mole compressors, diaphragm compressors as also the more persistant and severe problem of plunger pumps in the Heavy Water Plant have been satisfactorily resolved. Besides, additional diaphragm type pumps have been procured and installed as back up for the plunger pumps. In so far as process related problems are concerned the choking of the hot stripper has virtually disappeared subsequent to modification of the gas inlet nozzle, excessively long periods of drying observed in early stages of commissioning have come down to reasonable levels as seen from the experience of the recent past, scaling of the steam heaters which once forced a stoppage of operation has also considerably reduced with the performance remaining steady for a long time. The constraints of the throughout due to higher degree of foaming as well as choking

of the trays are also now reduced. The inadequacy of the main steam heater is being made up and of the catalyst separator has already been made up by changing the static heater to thermosyphon type. Many of these modifications are based on the recommendations made by a Committee of experts appointed for the purpose. With some of these modifications already completed, the plant trials have established the feasibility of the process, simplicity of operation and an indication of the plant being able to meet the design expectations to a substantial extent. The plant will not, however, be able to achieve any significant capacity factor unless a solution to the steam shortage is found. The steam is to be supplied by the FCI fertilizer plant. But due to imbalance in steam demand and availability under some situations, supply to Heavy Water Plant is interrupted causing plant shut down. Some solutions have been proposed for implementation to surmount this. Even after steam supply problem is resolved, assessed effective capacity for the heavy water plant cannot be achieved unless FCI is able to produce full quantity of gas by adding the 4th gasifier and the 4th boiler, in their plant.

Concurrently, action is in hand to complete expeditiously the Thal and Manuguru Projects as to ensure self-sufficiency in supply of heavy water for the nuclear power projects. As per the present indications there is not likely to be any significant delay in the completion of these projects. Production from these plants will commence in February, 1987 and April, 1988 respectively.

Advance action is being taken to set up another project linked to a fertilizer project. Additional projects in the 8th and 9th plan will be needed to meet the Heavy Water needs of unclear power programme in the country."

1.15 The Committee find it extremely distressing that even after implementation of the recommendations of the Technical Committee, appointed at the instance of this Estimates Committee the performance of the Tuticorin and Baroda Heavy Water Plants has not shown substantial improvement. During 1984-85, the performance of Tuticorin Plant was no more than 70% of what is termed as the plants "effective

capacity" of 45 Te per year (installed capacity being 71.3 Te per year). Similarly, the performance of the Baroda Plant during that year was only 40% of the "effective capacity" of 45 Te per year (installed capacity being 67.2 Te per year). The position in regard to Talcher Plant is still worse. The mal-functioning of the plants due to internal and external constraints could be attributed to inherent defects in project planning and poor coordination with principle or related industrial undertakings. While emphasising the need for constant endeavours for improvement in the performance of these Heavy Water Plants, the Committee would like the Department of Atomic Energy to learn a lesson from the shortcomings and fallings observed in the conception and operation of the plants and try to avoid them while formulating future projects.

Implementation of Recommendations

1.16 The Committee would like to emphasise that they attach the greatest importance to the implementation of the recommendations accepted by the Government. They would, therefore, urge Government to implement such recommendations expeditiously. In case where it is not possible to implement the recommendations in letter and spirit for any reason, the matter should be reported to the Committee in time with reason for non implementation.

1.17 The Committee also desire that final replies in respect of the recommendations contained in Chapter V of this Report may be furnished to the Committee expeditiously.

NEW DELHI ;
December 10, 1985
Agrahayana 19, 1907 (S)

CHINTAMANI PANIGRAHI,
Chairman,
Estimates Committee.

CHAPTER II

RECOMMENDATIONS/OBSERVATIONS WHICH HAVE BEEN ACCEPTED BY GOVERNMENT

Recommendation (Serial No. 2, Para 1.15)

The Committee understand that nearly 9% of all world electricity is being generated from nuclear power. The corresponding figure for India is 2.5% only. As against this, the share of electricity generated from nuclear power in other countries in 1981 was about 37.7% in France, 35.7% in Finland, 35.3% in Sweden, 28.1% in Switzerland, 25.3% in Belgium, 25.7% in Bulgaria, 17.3% in Japan, 14.6% in Federal Republic of Germany, 12.7% in U.K., 11.9% in U.S.A, 10.0% in Canada and 5.5% in Pakistan. Even though India is producing 30 times more nuclear power than Pakistan, in terms of percentage, electricity generated from nuclear power in India is less than half of that of Pakistan. In this connection, the Committee wish to recall that late Dr. Bhabha had claimed that 70% of energy requirements of India could be met by Atomic Energy. Although capital cost of nuclear power plants is estimated to be 25% more than Thermal Plants, the overall cost in respect of nuclear energy is quite less. In view of this the Committee see no reason why India should not tap the atomic energy source for generating electricity in a big way to meet the overgrowing power needs of the country.

Reply of Government

The Department of Atomic Energy has drawn up a perspective plan upto the year 2000 AD. The installed capacity for nuclear power is proposed to be raised to about 10,000 MWe by the year 2000 AD by installing 12 PHWR units of 235 MWe each beyond Kakrapar Atomic Power Project followed by 10 PHWR units of 500 MWe size. The proposed programme has been considered by the Atomic Energy Commission and is presently under consideration of the Government. Recently, it has been decided to locate two units of 235 MWe at

Rawatbhata in Rajasthan and two units of 235 MWe at a new site at Kaiga in Karnataka.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP Dated May, 1985]

Recommendation (Serial No. 3, Para 1.16)

The Committee find that though the Atomic Energy Commission had in 1968 envisaged commissioning of 2700 MW of nuclear power capacity by the end of 1980, so far only a total capacity of 860 MW (i.e. 420 MW at Tarapur Atomic Power Station and 440 MW at Rajasthan Atomic Power Station) has been established indicating a shortfall of as much as 68%. According to the Department of Atomic Energy, this shortfall had been due to two constraints viz. limited industrial infrastructure capable of supporting the nuclear programme and the restrictive practices in international trade in nuclear materials. The Department has assured the Committee that, on a reassessment of the programme, they have now set a target of generating 10,000 MW of nuclear power (i.e. 10 per cent of power from all sources) by the turn of the century. The Committee hope and trust that the Department would make concerted efforts to achieve this target.

Reply of Government

The long term nuclear power perspective document prepared by the Department has also identified the various tasks to be completed and actions required in order to achieve the target of 10,000 MW by the year 2000. Advance action on procurement of raw materials as well as procurement of critical items with long delivery schedules is under way for four units of 235 MWe beyond Kakrapar Project. Action is also being taken to expedite decisions on sites of future units. A separate design team has been formed for completing the design of 500 MW PHWR units expeditiously. The R & D input for achieving this target has also been identified and action has been initiated. Action on extension of existing facilities for fuel fabrication has been initiated. Similarly, additional Heavy Water Projects have also been identified and proposals are being finalised. The Department is ensuring that all efforts are being made to achieve the target.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP Dated May, 1985]

Recommendation (Serial No. 4, Para 1.17)

The Secretary, Department of Atomic Energy, informed the Committee in evidence that countries with whom India had entered into an agreement for supply of enriched uranium had not only failed to ensure uninterrupted supply of that material but had started placing restrictions of supply of heavy water and spare parts for Tarapur Atomic Power Plant. The Committee could well imagine the extent to which all this inhibits our progress towards enlarging nuclear power generation for constructive purposes. Nevertheless they hope that Government would take suitable steps to get over the situation. It is needless to say that it would be prudent to diversify our sources of supply to avoid dependence on one source.

Reply of Government

Recommendations have been noted and are being followed.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP Dated May, 1985]

Recommendation (Serial No. 5, Para 1.23)

The Committee find that at present the designing, construction and operation of the nuclear power stations in the country is being administered by a Central Board of Management, though the primary responsibility thereof continues to be that of the Power Projects Engineering Division of the Department of Atomic Energy. Recently Government have set up an Atomic Energy Regulatory Board. Under the Atomic Energy Act, the Department of Atomic Energy is required to coordinate its policy on Atomic Energy with the Central Electricity Authority and the State Electricity Boards etc., to implement schemes for the generation of electricity, and to operate atomic power stations in consultation with the Boards or Corporations concerned. However, while there is a good measure of coordination with the Central Electricity Authority this cannot be said of the coordination with the State Electricity Boards. The Committee recommend that the existing machinery for coordination should be strengthened in order that planning and execution as well as generation of electricity from nuclear power projects may not in any manner be inhibited.

Reply of Government

In order to improve the coordination with State Electricity Boards and Regional Grid authorities various committees have been set up in which representatives from Atomic Power Stations and also from the Headquarters organisations are participating.

Under the Atomic Energy Act, the Department of Atomic Energy is vested with the responsibility for developing a sound and adequate national policy in regard to atomic energy and to coordinate such policy with Central Electricity Anthority. State Electricity Boards and similar statutory corporations, to implement schemes for the generation of Electricity and to operate atomic power stations in consultation with the Boards or Corporations concerned.

All atomic power projects are finalised in consultation with the Ministry of Energy and the Central Electricity Authority. The nuclear power profile covering the period upto the year 2000 was also finalised in consultation with the Ministry of Energy and Central Electricity Authority. Electrical system expansion studies pertaining to integration of the proposed nuclear power plants with the rest of the system were carried out by CEA. Comparative studies concerning investment costs and generation costs of coal and nuclear electricity were carried out by the J.C. Shah Committee on which representatives from CEA, Planning Commission and APSEB also participated as full members. Member (Planning) CEA is a member of the Site Selection Committee constituted by Department of Atomic Energy to select suitable sites for future nuclear power stations.

The Nuclear Power Board (NPB) which has the primary responsibility for construction and operation of nuclear power plants is represented on the Regional Electricity Boards. This enables preparation of a coordinated maintenance schedule for the generating plants and drawing up generation schedules for utilization of available capacity in each system in an optimal way. The meetings which are held periodically also enable discussion and resolution of mutual problems.

The Regional Electricity Boards have various Sub-committees on which personnel from Nuclear Power Board/atomic power stations

serve as members. Some of the important sub-committees are :

(i) Operating Committee : This Committee normally meets once a month :

(a) to review the actual generation of the power stations with reference to the schedule drawn up in the previous month.

(b) to estimate the availability of power and energy.

(c) to coordinate maintenance schedules.

(ii) Load Generation Balance Committee : This Committee normally meets every quarter and reviews long term (annual) power supply and demand position.

(iii) Protection Committee : This committee meets as necessary from time to time to review the performance of protective relaying schemes, in the light of system occurences.

The Atomic Power Stations also are in direct contact with the respective State Electricity Boards, to which they are supplying power.

The Ministry of Energy/Central Electricity Authority are also kept apprised of generation targets, actual generation achieved and outage details by the power stations. Further since CEA is also represented on the Regional Electricity Boards, there is effective coordination in respect of atomic power generation activities with the Ministry of Energy.

A Nuclear Power Board under the Department of Atomic Energy has been set up on August 17, 1984 to implement the nuclear power programme in the country. The Board consists of a Chairman and eight members drawn from the Department of Atomic Energy, Central Electricity Authority and some outstanding experts in the field of power. The functions of the Board include design, engineering, construction and operation of nuclear power stations, testing and development systems, equipment and components required for nuclear power plants, generation and supply of electricity including arrangements for its transmission.

Recommendation (Serial No. 6, Para 1.28)

The Committee find that the size of the plan outlays for development of Atomic Power has been going up in every successive Five Year Plan. In the Third Five Year Plan, a modest allocation of Rs. 31 crores for development of Power Generation was made. This was increased to Rs. 132 crores in the Fourth Five year Plan and Rs. 331 crores in the Fifth Five Year Plan. In the Year 1978-79 and 1979-80 funds to the extent of Rs. 16 crores and Rs. 55 crores respectively were allocated for this programme. In the Sixth Five Year Plan, a still larger outlay *viz*- Rs. 450 crores was made. It has been reported to the Committee that during the first two years of the Sixth Five Year Plan an expenditure of Rs. 135.05 crores had already been incurred and that the expenditure during the remaining 3 years of plan was likely to be of the order of Rs. 359.12 crores aggregating to a total expenditure of Rs. 491.17 crores during the entire plan period. There will be thus an excess of Rs. 41.17 crores (about 10 per cent) over the provision. The Committee are not clear as to what extent this increase has been due to cost escalation and whether the physical achievement would be higher than contemplated intially in the Sixth Plan. In any case, they would impress on the Department the need for a realistic projection of requirements to the Planning Commission for formulation of Five Year Plans in future.

Reply of Government

The recommendation to project the requirement of the Department in a realistic manner to the Planning Commission for formulation of 7th Five Year Plan has been followed. The estimates are progressively becoming more realistic as the designs have been standardised and the variation is mainly attributable to escalation. Variation of cost estimates attributable to designs changes and improvement is expected to be marginal.

The Department sold nuclear power worth Rs. 90 crores during 1984 and revenue is expected to total about Rs. 125 crores by the end of the financial year, representing a 75 per cent increase over the previous year. Apart from this the Department earned over Rs. 2

crores from the sale of BARC produced isotopes and related instruments.

[Department of Atomic Energy O.M.No. 10/6(1)/84-PP
Dated May 6, 1985]

Recommendation (Serial No. 7, Para 2.9)

The Committee find that during the last 3 years (1981-82 to 1983-84) while the Tarapur Atomic Power Station worked to a capacity factor ranging between 39 to 53 per cent, the capacity utilisation at Rajasthan Atomic Power Station ranged between 27 and 45%. According to the Department Atomic of Energy the under-utilisation at Tarapur had been due to uncertainty in supplies of enriched uranium requiring reduction in operating power level to conserve available fuel. In the case of Rajasthan Atomic Power Station, the major factor inhibiting full utilisation of installed capacity has been stated to be equipment problems both of conventional and nuclear equipment in the Station and grid operating conditions. The Committee were assured in evidence that the fuel constraint at Tarapur has since been overcome and that they will now be getting fuel from France for that Station. It has however been stated that it would be better to restrict the power level of the Tarapur reactor at 160 MW as against its installed capacity of 210 MW. As a matter of fact, Tarapur Plant had in earlier years achieved a capacity factor of as much as 75 to 77% and the Committee hope that optimal production will be ensured in future.

Reply of Government

At present all the five nuclear power units in operation including the two units at Tarapur are performing satisfactorily and steps are being taken to ensure that they continue to perform in a steady and satisfactory manner. The Tarapur units have been derated to 160 MWe and are presently working at power levels close to 160 MWe.

[Department of Atomic Energy OM No. 10/6(1)/84-PP
Dated May 6, 1985].

Recommendation (Serial No., 8 Para 2.10)

The Committee are perturbed to find that while Unit No. 2 of

Rajasthan Atomic Power Station had been working somewhat smoothly, Unit No. 1 had been posing equipment problems. This Unit worked upto August-September, 1981 and when the equipment problem surfaced, it was temporarily fixed up and the Unit started functioning again in January, 1982, but as that particular fixing did not last, the Unit had to be taken out for servicing in March, 1982. Since then this Unit is reported to be out of operation. According to the Committee headed by Dr. N.B. Prasad which had gone into the working of the Rajasthan Atomic Power Station, the location of this plant was not a right one. That Committee has also pointed out that the fact that the reactor at Rajasthan was only a prototypical reactor was lost sight of by the authorities concerned. It has also been pointed out that another constraint in the case of this plant has been that all the power for this plant came from only one source. The Committee were assured during evidence that most of the technical recommendations made by the Prasad Committee have already been implemented at an estimated cost of Rs. 20 crores. The Committee recommend that the Prasad Committee's recommendations relating to Organisational weaknesses may also be processed and conclusive action taken without further loss of time.

Reply of Government

The technical measures recommended by the Prasad Committee are in the procass of being implemented. Tne financial sanction for implementing these modifications at an estimated cost of Rs. 20 crores has been recently obtained. The recommendations of the Prasad Committee relating to organisational aspects have also been considered by the Atomic Energy Commission and the Government and the erstwhile Power Projects Engineering Division has been reconstituted as "Nuclear Power Board" with enhanced delegation of powers.

The Nuclear power Board has been constituted with a Chairman and eight members drawn from the Department of Atomic Energy, Central Electricity Authority and some outstanding experts in the field of power. There are two Executive Directors having total responsibility for the 235 MWe programme and the 500 MWe programme respectively. There is also an Executive Director responsible for the personnel and finance functions at a rank equivalent to Joint Secretary

and a suitable person is being appointed to fill this post. Contracts and Materials management function is also being decentralised and NPB has a Director-in-Charge of this function reporting to the Chairman, NPB.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP
Dated May 6, 1985]

Recommendation (Serial No. 9, Para 2.13)

The Committee are concerned to note that during the last four years both Tarapur Atomic Power Station and the Rajasthan Atomic Power Station have suffered a number of outages resulting in loss of working days. In 1982 alone Unit II of Tarapur Atomic Power Station lost as many as 113.5 days Unit-I and Unit-II of Rajasthan Atomic Power Station lost 222.27 days and 180.36 days respectively. The Committee recommend that effective steps may be taken to see that whatever equipment we have is maintained well by periodical inspections and rectifications of defects as and when they occur. In any case it should be ensured that there is no lapse or element of human error in keeping the equipment at these plants in working order.

Reply of Government

Efforts are continuing to minimise outages due to equipment problems by resorting to preventive maintenance and taking periodic maintenance outages on the plants. The time lost attributable to human error is already negligible.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP
Dated May 6, 1985]

Recommendation (Serial No. 10, Para 2.20)

The Committee find that the current tariff rate for supply of power by Tarapur Atomic Power Station to Maharashtra and Gujarat Electricity Boards is 18.91 paise/KWH, the tariff for power supplied by Rajasthan Atomic Power Station is 28.36 paise/KWH. The Committee have been informed that the actual return in the case of Tarapur

Atomic Power Station has been 15.83% in 1978-79, 6.83% in 1979-80 and 6.23% in 1980-81 and in the case of Rajasthan Atomic Power Station it was (—) 1.58% in 1978-79, 8.25% in 1979-80 and 3.90% in 1980-81. Thus although it was expected to have 12 per cent return it has not materialised except in one year and that too in the case of Tarapur Station only. The Committee feel that it should be possible to achieve the desirable rate of return if only the cost of operation is controlled and sustained power production at the optimal level of capacity utilisation ensured in future.

Reply of Government

Recommendations are noted to ensure proper return.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP
Dated May 6, 1985]

Recommendation (Serial No. 11, Para 2.25)

The Committee cannot resist the impression that adequate attention was not paid by Project Authorities to ensure that the units meant for management of radio-active wastes generated during the operation of nuclear power station and for ensuring that release of radioactivity to the environment is well below the stringent criteria laid down by the safety authorities, were completed on time and without any cost overrun. For example, the Waste Immobilisation Project and the Solid Storage Surveillance Facility Unit at Tarapure which were expected to be completed by August, 1983 and September, 1983 respectively are so much behind schedule that they are expected to be operational only at the end of 1984. The Committee recommend that project implementation machinery should be geared up to ensure that such important units for the Atomic Power Plants are not held up. The Committee also recommend that in future it should be ensured that waste management units *aoinitie* become part of an Atomic Power Project and are set up along with the project.

Reply of Government

At all power station sites adequate importance has been given in the planning and setting up of requisite ancillary waste management

facilities to ensure that release of radioactivity to the environment is well below the stringent criteria laid down by the Safety Authorities. At these sites the radioactive concentrates which results from treatment of low and intermediate level radioactive wastes are solidified and stored under constant surveillance in controlled areas close to the nuclear power stations at each site. Waste management facility is set up along with the power plant.

The referred facilities *viz.* .Waste Immobilisation Plant and Solid Storage Surveillance Facility, Tarapur are connected with the management of radioactive wastes generated during the operation of reprocessing of the spent fuel from the reactors, and not for the low and medium wastes generated by the power reactor. Hence it would have to be taken up at a subsequent point of time.

The recommendations of the Committee regarding timely completion of Waste Immobilisation Project and Solid Storage Surveillance Facility have been noted and it will be ensured that the time schedules are adhered to.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP
Dated May 6, 1985]

Recommendation (Serial No. 12, Para 3.8)

It is a matter of great concern that the Atomic Power Projects under construction in the country *viz.* Madras Atomic Power Project (Unit I & II), Narora Atomic Power Project (Unit I & II) Kakrapar Atomic Power Project (Unit I & II) are behind schedule by periods varying from 5 to 10 years resulting in frequent increases in projects costs estimates. The original project cost of Unit I & II at Madras was Rs. 61.78 crores and Rs. 70.63 crores respectively. According to the 3rd revision of cost estimates in October, 1982, the revised cost of Unit I will be around Rs. 180.83 crores and according to the second revision (October 1982) of cost estimates of Unit II the revised cost will be Rs. 127 04 crores. As against this, the expenditure incurred upto 31.3.1982 on Unit I amounted to Rs. 105.64 crores and that on Unit II Rs. 86.82 crores. In the care of Narora Atomic Power Project, the original project cost of Rs. 209.89 crores has had to be revised to Rs. 399.64 crores. Besides, general inflation, the main reasons for

increase in projects cost have been attributed to (i) increase in scope of work including design changes (ii) increase in cost of fuel and heavy water, (iii) augmentation of upgrading facilities and (iv) increases/ augmentation of housing facilities. In any case delays in execution of projects result in not only pushing up the project cost but also in loss of production. The Committee, therefore, recommend that the implementation of Atomic Power Projects may be streamlined and modern techniques of management to ensure that Atomic Power Projects taken in hand are completed and commissioned on time in future.

Reply of Government

An important factor affecting the early completion of projects has been delayed deliverics of major equipment. Steps are being taken to mobilise industrial support for timely delivery of equipment and to set up additional Heavy Water Projects to ensure timely availability of Heavy Water for commissioning the reactors.

Narora designs have been standardized for adoption at Kakrapar Atomic Power Project and future 235 MWe units to enable shortening of the engineering time and to permit advance ordering of equipment.

In order to realise the benefits of standardization to a greater extent, initiation of work on 12 units of 235 MWe each and one unit of 500 MWe beyond Kakrapar Atomic Power Project has been proposed during the 7th Five Year Plan period so that batch ordering of various long delivery equipment can be adopted.

Detailed scheduling of various activities using PERT/CPM techniques is being continued so that erection and commissioning activities can be carried out in parallel to the maximum extent feasible. To enable power generation soon after the reactor attains criticality, Turbo Generator has been commissioned with Auxiliary boilers even before completion of the Nuclear system at Madras Atomic Power Project. This approach is proposed to be adopted at future projects also.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP
Dated May 6, 1985[

Recommendation (Serial No. 15, Para 4.5)

The three nuclear power projects viz. Madras Atomic Power Project (Unit I & II), Narora Atomic Power Project (Unit I & II) and Kakrapar Atomic Power Project (Unit I & II) which are under construction at present in the country are of "natural uranium fuelled, pressurised heavy water reactor design". The Committee find that though no foreign collaboration has been entered into for these projects, the import content in these projects is likely to be about 10%. According to the Department of Atomic Energy "100% indigenisation though technically achievable would not be economically viable". The Committee are not impressed by this view. The Committee feel that by importing a part of the critical equipments, however small it may be in value, we would be completely dependent on the foreign suppliers for servicing and replacement and that this would amount to repeating the same mistake we did in the case of Tarapur Plant. Unfortunately, the experience in the case of Tarapur Plant has not been a happy one. The Committee would therefore, urge Government to consider seriously why even this 10% of import content should be there especially when 100% indiginisation is not only desirable but also achievable.

Reply of Government

Recommendations of the Committee are noted and efforts are continuing to maximise the indigenous manufacture of items presently being imported to avoid reliance on foreign suppliers.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP Dated May 6, 1985].

Recommendation (Serial No. 18, Para 5.14)

The Committee are glad to note that the Development work on MOX (Mixed Oxide Fuel-Platinum Oxide and Uranium Oxide) as alternative fuel for nuclear reactor has been carried out and the possibility of using it in the light water reactors has been established. The Committee would await the steps taken to adopt this technology in view of its obvious advantages.

Reply of Government

The development work on MOX has been successfully completed and it has been tested in one of the Research Reactors at Trombay.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP Dated May 6, 1985].

CHAPTER III

RECOMMENDATIONS/OBSERVATIONS WHICH THE COMMITTEE DO NOT DESIRE TO PURSUE IN VIEW OF GOVERNMENT REPLIES

Recommendation (Serial No. 1, Para 1.6)

Section 22(1)(a) of the Atomic Energy Act, 1962 (33 of 1962) has vested powers in the Union Government "to develop a sound and adequate National Policy in regard to Atomic Power". The Committee recommend that Government should formulate a comprehensive and sound National Policy on Atomic Power and place it before Parliament.

Reply of Government

Government's policy in regard to development of atomic power in India has been discussed in Parliament repeatedly in all its ramifications. Government has approved, in principle a 15 year programme for development of nuclear power in the country so as to achieve a target of installed nuclear electrical generating capacity of 10,000 MWe by the year 2000.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP
Dated May 6, 1985].

CHAPTER IV

RECOMMENDATIONS/OBSERVATIONS IN RESPECT OF WHICH GOVERNMENT'S REPLIES HAVE NOT BEEN ACCEPTED

Recommendation (Serial No. 14, Para 3.16)

The Secretary, Department of Atomic Energy observed in evidence that "power is for the whole of India. We should plan our strategy in such a manner that one day there should be one common grid for the whole country. That should be an ideal situation". The Committee would recommend that the feasibility and the advisibility of setting up an integrated power grid for the entire country may be examined in consultation with the State Government.

Reply of Government

After independence, the first step towards integration of power systems was enabled by the Electricity (Supply) Act, 1948. This Act provided for the creation of State Electricity Boards responsible for generation, supply and distribution of electric power in their respective states and also for development of grid systems within each State under the aegis of State Electricity Boards. Thus the process of rationalising power development by integration of power systems at the special level of each state was initiated just after independence. The Industrial Policy Resolution of 1956 reserved generation and transmission of electricity exclusively to the State Sector and this led to a gradual nationalisation of the power supply industry and State Electricity Boards got established in most of the States. The first and second Plan periods witnessed gradual consolidation of power systems in most of the States. It was in the early sixties that the limitation of the State as a spatial unit for Power Planning and Operation was felt due to uneven distribution of power resources among States. The advantage of integration of power systems at the regional level was then recognized. The need for extending the spatial limit for power development from indivi-

dual States to Regions was thereby recognized and the country was divided into five Regions, namely, Northern, Western, Southern, Eastern and North-Eastern, for the purpose of systems planning and operation.

The Regional Electricity Boards (REBs) as associations of the constituent State Electricity Boards and other power organisations in the region were set up with a view to coordinating the operation of the constituent power systems. Thus the regional concept in Power planning and systems operation was introduced in the third plan.

From the Fourth Plan onwards, as a first step, stress was given for integration of State power systems to regional grids by establishing Inter-State transmission lines. In order to accelerate the process for formation of regional grids, 100 per cent loan assistance to the States was given by treating inter-State ties as centrally sponsored schemes. Under this programme, so far 21 Nos. 220 KV lines involving 3252 ckt. Kms. and 16 Nos. 132 KV and 66 KV lines of 1517 ckt. Kms. have been added. This includes six 220 KV inter-regional lines of 795 ckt. Kms. length. This has helped in unification of power systems within a region and linking the different regions.

In mid seventies, it was decided to enlarge the scope of central power generation and establish regional power plants under the ownership and operation of Central Government. For this purpose, two corporations, namely National Thermal Power Corporation and National Hydel Electric Power Corporation, were created. The participation in power development by the Central Government was mainly with a view to promoting regional concept to optimise power development and take care of the needs of States which were not so well endowed with energy resources.

The central generation and power transmission facilities have made significant headway and their successful operation would depend on the effective integration of the regional power systems and exchanging power according to the allocaied of shares. With a view to achieving integrated operation of State/System and regional grids facilities for communication systems and control systems by way of setting up of State Load Despatch Centres (SLDCs) in many states and Interim Regional Load Despatch Centres (RLDCs) in all the five regions have been estab-

lished, In the Southern Region, permanent Load Despatch Centre has already started functioning at Bangalore. This is being further strengthened and made sophisticated. Three Regional Load Despatch Centres with modern computer and telemetry equipment data processing and LFC equipment are being set up at Bombay, Delhi and Calcutta.

One of the strategies for improving power availability in the near future would be by way of effective integrated operation of power systems in the various regions. To ensure optimum utilisation of resources in the country and to promote integrated operation and transfer of power from one system to another, ultimate aim is to form National Power Grid. In this context, it may be mentioned that the principle of centrally owned National Power Grid has since been accepted by the Union Cabinet. In addition to 400 KV transmission system being constructed by Central Government Corporations, 400 KV inter-State and inter-regional transmission lines, 400 KV transmission lines of individual State and Central Power Transmission Project-I, which Includes as HVDC back-to-back station of 2x250 MW capacity located at Vindhyachal interposed on a 400 KV inter-regional link between the Northern and Western Regional Grids and Central Transmission Project-II covering 400 KV lines and substations have been approved. These EHV network would from the backbone of the power system in the various regions and would ultimately form part of the National Power Grid. Similarly, setting up of National Load Despatch Centre located at Delhi would be taken up during the Seventh Plan. These facilities would pave the way for the formation of National Power Grid. However, this is an evolutionary process and will take time to evolve.

Recommendation (Serial No 19, Para 5.25)

The Committee find that as the extrusion press of the Nuclear Fuel Complex, Hyderabad had spare capacity, the Tubes Division undertook manufacture of stainless steel tubes and ball-bearing tubes as a commercial activity of the complex and as an import substitution venture. The Committee are concerned to note the gross under-utilisation of the capacity in the Tubes Division and consequential loss suffered. The Committee were informed that the stainless steel Tubes Plants suffered losses of Rs. 1.2 crores in 1980-81 and Rs. 2.3. crores in 1981-82. In the case of ball-bearing tubes plant the low production is stated to have resulted in losses to the extent of Rs. 6.70 lakhs and

Rs. 84 lakhs respectively during this period. The representative of the Department of Atomic Energy disclosed in evidence that this commercial venture had been taken up by them at the instance of the Ministry of Industry. He was of the view that unless high import duty was imposed by Government on the import of such tubes it would not be possible for the Tubes Division to be commercially viable. The reason for the indigenous tubes being costlier is because of high costs of billets in India which go into the production of these tubes. The Committee feel that the Nuclear Fuel Complex should not be made to suffer losses year after year on production of these tubes on the plea that they have developed the technology for such manufacture. The basic question that arises in this context is how spare capacity arose in the extrusion press of the Nuclear Fuel Complex, Hyderabad and how far it has been economically, if not financially, justified in deciding to make use of this capacity to produce stainless steel tubes and ball-bearing tubes. While the committee would await an answer to this, they would suggest that it should be examined whether by adjustment in fiscal levies the unit could be made viable or whether the spare capacity could be used for some other productive purpose profitably.

Reply of Government

The spare capacity of extrusion press arose primarily due to the difference between the rated capacity of the press and total workload of zircaloy. The capacity of the press (pressure) is, however, dictated by the size of the zircaloy materials—most critical components for power reactors. Although diversification is taken up for utilization of the extrusion press spare capacity for production of seamless stainless steel and ball-bearing tubes at the instance of the Ministry of Industry, anticipated output could not be achieved even in the past few years. The reasons are primarily attributed to one or more of the following :—

(a) Availability of fully acceptable indigenous raw material in form of stainless steel or ball bearing billets.

(b) Very high cost of indigenous raw material which in turn has a large bearing on the final product cost and due to which the orders are not forthcoming as envisaged.

(c) *Liberalised policy of the Government for promoting import of tubes* : Stainless Steel tubes are included in Appendix 3 of

the import policy as a restricted item of import. But for project requirements the ban under Appendix 3 does not apply and the project authorities are allowed imports of fabrication equipment like heat exchangers containing stainless steel tubes at a very low rate of import duty (40%). In case of ball bearing tubes, the duty on imported tubes is only 110%. In respect of raw material however there is strong restriction on import of S.S. and B.B. rounds as both are canalised items controlled by SAIL. This therefore, results in a situation where the finished tube imported from foreign manufactures will have the same price as that of an indigenous billet supplied by the steel manufacturers. This anamoly in the import duty structure is resulting in the pricing out of NFC tubes in the indigenous market.

(d) *Time taken for optimizing the most critical parameters for extrusion/pilgering/heat treatment* : Originally as indicated in the Engineer Report a good number of sizes of tubes/pipes were supposed to be produced as hot extruded product. In actual practice it was found that many of the sizes could not be supplied as hot extruded product because the surface finish achievable was not acceptable to the customers. Secondly the sizes of blanks to be extruded had to be increased (for further cold rolling to smaller sizes on the pilger mills) resulting in higher number of pilgering passes and consequent reduction in capacity.

Steps have already been taken to improve the surface finish.

The extrusion process involves a large number of steps/ operations, major ones being heating the machined billets in horizontal induction furnaces, lubricating the billets, transporting the heated billets, expansion of the billets in the vertical piercing press, transfer of the expanded hot billets to vertical furnaces for further heating, transfer of hot billets to horizontal extrusion press after glass lubrication, and extrusion of the billets to the required size.

For a steady rate of production, the equipment/controls at various stages have to work without fail and reliably. This could not be achieved to the desired level and steps are under way to improve the availability of the installation as a whole.

A review is under way to determine the capacities of various equipment taking into consideration the past experience.

(e) *Maintenance problems, as a system as a whole* : The extrusion press was originally procured only for Zircaloy extrusion but subsequently modifed for S.S. and ball bearings production which load is much more than for Zircaloy requirement. Because of the complex nature of the equipment every subsystem has to be kept in good working condition. There were many components whose failure during operation require immediate attention. To achieve the same the production and maintenance group were integrated into the single task force for this installation. Since then, the output from the press could be substantially increased. Further, revamping of the equipment by replacing many worn out parts due to the long usage has also been taken up. In this connection, one high pressure emulsion pump and high pressure compressors had already been over-hauled.

It should, however, be said that all the above points are being attended to increase the production, thereby minimizing the under utilization of the press capacity.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP
Dated May 6, 1985]

Recommendation (Serial No. 20, Para 6.7)

The Committee find that the Heavy Water Plants at Tuticorin and Baroda which were commissioned in July 1978 and in July 1980 with an installed capacity of 67.2 MT and 71.3 MT respectively have not been working at full capacity because of technical problems. The Committee have been informed that some of these problems have

already been over-come while measures have been thought of for solving the rest of the problems in a phased manner to achieve optimal production of 45 tonnes per year based on irremedial constraints. The Committee view the under-utilisation of capacities in these plants with serious concern because any shortfall between demand and indigenous production has to be made good by the import of heavy water. During the last 3 years ending 1982 the total quantity of 131 tonnes of the total CIF value of Rs. 30.79 crores had to be imported from USSR. The Committee recommend that the technical problems confronting the two heavy water projects at Tuticorin and Baroda may be examined in depth by a Technical Committee who may be asked to suggest solutions to these problems within a specified period. The Committee are of the firm view that when the demand for heavy water to support the nuclear energy programme is picking up so fast, we cannot afford to let the existing heavy water plants languish. If, however, the constraints of these plants are really found 'irremediable' augmenting of the available capacity for production of Heavy Water should be considered forthwith.

Reply of Government

A Technical Committee was constituted by the Board of Management of Heavy Water Projects to recommend measures for improving the Heavy Water Plants at Tuticorin and Baroda and the recommendations are being implemented progressively. Already there has been very significant improvement in the steam factor i.e. the number of days the plants have been in continuous operation. The performance of the heavy water plant at Tuticorin had not been satisfactory in the initial stages. There were a number of internal and external constraints which were responsible for such performance. The external constraints related to (1) frequent interruption in the plant due to voltage dips, frequency variations and non-availability of power; (2) low feed gas availability from the fertilizer unit of SPIC with which the plant is integrated (3) lower deruteium content in the feed gas to the heavy water plant and (4) ingress of excessive impurities through the feed gas from SPIC fertilizer plant. The internal constraints that had affected the performance of the Tuticorin plant related to (1) limitation in the booster compressor in handling the rated quantity of gas; (2) poor recovery due to reduced ammonia reflux and (3) restriction on the temperature of the

ammonia cracker subsequent to failure of some cracker tubes. Most of the remedial measures suggested by the Technical Committee have already been incorporated while a few that need long time are being incorporated. The power position in the region has shown significant improvement ever since the commissioning of the Madras Atomic Power Station. Since then, the State Electricity Board has also not imposed any power out on the heavy water plant and the fertilizer plant with which it is integrated. As a result, there has been a steady improvement in the performance of this plant. During 1984-85, the performance of the Tuticorin plant was nearly 70% of the effective capacity which is 45 Te with monthly capacity utilisation reaching 90% in some instance.

The Baroda plant which was commissioned in '77 was shut down following an explosion and was restarted in the year 1980. The performance of the plant had not been satisfactory also for reasons of external and internal constraints. The external constraints are : (1) low deuterium content in the feed gas; and (2) higher temperature of the incoming feed gas. The internal constraints relate to (1) higher skin temperature of the ammonia converter restricting the gas throughput of the plant; (2) inadequacy of refrigeration capacity for handling the higher inlet temperature of the feed gas; (3) frequent failure of syn. gas compressors and (4) interruption on the plant operation due to leakages from special high pressure valves. Many of these problems have been solved. The remedial measures suggested by the committee referred to above are also being incorporated in a phased manner. With the Modifications so far incorporated, the performance of the plant has shown a significant improvement in the avilability of the plant and when all the modifications are completed, the performance is expected to improve further. The performance during 1984-85 was however only 40% of the effective capacity of 45 Te per year.

A similar study was undertaken with respect to the Tachler plant and the Technical Committee has submitted its report in this regard. The Commissioning of the Talcher plant was delayed due to the compounded effect of many external and internal factors. The external factors relate to : (1) long power cuts on the fertilizer plant extending upto 3-4 months in a year alongwith a deleterious effect of such long idling of the plant leading to deterioration/damage of equipment and

machinery; and (2) unsatisfactory performance of the fertilizer plant both due to equipment and machinery as well as poor quality of coal. The internal problems in the heavy water plant relate to some equipment and machinery as well as the process related problems. While the problem of power cut still persists, it is not as severe as before due to setting up of a captive power plant in the fertilizer unit. With certain modifications incorporated in the fertilizer plant as also better quality of coal now available, the performance of the fertilizer plant has, to some extent, improved. The problems encountered in some of the mechanical units like the canned motor pumps, mole compressors, diaphragm compressors as also the more persistent and severe problem of the plunger pumps in the Heavy Water plant have been satisfactorily resolved. Besides, additional diaphragm type pumps have been procured and installed as back up for the plunger pumps. In so far as process related problems are concerned, the choking of the hot stripper has virtually disappeared subsequent to modification of the gas inlet nozzle, excessively long periods of drying observed in early stages of commissioning have come down to reasonable levels as seen from the experience of the recent past, scalling of the steam heaters which once forced a stoppage of operation has also considerably reduced with the performance remaining steady for a long time. The constraints of the throughput due to higher degree of foaming as well as choking of the trays are also now reduced The inadequacy of the main steam heater is being made up and of the catalyst separator has already been made up by changing the static heater to thermosyphon type. Many of these modifications are based on the recommendations made by a committee of experts appointed for the purpose. With some of these modifications already completed, the plant trials have established the feasibility of the process simplicity of operation and an indication of the plant being able to meet the design expectations to a substantial extent. The plant will not however, be able to achieve any significant capacity factor unless a solution to the steam shortage is found. The steam is to be supplied by the FCI fertilizer plant. But due to imbalance in steam demand and availability under some situations, supply to Heavy Water plant is interrupted causing plant shut down. Some solutions have been proposed for implementation to surmount this. Even after steam supply problem is resolved, assessed effective capacity for the heavy water plant cannot be achieved unless FCI is able to produce

full quantity of gas by adding the 4th gasifier and the 4th boiler, in their plant.

Concurrently, action is in hand to complete expeditiously and the Thal and Manuguru Projects to ensure self-sufficiency in supply of heavy water for the nuclear power projects. As per the present indications there is not likely to be any significant delay in the completion of these projects. Production from these plants will commence in February 1987 and April 1988 respectively.

Advance action is being taken to set up another project linked to a fertilizer project. Additional projects in the 8th and 9th plan will be needed to meet the Heavy Water needs of nuclear power programme in the country.

Details of Heavy Water plants/projects under operation/construction are given in the attached statement.

[Department of Atomic Energy O.M. No. 10/6(1)/84-PP
Dated May 6, 1985]

DETAILS OF HEAVY WATER PLANTS/PROJECTS

Sl. No.	Location	Linked to	Designed capacity Tonnes per year (Effective capacity in brackets)	Cost (Rs. crores)	Year of actual/ sched. com-mission-ing	Technology	Collaboration
1.	Nangal (Punjab)	M/s. National Fertilizers Ltd.	14.2	3.21	1962	Liquefaction & dist-illation of Hydro-gen	M/s Linde, W. Germany.
2.	Baroda (Gujarat)	M/s. Gujarat State Fertilizer Co. Ltd.	67.2(45)	33.87	1977/ 1980	Ammonia-Hydrogen (Mono-thermal) Ex-change	M/s. Gelpra, France.
3.	Tuticorin (Tamil Nadu)	M/s. Southern Petro-chemical Industries Co. Ltd.	71.2(45)	37.37	1978	Ammonia-Hydrogen (Mono-thermal) Ex-change	M/s. Gelpra, France.
4.	Talcher (Orissa)	M/s. Fertilizer Corpora-tion of India Ltd.	62.7(50)	73.00*1	April 1985	Ammonia-Hydrogen (Bi-thermal) Ex-change	M/s. Uhde, W. Germany.

5.	Kota (Rajasthan)	Rajasthan Atomic Power Station	100.0(85)	81.45*2	April 1985	Hydrogen Sulphide Water Exchange	Indigenous
6.	Thal-Vaishet (Maharashtra)	M/s. Rashtriya Chemicals & Fertilizers	140.0(110)	187.0	1987	Ammonia-Hydrogen (Mono-thermal) Exchange	Indigenous
7.	Manuguru (Andhra Pradesh)	—	200.0(185)	421.0	1988	Hydrogen sulphide—Water Exchange	Indigenous
8.	NP-3*3	—	140.0(110)	—	—	Ammonia Hydrogen (Mono-thermal) Exchange	Indigenous

Note : *1. Latest estimate. Net cost excluding Rs. 75 lakhs being the cost of spares to be decapitalised.

*2. Latest sanctioned cost excluding Rs. 550 lakhs being the cost of spares to be decapitalised.

*3. Proposed to be located at Hazira, linked to M/s. KRIBHCO's Fertilizer Plant; Estimated Cost Rs. 221 crores; Scheduled commissioning—1989.

CHAPTER V

RECOMMENDATIONS/OBSERVATIONS IN RESPECT OF WHICH FINAL REPLIES ARE STILL AWAITED

Recommendation (Serial No. 13, Para 3.15)

It transpired during examination by the Committee that Government have given up their earlier idea of having four reactor clusters of 235 MW each in Southern, Western and Northern region and that now the Department of Atomic Energy propose to go in for nuclear power stations of 2000 MW in clusters in each of the four regions *viz.* South, East, North and West.

It was claimed that setting up of nuclear power stations in large numbers and putting them in clusters would be cheaper. The putting up of nuclear power stations in the Eastern region also has been justified on the basis that it could help to have a mix of thermal and nuclear power stations to cater to the needs of the region just in case sufficient coal is unavailable for any reason. The Committee welcome this approach.

Recommendation (Serial No. 16, Para 3.16)

The Committee recall that based on the limited Uranium deposits and more abundant thorium deposits in the country an integrated strategy of first using natural uranium with heavy water type reactors followed by a fast breeder reactor was visualised at the outset of India's nuclear power programme. It has been reported by the Department of Atomic Energy that India's first Fast Breeder Reactor being constructed at the Reactors Research Centre at Kalpakam is expected to be completed by 1984. However, the Fast Breader Prototype rector is expected to be commissioned only by the middle of 1990. The design and construction of this Prototype Reactor would entail an expenditure of Rs. 750 crores spread over 15 years. When the Committee referred to the doubts expressed in certain quarters that the Fast Breeder

reactors were neither safe nor stable, the Secretary Department of Atomic Energy pointed out that such reactors have been working satisfactorily in France and Russia and that such fears were unfounded. The Committee agree that setting up fast breader recator is perhaps the only way of using our thorium deposits. The Committee stress the need to see that the programme of design and construction of Prototype fast breader reactor is completed on schedule and three is no let up at any stage.

Recommendation (Serial No. 17, Para 5.13)

The Nuclear Fuel Complex was set up in Hyderabad in 1972 to cater to the Fuel requirements of India's power reactor programme. The power reactor programme in India is based on the use of natural uranium as fuel and only the Tarapur Atomic Power Station uses enriched uranium. The copmlex comprises of two Divisions namely the Fuel Division and the Tubes Division. The main production plants of this fuel division *viz.* Natural Fuel Fabrication plant, the Zircalloy Fabrication Plant and the Enriched Fuel Fabricating Plant of the Complex were commissioned during the year 1972-73. The Committee find that these 3 plants of the Fuel Division have not been working to their full capacity. During the last 3 years (1980-81 to 1982-83) the capacity utilisation at the natural Uranium Oxide Fuel Plant had been 50%, 60% and 85% respectively. In the enriched Uranium Fuel Plant, the utilisation was only 10 per cent in 1980-81, 50% in 1981-82 and 15% in 1982-83. In the Zircalloy Plant the capacity utilisation in 1980-81 was about 32%, in 1981-82 about 50% and in 1982-83 it was more than 50 per cent. The Committee were given to understand that the fuel production at the nuclear fuel complex had been regulated keeping in view the fuel needs of the different reactors and that all through ever since the commissioning of the Complex in 1972 the fuel has been available in sufficient reserves at the reactors including the Tarapur reactor.

The Committee were assured that even at Tarapur Plant where there was set back in terms of utilisation because of non-availability of the enriched uranium from U.S. the working of that plant was not allowed to suffer.

APPENDIX

(*Vide* Introduction)

Analysis of action taken by Government on the 82nd Report of the Estimates Committee (7th Lok Sabha).

I.	Total number of Recommendations	20
II.	Recommendations which have been accepted by Government (Sl. No. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 15 and 18) Total 13	
	Percentage to total	65%
III.	Recommendations which the Committee do not desire to pursue in view of Governments replies (Sl. No. 1)	1.
	Percentage to total	5%
IV.	Recommendations in respect of which replies of Government have not been accepted by Committee (Sl. No. 14, 19 and 20)	3.
	Percentage to total	15%
V.	Recommendations in respect of which final replies of Government are still awaited (Sl. No. 13, 16 and 17)	3.
	Percentage to total	15%

Printed at : Akashdeep Printers, 20-Darya Ganj, New Delhi-110002