TWENTY-SECOND REPORT

PUBLIC ACCOUNTS COMMITTEE (1991-92)

(TENTH LOK SABHA)

MADRAS ATOMIC POWER PROJECT

DEPARTMENT OF ATOMIC ENERGY

[(Action taken on 162nd Report of Public Accounts Committee (8th Lok Sabha)]

Presented in Lok Sabha on 24.4.92

Laid in Rajya Sabha on 27.4.92

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INTRODUCTION

I, the Chairman of the Public Accounts Committee as authorised by the Committee do present on their behalf this Twenty-Second Report on action taken by Government on the recommendations of the Public Accounts Committee contained in their 162nd Report (8th Lok Sabha) on Madras Atomic Power Project.

In their earlier Report, the Committee had made a specific recommendation that effective and timely steps should be taken to get over the mechanical and operational problems of Madras Atomic Power station with a view to improving its performance so that the desirable rate of return on capital invested may be ensured in future. However, the Department of Atomic Energy have not spelt out the specific steps taken to implement this recommendation of the Committee. While understanding that, in the operation of any atomic plant, the aspect of safety is of paramount importance and that all actions must be guided by this principle, the Committee have desired that the requisite steps may be initiated as soon as possible so as to achieve the optimum level of capacity utilisation and to ensure the desirable rate of return of 12% on the capital invested.

3. The Report was considered and adopted by the Public Accounts Committee at their sitting held on 31 March, 1992. Minutes of the sitting form Part II of the Report.

4. For facility of reference and convience the recommendations of the Committee have been printed in thick type in the body of the Report and have also been reproduced in a consolidated form in Appendix to the Report.

5. The Committee place on record their appreciation of the assistance rendered to them in the matter by the office of the Comptroller and Auditor General of India.

ATAL BIHARI VAJPAYEE,
Chairman,
Public Accounts Committee.

NEW DELHI;
6 *April,* 1992
17 *Chaitra,* 1913 (*Saka*)

CHAPTER I

REPORT

This Report of the Committee deals with the action taken by Government on the Committee's observations/recommendations contained in their 162nd Report (8th Lok Sabha) on the Supplementary Report of the Comptroller and Auditor General of India for the year 1985-86, Part II, Union Government (Civil) relating to "Madras Atomic Power Project."

2. The 162nd Report, which was presented to Lok Sabha on 27th April, 1989, contained 25 observations/recommendations. Action Taken Notes have been received on 25.7.90 and 28.11.90 in respect of all the recommendations. The replies received from the Department of Atomic Energy have been broadly categorised as under:

(i) Recommendations and observations that have been accepted by Government;

Sl. Nos. 1-6, 8, 9, 12, 13, 18, 20, 22 and 23.

(ii) Recommendations and observations that the Committee do not desire to pursue in the light of replies received from Government;

Sl. Nos. 7, 10, 11, 14, 15 and 21.

(iii) Recommendations and observations replies to which have not been accepted by the Committee and which require reiteration;

Sl. No. 17

(iv) Recommendations and observations in respect of which Government have furnished interim replies;

Sl. Nos. 16, 19, 24 and 25.

3. The Committee note that their 162nd Report (8th Lok Sabha) was presented to Lok Sabha on 27 April, 1989 and the Department of Atomic Energy were required to furnish replies to all the recommendations contained in this Report within a period of six months of the presentation of the Report. The Committee are deeply concerned to note that about three years have already elapsed since the presentation of the Report but the Department have failed to furnish the final replies on the recommendations at paragraphs 4.13, 4.33, 4.42 and 4.43. The Committee deprecate such a lackadaisical approach on the part of the Department. The Committee recommend that final replies to the recom-

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mendations in respect of which only interim replies have so far been furnished should be expeditiously submitted after getting them duly vetted by Audit.

4. The Committee will now deal with Action Taken by Government on some of their Recommendations/Observations.

Under-utilisation of capacity/rate of return on capital invested

(S. No. 17—Para 4.31)

5. While dealing with the tariff rate for supply of power and the expected 12% rate of return on capital invested the Committee had, in their earlier Report, observed *inter-alia*:

> "The Committee note that the tariff rate for supply of power by Madras Atomic Power Project was calculated to be 39 paise per unit in 1984-85. It has however, been observed in audit that the final cost of generation of power would have been higher on the basis of the proforma accounts for that year. According to audit reckoning, only 3.5 per cent return on capital was realised in 1984-85 as against the expected rate of 12 per cent return on capital invested. The Committee have been informed that the desirable rate of 12 per cent return on capital can be ensured if target capacity factor of 62.8 per cent is achieved during the relevant period. The Committee however, find that the actual capacity factor achieved by the Madras Atomic Power Station has always remained far below the prescribed norms and it was only 41.3 per cent and 49.3 per cent during the year 1986-87 and 1987-88 and the rate of return on investment that could be realised in these years was only 3.5 per cent and 8 per cent respectively. The Committee are in no doubt that the desirable rate of return from Madras Atomic Power Station can be achieved only if the optimal level of capacity utilisation is ensured in future. As has already been stated elsewhere in this Report, effective and timely steps should be taken to get over the mechanical and operational problems of this Station with a view to improving its performance so that the desirable rate of return on capital investment may be ensured in future."

6. In their action taken note dated 25.7.90 the Department of Atomic Energy have stated that:

> "The cost of generation based on 1984-85 proforma accounts works out to 34.86 p/kwh which is less than the tariff in force then.
>
> The observations of the Committee that they are in no doubt that the desirable rate of return from Madras Atomic Power Station can be achieved only if the optimal level of capacity utilisation is ensured in future and the effective and timely steps should be taken to get over the mechanical and operational problems of these stations with a view to improving its performance so that the

- desirable rate of return on capital investment may be ensured in future are noted."

7. The Committee had made a specific recommendation that effective and timely steps should be taken to get over the mechanical and operational problems of this station with a view to improving its performance so that the desirable rate of return on capital invested may be ensured in future. However, the Department of Atomic Energy have not spelt out the specific steps taken to implement this recommendation of the Committee. They have merely stated that the observations of the Committee are "noted".

The Committee had observed until the required steps are initiated in this direction the under-utilisation of the capacity may continue and the expected improvement in the performance of the station may be delayed further while understanding that, in the operation of any atomic plant, the aspect of safety is of paramount importance and that all actions must be guided by this principle, the Committee desire that the requisite steps may be initiated as soon as possible so as to achieve the optimum level of capacity utilisation and to ensure that desirable rate of return of 12% on the capital invested. The Committee would like to be informed of the specific steps taken in this direction within a period of 3 months.

CHAPTER II

OBSERVATIONS AND RECOMMENDATIONS WHICH HAVE BEEN ACCEPTED BY GOVERNMENT

Recommendation

The Atomic Energy Commission (AEC) in 1954 had contemplated a target of 8000 MWe of nuclear power generation by the year 1980-81. However, this target was revised downwards by AEC in 1968 to 2700 MWe of nuclear power generation by the yeart 1978-79 on the ground that the projections made earlier were based on assumptions which needed revision in the light of experience. But even this reduced target could not be achieved and the installed capacity of nuclear power in 1978-79 was merely 640 MWe which could go upto only 1330 MWe after the commissioning of Rajasthan Atomic Power Station-2 in 1980 and Madras Atomic Power Station-I and 2 in 1983 and 1985 respectively. Only 3 units of 235 MWe each viz. Madras Atomic Power Project-II and Narora Atomic Power Project I & II were sanctioned during the fourth Plan period in 1971 and 1974 respectively. Even these two projects have been affected substantially by time overruns admittedly due to initial expectation of unduly optimistic gestation period and due to absence of the nuclear grade industrial capability in even such basic areas as welding technology in the country.

[Sl. No. 1 (Para 1.9) of Appx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

While the initial gestation period of 5 1/2—6 years estimated for MAPP and 7 years for NAPP might now appear to have been optimistic, at the time these estimates were made, TAPS (2×220 MWe) and RAPS-1 had been completed in 7-8 years. Both for MAPS and NAPP, it was originally assumed that certain critical equipment and materials for which manufacturing capabilities were not available in India, would be imported. However, the peaceful nuclear explosion of 1974 led to an embargo being imposed on exports from the USA, Canada and some European countries. This necessitated import substitution through indigenisation and location of alternative supplies in Europe, which led to attendant delays involved in mastering a new technology.

[Deptt. of Atomic Energy D.O. No. PrAO/Control/1/(23)/PAC/89/MAPP/147 dated 25.7.1990]

Recommendation

The Committee are inclined to conclude that the AEC in 1968, while envisaging targets of nuclear power generation, had neither fully anticipated the time and effort required for establishing a nuclear power station nor taken into consideration the realities of the industrial situation prevailing in the country with the result that targets of nuclear power generation continue to remain elusive even today. The Committee urge the Government to give thrust to the achievement of the current Nuclear Profile of Department of Atomic Energy which aims at attaining 10,000 MWe of power by 2000 AD, keeping in view the experience gained in constructing nuclear power stations and also by making a realistic assessment of indigenous industrial capabilities of the quality required to supply nuclear components for future reactors of different capacities so that the limited plan resources committed on this programme may yield timely benefits to the economy in the vital power sector.

[Sl. No. 2 (Para 1.10) of Appn. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

Present industrial capabilities have been assessed with a higher degree of confidence now. With the reduction in the manufacturing time achieved for major nuclear components and with the advance procurement programmes for critical and long delivery equipments, delays of the nature experienced in the past are not likely to recur and the Department is confident of the Projects being completed and yielding benefits in time.

[Deptt. of Atomic Energy D.O. No. PrAO/Control/2/1/(23)/PAC/89/MAPP/147 dated 25.7.1990]

Recommendations

Based on the limited uranium reserves and abundant thorium deposits available in the country, the Indian Atomic Energy Programme drawn in 1954 had envisaged a strategy of first establishing natural uranium fuelled heavy water moderated reactors followed by plutonium fuelled fast breeder reactors using plutonium obtained from the first stage reactors. The third stage would be thorium based reactors. The Department of Atomic Energy is, however, still pursuing the objective of establishing natural uranium fuelled heavy water reactors in the first phase of the programme and the work on fast breeder reactor technology is only at experimental levels. Currenly identified uranium reserves in the country can support the first stage programme of establishing natural uranium fuelled power reactors upto only 10000 MWe. (Para 1.21)

With a view to establishing natural uranium fuelled heavy water moderated reactors in the first phase of the nuclear power programme, the Department of Atomic Energy entered into an agreement with Atomic Energy of Canada Ltd. for obtaining technology for pressurised heavy water reactors and construction of 2 such units in Rajasthan. Accordingly, construction of the first unit in Rajasthan with Canadian assistance was commenced in 1964. The Department of Atomic Energy almost simultaneously decided to set up two units at Madras. This project was approved by the Government of India in 1965. The Department undertook responsibility for construction and commissioning of Madras Atomic Power Project with maximum participation from Indian industry. However, both Rajasthan and Madras Atomic Power Projects were affected by substantial time overruns. The Department of Atomic Energy have tried to justify the delay on the ground that the time and efforts required for certain specialised work in this frontier technology, which was being carried out for the first time in the country, were not fully anticipated at planning stages and that the initial estimates of the time for completion of early nuclear power projects even in the developed countries were found to be urealistic. The Committee are not convinced by these justifications and are further of the view that the Department of Atomic Energy over estimated the industrial capability and infrastructure available in the country. Since the Department were venturing into a new field, the Committee feel that they should have made thorough enquiries about the capabilities of the indigenous manufacturers to decide whether and to what extent they were capable of manufacturing critical nuclear equipments and within what time frame so as to leave little or no scope for the stretch in time schedules. Considering the fact that a developing nation like India can ill afford to commit limited financial resources on the projects whose costs are bound to escalate with delays besides entailing loss of production, the Committee hope that the Department of Atomic Energy will draw a lesson from this experience and take adequate precautions in future. (Para 1.22)

[Sl. Nos. 3 & 4 (Paras 1.21 and 1.22) of Appx. VI to 162nd Report of PAC (8th Lok Sabha]

Action Taken

In view of the fact that these high technology equipments were being made by Industry for the first time and neither Department nor Industry had adequate prior experience or data bank the time frame envisaged, based on the surveys and studies made by the Department could not be fully realised. It was to a certain extent inevitable that the Department had to learn the hard way on the first fully indigeneous effort at MAPP.

The observations of the Committee have been noted. (Paras 1.21 & 1.22)

[Deptt. of Atomic energy D.O. No. PrAO/Control/2/1(23)/PAC/89/MAPP/147 dated 25.7.1990]

Recommendation

The Committee are constrained to observe that the Department of Atomic Energy could not prepare realistic project estimates in case of both the units of Madras Atomic Power Project. While the first unit had to undergo as many as seven revisions in the projected date of criticality, the number of revisions made in the case of second unit were three. As against the originally targetted date, there were delays of 9½ years and 8 ½ in the first and second units respectively. Similarly, the cost estimates together with upgradation of installed capacity underwent three and two revisions in the case of first and second unit respectively. The Department's plea that they had no indepenedent data base at that point of time and the only method available to them was to extrapolating information available through the project schedule prepared for the Rajasthan Project by a Joint Indo-Canadian study is hardly convincing since the methodology adopted for Madras Atomic Power Project was clearly different from that of the first unit of Rajasthan Atomic Power Project in so far as manufacture of the critical nuclear components and construction methodology concerned. The Committee feel that while it may always not be possible to precisely estimate the cost and time frames for accomplishing tasks in the high technology area like nuclear technology at the very beginning of the programme, these estimates have to be correct within reasonable limits and there estimates have to be correct within reasonable limits and there should not be extraordinary stretch in schedule as has been in this case. The Committee are led to believe that the Department of Atomic Energy, in their anxiety to embark on the Madras Atomic Power Project commenced the work without taking proper preparatory measures.

[Sl. No. 5 (Para 2.18) of Appx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

The Department and based its estimates of cost and time on the best available data. However, the India industry took more time than anticipated to absorb the new technology and this led to delayed delivery of several key equipments. This resulted in substantial time overrun and consequent escalation in costs.

The Committee's observations that while it may always not be possible to precisely estimate the cost and time frames for accomplishing task in the high technology area like nuclear technology at the very beginning of the programme, these estimates have to be corrected within reasonable limits and there should not be extraordinary stretch in schedule as have been in this case are noted, for observance.

[Deptt. of Atomic Energy D.O. No. Pr AO/Control/2/1/(23)/PAC/89/MAPP/147 dated 25.07.1990]

Recommendation

Considering the fact that frequent revisions in project schedules were made mainly due to non-delivery of various equipments by indigenous manufacturers, the Committee have an impression that the Department could not appreciate the Indian Industrial situation and relied upon the time and cost estimates of the indigenous manufacturers without proper scrutiny of their claims. The Committee would like the Department of Atomic Energy to develop proper organisation and methodology for estimating the capabilties and scrutinising the claims of the indigenous manufacturers.

[Sl. No. 6 (Para 2.19) of Appx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

In this connection, it may be mentioned that technology could be acquired and industrial infrastructure upgraded only by actually doing the task. Any delay in starting the initial projects would have delayed to that extent the country acquiring self-reliance in this area. Proper organisation and methodology for estimating the capabilities of indigeneous manufacturers have been progressively developed in the Department since the first effort in this regard for RAPP and MAPP. In the light of the experience in the manufacturing of critical equipment for RAPP-2, MAPP-1 & 2, NAPP 1 & 2, KAPP 1 & 2 a better expertise and appreciation of the time and effort required for manufacture of critical nuclear equipment is now available with the Department as well as the Industry. A significant reduction has now been achieved in the manufacturing periods for critical nuclear equipment.

[Deptt. of Atomic Energy D.O. No. Pr AO/Control/2/1/(23)/PAC/89/MAPP/147 dated 25.7.1990].

Recommendation

The Committee are surprised to find that the sub-soil problems specific to the site of Madras Atomic Power Project could be known only on excavation at site thus necessitating deeper excavation to reach the required strata for founding the reactor building raft. The Committee have been informed that extensive foundation drilling was undertaken but problems were encountered due to terrain and variable characteristics of rocks. The plea of the Department that there is an inherent limitation in the current method of investigation involving drilling bore holes at suitable spacing during exploratory stage do not find favour with the Committee and they consider that detailed geological investigations about the rock conditions etc. should have been conducted by drilling more holes at site before undertaking work. The Committee are convinced that the work on such a big project was started without adequate geological investigations and the net result of the lapse was increase in scope of work and resultant cost escalations. The Committee recommend that the Department should

ensure in future that proper and adequate geological investigations of the project sites are made before submitting the project reports to the Government for approval.

[Sl.No. 8 (Para 3.18) of Appx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

Observations are noted. It may not always be possible to finalise all aspects completely before submitting project reports for approval. Subsequent adaptation of foundation design to suit actual on the ground situation may at times become necessary when excavation has been completed, and more exact soil investigation is possible. Such instances would, however, be restricted to the minimum, as is feasible.

[Deptt. of Atomic Energy D.O.No. PrAO–Contd/2/1/(23)/ PAC/89/MAPP/147 dated 25.7.1990]

Recommendation

The Committee note that the other reasons responsible for delay in completing the civil works were design changes and modifications made during the execution of the project. The profile of the dome was changed after the detailed design stage and additional civil work had to be undertaken owing to process design changes. According to the Department, the design of the dome was changed taking advantage of deeper excavation to make a conceptual change in the vapour suppression system. In the case of Turbine Building, increase in the scope of work was called for due to provision of additional space in the building on the basis of experience gained in operating Rajasthan Atomic Power Station. Similarly, an indoor switch-yard was an additional item of work provided for greater reliability of switch-yard equipment in saline atmosphere at Kalpakkam. Taking due note of the facts that the Department of Atomic Energy had limited experience in the execution of the nuclear power projects during early seventies and that the evolving of safety needs have affected nuclear projects around the world, the Committee desire that the Department should keep themselves abreast of the advancements and the latest developments in the field of nuclear technology in the world over with a view to taking these into account at the project formulation stage so that design changes and modifications during the execution of the project may be kept to the barest minimum and that too in the light of subsequent developments, if any.

[Sl. No. 9 (Para 3.19) of Appx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

Observations are noted.

Changes during construction had to be made not because the Department was not keeping abreast of latest developments at the formulation stages but because of the evolving nature of the safety requirements. The Department considered it essential to implement all important and evolving changes related to safety during the project execution stage also, so that by the time Unit was commissioned it was as upto date as was feasible, in view of the importance to be attached to safety requirements.

[Deptt. of Atomic Energy D.O. No. Pr AO/Control/2/1/(23)/PAC/89/MAPP/147 dated 25.7.1990]

Recommendation

The Committee note that the coolant tubes were manufactured by Nuclear fuel Complex for both the units or Madras Atomic Power Project. However, the manufacture of these tubes for MAPP-I could commence only after the manufacture of calandria tubes at Nuclear Fuel Complex. The Committee are not inclined to agree with the plea of the Department that this was the first lot of coolant tubes manufactured in India and considerable development work had to be carried out to overcome certain problems, as the subsequent delivery of this item to the second unit was also substantially delayed and accounted for 29% of the proportionate distribution of total delays. The Committee are not able to understand as to why the Department having control over Nulcear Fuel Complex, could not take advance action to make available this item in time. It is obvious that there was a deficiency in comprehensive planning of the project and the delayed delivery of this item reveals in-house failure. The Committee consider that is time for the Department of Atomic Energy to do introspection with a view to obviate repetitions of the experience of this project in future.

[Sl. No. 12 (Para 3.31) of Appx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

Manufacture of calandria tubes and coolant tubes involved development of difficult technology, essentially by in-house development. This took more time than anticipated.

Observations regarding introspection, to obviate repetitions of the experience of this project are noted.

[Deptt. of Atomic Energy D.O. No. Pr AO/Control/2/1/(23)/PAC/89/MAPP/147 dated 25.7.1990]

Recommendation

The Committee regret to observe that the Department of Atomic Energy could not ensure timely supply of requisite quantity of heavy water to both the units of Madras Atomic Power Project. The commissioning of the first unit alone was delayed by more than 16 months due to non-availability of heavy water which according to audit, meant an estimated revenue loss of the order of Rs. 56.42 crores. Considering the fact that the Madras Atomic Power Project was already running behind the schedule, the non-availability of heavy water at appropriate time shows nothing but another facet of poor planning in the Department of Atomic Energy. The Committee are not able to understand as to why the Department, with their intimate knowledge about the heavy water stocks and production, could not take advance action to meet the heavy water requirements of the two units of this project especially after the four new heavy water plants could not become functional within the time frame as was originally anticipated. The Committee feel that the heavy water crunch for this nuclear power project would not have arisen had the Department taken timely measures in developing technical knowhow for heavy water upgrading plants. It is obvious that the planning on heavy water front was not done with adequate care with the result that the time schedule of the Madras Atomic Power Project was affected adverely. The Committee hope that the Department of Atomic Energy would evolve a suitable strategy to prevent deficiencies in the programme of indigenous production of heavy water with a view to avoiding slippages in the future nuclear power projects.

[(Sl. No. 13 (Para 3.40 of Appx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

The Committee's recommendations for avoiding slippages in the future Power Projects have been noted.

[Deptt. of Atomic Energy D.O.No. Pr AP/Control/ 2/1/(23)/PAC/89/MAPP/147 dated 25.7.1990]

Recommendation

The Committee have been informed that on the basis of representations made by State Electricity Boards, the Central Electricity Authority agreed to reduce the total IDC of Rs. 70.74 crores to Rs. 41.32 crores for capitalisation on the ground that there was delay in commissioning of the MAPP. The Committee consider that this reduction has resulted in recurring loss by understating cost of production of power. Taking note of the fact that even the subsequent atomic power project act Narora has also been affected by substantial time and cost overruns, the Committee would like the Government to take into consider-

ation the actual gestation period of nuclear power projects with a view to calculating the actual IDC so that the actual cost is fully taken into account in determining the selling price.

[Sl. No. 18 (Para 4.32) of Appx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action taken

For NAPP, full IDC would be taken into account. Even for MAPS, an attempt will be made to account for full IDC when the tariff agreement is re-negotiated.

[Deptt. of Atomic Energy D.O. No. Pr AO/Control/2/1(23)/PAC/89/MAPP/147 dated 25.7.1990]

Recommendation

The Committee further note that while a uniform levy of 1.25 paise per unit is being made to cover decommissioning costs, no provision in the tariff has been made for major repairs. Considering the fact that Rs. 750/- lakhs have so far been incurred as major capital expenditure on repairs at Madras Atomic Power Station, the Committee are of the opinion that provision for major repairs must be incorporated in the cost of generation of power. The Committee would like to know the action taken in this regard.

[Sl. No. 20 (Para 4.34) of Appx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

At the time of tariff revision, any capital expenditure incurred or likely to be incurred upto the end of the tariff period is taken into cosideration for arriving at the capital employed and return is adjusted accordingly.

[Deptt. of Atomic Energy D.O. No. Pr AO/Control/2/1(23)/PAC/89/MAPP/147 dated 25.7.1990]

Recommendation

The Committee also recommend that the nuclear power pricing policy may be reviewed in the light of observations made in the preceding paragraphs. From the reasons given for underassessment of various costs for determination of return on investment, the Committee note that the reductions in cost were made, more with a view to peg down the rate of power supply to Electricity Boards rather than from acceptable commercial norms of accounting. In such circumstances the Committee do not approve of the system adopted to modify the accounting principles to meet a particular tariff and recommend that while accounts may be allowed to present a true and fair state of affairs, the extent of reduction allowed in tariff with reference to operational cost may be clearly exhfibited as a subsidy consciously allowed.

[Sl. No. 22 (Para 4.36) of Appx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

This will be considered by the J.C. Shah Committee. It is submitted that no reductions in costs were made to peg down the rate of power supplies. All expenditure towards setting up and running of the Station are taken into account for electricity pricing. Hence, there is no reduction allowed in tariff, as there is no subsidy allowed towards operational costs.

[Deptt. of Atomic Energy D.O. No. PrAO/Control/2/1/(23)/PAC/89/MAPP/147 dated 25.7.1990]

Recommendation

The Committee desire the Government to examine the feasibility of introducing Technical Audit in the scientific departments with a view to getting the performance of such departments evaluated in all respects and inform the Committee of the action taken in this regard.

[Sl. No. 23 (Para 4.37) of Appx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

This will be examined, as desired by the Committee.

[Deptt. of Atomic Energy D.O. No. PrAO/Control/2/1/(23)PAC/89/MAPP/147 dated 25.7.1990]

CHAPTER III

OBSERVATIONS AND RECOMMENDATIONS WHICH THE COMMITTEE DO NOT DESIRE TO PURSUE IN THE LIGHT OF THE REPLIES RECEIVED FROM GOVERNMENT

Recommendation

While the first nuclear power unit in the country incorporating natural uranium fuelled reactor technology was in its early stages of construction in Rajasthan with the Canadian assistance, the Department of Atomic Energy decided to construct Madras Atomic Power Project using the same basic reactor technology with indigenous effort. However, the project schedules for Madras project were based by and large, on the schedules prepared for Rajasthan Atomic Power Project despite the fact that site conditions and the methodology for manufacture of critical nuclear equipments were clearly different in these two projects. Although it was recognised by the Department in the initial stages itself that the time schedule for Madras Project would be governed by the design changes being contemplated in the building designs, the initial time schedule of 35 months for civil structural works is stated to have been made with a view to striving for a certain degree of compression of time for completion of the project. The Committee feel that proper planning was not made at the pre-construction stage and the project was best with problems right from the beginning due to inadequate investigations at site, changes and modifications in design during construction and the delayed delivery of various equipments/items by the indigenous manufacturers with the result that there were heavy overruns of both time and cost.

[SC. No. 7 (Para 3.17) of Appnx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

In order not to delay the implementation of an indigenous nuclear power programme, an overlap of various activities like preliminary site investigations, changes and modifications to design during construction ordering of equipment for subsequent projects in parallel with first indigenous effort RAPP-2 etc. were necessary and unavoidable. If the Department had postponed the implementation of the project in order to finalise all phases before the start of MAPP, this would have resulted in appreciable delay in the construction of MAPP and in establishing an independent, self-reliant nuclear power programme.

[Deptt. of Atomic Energy Do. No. Pr. AO/control/2/1/(23)/PAC/89/MAPP/147 dated 25-7-1990]

Recommendation

The Committee are greatly concerned at the disquieting picture that has emerged in regard to substantially delayed delivery of nuclear equipments/ itmes by the indigenous sources. The Committee wounder as to how the Department of Atomic Energy embarked upon building a nuclear power station on a self-reliant basis without meticulously assessing the capabilities of industrial infrastructure available in the country in late sixties and early seventies. While agreeing that the Department could not buy capital goods on extensive basis from overseas, the Committee consider that execution of an ambitious project of this dimension called for both advance planning and dynamic planning to deal with changes in various parameters. The Committee are convinced that while the pre-project planning in this case needed thorough acquanitance with the Indian industrial scene, no earnest and systematic effort was made in this regard with the result that the indigenous industries failed to deliver the goods in time.

[Sl. No. 10 (Para 3.29) of Appn-VI to 162nd Report of PAC [(8th Lok Sabha)]

Action Taken

Earnest and systematic efforts were made to assess the industrial infrastructural capability, and a best judgement assessment of the capability and potential available had to be made in view of the inadequate experience of industry in the manufacture of high technology equipment. Delays were largely attributable to technological problems and other external conditions as explanied earlier to the PAC.

[Deptt. of Atomic Energy Do. No. PrAO/Control /2/1/(23)/PAC/89/ MAPP/147 dated 25-7-1990]

Recommendation

Among the important items which were delivered later thereby affecting the project schedule were "end shields" and "coolant tubes". The end shields were required at the initial stages of the project but the same were delivered after a delay of 4 years in the case of MAPP-I. In the case of MAPP-II, the end shields alone accounted for 55% of the proportionate distribution of total delays between original and final completion dates. The Committee have been informed that a certain amount of development work became inevitable in case of the end-shields used in MAPP-II due to change in shell material and induction of a new manufacturer. While a

second source of supply would definitely benefit the country in the long run, the Committee cannot but express their unhappiness over this approach and process of experimentation during execution of the project as it had ultimately cost the exchequer heavily due to stretch in schedule.

[Sl. No. 11 (Para 3.30) of Appx-VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

The process of experimentation has now yielded two manufacturers of end shields in the country. The manufacturing time for this complicated component has now been reduced to 36 months for the 235 MWe reactors. For end shields, changes in material used became absolutely necessary in the light of experience gained in Canada.

[Deptt. of Atomic Energy D.O. No. Pr AO/Control/2/1(23)/PAC/89/MAPP/147 dated 25.7.1990]

Recommendation

The Committee note that there has been steep escalations in the cost of the two units of Madras Atomic Power Project. As against the original project estimates, the project cost of MAPP-I has gone up from Rs. 61.78 crores to Rs. 118.83 crores and from Rs. 70.63 crores to Rs. 127.04 crores in MAPP-II thus registering an increase of 91% and 79% over the originally sanctioned estimates in the two units respectively. However, the foreign exchange component stands at about 10% of the total cost in each of the two units. The Committee have been informed that the increases in the cost of two units are attributable mainly to price escalation, stretch in schedule, indigenisation, increase in scope of work and design changes. The increase in cost of the project due to price escalations, stretch in schedule and indigenisation worked out to Rs. 46.76 crores and Rs. 41.89 crores for MAPP-I and II respectively. While commending the effort of the Department at indigenisation, the Committee deprecate the expenditure incurred on the project due to stretch in schedule. The Committee would like to know the expenditure incurred due to stretch in schedule in the two units separately.

[Sl. No.14 (Para 3.57) of Appn-VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

It has not been possible at this stage to separately identify the expenditure incurred due to stretch in schedule.

[Deptt. of Atomic Energy D.O. No. Pr AO/Control/2/1/(23)/PAC/89/MAPP/147 dated 25.7.1990]

Recommendation

The other areas where the original estimates of costs have registered steep escalations are increase in scope of work, new work and design changes. The increase over the original estimates due to these factors is Rs. 10.29 crores and Rs. 14.52 crores in MAPP-I and MAPP-II respec-

tively. Considering the fact that MAPP-II essentially followed MAPP-I, the Committee would like to know the specific reasons for proportionately more expenditure incurred in MAPP-II on account of increase in scope of work, new work and design changes.

The Committee would also like to emphasise the need for realistic planning at the project formulation stage so as to leave little scope for cost escalation on account of subsequent design changes and new works.

[Sl. No. 15 (para 3.58) of Appx. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

The sanctioned costs and expenditure for MAPP-I & MAPP-II are given below:

	MAPP-I	MAPP-II
	(Rs. in crores)	
Sanctioned cost	118.83	127.04
Actual expenditure (upto March 88)	118.16	115.82

The scope of work for MAPP-II was comparatively less than that of MAPP I, as many of the facilities common to both MAPP-I & II have been installed along with construction of MAPP-I. It may also be seen from the expenditure figures mentioned above that expenditure on MAPP-II has been less than that of MAPP-I. However, the finally approved cost of MAPP-II was higher than that of MAPP-I, mainly due to the higher escalation in prices in case of MAPP-II as the second unit was taken up about 4 years later than the first unit. If we compare the cost of these units at a constant rupee value, it will be seen that the cost of unit II is lower by about 20%. It may also be noted that the actual capital expenditure on MAPP-II is lower than the I unit on account of higher credit from infirm power than estimated.

The Committee's findings as regard to the need for realistic planning at project formulation stage has been noted for future compliance.

[Deptt. of Atomic Energy D.O. No. 11/40-A/90-Parl. dated 29-11-1990]

Recommendation

The Committee are surprised to find that the transfer and storage costs of in waste fuel are not added in computing nuclear power tariff and the assumption that these costs would be offset by the plutonium and depleted uranium recovered from the spent fuel. On the other hand the Committee have also been informed that it would be necessary to allow credit for plutonium recovered from spent fuel in case expenditure towards high level waste management is included and that neither of them can be precisely estimated presently. In the opinion of the Committee, it is financially improper not to include the waste fuel costs in computing the power tariff on the basis of certain assumptions. They consider that this aspect may be

examined in detail so as to avoid any loss of revenue to Government exchequer in future.

[Sl. No. 21 (Para 4.35) of Appn-VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

There is no loss of revenue to the Government, because in the pricing of electricity, cost of fuel is fully accounted for. Having chosen the route of reprocessing so that recovered Pu is available for fast breeder reactor programme, it is imperative that all costs connected with Pu recovery i.e. reprocessing and its waste management are borne by the breeder programme. However, a committee of experts have been set up under the Chairmanship of Shri J.C. Shah, ex-Chairman Atomic Power Authority and Gujarat Electricity Board to review the system of nuclear power pricing.

[Deptt. of Atomic Energy D.O. No. PrAO/Control/2/(23)/1/PAC89/MAPP/147 dated 25-7-1990]

CHAPTER IV

OBSERVATIONS AND RECOMMENDATIONS REPLIES TO WHICH HAVE NOT BEEN ACCEPTED BY THE COMMITTEE AND WHICH REQUIRE REITERATION

Recommendation

The Committee note that the tariff rate for supple of power by Madras Atomic Power Project was calculated to be 39 paise per unit in 1984-85. It has however been oberved in audit that the final cost of generation of power would have been higher on the basis of the proforma accounts for that year. According to audit reckoning, only 3.5% return on capital was realised in 1984-85 as against the expected rate of 12% return on capital invested. The Committee have been informed that the desirable rate of 12% return on capital can be ensured if target capacity factor of 62.8% is achieved during the relevant period. The Committee, however, find that the actual capacity factor achieved by the Madras Atomic Power Station has always remained far below the prescribed norms and it was only 41.3% and 49.3% during the year 1986-87 and 1987-88 and the rate of return on investment that could be realised in these years was only 3.5% and 8% respectively. The Committee are in no doubt that the desirable rate of return from Madras Atomic Power Station can be achieved only if the optimal level of capacity utilisation is ensured in future. As has already been stated elsewhere in this report, effective and timely steps should be taken to get over the mechanical and operational problems of this stations with a view to improving its performance so that the desirable rate of return on capital investment may be ensured in future.

[Sl.No.17(Para 4.31) of Appn.(VI)/to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

The cost of generation based on 1984-85 proforma accounts works out to 34.86 P/KWh which is less than the tariff in force then.

The observations of the Committee that they are in no doubt that the desirable rate of return from Madras Atomic Power Station can be achieved only if that optimal level of capacity utilisation is ensured in future and that effective and timely steps should be taken to get over the mechanical and operational problems of these stations with a view to improving its performace so that the desirable rate of return on capital investment may be ensured in futrure are noted.

[Deptt. of Atomic Energy D.O.No. PrAo/Control/2/1/(23)/PAC/89/MAPP/147 dated 25.7.1990]

CHAPTER V

OBSERVATIONS AND RECOMMENDATIONS IN RESPECT OF WHICH GOVERNMENT HAVE FURNISHED INTERIM REPLIES

Recommendation

The two units of the Madras Atomic Power Station started commercial operations on 27th January, 1984 and 21 March, 1986 respectively. Although lower targets of power generation are stated to have been fixed during the initial 2 or 3 years due to test problems, the Committee are perturbed to find that except in case of unit-I in 1985-86, the actual generation of power in both the units upto the end of 1987-88 has always remained below the prescribed targets. The shortfall was more pronounced in Unit-I during 1986-87 and Unit-II during 1987-88. The HP stage blade failures in the trubines of both the Units beside LP stage blade failure in the turbine of second unit are stated to be the main cause for lower power generation during 1987-88 at Madras Atomic Power Station. The Committee have been informed by the Secretary, Department of Atomic Energy during evidence that the performance of these machines manufactured by BHEL as well as services rendered by them are very unsatisfactory and this matter is being reviewed at the level of Prime Minister's Secretary and the Miniser of Industry. The Committee would like to know the outcome of this review. The Committee would also like the Department to examine the prospects of claiming compensation from the manufacturers of critical nuclear components, be they come from public sector, fo the supply of defective components by them so that the poor consuer is not made to pay for the failure of the manufactures in such a vital sector as power. The Committee also recommend that effective steps may be taken to get these defects rectified at the earliest so as to avoid the forced and unplanned outages resulting in loss of genertion of power entailing revenue losses.

[Sl. No. 16(Para 4.13) of Appn. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

Matter is still under discussion. Observations of the Committee are noted.

All efforts are being made to get the defects rectified at the earliest. BHEL is proposing changing of the rotor design to overcome

the failure problem. The details are in an advanced stage of finalisation. Alternative H.P. rotor design of M/s. Cometto-Alsthom is also under consideration by NPC. If superiority of the alternative design *vis-a-vis* the modification being finalised by BHEL is established, procurement of the alternate design of rotors for MAPP, directly by NPC if the design is appropriately guaranteed by M / s. Alsthom, a leading Turbine manufacture in France, is also under study.

[Deptt. of Atomic Energy D.O. NO. PrAO / Control / 2 / 1 / (23) / PAC / 89 /MAPP / 147 dated 25.7.1990]

Recommendation

The Committee are concerned to note that although the Government have prescribed a return of 12% on capital investment, the Department is levying 8% lease charges on heavy water for the purpose of calculation of tariff. The Committee have now been informed that the present rate of lease charges is under review and may be revised suitably taking into consideration the intereset rates applicable etc. The Committee trust that such a review will be completed expeditiously and realisitic lease charges prescribed, so that the nuclear power costs are not made artificially lower whatever be the price charged on other than economic considerations.

[Sl. No. 19 (Para 4.33) of Appn. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

The review will be completed expeditiously and realistic lease charges will be fixed.

[Deptt. of Atomic Energy D.O. NO. PrAO / Control / 2 / 1 / (23) / PAC / 89 /MAPP / 147 dated 25.7.1990]

Recommendation

According to the 'Stores Procedure' issued by Department of Atomic Energy, an item may be considered as surplus if it is found that there have been no demands against an item for a period of two years or if the issues during the previous two years have been very small as compared to the stock balance of such an item (Sub-para 7.3.1.1 of the Stores Procedure) (Para 4.42).

It is disquieting to note that certain equipment procured in early seventies at considerable costs, could not be utilised at all and are lying idle in stores. Moreover, these equipments were declared surplus only in 1986 obviously at the instance of audit. This clearly indicates that the stores procedure was not propoerly followed thereby resulting in blocking the capital. The committee would like the Department to pin-point responsibility in these specific cases. The Committee may be apprised of the action taken in this regard. (Pare 4.43)

[Sl. Nos. 24 & 25 (Para 4.42 + 4.43) of Appn. VI to 162nd Report of PAC (8th Lok Sabha)]

Action Taken

The Committee will be apprised of the action taken in this regard. [Paras 4.42 and 4.43]

[Deptt. of Atomic Energy D.O. NO. PrAO / Control / 2 / 1 / (23) / PAC / 89 /MAPP / 147 dated 25.7.1990]

NEW DELHI;
April 6, 1992

Chaitra 17, 1914 (S)

ATAL BIHARI VAJPAYEE,
Chairman,
Public Accounts Committee

APPENDIX

Observations and Recommendations

Sl. No.	Para No.	Ministry/Deptt. concerned	Observations/Recommendations
1	2	3	4
1.	3	Atomic Energy	The Committee note that their 162nd Report (8th Lok Sabha) was presented to Lok Sabha on 27 April, 1989 and the Department of Atomic Energy were required to furnish replies to all the recommendations contained in this Report within a period of six months of the presentation of the Report. The Committee are deeply concerned to note that about three years have already elapsed since the presentation of the Report but the Department have failed to furnish the final replies on the recommendations at Paragraphs 4.13, 4.33, 4.42 and 4.43. The Committee deprecate such a lackadaisical approach on the part of the Department. The Committee recommend that final replies to the recommendations in respect of which only interim replies have so far been furnished should be expeditiously submitted after getting them duly vetted by Audit.
2.	7	-do-	The Committee had made a specific recommendation that effective and timely steps should be taken to get over the mechanical and operational problems of this station with a view to improving its performance so that the desirable rate of return on capital invested may be ensured in future. However, the Department of Atomic Energy have not spelt out the specific steps taken to implement this recommendation of the Committee. They

1	2	3	4
			have merely stated that the observations of the Committee are "noted". The Committee had observed until the required steps are initiated in this direction the under-utilisation of the capacity may continue and the expected improvement in the performance of the station may be delayed further while understanding that, in the operation of any atomic plant, the aspect of safety is of a paramount importance and that all actions must be guided by this principle, the Committee desire that the requisite steps may be initated as soon as possible so as to achieve the optimum level of capacity utilisation and to ensure the desirable rate of return of 12% on the capital invested. The Committee would like to be informed of the specific steps taken in this direction within a period of 3 months.

PART-II

MINUTES OF THE SITTING OF P.A.C. HELD ON 31 MARCH, 1992

The Committee sat from 1500 hrs. to 1735 hrs. on 31 March, 1992.

PRESENT

CHAIRMAN

Shri Atal Bihari Vajpayee

MEMBERS

2. Shri Girdhari Lal Bhargava
3. Shri Nirmal Kanti Chatterjee
4. Shri Kashiram Rana
5. Shri R. Surender Reddy
6. Shrimati Krishna Sahi
7. Shri Pratap Singh
8. Shri R.K. Dhawan
9. Shri Vishvjit P. Singh

LOK SABHA SECRETARIAT

1. Shri S.C. Gupta — *Joint Secretary*
2. Smt. Ganga Murthy — *Deputy Secretary*
3. Shri K.C. Shekhar — *Under Secretary*

REPRESENTATIVES OF AUDITS

1. Shri A.K. Menon — *Addl. Dy. C&AG*
2. Shri N. Sivasubramanian — *Addl. Dy. C&AG (Reports)*
3. Shri Dharam Vir — *Director General of Audit CR(I)*
4. Shri P.K. Bandhopadhyay — *Pr. Director (Indirect Taxes)*
5. Shri A.K. Banerjee — *Pr. Director (Reports) Central*
6. Shri T.N. Thakur — *Pr. Director of Audit (SD)*
7. Shri Dhirendra Swarup — *Pr. Director of Audit CR(II)*

2. The Committee took up consideration of the following Drafts Reports:

(i) ** ** ** **

(ii) Draft Report on Action taken on 162nd Report (8th Lok Sabha) *re:* Madras Atomic Power Project.

(iii) ** ** ** **

(iv) ** ** ** **

3. The Committee adopted draft Report at (ii) above subject to modifications/amendments shown in Annexure II.

4. The Committee authorised the Chairman to present the Reports to the House after incorporating therein modifications/amendments arising out of factual verification by Audit.

5. ** ** ** **

The Committee then adjoured.

ANNEXURE II

Amendments/Modifications made by the PublicAccounts Committee at their Sitting held on 31.3.1992 in the Draft Report on Action Taken on 162nd Report (8th Lok Sabha) of Public Accounts Committee Relating to Madras Atomic Powers Project.

Page	Para	Line	Amendments/Modifications
4	7	5	*After* 'be delayed further.'
			Insert 'while understanding that, in the operation of any atomic plant, the aspect of safety is of paramount importance and that all actions must be guided by this principle'.
		6-7	*For* 'immediately, if already not done', *Substitute* 'as soon as possible'