21

SHORT CLOSURE OF PROJECT FOR DEVELOPMENT OF SPECIAL GRADE CARBON FIBRE

DEPARTMENT OF SPACE

COMMITTEE ON PUBLIC ACCOUNTS
(2024-25)

TWENTY FIRST REPORT

EIGHTEENTH LOK SABHA

सत्यमेव जयते

LOK SABHA SECRETARIAT
NEW DELHI

PAC NO. 2415

T W E N T Y F I R S T R E P O R T

COMMITTEE ON PUBLIC ACCOUNTS
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DEPARTMENT OF SPACE

Presented to Lok Sabha on: ***26.03.2025***

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LOK SABHA SECRETARIAT
N E W D E L H I

March, 2025 /Chaitra, 1947 (Saka)

CONTENTS

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(2024-25)

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INTRODUCTION

I, the Chairperson, Committee on Public Accounts (2024-25) having been authorised by the Committee, do present this 21st Report (18th Lok Sabha) on "Short closure of project for development of Special Grade Carbon Fibre" based on Para 2.3 of C&AG Report No. 24 of 2023, relating to the Department of Space.

2. The C&AG Report No. 24 of 2023 was laid on the Table of the House on 09.02.2024.

3. The Committee on Public Accounts (2024-2025), selected the aforesaid subject for detailed examination and held informal discussion with the representatives of the Department of Space at Bengaluru on 16.10.2024. Based on the written replies furnished by the Department of Space, the Committee examined the subject in detail.

4. The Committee on Public Accounts (2024-2025) considered and adopted the Draft Report on the aforementioned subject at their Sitting held on 25.03.2025. The Minutes of the Sittings are appended to the Report.

5. For facility of reference and convenience, the Observations and Recommendations of the Committee have been printed in bold and form Part- II of the Report.

6. The Committee would like to express their thanks to the representatives of the Department of Space for furnishing the requisite information to the Committee in connection with the examination of the subject.

7. The Committee also place on record their appreciation of the assistance rendered to them in the matter by the Committee Secretariat and the Office of the Comptroller and Auditor General of India.

NEW DELHI:
25 March, 2025
Chaitra 4, 1947 (*Saka*)

K. C. VENUGOPAL
Chairperson
Committee on Public Accounts

PART- I

INTRODUCTION

The Report of the Committee is based on Para no 2.3 of the C&AG Report No. 24 of 2023. The C&AG Report No. 24 of 2023 for the year ended 2022 contains significant results of the compliance audit of the Department of Space of the Union Government.

Committee on Public Accounts (2023-24) selected the aforesaid C&AG Report for examination and report. The Committee considered the subject for detailed examination, held informal discussion with the representatives of the Ministry/Department concerned during their study visit to Bengaluru and Kochi from 16-18 October, 2024 and obtained written replies to the List of Points.

1. Para no 2.3 “Short closure of project for development of Special Grade Carbon Fibre”

Vikram Sarabhai Space Centre (VSSC), Thiruvananthapuram a unit of Indian Space Research Organisation of Department of Space is mandated for the design and development of launch vehicle programme. VSSC procures launch vehicle consumables for the program from vendor on proprietary basis. VSSC imports carbon fibres (T 800) for its launch vehicle programme. National Aerospace Laboratories (NAL) of Council of Scientific and Industrial Research had established (July 2004) an integrated facility for making Carbon fibres, developed a process for T 300 grade fibres and has facilities for processing special grade carbon fibres. VSSC therefore signed a Memorandum of Understanding with NAL in Feb 2006 to develop the process technology for special grades of carbon (T 800 grade) fibres for space use as an import substitute. The project was to be completed by September 2007 which was extended five times up to March 2015. An aMoUnt of ₹3.50 crore was paid (Feb 2006) on signing the MoU towards ‘facility upgradation and development work’ and another ₹ 50 lakh subsequently requested by NAL was released (Feb 2009) towards ‘Manpower for the developmental work.

As per the MOU, NAL was to supply special grade Carbon Fibres to VSSC initially for five years and continue thereon. Further, the MOU also included provisions related to Intellectual Property Rights (IPR) of the project. The Intellectual property that is knowhow/ process generated was to be jointly owned by NAL and VSSC.

Audit observed that due to delays in procurement of equipment and other technical problems that occurred during the execution, the project had to be extended five times upto 2015 which was indicative of improper planning. Further, despite repeated extensions, NAL could not develop the special grade (T 800 grade) Carbon fibres due to its inability to support the project in terms of manpower. VSSC and NAL mutually agreed (July 2019) to short close the MOU. NAL did not pursue the activity after October 2015. In a review meeting of the project held in July 2019, it was decided to short close the MOU without extension considering the huge investment and time required for further development in the project and pre-occupation of the NAL team with the setting up of carbon fibre plant for DRDO and BARC.

As per the MOU the Joint Review Committee (JRC) consisting of members from NAL and VSSC was to review the project once every three months. Audit observed that during the period from February 2006 to May 2019, the JRC meetings were held continuously up to the end of year 2007. However, the meetings of the JRC were not held on regular basis in the subsequent period. Review meetings were held only once or twice in each year during the period 2008 to 2016. After 2016, the JRC met only once in 2019.

A committee appointed by Director, VSSC visited NAL facilities and recommended (November 2005) that NAL has the expertise and capability to develop special grade carbon fibre to the requirement of ISRO. However, NAL replied in (Dec 2022) that the equipment to improve the carbon fibre properties to the requirement of ISRO are in the technology denial regime and sufficient indigenous expertise is not available to develop the equipment.

Thus, improper planning and lack of clarity on resource availability (facility, financial and manpower) required for the project, finally resulted in short closure of the project and the expenditure of ₹ 4 crore remained largely infructuous.

VSSC replied (October 2020) that the development of T 800 grade of carbon fibre require significant funding and establishment of a production facility in an industrial setting. VSSC added (October 2021) that NAL could not fully accomplish the specification as required by VSSC. Even though NAL came out with a carbon fibre which was better than its T 300 grade, it did not reach the required level of T 800 grade.

DOS replied (Jan 2023) that due to uncertainty of achieving the desired results along with difficulty of NAL to support the project in terms of manpower it was decided to short close the MoU.

Reply of VSSC/DOS is not acceptable. NAL was not even able to successfully develop the material to the requirement of ISRO at its laboratory level. Further, no efforts were made to secure Intellectual Property Rights on the process knowhow developed as a result of the project.

2. The Ministry in their Background Note have stated as under:-

- *T800 carbon fibre is a critical raw material used for making upper stage motor cases of launch vehicles, Pressurant tanks for spacecraft and Gaganyaan application. The raw material was sourced from M/s Toray, Japan, the only qualified source available in the world from the beginning. The material has wider applications in Defence sector also. Considering single point dependency and export clearance issues under export control regime, it was decided to indigenize the item to meet the national demands through NAL which was the only agency considered to have much technical expertise in the country.*
- *Considering NAL's experience of establishing the process technology for T300 grade of Carbon fibre, a National level committee was constituted by Director, VSSC in 2005 to discuss and review the expertise available with NAL for developing special grades of Carbon fibre.*
- *Based on the recommendations of the above Committee, VSSC entered into an MoU with NAL for development of high strength and high modulus fibre. MoU was signed on 03.02.2006 with expected date of completion as September 2007.*
- *Scope of the MoU included Pilot Plant scale development of processes for the high strength carbon fibre equivalent to commercially available T 800 grade and from high modulus carbon fibre equivalent to commercially available M55 J grade using Polyacrylonitrile (PAN) based resin.*
- *However, high molecular weight PAN precursor was found unsuitable to realize required specification of M 55 J fibre. Hence, work could not proceed further for development of M 55 J fibre.*

Work carried out at NAL

- *NAL already had a pilot plant to process T300 grade Carbon fibre, which needed modification to develop T800 grade Carbon fibre.*
- *The existing equipments were modified/ augmented for processing T 800 fibre. A number of trials were carried out in all the three major areas related to process technology of carbon fibre viz Polymerization, Spinning and Carbonization.*
- *However, analysis of the process - details and results of spinning as well as carbonization experiments showed that the existing set of equipment could not yield the required mechanical properties.*
- *To address the above inadequacies of the existing processing equipment, a major work was undertaken for the augmentation / modification of the existing facilities. It took more than 3 years to complete the above works and to commission the new process-lines.*
- *The optimization trails of process resumed after modification of the plant and the properties of carbon fibre obtained by the end of MoU validity period (Mar 2016) and submitted to VSSC are given below:*

Tow Strength	*Tensile strength (GPa)*	*Tensile Modulus (GPa)*	*% elongation*	*Density (g/cc)*
Target specifications of commercially available T800 (as tested at VSSC and NAL)	*4.65*	*300*	*1.55*	*1.80*
Values Obtained	*3.8*	*280*	*1.36*	*1.78*

Achievements of Process Development Activities at NAL:

- *Establishment of Polyacrylonitrile Copolymer with <2.7 molecular weight distribution (MWD) and monomer composition having optimum stretch ability (10-11X) in wet spinning.*

- *Establishment of Wet Spinning Technology for 3K and 6K Tow for titer reduced down to 0.85 denier per filament (dpf)*
- *Establishment of Heat Treatment Process for 0.85 DPF Special Acrylic Fibre with 90 mins residence time in oxidation oven, ~5 mins residence time in pre carbonization and carbonization, which is the optimum possible in the existing heat treatment line.*
- *Process development of continuous operation at every stage, i.e: polymerization, wet spinning and heat treatment.*
- *Well controlled co - efficient of variation in filament properties.*

Budget details

- *The project was for a total cost of Rs. 482 lakhs wherein Rs. 350 lakhs was paid on signing the MoU.*
- *An additional a MoUnt of Rs. 50 lakhs was paid to meet manpower deployment expenses through an MoU amendment in February 2009.*
- *Total fund allocation: Rs 532 lakhs, Total paid: Rs 400 lakhs.*
- *Remaining Rs. 132 lakhs was earmarked to be paid after delivering the 1st lot of T-800 grade carbon fibre or its prepreg, as per MoU terms.*

Present Status

- *Development work (with NAL) for T-800 equivalent grade carbon fibre so far has resulted in preparation of carbon fibre within 80% of the targeted strength and~ 95% of the targeted modulus.*
- *The annual requirement is 400 kg with the cost of Rs.92.00 L. At present, M/s Toray, Japan, Formosa, Taiwan, Hyosoung, Korea and Hexcel, USA are the four sources known in the world for supplying this item. Since this item is of dual use nature, risk of facing the export clearance issue still exist considering the geo political scenario. Hence, indigenization effort for the development of T800 carbon fiber is essential.*

MoU Short Closure

- *The Expert review committee constituted by Director, VSSC met on 7th June, 2019. The committee noted that though the results obtained were close to the target (80 % of strength and other parameters), the specification of T800 could not be achieved. A further investment of Rs.700.00 L was required for establishing additional facilities for further process improvements to achieve final specification of T800. Considering the above, the committee*

decided to short close the MoU without further extension.

- *Being a critical technology development, there were many technical challenges experienced during the final phases of the process optimization. It may be noted that such critical research and development activities are always associated with high risks and uncertainties and hence the efforts made in pursuit of national goals may not achieve the desired outcome sometimes.*

IPR Process

The developed carbon fibre was better than T300 grade but did not reach that of T800 grade as per the MoU. Since, this development had reached an intermediatory stage against the original plan, IPR process was not initiated.

3. On being asked about the import bill of T 800 carbon fibre since the start of its import and the probable cost of the project to develop Special Grade (T 800 grade) Carbon fibre, the Ministry in their written reply stated:

"Total import from 2005 works out to be 3408 kg at a total cost of Rs.4.80 crores. (at current US dollar exchange rate i.e 1 USD = Rs. 83.93). The estimated cost of indigenous development is Rs.12.32 Crore (including the MoU value of Rs.5.32 crore and the additional investment of Rs. 7.00 Crore projected by NAL in 2019)."

4. When asked to furnish details of comparison between the cost of import of T 800 grade and the probable cost of its indigenous development, if any, the Ministry in their written reply stated as under:-

"Yes. Development cost would be higher for indigenizing the complex technology considering the capital investment, process development and operational cost."

5. Initially, VSSC showed faith in NAL's ability to develop T 800 grade but lost that faith later simply because the project would cost significantly and outcome was not certain. On being asked whether such a haphazard approach towards R&D would bring about the desirable result, the Ministry through a written note stated:-

"It may be noted that the Department had followed a fairly structured approach to initiating this research & development activity with NAL. This approach has yielded several successes in the development of metallic & non-metallic materials, notably Maraging Steel in association with MIDHANI, which is the backbone material for ISRO's launch vehicle programme. This approach has eliminated the need for importing steels

and has also resulted in the successful development of superalloys and other non-metallic materials & chemicals for the Indian Space Programme. The approach taken for this activity with NAL went through the following phases."

a. Assessment of the technical feasibility & evaluation by a National Committeeand initiating the R & D activity with NAL.

As of the year 2005, NAL had established an integrated facility for making carbon fibre in Bangalore in the T300 grade and had agreed to develop high strength carbon fibres (T800 grade) meeting ISRO's requirements utilizing the available expertise at NAL and the facility with minimum modifications & augmentation. Before initiating the R & D with NAL, a National level committee including experts from ISRO, Central Leather Research Institute (CLRI) & Sardar Patel University, Gujarat was constituted by Director, Vikram Sarabhai Space Centre of ISRO to evaluate & assess the technical feasibility, proposed process methodology along with the proposed facility augmentation at NAL. The Committee held discussions with the NAL team and recommended to initiate the R & D activity with NAL with the proposed process methodology and augmentation of the equipment. Considering the strategic nature of these types of carbon fibers and the availability of a single import source at the time along with the embargo imposed on ISRO at that time, it was decided to enter into an MoU with NAL based on the recommendations of the National Committee.

b. Progress of the activity & periodic Monitoring of the activity through a JointReview Committee (JRC).

The existing equipment at NAL were modified/augmented and number of trials were carried out in areas of polymerization, spinning and carbonization. A Joint Review Committee regularly monitored the progress of the activity during the period 2006-2016. Since the modification of equipment did not yield results, a further major modification was carried out by NAL over 3 years. However, the batches of carbon fibre could not achieve the desired results. Being a closely guarded technology, it was difficult to comprehend the further modification needed to obtain the desired parameters. Subsequently it was felt by NAL team that a further investment of Rs. 7.00 Crore would be required towards new equipment that could possibly yield the results but the assessment of the Department was that the suggested equipment had little chance of obtaining export clearance considering the dual use nature. Moreover, the availability of multiple global sources of this strategic item had eased the supply risk for high strength carbon

fibres in 2014 & beyond. In view of the above and also considering the high risk of further cost & schedule overrun, Director, VSSC constituted a Committee in 2019 to review the status of the activity, assess the outcomes and suitably recommend further course of action.

c. Assessment of status & recommendation of short closure.

The Committee constituted in 2019, reviewed the status and assessed the outcome of the activity and determined that the efforts of NAL had resulted in Carbon fibre samples with improved parameters w.r.t T300 grade but fell short of the targeted specifications of high strength T800 grade fibres. Concurrently, NAL had also entered into an MOU with DAE and was in the process of assisting DAE and DRDO in establishing a plant for the production of T300 fibres. The Committee took cognizance of this situation where the resources at NAL would now be also engaged for this purpose. Subsequently, the Committee recommended to short close the activity considering the huge cost & schedule risk and also the uncertainty in obtaining the export clearance for the dual use equipment. One more Committee was constituted in 2020 to further review and formally close the MOU, which was done in 2021.

Therefore, it may be noted that the Department has followed a structured and systematic approach in initiating the activity, monitoring the progress and recommending for short closure of the activity.

6. It is stated that NAL team achieved higher than T 300 grade and was nearer to T 800 grade. When enquired that considering this backdrop whether VSSC made hurry in short closing the project, the Ministry in their written reply stated as under:

"With all the modifications to the existing plant and R&D efforts, NAL could achieve Carbon fibre better than that of T-300 grade. Last batch of carbon fibre was supplied by NAL to VSSC in the year 2014 which was not meeting the required specification of T- 800 grade. The decision to short close was taken only after all possible options were exhausted with the existing equipment and it became clear that new equipment (that is under stringent export controls) would require to be imported. The desired material properties could not be achieved even after 12 years from signing the MoU and the decision was taken to short close after review by two committees in 2019 and 2021. Therefore, there was no hurry in short closing the project."

7. On the one hand, VSSC stated that indigenization of high strength carbon fibre is still not a reality due to technological complexity and high investment and inadequate commercial demands and on the other hand, it is called strategically important in long term stating that R&D in this regard should not be treated as infructuous. On being asked how does the Ministry plan to address this paradox, the Ministry in their written reply intimated:-

> *"As mentioned above, the efforts of NAL had resulted in Carbon fibre samples with improved parameters w.r.t T300 grade but fell short of the targeted specifications of high strength T800 grade fibres. In spite of this shortfall, the MoU had achieved the following:*
>
> *(a) The development of a continuous mode process that was an improvement overthe previously existing batch mode process.*
> *(b) The technical specifications of the Carbon fibre achieved with improved properties w.r.t T300 grade that is suitable for several other applications.*
>
> *Therefore, it may be noted that the MoU has resulted in the development of a process technology from batch mode to continuous processing for Carbon fibre with improved properties that can be gainfully utilized by the Ministry of Defense and DAE for those applications which require standard modulus carbon fibres. Therefore, the R & D activity carried out at NAL under this MoU was not entirely infructuous."*

8. When asked to respond to audit conclusion that improper planning and a lack of clarity regarding resource availability (facilities, finances and manpower) for the project ultimately led to its premature closure, rendering the expenditure of Rs 4 crore largely unproductive, the Ministry in their written reply stated as under:-

> *"As already substantiated in Sl No.2 above, the Department had followed a fairly structured approach in initiating the activity, monitoring the progress through a joint mechanism, reviewing the status and deciding on induction / short closure. This approach has resulted in successful indigenization of many materials & sub-systems along with the qualification of new vendors through development orders and technology transfer.*

In the case of this activity, as of 2005, NAL was the only agency in the country with an integrated facility for T300 grade fibres along with the human resources which provided NAL the advantage to proceed with the development of high strength fibres in the T800 grade. Therefore, the Department initiated the activity with NAL after an assessment by a National Committee of experts which held discussion with NAL on the feasibility and process methodology.

Considering the strategic & closely guarded nature of the technology, embargo issues at the time and single source availability, the Department proceeded with this technologically complex and challenging task based on the recommendations of the National Committee. It may be noted that R & D of this complex nature is always a calculated risk and it is very difficult to assess apriori the technical challenges involved and exact investment needed to develop this product.

In this case, NAL had to upgrade their facility and processes to achieve the desired parameters. The existence of just one or two global players in this product segment over many decades up to 2005 and even beyond till 2014 is evidence of the highly challenging nature of this activity. It may be noted that the activity has resulted in an improvement in the process in spite of shortfall in achieving the properties of T800 grade fibre. This improvement can be gainfully utilized by NAL for establishing the plants for T300 fibre to meet the requirements of DAE and MoD and therefore the activity undertaken with NAL cannot be termed unproductive.

Further, when the MoU was initiated, there was no industry in India for converting the carbon fibre into a semi-processed form called prepregs, which is the structural material for composite hardware. As on today, multiple industries are available today in the country to convert the carbon fibre into prepregs. Considering the strategic importance of the technology, ISRO is encouraging these industries to take up the technology of carbon fibre development."

9. Considering the fact that as to why the MoU to develop special-grade carbon fibres (T-800 grade) was extended five times, despite NAL lacking the expertise and capability to meet ISRO's requirements for special-grade carbon fiber, the Ministry in their written reply stated as under:-

> *"As mentioned above, R & D of this complex nature is always a calculated risk and it is very difficult to assess apriori the technical challenges involved and exact schedule to develop this product. Being highly process sensitive, several trials and equipment modifications were essential as part of the activity that required multiple extensions. The decision to short close was taken only after all possible options were exhausted with the existing equipment and it became clear that new equipment would require to be imported."*

10. On being asked why Joint Review Committee (JRC) meetings were not held regularly as per the MoU after 2007, the Ministry in their written reply stated as under:-

> *"It may be noted that Joint Review Committee (JRC) meetings were held regularly between 2005-2016 with at least 1 or 2 meetings per year."*

11. To a question as to whether pre-occupation of the NAL team with DRDO and BARC holds sufficient ground for short-closure of the MoU, the Ministry in their written reply stated as under:-

> *"It may be noted that the decision on short-closure was predominantly taken owing to the following."*
>
> - *Cost overrun*
> - *Schedule overrun*
> - *Reduced risk of supply due to availability of multiple global vendors*
> - *Availability of Indian industries to process prepreg from carbon fibre.*
>
> *As NAL had entered into an MoU with DAE and was in the process of assisting DAE and DRDO in establishing a plant for the production of T300 fibres, the Department took cognizance of this situation where the resources at NAL would now be also engaged for this purpose and may not be able to fully devote their efforts towards this activity that can further contribute to the schedule risk."*

12. When asked as to why it took so long to file IPR for the process know-how developed as a result of this project, the Ministry in their written reply stated:-

"IPR was not filed since T800 properties were not achieved."

13. Going by the economic logic of 'money saved is money produced'. When asked to express their opinion keeping in mind that the invention cost could have been much less than the continuous import cost and this it would also protect national interest from prospective possibilities of embargo on the Indian State for reasons of its strategic importance, the Ministry in their written reply stated as under:-

"In this case, the invention cost cannot be considered less than the continuous import cost. Considering the low volume requirement of T800 fibres and also with the invention cost amortised based on the development cost and cost of machinery, import cost would still be substantially lower. In 2005, ISRO was in the restricted list which warranted exploring the feasibility of indigenous development. By 2019, ISRO was removed from the restricted list and multiple suppliers were identified globally including Asia, USA and Europe. This has reduced the supply risk substantially."

Part II

OBSERVATIONS AND RECOMMENDATIONS

Introduction

The Committee learn that Vikram Sarabhai Space Centre (VSSC) imports carbon fibres (T 800) for its launch vehicle programme from vendors on proprietary basis. National Aerospace Laboratories (NAL) of CSIR established in July 2004 is an integrated facility for making Carbon Fibres, developing a process for T 300 grade fibres with facilities for processing special grade carbon fibres. On the recommendation of a committee appointed by Director, VSSC, a Memorandum of Understanding was signed between VSSC and NAL in Feb 2006 to develop special grades of carbon (T 800 grade) fibres for space use as an import substitute. The project was to be completed by September 2007 which was extended five times up to March 2015 due to delays in procurement of equipment and other technical problems. An advance of ₹3.50 crore was paid in February, 2006 on signing the MoU towards 'facility upgradation and development work' at NAL and an amendment to MoU was effected in February 2009 and ₹ 50 lakh was released in February, 2009 towards 'Manpower for the developmental work'. This constitute 75% of total payment as per MoU for completion of the project by September 2007. Despite repeated extensions, NAL could not develop the special grade (T 800 grade) Carbon fibres to the requirement of VSSC. Hence, VSSC and NAL mutually agreed in July 2019 to short close the MoU. NAL did not pursue the activity after October 2015.

1. Lack of capacity Assessment and improper planning

From the audit finding, the Committee note that due to delays in procurement of equipment and other technical problems that occurred during the execution, the project had to be extended five times upto 2015 which was indicative of improper planning and lack of foresight. The audit further observed that despite repeated extensions, NAL could not develop the special grade (T 800 grade) Carbon fibres due to its inability to support the project in terms of manpower. The Committee are not satisfied with the reply of VSSC that the development of T-800 grade of carbon fibre require significant funding and

establishment of a production facility in an industrial setting. VSSC added in October 2021 that NAL could not fully accomplish the specification as required by VSSC. The reply further stated that even though NAL came out with a carbon fibre which was better than its T300 grade, it did not reach the required level of T 800 grade. To this, the Department of Space replied in January, 2023 that due to uncertainty of achieving the desired results along with difficulty of NAL to support the project in terms of manpower, it was decided to short close the MoU.

1.1 The Committee note that a committee appointed by Director, VSSC visited NAL facilities and recommended in November 2005 that NAL has the expertise and capability to develop special grade carbon fibre to the requirement of ISRO. However, NAL replied in December, 2022 that the equipment to improve the carbon fibre properties to the requirement of ISRO are in the technology denial regime and sufficient indigenous expertise is not available to develop the equipment. The Committee would like to be apprised of the reasons as to why the committee appointed by the Director of VSSC in November 2005 recommended that NAL had the expertise and capability to develop special-grade carbon fibre. The Committee may also be apprised as to why was the MoU to develop special-grade carbon fibres (T-800 grade) extended five times, despite NAL lacked the expertise and capability to meet ISRO's requirements for special-grade carbon fibre.

1.2 The Committee find that NAL did not have the requisite level of technical capabilities and equipment to develop Special Grade of Carbon T800 at the time of signing of MoU with VSSC, which is evident from the fact that NAL could not succeed in achieving the objective of MoU even after extending the term for five times upto March 2015. The Committee are unable to understand the reasons for lack of proper capacity assessment of NAL by the Committee appointed by VSSC and VSSC before signing MoU with NAL, release of advance payment and extension of the term of MoU for five times. Further, the Committee note that VSSC appointed Committee and VSSC also had not taken into consideration the crucial fact of technology denial regime that was applicable on import of high grade carbon. In view of above, the Committee feel the requirement of framing proper guidelines and SOPs that are to be mandatorily followed by Scientific

Departments and Autonomous Institutions before entering into Agreements /MoUs with other Department/Organisations. Therefore, the Committee recommend that such guidelines/SOPs should be framed and circulated within 6 months of presentation of this report to Parliament.

2. Loss to the exchequer

The Committee find that VSSC and NAL mutually agreed in July 2019 to short close the Memorandum of Understanding, which was signed in 2006 and extended five times upto March 2015. The Committee further note that NAL did not pursue the activity after October 2015 and there was no coordination between VSSC and NAL for four years. The Committee find it difficult to understand as to why the MoU was described to be 'Short closed or prematurely closed' when it was closed after a period of 13 years without achieving the intended objective. In July 2019 considering the huge investment and time required for further development in the project and pre-occupation of the NAL team with the setting up of carbon fibre plant for DRDO and BARC it was decided to short close the MoU. The Committee are constrained to note that there was no project monitoring mechanism within VSSC to assess the progress in the project as per MoU and to report inaction on the part of NAL for timely decision, instead of extending the term of MoU for five times upto 2015 and wasting another 4 years without even extending the term of MoU, which ultimately resulted in loss of Rs.4 crore to the exchequer and waste of valuable time of 13 years without any results.

2.2 The Committee, considering the facts as brought out in the above paragraph recommend that there should be stringent provisions for project monitoring Committee constituted to assess physical progress and report in all projects and release of payment should be linked to such report.

3. Joint Review Committee Meetings

The Committee note that as per the Memorandum of Understanding, the Joint Review Committee (JRC) consisting of members from NAL and VSSC was to review the project once every three months. The Committee further note that

that during the period from February 2006 to May 2019, the JRC meetings were held continuously up to the end of year 2007. The Committee are peeved to note that the meetings of the JRC were, however, not held on regular basis in the subsequent period. The review meetings were held only once or twice in each year during the period from 2008 to 2016. The Committee are also note with constraint that after 2016, the JRC met only once in 2019. Noting that significant time could have been saved, the Committee may be apprised of the reasons for not convening Joint Review Committee (JRC) meetings as per the MoU after 2007, given that only one JRC meeting took place after 2016.

4. Provision of recovery in MoU

The Committee note that despite multiple extensions of the MoU and modifications to NAL's existing facilities, the desired T800-grade specifications could not be achieved. The Department has justified the short closure of the project by citing the availability of multiple global suppliers reducing supply risks, high costs and uncertainty in obtaining export clearance for necessary equipment and involvement of NAL in other projects with DAE and DRDO. The Committee have every reason to believe that the prolonged nature of the project for over 13 years would have impacted other projects of ISRO/VSSC. While the Department claim to have followed a structured review process, the failure to achieve the desired outcome despite continuous extensions indicates that project risks were not adequately accounted for at the outset and initial years. The Committee, therefore, recommend that future projects involving high-risk technology development incorporate well-defined exit strategies and periodic audits to assess feasibility at different stages and to recover the advance payments made but no tangible progress in the project could be achieved within the targeted period.

5. Policy for critical raw materials and technologies

The Committee find that the Department initially pursued indigenous development due to embargo concerns. But by 2019, ISRO was removed from restricted lists, and multiple global suppliers were available. The Committee further note that the shift in the global trade landscape played a key role in the

decision to short-close the project. However, the Committee believe that the given rationale of "money saved is money produced" is not entirely valid in the case of strategic materials. While import dependency has been eased, the long-term risk of embargoes or supply chain disruptions still remains. The Committee, in no uncertain words recommend the Department to reassess India's requirement for strategic materials and formulate policies so as to ensure that critical raw materials and technologies are developed indigenously, with a robust and planned financial and institutional support from friendly nations.

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NEW DELHI:
25 March, 2025
Chaitra 4, 1947 ***(Saka)***

K.C. VENUGOPAL
Chairperson,
Committee on Public Accounts

APPENDIX-I

MINUTES OF THE SIXTEENTH SITTING OF THE COMMITTEE ON PUBLIC ACCOUNTS (2024-25) HELD ON 25 MARCH, 2025

The Committee on Public Accounts sat on Tuesday, the 25 March,2025 from 1000 hrs to 1030 hrs in Room No. 51, Hon'ble Chairperson's Chamber, Samvidhan Sadan, New Delhi.

PRESENT

Shri K.C. Venugopal - Chairperson

Members

LOK SABHA

2. Shri T. R. Baalu
3. Shri Jai Parkash
4. Shri Ravi Shankar Prasad
5. Shri C. M. Ramesh
6. Shri Magunta Sreenivasulu Reddy
7. Smt. Aparajita Sarangi
8. Dr. Amar Singh
9. Shri Tejasvi Surya
10. Shri Anurag Singh Thakur

RAJYA SABHA

11. Shri Shaktisinh Gohil
12. Dr. K. Laxman
13. Shri Tiruchi Siva
14. Shri Sudhanshu Trivedi

LOK SABHA SECRETARIAT

1.	Dr. Sanjeev Sharma	-	Joint Secretary
2.	Shri Muraleedharan. P	-	Director
3.	Shri Alok Mani Tripathi	-	Deputy Secretary
4.	Shri Pankaj Kumar Sharma	-	Deputy Secretary
5.	Shri Atul Bhave	-	Deputy Secretary
6.	Smt. Malvika Mehta	-	Deputy Secretary

REPRESENTATIVES OF THE OFFICE OF THE COMPTROLLER AND AUDITOR GENERAL OF INDIA

1.	Dr. Kavita Prasad	-	Director General
2.	Shri Ashutosh Sharma	-	Director General
3.	Shri Samar Kant Thakur	-	Director General

At the outset, Hon'ble Chairperson welcomed the Members and Officers of the office of C&AG of India to the sitting of the Committee. Thereafter, Hon'ble Chairperson stated that the following three draft reports may be taken up for consideration and adoption:-

(i) XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX;

(ii) XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX XXXXX; and

(iii) Draft report on **"Short closure of project for development of Special Grade Carbon Fibre"** based on Para 2.3 of C&AG Report No. 24 of 2023.

2. After some deliberations, the Committee adopted the aforesaid Draft Reports with some modifications in the Report at Sl. No. (i) and authorised the Chairperson to finalise the Reports in the light of factual verification done by the Audit.

The Committee then adjourned.