

me.

SHRI BASUDEB ACHARIA: There is a complete deadlock.

MR. DEPUTY SPEAKER: About that, I cannot say anything.

(Interruptions)

SHRI BASUDEB ACHARIA: Why don't you call the Minister to the House?

SHRI SAIFUDDIN CHOWDHARY: Why don't you call the Minister to the House.

MR. DEPUTY SPEAKER: I cannot call. If you want, you can go and meet the Minister.

(Interruptions)

SHRI BASUDEB ACHARIA: Government is silent. He should tell the House whether he will start a dialogue with the teachers.

(Interruptions)

MR. DEPUTY SPEAKER: Now, Mr. K.R. Narayanan.

12.13 hrs.

STATEMENT RE: FINDINGS OF FAILURE ANALYSIS COMMITTEE CONSTITUTED TO ENQUIRE INTO THE CAUSE OF THE FAILURE OF THE FIRST ARGUMENT SATELLITE LAUNCH VEHICLE (ASLV-D1)

[English]

THE MINISTER OF STATE IN THE MINISTRY OF SCIENCE AND TECHNOLOGY AND MINISTER OF STATE IN THE

DEPARTMENT OF OCEAN DEVELOPMENT, ATOMIC ENERGY, ELECTRONICS AND SPACE (SHRI K.R. NARAYANAN): The Honourable Members may kindly recall that I had made a statement in the House on 25th March, 1987 regarding the launch of the first developmental flight of ASLV D-1 which took place from Sriharikota on March 24, 1987. As the mission was not successful, I had indicated that further analysis of the data would continue to understand the reasons of the failure in order to incorporate modifications as necessary for future vehicles.

While the expert teams were conducting the post flight analysis of failure, a Failure Analysis Committee (FAC), was constituted to find the cause of the failure with Sri R. Aravamudan, Director, ISRO Reliability (ISREL) as its Chairman. The FAC has submitted its final report and recommendations to the Chairman, ISRO/Secretary, Department of Space, based on detailed analysis of the voluminous data obtained in the flight. In arriving at its conclusions the FAC had co-opted over a hundred specialists from various disciplines as well as a number of external experts including Dr. A.P.J. Abdul Kalam, Director, DRDL, Hyderabad (Former Project Director, SLV-3 E1 & E2), Sri V.P. Sandlas, Director, DEAL, Dehradun (Former Project Director, SLV-3 D1 & D2).

The FAC constituted seventeen sub-committees to carry out in-depth studies and conduct investigative/confirmative tests where necessary in specific areas such as the first stage (AS1) ignition system consisting of igniter, safe/arm, the electrical circuit, vibration levels etc.

The data the following sources were analysed by the FAC:-

Vehicle telemetry data

- Spacecraft telemetry data
- ground-station data on tracking
- vehicle check out data
- the debris from the flight
- visual observations
- video records
- photographic records
- kinetheodolite pictures
- documents/log books pertaining to specification, design, qualification, process, acceptance, integration and pre-launch operations.

In addition, data were also specifically generated to assist the failure analysis through failure mode simulation and certain investigative tests.

The failure analysis confirms that after a perfect lift-off the vehicle had functioned nominally upto 48.74 sec, and that thereafter the first stage did not ignite even though the ignition command was sent by the on-board Computer, thereby causing loss of control of the vehicle. The strap-on motors separated even under this adverse environment at the intended time of 52.2 sec. However, the large aero-dynamic loads experienced by the vehicle due to loss of control resulting from the non-ignition of 1st stage, caused the severance of the vehicle at the interface between the second and the third stages at 52.41 sec. The third stage has ignited at the intended time 156.8 sec. and performed nominally till the splash down at 164 sec. after launch.

Having established the non-ignition of the first stage as the cause of failure, the

failure analysis efforts were specifically focused on the regime of flight upto 50 sec., even though detailed analysis of the data all the way till ASLV splash down at 164 sec. was conducted. An exhaustive list of thirty seven possible failure modes was identified in the areas of igniter, safe/arm unit, ignition circuit and the check out system. They include problems relating to vacuum ignition, structural resonance, de-mating of connectors in flight, effect of acceleration of safe/arm etc. The data from the Shock, Acoustic And Vibration Experiment (SAVE) payload in the SROSS-I satellite indicated that the acoustic levels monitored at the satellite are within the design limits and as per predictions based on the extensive tests carried out earlier. Data obtained from the vibration sensors mounted along various points in the vehicle indicated that the vibration levels experienced by the vehicle are within the qualification levels. Data from strain, temperature and acceleration sensors also indicate normal performance till the malfunction of the first stage. After detailed examination of all these failure modes, seen in the context of the available data on the vehicle performance, the FAC has ruled out the possibility of occurrence of any of these failure modes.

After an exhaustive and in-depth analysis of all flight data and extensive simulation studies, the FAC has concluded that the failure of the ASLV mission was primarily due to non-ignition of the AS1 motor, and that the non-ignition of the motor could only be explained by an extremely small but finite probability of:

(a) Inadvertent short circuit in both the ignition circuits;

(b) Inadvertent electrical open circuit in both the ignition circuits;

(c) Random malfunction of safe/arm device.

[Sh. K.R. Narayanan]

All these three possible failure mechanisms being random nature, pinpointing a single cause of failure amongst the three, through post-facto reconstruction of the events has not been possible. Such a situation is not uncommon to aero-space failure mechanisms, particularly when the cause of failure is attributable to random phenomena having a small probability of occurrence and hence not repeatable.

In order to ensure realisation of successful launch of future ASLV's, the FAC has made a comprehensive set of recommendations to further improve reliability of performance and incorporate adequate redundancy measures taking specifically into account all the three possible failure causes. All the steps recommended by the FAC are being incorporated for the second development flight of ASLV.

The assessment of the expert teams during the failure analysis deliberations is that in spite of the failure of the mission, the new technology of strap-on development has been substantially proven in the flight and no modifications have been suggested to this system. The Inertial Guidance System has also performed nominally. However, the closed loop guidance system did not get an opportunity to perform fully in view of the premature termination of the flight, even though the limited data gathered by this system shows nominal performance.

The preparations for the next ASLV flight incorporating the necessary changes are progressing satisfactorily to realise a successful launching of ASLV in early 1988. The next ASLV will launch the second Stretched Rohini Series Satellite (SROSS-II) with the joint ISRO-DEVLR stereo imaging telescope (MEOSS) as the primary payload.

(*Interruptions*)

[*English*]

THE MINISTER OF STATE IN THE MINISTRY OF PARLIAMENTARY AFFAIRS (SHRIMATI SHEILA DIKSHIT): Sir.....(*Interruptions*).

SHRI H.A. DORA: She is not the concerned Minister, Sir.....(*Interruptions*)

MR. DEPUTY SPEAKER: She is the Parliamentary Affairs Minister. She will take care of what you have said.....

(*Interruptions*)

SHRI V. SOBHANADREESWARA RAO (Vijayawada): Is she going to make a statement on behalf of the Human Resource Development Minister?

MR. DEPUTY SPEAKER: As you are saying on behalf of the teachers, she also wants to say on behalf of the Minister.

SHRIMATI SHEILA DIKSHIT: We have heard all that you have said. Whatever we could make out of it, I will convey your sentiments to the Human Resource Development Minister.....(*Interruptions*).

SHRI SAIFUDDIN CHOWDHARY (Katwa): No, no, you call him here just now.....(*Interruptions*)

MR. DEPUTY SPEAKER: Now matters under rule 377. Shri Kalicharan Sakargayan.....

(*Interruptions*)

MR. DEPUTY SPEAKER: I have called Shri Kalicharan to make his statement under rule 377. Nothing is going on record except his statement under rule 377.....

(*Interruptions*)^{**}

SHRI KALICHARAN SAKARGAYAN

(Khandwa): Sir, The Railway Administration has taken up the work of electrification of the rail line.....(*Interruptions*).

SHRI C. MADHAV REDDI (Adilabad): Sir, we are walking out in protest.

Shri C. Madhav Reddi and some other hon. Members then left the House

[*Translation*]

SHRI C. JANGA REDDY (Hanamkonda): Mr. Deputy Speaker, Sir, all the teachers are on strike and in this connection, some Members of the Bharatiya Janata Party had made efforts to meet the hon. Minister but he refused to grant them even an interview. As a protest Bharatiya Janata Party stages a walk out.

Shri C. Janga Reddy then left the House

[*English*]

12.18 hrs.

MATTERS UNDER RULE 377

- (i) **Need to replace the existing bridge with a new one at Khanda on Itarsi-Bhusawal section of Central Railway**

SHRI KALICHARAN SAKARGAYEN (Khandwa): Sir, the Railway Administration has taken up the work of electrification of the railway line of Itarsi-Bhusawal section in Central Railway. Since the over-bridge at Khandwa is at a low height, it is necessary to remove the same and construct another bridge of appropriate height and size.

There are only two alternative-either the

height of the existing bridge should be raised or another bridge on a new site be constructed. I have suggested to the hon. Minister of Railways that the present railway bridge is quite insufficient, narrow and in a very dilapidate condition. It is inadequate to meet the growing traffic.

Therefore, I request the Railway Minister to use his good offices for bringing about a coordinated plan of action so that a broad, strong and high overbridge may be constructed on the site selected by the Engineers of PWD, Madhya Pradesh and the Railways in a joint inspection held three years back.

[*Translation*]

- (ii) **Need to make more budgetary provisions for development of dairy industry in the States**

SHRI MAHENDRA SINGH (Guna): Mr. Deputy Speaker, Sir, there is a provision for spending 10 per cent of the amount earmarked for rural development programme on creation of permanent assets. But the Central Government has directed Madhya Pradesh and several other States that this amount should not be spent for dairy industry under operation flood. Due to this, this amount cannot be spent of Frozen Semen Centres, Instant Milking Chilling Units etc. and it has caused a great set back to the programme of raising the income of farmers and quantum of milk by paying remunerative price of milk to farmers and improving the breed of cattle by artificial insemination. It is becoming difficult to maintain families on small holdings of land due to rise in population and division of land at family level. Therefore, it is necessary to develop the dairy industry with a view to raise family income and eliminate poverty and deal with unemployment problem. Continuous curtailment of the budgetary provisions of the Dairy