



1901/181

سول ایوی ایشن اتھارٹی

CIVIL AVIATION AUTHORITY

KARACHI PAKISTAN

FINAL ACCIDENT REPORT

ACCIDENT TO KAZAKHSTAN AIRLINE TU-154

B-2 AIRCRAFT NO.UN-85455 WHICH

OCCURRED ON 21-01-1995

AT KARACHI AIRPORT



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Authority: Director General Civil Aviation Authority Memorandum No. HQ
CAA/1901/181/SIB dated 23rd January, 1995 (Appendix - 'A')

COMPOSITION OF INVESTIGATION TEAM

- | | | |
|---|---|------------------------|
| a) Air Cdre (Retd)
Rashid A. Bhatti
Pilot Investigator (SIB) CAA | : | Investigator-in-Charge |
| | | |
| b) Wg Cdr (Retd)
Sajjad Ahmed
Technical Investigator (SIB) CAA | : | Member |
| | | |
| c) Mr. VI Victor
General Inspector of
Air Transport Department
of Kazakhstan | : | Accredited Member |
| | | |
| d) Mr. Makarenko Sergei
General Inspector of
Kazakhstan Airlines. | : | Accredited Member |

1. AIRCRAFT INFORMATION

- | | | |
|---|---|--|
| 1.1. Aircraft type and Maker's S.No. | : | TU-154 B-2 S. No.80A455 |
| | | |
| 1.2. Registration Marking | : | UN-85455 |
| | | |
| 1.3. Engine types and Airframe
position | : | NK-8-2U three engines mounted
on tail |
| | | |
| 1.4. Certificate of Registration | : | No.0263 (Valid) |
| | | |
| 1.5. Certificate of Airworthiness and
date of Expiry | : | KA-1191 28-03-1995 |

- | | | | |
|-------|--|---|---|
| 1.5. | Certificate of Airworthiness and date of Expiry | : | KA-1191 28-03-1995 |
| 1.6. | Date of Construction of Airframe | : | 28-11-1980 |
| 1.7. | Name and Address of Owner | : | "Kazakhstan Airlines" Almaty, Kazakhstan |
| 1.8. | Max Take-Off Weight | : | 98 M TON |
| 1.9. | Center of gravity limits | : | 46.9% from MAC (21% - 32%) |
| 1.10. | Airframe Hrs since new, last overhaul and periodic check | : | 25597 Hrs
28-03-1984
13-01-1995 |
| 1.11. | Engine hours since new, last overhaul and periodic check | : | (a) 10237 06-10-94 - 13-01-95
(b) 15449 30-11-92 - 13-01-95
(c) 14151 20-09-92 - 13-01-95 |
| 1.12. | Defects | : | No defect was discovered during investigation. |

2. CREW INFORMATION

2.1. Pilot-in-Command

- | | | | |
|----------|--------------------------|---|----------------------------|
| 2.1.1. | Name | : | Markachov Valeri |
| 2.1.2. | Position in the Cockpit | : | Left Seat |
| 2.1.3. | Date of Birth | : | 26 July 1943 |
| 2.1.4. | Type of Lic. and No. | : | Pilot License LP No.010656 |
| 2.1.5. | Medical date with status | : | 09 November 1995 (Fit) |
| 2.1.6. | RATING | | |
| 2.1.6.1. | Type(s) held | : | AN-2, AN-24, |
| 2.1.6.2. | Type current | : | TU-154 |

2.1.7. FLYING EXPERIENCE

2.1.7.1. Grand total : 17896 Hours

2.1.7.2. Total-in-Command : 8425 Hours

2.1.7.3. Total-in-Command on : 905 Hours
the type accident/
incident occurred

2.1.8. Where trained : KRASNOKUTS FLYING COLLEGE

2.1.9. Date of Joining the Org. : September, 1965

2.2. CO-PILOT

2.2.1. Name : PAKHOMOV VLADIMIR

2.2.2. Position in the Cockpit : Right Seat

2.2.3. Date of Birth : 26 June 1947

2.2.4. Type of Lic. and No. : Pilot License 010668

2.2.5. Medical date with status : 10-11-1995 (Fit)

2.2.6. RATING

2.2.6.1. Type(s) held : AN-2, AN-24, TU-154

2.2.6.2. Type current : TU-154

2.2.7. FLYING EXPERIENCE

2.2.7.1. Grand total : 11958 Hours

2.2.7.2. Total-in-Command : 5884 Hours

2.2.7.3. Co-Pilot on the : 3112 Hours
type accident/
incident occurred

2.2.8. Where trained : KRASNOKUTSK FLYING SCHOOL

2.2.9. Date of Joining the Org. : December, 1974

2.3. FLIGHT ENGINEER

- 2.3.1. Name : KONNOV ANATOLI
- 2.3.2. Position in the Cockpit : Behind Co-Pilot Seat
- 2.3.3. Date of Birth
- 2.3.4. Type of Lic. and No. : Flight Engineer IV BM 009442
- 2.3.5. Medical date with status : 11-02-1995 (Fit)
- 2.3.6. **RATING**
- 2.3.6.1. Type(s) held : IL-18, TU-154
- 2.3.6.2. Type current : TU-154
- 2.3.6.3. Flt.Instructor Rating : Flight - Engineer
- 2.3.7. **FLYING EXPERIENCE**
- 2.3.7.1. Grand total : 10186 Hours
- 2.3.7.2. Total-in-Command : N/A
- 2.3.7.3. Total Flt.Engr. on : 5065 Hours
the type accident/
incident occurred.
- 2.3.8. Where trained : EGORIEVSK TECHNICAL
AVIATION COLLEGE
- 2.3.9. Date of Joining the Org. : February, 1976

3. SUMMARY OF ACCIDENT

3.1 On 21st January, 1995 M/s Kazakhstan Airline's aircraft TU-154 B-2 Registration No.UN-85455 Flight No.KZA 1940 was scheduled to operate as chartered flight from Karachi to Almaty with 105 Passengers and 12 Crew members on board.' The aircraft taxied out at 1237 Hrs. (PST) for departure from runway 07L. During take-off roll when the captain attempted to lift the nose wheel at appropriate speed (270 - 280 KPH) the aircraft nose did not come up. At 290 - 300 KPH the captain decided to abort the take-off. The aircraft overshot the runway and came to rest at approximately 1500 feet from threshold of RW 25 R. The rescue and fire fighting immediately reached the site at 1245 Hrs. All the passengers and crew evacuated the aircraft safely. The nose landing gear broke in the over-run area and aircraft nose contacted the ground and dragged on the ground for about 300 feet. The forward fuselage under surface was substantially damaged. Two approach lights on RW 25 R were also damaged.

4. INJURY TO PERSONS

4.1. There was no injury to any passenger or the crew members.

5. DAMAGE TO AIRCRAFT

5.1. As a result of the accident the nose landing gear had broken. The nose landing gear wheel well and left and right truning were extensively damaged. Forward fuselage under surface skin extensively damaged from N 4, 5 bulk head to N 14 bulk head. Left inboard flap skin, rear right flaps longerson and technical compartment sustained extensive damage. Details of damage to aircraft is attached at Appendix 'B' and relevant photographs of the damaged aircraft are placed at Appendix 'C'.

6. OTHER DAMAGE

- 6.1. Two approach lights on RW 25 R were damaged when main landing gears passed over these lights as aircraft overshot the runway.

7. METEOROLOGICAL CONDITION

- 7.1. The weather was fair and visibility was good. Weather was not a factor in this accident. Actual weather at the time of accident is placed at Appendix 'D'.

8. AIDS TO NAVIGATION

- 8.1. All Navigation and Landing Aids were serviceable at the time of accident. Navigation Aids were not a factor in this accident.

9. COMMUNICATIONS

- 9.1. Normal Communications were maintained between the aircraft and ATC. The copy of the Tape Extracts of ATC is placed at Appendix 'E'.

10. AERODROME AND GROUND FACILITIES

- 10.1. Aerodrome and Ground Facilities at Karachi Airport were not a factor in this accident.

11. FLIGHT RECORDERS

- 11.1. At the time of accident TU-154 B-2 aircraft was fitted with a Flight Data Recorder and Cockpit Voice Recorder. Both the recorders were removed from the aircraft and taken to Almaty, Kazakhstan for their accurate read out. The FDR and CVR read out is placed at Appendix 'F' and 'G' respectively.

12. WRECKAGE

12.1. The aircraft overshot the runway and came to stop at location approximately 1500 feet east of threshold RW 25 R and 15 -20 feet south of extended runway center line. As the aircraft crossed the over-run area the nose landing gear broke at a distance of 250 feet from the end of over-run area. At this stage the aircraft forward nose area came in contact with the ground. The forward nose area dragged on the ground for about 300 feet before reaching the final resting place. Some small portions of the under surface of forward fuselage were also located in an area where the aircraft nose contacted the ground. The wreckage diagram is placed at Appendix 'H'.

13. FIRE

13.1 No fire occurred during or after the accident.

14. SURVIVAL ASPECTS

14.1. Soon after the aircraft came to a final stop the captain told to senior cabin attendant to evacuate all the passengers immediately. The cabin attendants opened all the exits including the emergency doors in the second cabin and two sliding rafts were deployed. All the passengers evacuated safely from the aircraft in about one minute. No injury was caused to any passenger or flight attendant during the evacuation process.

INVESTIGATION

15. SCENE OF ACCIDENT

15.1. Kazakhstan Airlines TU-154 B-2 aircraft Registration No.UN-85455 Flight No.KZA 1940 was scheduled to operate as chartered flight from Karachi to Almaty on 21st January, 1995. The aircraft taxied out at 1237 Hrs (PST) for departure from Runway 07 L. During take-off roll when captain attempted to lift the nose wheel at 270-280 KPH the aircraft nose did not come up. At 290-300 KPH the captain decided to abort the take-off. The aircraft overshot the runway and came to a resting position at approximately 1500 feet from the end of runway 07 L. The Investigators reached the scene of accident at about 1430 Hrs on 21st January, 1995.

15.2. The examination at the scene of accident revealed no evidence of any part of the aircraft had detached before aircraft overshot the runway. No signs of fire or bird strike damage were revealed by examination of the scene of accident, the airframe or the engines. The aircraft was examined at the site of the accident, and wreckage distribution diagram was prepared. Photographs of the scene of accident and the aircraft were taken. Only those photographs considered relevant to this report are placed at Appendix 'C'.

16. BAGGAGE OFF LOADING AND WEIGHING

16.1. The total baggage loaded in the aircraft at the time of departure was off loaded under the supervision of the Investigators and cockpit crew. The baggage off loaded from different aircraft baggage compartments was taken to the departure lounge of Terminal-3 at Karachi Airport. The total baggage off loaded from the aircraft was re-weighed by the Investigation Team in presence of air crew and Chemech Aviation Staff. The number of baggage pieces loaded in each aircraft baggage compartment and their total weight was as follows:-

COMPARTMENT	PIECES	WEIGHT (KG)
1ST CABIN	176	5887.5
NOSE BAGGAGE	103	3111.5
REAR BAGGAGE	<u>77</u>	<u>2349.0</u>
	356	11348.0

- 16.2. The hand carried baggage weight as calculated by Chemech Aviation staff at the time of check-in was 2500 Kg. Therefore, the total baggage weight including hand carried baggage loaded on the aircraft at the time of departure was 13848 Kgs.

17. DOCUMENTS

- 17.1. Some of the relevant documents obtained during the investigation of TU-154 aircraft No.UN-85455 revealed the following information:-

17.1.1. Load Sheet. The load sheet was prepared by Chemech Aviation Staff showing 332 pieces of baggage weighing 7500 Kgs and 105 passengers (7875 Kgs). The load sheet did not contain any information regarding distribution of weight in each aircraft baggage compartment. The crew accepted the load sheet and signed it for acceptance. The load sheet proforma is placed at Appendix 'J'.

17.1.2. Trim Sheet. The Co-Pilot prepared the trim sheet based on the information provided on the Load Sheet by Chemech Aviation Staff. He calculated the C G and take-off weight i.e. 23.8% and 97650 Kgs respectively. Trim Sheet is placed at Appendix 'K'.

- 17.1.3. **Flight Data Recorder and CVR.** The read out of Flight Data Recorder and Cockpit Voice Recorder placed at Appendix 'F' and 'G' respectively indicates that the aircraft was serviceable in all respect at the time of departure, taxi and during take off from Runway 07 L at Karachi Airport. At 272 KPH the position of elevator changed from + 2.4 to -30.2 . At 293 KPH the take off abort actions were initiated and at 300 KPH reverse thrust were activated on engines N1 and N3. The read out of FDR and CVR indicated that Captain followed the correct abort procedure when the aircraft nose failed to lift off at 272 KPH .
- 17.1.4. **Agreements.** The relevant information obtained from various agreements made between the parties for the aircraft ground handling services and for the promotion of tourism between Kazakhstan and Pakistan is briefly mentioned in the subsequent paragraphs.
- 17.1.5 M/s Chemech Aviation (Pvt) Ltd., were granted permission for setting up of Ground Handling Facilities at QIAP Karachi by CAA vide their letter No. HQCAA/2833/212/Com dated 2nd June, 1992. The copy of License Agreement is placed at Appendix 'L'. The para 5 of License Agreement made at Karachi on 30th June, 1992 between CAA Karachi and Chemech Aviation says that the licensee shall employ QUALIFIED PERSONNEL and shall provide names and details of all business employees to the licensor at the time of commencement of the business. As per paras 12 and 12.1 of the License Agreement the licensee shall provide the services to the Airline as listed in Annex 'A' placed at Appendix 'L-2'. Section 3 of Annex 'A'

says "convey and deliver flight documents between the aircraft and appropriate airport buildings i.e. prepare, SIGN, distribute, clear and file as appropriate, documents, for example, LOADING INSTRUCTIONS, LOAD SHEETS, BALANCE SHEET, CAPTAIN'S LOAD INFORMATION and MANIFESTS, in accordance with local or international regulations".

17.1.6. M/S AL-KARAM (PVT) LTD., Karachi (a Travel Agency) made Ground Handling Agreement with M/S CHEMECH AVIATION (handling Company) dated 25th September, 1994. As per para 1.1.1. of the agreement the Chemech Aviation is required to provide service for load control, loading and off loading of baggage within the structural limit of the aircraft and baggage-hold capacity. The copy of agreement is placed at Appendix 'M'.

17.1.7. M/s SANAT Tourism Company and M/s Al-Karam Travels made an agreement on 13th October, 1994 to co-operate in promoting tourism between Almaty and Pakistan. As per para 7 and 8 of the agreement, M/s SANAT is responsible for sending minimum of 80 passengers with 20 Kgs free baggage allowance for each flight and to inform passengers that any baggage in excess of 20 Kg. will be charged at 03 US dollars/Kg in Karachi Airport. M/S AL-KARAM Travel is responsible for collection of excess baggage charges on departure from passengers and to make all endeavors to load total passenger baggage into the aircraft. The copy of agreement is placed at Appendix 'N'.

17.1.8. M/S SANAT Tourism and KARAGANDA Aviation made an agreement on 26th October, 1994 for the transportation of passengers, baggage and cargo by charter flights on TU-154 aircraft on Karaganda - Almaty - Karachi - Almaty - Karaganda route by Karaganda Aviation as per the requirements of the SANAT Tourism Company with maximum commercial loading of 16 Tons. As per para 3.1.4 of the agreement the "Carrier" (Karaganda Aviation) is responsible for insurance of aircraft and passengers, baggage and cargo, according to international traffic regulations. The copy of the agreement is placed at Appendix 'O'.

17.1.9. Insurance Policy. The Insurance Policy No.A1 9412684 obtained from the air crew of TU-154 aircraft No. UN-85455 revealed that the type of insurance was "Aviation Liability Insurance to cover the Insured's fleet of aircraft against Legal Liabilities in respect of THIRD PARTIES including Liability to Passengers, Baggage and Cargo legal Liabilities". As per this insurance Policy the aircraft is not insured against any loss or damage caused due to accident. This insurance policy expired on 14th January, 1995 i.e. before the date of accident on 21st January, 1995. The copy of Insurance Policy is placed at Appendix 'P'.

18. WITNESS

The following relevant information was obtained from the statements of Chemech Aviation Staff, Cockpit Crew, Cabin Crew, M/s Kazakhstan Airlines Operations Supervisor, Sanat Tourism and Al-Karam Travels.

- 18.1 Mr. Azam traffic assistant of Chemech Aviation stated that he prepared the manifest of 57 passengers who checked-in from his counter. In the manifest the name of passenger alongwith the number of pieces checked-in and total baggage weight (including hand baggage) was written. The total number of checked in pieces was 212 and their weight was 6861 Kg. The statement of Mr. Azam is placed at Appendix 'Q'.
- 18.2. Mr. Ashfaq Ahmed traffic assistant of Chemech Aviation said that he prepared the manifest of 47 passengers who checked-in from his counter. The number of pieces checked-in and total baggage weight (including hand baggage) was written on the manifest. However, the grand total of number of pieces checked-in and their total weight was not shown on the manifest because shift incharge directed him to proceed to departure lounge. The statement of Mr. Ashfaq and copy of manifest prepared by Mr. Ashfaq and Mr. Azam are placed at Appendix 'R' and 'S' respectively.
- 18.3. Mr. Mustafa Anis traffic assistant of Chemech Aviation said that the manifests prepared from two counters were handed over to him. The manifest prepared by Mr. Ashfaq did not indicate the total number of pieces and their weight, however, this information was given to him on a piece of paper. Subsequently, he passed on the information regarding total number of pieces and their weight to Mr. Shahid Jamil verbally. In reply to a question as to how did he calculate the total number of pieces and their weight before passing it to Mr. Shahid, he said that the information regarding total weight was actually calculated from the manifest, however, the figures regarding checked-in pieces was obtained from the baggage segregating staff. Therefore the exact figures passed on to Mr. Shahid was 455 pieces and 14183 Kg weight. The statement is placed at Appendix 'T'.

- 18.4. Mr. Zulfiqar Ahmed traffic assistant of Chemech Aviation said that he was required to count the number of baggage pieces being loaded on the aircraft under the supervision of load master of Kazakhstan Airline. A total of 332 pieces were loaded in the aircraft and this information was passed on to the main office. In reply to a question, who decided to load the total number of pieces in various baggage compartments, he said that this was decided by the cabin attendant No.4 (load master) and instructed us to stop loading after seeing the space in the baggage compartment. The statement of Mr. Zulfiqar is placed at Appendix 'U'.
- 18.5. Mr. Shahid Jamil traffic officer of Chemech Aviation said that after obtaining necessary details about baggage and passengers from the check-in staff he filled the load sheet showing 332 pieces of baggage weighing 7500 Kgs and 105 passengers. Since he does not possess license for preparing load sheet therefore, he did not sign it. The crew accepted the load sheet and signed it for acceptance. Initially the check-in staff gave him the total weight of 455 pieces weighing 14183 Kg including hand baggage weight which was 2500 Kg. Hence the check-in baggage weight was about $(14183 - 2500) = 11683$ Kg. After wards he was informed that 123 pieces could not be loaded due to space problem. Therefore, 4305 Kg $(123 \times 35 \text{ Kg})$ were subtracted from 11683 Kg which equals to 7378 Kg and was approximated to 7500 Kg. In reply to a question, as to why hand baggage weight of 2500 Kg was not added, he said that it is general practice that hand baggage weight is not shown in the load sheet. The statement of Mr. Shahid Jamil is placed at Appendix 'V'.
- 18.6. Mr. Nadeem traffic assistant of Chemech Aviation said the previous shift incharge handed over the passenger manifest, General Declaration and Cargo manifest. Whereas Mr. Shahid Jamil gave the four copies of the load sheet. He handed over the second copy of the load sheet to a person outside the aircraft after obtaining his signature. The statement of Mr. Nadeem is placed at Appendix 'W'.

- 18.7. Mr. Hyder Abbas traffic assistant of Chemech Aviation said that GD documents alongwith the manifest were handed over to the Captain personally by him in the cockpit at about 1030 Hrs. The statement of Mr. Hyder is placed at Appendix 'X'.
- 18.8. Mr. Rashid Qureshi Manager Chemech Aviation said that as per procedure when-ever charter flight from Kazakhstan is scheduled, the representatives of the airline from Almaty come to Pakistan to supervise the check-in of passengers and baggage handling. For this flight representative from Al-Karam was also present at the check-in counter. When all the passengers had checked-in the total number of pieces and total weight of the checked-in baggage and hand carried baggage is calculated. The information on load sheet was transcribed by Mr. Shahid Jamil, however, he did not sign it because he does not possess the requisite license. In reply to a question, as to how an unqualified person was allowed to prepare the load sheet he said that Mr. Shahid only provide information regarding total baggage weight and number of passengers on the load sheet. While answering another question, he said that Chemech Aviation should deploy qualified people for preparing load sheet and management has been informed about this deficiency. The statement of Mr. Qureshi is placed at Appendix 'Y'.
- 18.9. Gp. Capt. (Retd) Muhammad Yunus G.M. (Ops) Chemech Aviation said that as per the agreement signed between Chemech Aviation and M/s Al-Karam on 25th September, 1994, Chemech Aviation is responsible for handling all chartered flights of M/s Al-Karam. As per procedure our staff gave information regarding total baggage weight and number of passengers on load sheet proforma. However, person who wrote the information on load sheet did not sign it because he is not a qualified load control officer. While answering a question regarding loading of baggage within the structural limit of the aircraft and baggage hold capacity, he said that the baggage is loaded in the aircraft as directed by the aircraft crew member.

He also said in reply to another question that management is aware of the fact that the person filling the information on load sheet is not qualified load control person. The statement of Gp.Capt. (Retd) yunus is placed at Appendix 'Z'.

- 18.10 Captain Markachov Valeri of Kazakhstan Airline said that when passengers started boarding the aircraft, the ground staff of Chemech Aviation handed over the passenger manifest and load sheet in the cockpit. The co-pilot calculated the C.G position and take off gross weight. (23.8% and 97.7 tons respectively). The start taxi out and line up on runway 07 for take-off was normal. After brake release at 270 - 280 KPH he pulled the control column to lift the nose wheel but the aircraft did not respond and by this time aircraft had accelerated to 290 -300 KPH. At this stage he decided to abort and followed the abort procedure. However, the aircraft went into the over run area, the nose gear broke and aircraft forward nose area dragged on the ground for about 250 meters and finally stopped. While answering questions he said that the Flight Attendant No.4 (load master) is responsible for receiving and loading the cargo on the aircraft and co-pilot prepares the trim sheet. He also said that load sheet is prepared by the ground handling agent and its authenticity is not validated as we trust the handling agent. In reply to other questions he said that the co-pilot gives instructions to the load master for distribution of baggage in various compartments and total load in each compartment is approximated based on number of pieces in each compartment and total weight shown on the load sheet. Based on these approximated calculations the C-G is calculated. This off course is a wrong practice for which he said he has no explanation. The statement of Captain Valeri is placed at Appendix 'AA'.

- 18.11 The Co-Pilot Pakhomov Vladimir said that the load master reported to him that there were 332 pieces weighing approximately 7500 Kg. The baggage trolleys received at the aircraft did not have any weight sheet with them and the load put in various compartments was approximated. Once he received the load sheet from representative of Chemech Aviation he calculated the C-G and take-off weight (23.8% and 97650 Kg respectively). He had no explanation for following wrong practice of distributing total weight on total number of pieces equally and calculating the approximate weight in each compartment. The statement of Co-Pilot Vladimir is placed at Appendix 'AB'.
- 18.12 Mr. Lomter Victor Andreevich Deputy Commander of flight operations at Karaganda Airport said that as per the operating procedures it is the responsibility of the Co-Pilot to ensure correct distribution of load on the aircraft according to the information provided on the load sheet. In reply to a question he said the load sheets are not correctly prepared by Chemech Aviation as it does not indicate distribution of weight in various baggage compartments and this discrepancy went unchecked unintentionally. The statement of Mr. Andreevich is placed at Appendix 'AC'.
- 18.13 Mr. Rimer Victor the Squadron Commander of No.1 TU-154 said that after each flight the Captain of the aircraft hands over the flight documents to him and he reviews all the papers and if there is any discrepancy it is discussed with the crew. In reply to a question he said that we observed the discrepancies in the preparation of load sheets by the Chemech Aviation and they were discussed with the crew and briefed them to ensure that the load sheet is prepared properly. However, inspite of his repeated briefings to the Captains regarding proper procedure for filling the load sheet, the Chemech Aviation never filled the load sheets properly as per their responsibility. In reply to other questions he said that in the interest

of completing the mission the crew kept on accepting the incomplete load sheets and this matter was discussed with Mr. Egorov Ivan, Commander of the Karganda Air Team, who is presently in the hospital and now he is not working with the company for flying duties. The statement of Mr. Rimer Victor is placed at Appendix 'AD'.

18.14 Mr. Ayupov Marat Director SANAT Tourism said that on 26th October, 1994 an agreement for charter flights between Karachi and Almaty was signed between SANAT and KARAGANDA AVIATION for promoting tourism between Pakistan and Kazakhstan. In reply to questions he said that the representatives from Chemech Aviation, Sanat and Al-Karam Travel are present at the check-in counter at Karachi Airport and they ensure that all baggage weight is correctly entered in the documents. The representatives of SANAT and AL-KARAM receive the payment from passengers for excess baggage. The statement of Mr. Ayupov Marat is placed at Appendix 'AE'.

18.15 Mr. Jawed Akhter Director Al-Karam Travel Limited said that Al-Karam Travel is responsible for making all arrangements for receiving, despatching and handling of charter flights from Almaty to Pakistan. Al-Karam is also responsible for collection of excess baggage charges on departure from passengers. In reply to a question he said that the record of excess baggage is maintained by Chemech Aviation Staff and excess baggage charges are collected by Al-Karam and Sanat representatives. The statement of Mr. Jawed Akhter is placed at Appendix 'AF'.

19. OBSERVATIONS

19.1. The Civil Aviation Authority, Karachi issued a license to M/s Chemech Aviation for providing Aircraft Ground Handling Services at Karachi Airport. The para 5 of agreement says that "The Chemech Aviation shall employ the qualified personnel". However, the qualification of the personnel to be employed by the Chemech Aviation for the specialized jobs, like preparation of load sheet, was not specified.

- 19.2. As per license agreement the Chemech Aviation staff is required to prepare and sign the load sheet. Since the Chemech Aviation does not have any qualified person i.e. Flight Operations Officer, therefore, the load sheets prepared by Chemech Aviation are not being signed by any person.
- 19.3. The load sheet prepared by Chemech Aviation staff which do not contain any information regarding distribution of weight in each aircraft baggage compartment are being accepted by the aircrew.
- 19.4. The Chemech Aviation does not have qualified staff to perform the specialized task of loading the baggage within the structural limit of the TU-154 aircraft and its baggage-hold capacity as per their responsibilities.
- 19.5. The baggage is loaded in each aircraft baggage compartment as directed by the load master (Cabin Attendant No.4). The trim sheets are being prepared by Co-Pilot based on the number of pieces loaded in each baggage compartment and their approximate weight calculated on the basis of average weight of each baggage as per information given in load sheet, i.e. total number of pieces and their total weight.
- 19.6. The Chemech Aviation personnel on duty are not completing the paper work properly. This observation is supported by the following discrepancies noted during the investigation.
- 19.6.1. The total number of pieces checked-in and their total weight was not shown on the passenger manifest prepared by Mr.Ashfaq from his check-in counter, because shift incharge directed him to proceed to departure lounge.

- 19.6.2. The information regarding total number of baggage pieces checked-in was obtained from the baggage segregating staff i.e. 455 pieces. However, when Investigation Team calculated the total number of checked-in pieces from the information entered in the passenger manifest, the total number of checked-in pieces were 437 (see Appendix 'S'). Therefore, there was difference of 18 pieces between the information obtained from baggage segregation staff and entries made in the passenger manifest.
- 19.6.3. Since 123 pieces could not be loaded on to the aircraft, therefore, total number of pieces shown on the load sheet were $455 - 123 = 332$. However, when the total checked-in baggage was off loaded from the aircraft after the accident, there were 356 pieces which were off-loaded. Therefore, there was a difference of 24 pieces between the information given in the load sheet and actual number of baggage pieces loaded on the aircraft.
- 19.6.4. Each passenger is allowed to carry 5 Kgs of hand carried baggage. There were total of 105 passengers travelling on this aircraft and their hand carried baggage weight as calculated by Chemech Aviation Staff was 2500 Kgs. This weight was not included in the load sheet proforma prepared by Chemech Aviation Staff.
- 19.7. The Insurance Policy documents obtained from the aircraft revealed that the Third Party Insurance was valid upto 14th January, 1995 where as the accident occurred on 21st January, 1995. As per agreement the "Carrier" Karaganda Aviation was required to have an Insurance coverage for the lose or damage to aircraft. The third party insurance policy did not cover this liability.

- 19.8. The load sheet proforma prepared by Chemech Aviation staff had been signed by some person giving an indication that it had been signed by a person who had prepared the load sheet. However, during the investigation it could not be established as to who had signed it because, neither the Chemech Aviation Staff, nor the aircrew owned these signatures.
- 19.9. The original copy of the load sheet prepared by Chemech Aviation Staff was required to be produced for the purpose of investigation. However, the original copy of load sheet could not be traced by the Chemech Aviation.
- 19.10 The previous record of load sheets prepared by Chemech Aviation revealed that all load sheets had been prepared without any information regarding distribution of weight in each aircraft baggage compartment.

20. DISCUSSION AND ANALYSIS

- 20.1. Keeping in view the sequence of events leading to accident as described by the Captain of the aircraft and evidences obtained from various sources i.e. Flight Data Recorder, Cockpit Voice Recorder, statement of witnesses, documents and wreckage examination, the Investigation Team discussed the following aspects to determine the cause of the accident.
- 20.1.1. The analysis of aircraft Flight Data Recorder and Cockpit Voice Recorder revealed that all the three engines and aircraft flight control system were functioning satisfactorily and the aircraft was in proper configuration for take off when Captain decided to abort the take off as the nose wheel did not lift off when the Captain pulled the control column at 270 -280 KPH. It is therefore, concluded that the aircraft was fully serviceable at the time of accident.

20.1.2. Aircraft All Up Take Off Weight. As per trim sheet prepared by the Co-Pilot the aircraft all up take off weight was 97650 Kgs. This weight calculation was based on the load information provided by the Chemech Aviation Staff on the load sheet proforma. The C.G of 23.8% was calculated based on the number of baggage pieces loaded in each baggage compartment and their approximate weight calculated on the basis of average weight of each baggage piece. The calculation of total weight in each baggage compartment through this method would not have made much difference in the calculation of C.G, if the total baggage weight loaded on the aircraft was the same as shown on the load sheet.

20.1.3. Actual Aircraft All Up Take-Off Weight. The total checked-in baggage loaded on the aircraft, as revealed by the investigation team after re-weighing the off-loaded baggage, was 11348 Kgs. The weight of hand carried baggage, as calculated by the Chemech Aviation Staff at the time of check-in, was 2500 Kgs. Therefore, the total baggage loaded on the aircraft at the time of departure was $11348 \text{ Kgs} + 2500 \text{ Kgs} = 13848 \text{ Kgs}$. The total baggage loaded on the aircraft was 6348 Kgs over and above the baggage load shown on the load sheet (7500 Kgs). Therefore, the actual aircraft all up take off weight comes to $97650 \text{ Kgs} \text{ plus } 6348 \text{ Kgs} = 103998 \text{ Kgs}$.

20.1.4. Max Permissible Take-off Weight. The maximum permissible take-off weight for TU-154 B-2 aircraft is 98000 Kgs. Therefore, the aircraft weight at the time of take off was 5998 Kgs over and above the max permissible take-off weight. The take-off data as calculated by the Captain of the aircraft was based on 97650 Kgs., but the actual take-off weight was 103998 Kgs. Therefore, the aircraft performance under these over load conditions could not have been the same as calculated by the Captain. The excess load affected the C.G, V1 speed, nose wheel lift off speed and take off speed drastically. Because of these reasons the Captain had no choice but to abort the take off when the nose wheel did not lift off at the appropriate speed.

20.1.5. Aircrew Awareness of Excess Load.

20.1.5.1. Captain. The Captain of aircraft is responsible for the safety of passengers, aircrew, cargo and aircraft. A Captain of any aircraft will not take-off or attempt to take-off if its gross weight exceeds its maximum take-off weight, because it would severely effect the performance of the aircraft. He is also aware of the importance of proper distribution of the load so that the C.G of the aircraft remains within the limitations specified in its flight manual or certificate of Air Worthiness. It is therefore, quite possible that captain may not have been aware of the fact that the aircraft all up take-off weight is in excess of maximum permissible take-off weight. However, the captain, as per his statement, inspected the baggage for security and proper clipping before carrying out the pre-departure checks. Therefore, during the inspection of the baggage, the captain must have observed that the baggage compartments are fully loaded upto their maximum capacity. This observation is also supported by the fact that 123 baggage pieces could not be loaded due to space problem in the baggage compartments. Therefore, the

captain, based on his experience and the types of items generally being carried by the passengers of charter flights, should have shown some concern regarding the total weight of checked in baggage loaded on the aircraft vis-a-vis the total weight of baggage indicated on the load sheet. The captain, instead of challenging the authenticity of the load sheet prepared by Chemech Aviation, accepted it in the interest of mission accomplishment.

- 20.1.5.2. Load Master (Cabin Attendant No.4). The cabin attendant No.4 who is not a qualified load master was given the responsibility of receiving and loading the cargo on the aircraft. He was required to count the number of baggage pieces being loaded on the aircraft. After baggage was loaded in 1st and 2nd baggage compartment he was informed by the representative of SANAT Tourism that total weight of baggage would be about 7500 Kgs. The rest of the baggage was loaded in the forward cabin compartment. As per his statement 332 pieces of baggage were loaded in the aircraft, whereas the Investigation Team found out after the accident that 356 pieces were loaded on the aircraft. This indicates that the load master (cabin attendant No.4) was not performing his duties properly and he was just accepting the passenger baggage and loading it into the aircraft baggage compartments upto their maximum capacity. The load master should have also realized that the total baggage being loaded in the aircraft appears to have more weight than what was communicated to him (7500 Kg) and should have informed the captain/co-pilot accordingly.

23.1.5.3. **Co-Pilot.** The Co-Pilot is responsible for calculating the Centre of Gravity position and take-off gross weight based on the load sheet information. The Co-Pilot was aware of the fact that the baggage trolleys received at the aircraft did not have any weight sheet with them and the load sheet also did not contain any information regarding distribution of weight in each baggage compartment. He accepted the incomplete load sheet in the interest of mission accomplishment and calculated C G position

based on number of baggage pieces loaded in each compartment and their approximate weight calculated on the basis of average weight of each baggage piece. The Co-Pilot who is equally responsible for the safety of passengers and aircraft should have ensured that the information provided on the load sheet is complete in all respect and corresponds to the actual load put on the aircraft.

20.1.6. **Possible Causes of Over Loading.** The Investigation Team discussed the following possible causes of over loading of the aircraft at the time of departure from Karachi Airport.

20.1.6.1. **Weighing Scale Under Reading.** The weighing scales used by the Chemech Aviation Staff at the time of check-in of passengers were checked for their accurate reading. Both the scales used for weighing the passengers baggage were found to be serviceable. The same scales were used for re-weighing the passenger baggage which was off-loaded after the accident. Therefore, the possibility of weighing scale under reading as a cause of over loading of the aircraft is ruled out.

20.1.6.2. **Method Used for Weight Calculation.** The Chemech Aviation Staff prepared the load sheet by following a highly unprofessional method. The baggage weight calculation process started from the total number of baggage pieces checked-in (455) by all the passengers and their total weight (14183 Kgs) including the hand baggage weight. Since 123 baggage pieces could not be loaded on to the aircraft due to space problem, therefore the total weight of 123 baggage pieces was approximated on the basis of average weight of each baggage i.e. $123 \times 35 \text{ Kgs} = 4305 \text{ Kgs}$ and subtracted it from total weight i.e. $14183 \text{ Kgs} - 4305 \text{ Kgs} = 9878 \text{ Kgs}$. The Chemech Aviation Staff while preparing a load sheet should have shown at least 9878 Kgs. as total weight of passenger baggage loaded on the aircraft. However, for some reason Chemech Aviation Staff further subtracted 2500 Kgs. (hand carried baggage weight) from 9878 Kgs and prepared the load sheet accordingly. It appears that the statements have been tailored to match the information given in the load sheet. Although the method used for weight calculation is not correctly applied to determine the baggage weight loaded on the aircraft, but it still does not answer the question as to how the actual weight (11348 Kgs.) of checked-in baggage pieces loaded on the aircraft was much more than what was calculated by Chemech Aviation Staff.

20.1.6.3. Improper Weighing. The total weight of checked-in baggage loaded on the aircraft, as discovered by the Investigators during re-weighing of the off-loaded baggage, was 11348 Kgs. The weight of hand carried baggage as determined by Chemech Aviation Staff was 2500 Kgs. Therefore, the total baggage weight loaded on aircraft was 13848 Kgs. However, the total baggage weight indicated in the load sheet was only 7500 Kgs. During the investigation it was revealed that the representatives from Chemech Aviation, M/s SANAT Tourism and M/s Al-Karam Travels were present at the check-in counters at Karachi Airport to ensure that the baggage weight is correctly entered in the documents. The representatives from M/s SANAT and M/s Al-Karam also received the payment from passengers for their excess baggage (20 Kgs free baggage allowance). As per agreement between M/s SANAT Tourism and Karaganda Aviation, M/s SANAT is permitted to carry maximum commercial loading of 16000 Kgs. (Passengers and cargo weight). Keeping in view the conditions of the agreement the Investigators are of the opinion that the load sheet was prepared to reflect the total commercial loading less than 16000 Kgs i.e. 15375 Kgs. (baggage weight 7500 Kgs and passenger weight 7875 Kgs). The representatives from Chemech Aviation, Sanat Tourism and Al-Karam Travels present at the check-in counter were certainly aware of the commercial loading limits. However, keeping in view their own commercial interest of excess baggage charges, the exact weight of passengers baggage was not reflected properly in the documents prepared by Chemech Aviation Staff. Therefore, the cause of over loading of the aircraft at the time of departure is improper weighing of passengers baggage at the time of check-in of passengers.

CONCLUSIONS

21. FINDINGS

- 21.1. From the foregoing investigation and analysis the Investigators find that:-
- 21.1.1. Kazakhstan Airline aircraft TU-154 B-2 Reg.No.UN-85455 FLT No.KZA 1940 was scheduled to operate as chartered flight from Karachi to Almaty on 21st January, 1995
 - 21.1.2. During take-off roll when the nose wheel did not come up at the appropriate speed, the captain decided to abort the take-off at 290 - 300 KPH and the aircraft over shot the Runway 07 L by 1500 feet.
 - 21.1.3. All 105 Passengers and 12 crew members on board the aircraft were safe.
 - 21.1.4. TU-154 B-2 aircraft nose landing gear wheel well and forward fuselage under surface skin sustained extensive damage as a result of the accident.
 - 21.1.5. The aircraft was fully certificated and had been maintained to the laid down standards.
 - 21.1.6. The pilots were properly certificated and authorized for the flight. Captain Markachov Valeri holding valid Pilot License No.010656 was the Pilot-in-Command and captain Pakhomov Vladimir holding valid Pilot License No.010668 was the Co-Pilot.
 - 21.1.7. The aircraft taxied out at 1237 Hrs (PST) for departure from Runway 07 L. During take-off roll when captain attempted to lift the nose wheel at 270 - 280 KPH the aircraft nose did not come up.
 - 21.1.8. At 290 - 300 KPH the captain aborted the take-off and followed the correct abort procedure, but the aircraft could not be stopped within the remaining runway length due to high speed abort.
 - 21.1.9. The aircraft flight control system and all the three engines were functioning satisfactorily and aircraft was in proper configuration for take-off.

- 21.1.10. The load sheet prepared by Chemech Aviation (Ground Handling Company) staff indicated that there were 332 pieces of baggage weighing 7500 Kgs and 105 passengers (7875 Kgs). The load sheet did not contain any information regarding distribution of weight in each aircraft baggage compartment. This load sheet was not signed as the Chemech Aviation does not have any qualified person to sign it.
- 21.1.11. The crew accepted the incomplete load sheet and Co-Pilot prepared the Trim Sheet and calculated the C.G. and take-off weight i.e 23.8% and 97650 Kgs respectively, based on the information provided on the load sheet by Chemech Aviation Staff.
- 21.1.12. The C.G of 23.8% was calculated based on the number of baggage pieces loaded in each baggage compartment and their approximate weight calculated on the basis of average weight of each baggage piece.
- 21.1.13. The actual number of checked-in baggage pieces loaded on the aircraft and their weight, as revealed by the investigators, were 356 pieces weighing 11348 Kgs.
- 21.1.14. The weight of hand carried baggage as calculated by Chemech Aviation Staff was 2500 Kgs.
- 21.1.15. The total baggage loaded on the aircraft at the time of departure was 13848 Kgs., but the baggage load shown on the load sheet was only 7500 Kgs.
- 21.1.16. The weight of excess baggage loaded on the aircraft was 6348 Kgs.
- 21.1.17. The actual aircraft all up take-off weight was 103998 Kgs. vis-a-vis the trim sheet all up take-off weight calculation of 97650 Kgs.
- 21.1.18. The max permissible take-off weight for TU-154 B-2 aircraft is 98000 Kgs. Therefore, the aircraft weight at the time of take-off was 5998 Kgs over and above the max permissible take-off weight.
- 21.1.19. The over loading of aircraft adversely affected the performance of the aircraft and captain had no choice but to abort the take-off when the nose wheel did not lift-off at the appropriate speed.

- 21.1.20. The representatives from M/s SANAT Tourism Company Almaty and M/s Al-Karam Travels (Pvt) Limited, Karachi were present at the check-in counter at Karachi Airport to ensure that the baggage weight is correctly entered in the documents prepared by the Chemech Aviation Staff. These representatives also receive the payment from passengers for their excess baggage.
- 21.1.21. As per agreement between M/s SANAT Tourism and Karaganda Aviation Almaty, M/s SANAT is permitted to carry maximum commercial loading of 16000 Kgs. Therefore, the load sheet was prepared to reflect the total commercial load less than 16000 Kgs.
- 21.1.22. The representatives from M/s SANAT Tourism and M/s Al-Karam Travels present at the check-in counter were certainly aware of the commercial loading limits. However, keeping in view their own interest of collection of excess baggage charges, the exact weight of passengers baggage was not reflected properly in the documents prepared by Chemech Aviation Staff.
- 21.1.23. The cause of over loading of the aircraft at the time of departure was a deliberate attempt by the supervisory staff to record a lower total weight to keep within the 16000 Kgs weight limit.
- 21.1.24. The captain inspected the baggage for security and proper clipping. The aircraft baggage compartments were loaded upto their maximum capacity. The captain, based on his experience and knowledge about the types of items generally being carried by the passengers of charter flight did not show any concern regarding the total baggage loaded on the aircraft. The captain, instead of challenging the authenticity of the load sheet, accepted it in the interest of mission accomplishment.
- 21.1.25. The cabin attendant No.4 who is not a qualified Load Master was given the responsibility of receiving and loading the cargo on the aircraft. He was accepting the baggage and loading it into the aircraft baggage compartments upto their maximum capacity. He did not realize that total baggage being loaded in the aircraft appears to have more weight than what was communicated to him by the representative of M/s SANAT Tourism.

- 21.1.26. The aircraft had only Third Party Insurance Policy which was valid upto 14th January, 1995. The carrier was required to have an insurance coverage for the loss or damage to aircraft. The Third Party Insurance Policy did not cover this liability.
- 21.1.27. As a result of this accident two approach lights were damaged. The cost of repair of damaged runway facilities is Rs.65,600.00 (Rupees Sixty Five Thousand Six Hundred Only).
- 21.1.28. The Parking and housing charges of TU-154 aircraft at Karachi Airport will be US \$ 384.16 per day wef 21st January, 1995.
- 21.1.29. Meteorological conditions and Airport facilities were not a causal factor in the accident.

22. CAUSES OF THE ACCIDENT

- 22.1. From the analysis of the available evidence the Board is of the opinion that the cause of the accident to Kazakhstan Airline TU-154 B-2 aircraft No.UN-85455 FLT No.KZA-1940 scheduled to operate as chartered flight on 21st January, 1995 was due to over loading of the aircraft by 6348 Kgs over and above the Aircraft All Up Take-Off Weight of 97650 Kgs calculated on the basis of load information given in the load sheet prepared by Chemech Aviation in consultation with the representatives of M/s SANAT Tourism and M/s Al-Karam Travels. The load sheet did not reflect the actual weight of passengers baggage loaded on the aircraft at the time of departure. The over loading of aircraft resulted in exceeding the Max Permissible Take-Off Weight for TU-154 aircraft which adversely effected the performance of the aircraft during take-off. Therefore, the captain had no choice but to abort the take-off at high speed when nose wheel did not lift off at the appropriate speed.
- 22.2. Contributing factors to the cause of accident are:-
 - 22.2.1 The captain even after having observed the amount of baggage loaded in the aircraft baggage compartments did not show any concern regarding the total weight of baggage loaded on the aircraft. The captain, instead of challenging the authenticity of the load sheet, accepted it in the interest of mission accomplishment.

22.2.2 The Co-Pilot accepted the incomplete load sheet which did not contain any information regarding distribution of weight in each baggage compartment. He calculated the C.G position based on number of baggage pieces loaded in each compartment and their approximate weight calculated on the basis of average weight of each baggage. He followed a wrong procedure for C.G calculation by accepting incomplete load sheet.

22.2.3 The Load Master did not count properly the number of baggage pieces loaded on the aircraft. He was just accepting the passenger baggage and loading it into the aircraft baggage compartments upto their maximum capacity. He did not realize that the baggage loaded on the aircraft appears to have more weight than what was communicated to him by the representative of M/s SANAT Tourism i.e. 7500 Kgs and should have informed the Captain or Co-Pilot accordingly.

23. RECOMMENDATIONS

- 23.1. The Board make the following recommendations based on the observations and findings.
- 23.2. Director Airport Management, Civil Aviation Authority, Karachi while granting permission to establish Aircraft Ground Handling Services by private agencies should specify the qualifications of the personnel to be employed by the Ground Handling Agencies for the specialized jobs like preparation of load sheet and loading the baggage within the structural limit of the aircraft and its baggage hold capacity.
- 23.3. M/s Chemech Aviation (Pvt) Ltd., should ensure that all personnel detailed to perform the duties at the time of check-in of passengers are completing all the formalities properly and correct weight of passengers baggage is reflected in the documents prepared before the aircraft departure.
- 23.4. M/s Chemech Aviation should ensure that passengers hand carried baggage in excess of 5 Kgs (free allowance for each passenger) is reflected in the load sheet.
- 23.5. M/s Kazakhstan Airline should brief all the pilots to ensure that the load sheet and other travel documents are complete in all respect before accepting them.

- 23.6. M/s Kazakhstan Airline should brief all the Co-Pilot that the Centre of Gravity position is calculated based on the exact load distribution in each baggage compartment of the aircraft.
- 23.7. M/s Kazakhstan Airline should brief all the Captains that they must ensure that the baggage loaded on the aircraft corresponds to the baggage load reflected in the load sheet.
- 23.8. M/s Kazakhstan Airline should detail a qualified Load Master for all charter flights being operated by them to ensure that the baggage is loaded properly.
- 23.9. M/s SANAT Tourism and M/s Al-Karam Travels should ensure that their representatives present at the check-in counter at Karachi Airport are performing their duties properly and passenger baggage weight is reflected correctly in the documents prepared by Chemech Aviation Staff.
- 23.10. Before renewing the License Agreements made between the Civil Aviation Authority, Karachi and all Aircraft Ground Handling Agencies including Chemech Aviation, the Director Airport Management, CAA should ensure that qualified personnel are employed by the Ground Handling Agencies for the specialized tasks being performed by them.
- 23.11. M/s Kazakhstan Airline should pay Rs.65,600.00 (Rupees Sixty Five Thousand Six Hundred Only) to Civil Aviation Authority, Karachi for the cost of repair of damaged runway facilities and parking/housing charges of TU-154 at Karachi Airport at the rate of US \$ 384.16 (US Dollars Three Hundred Eighty Four and Sixteen Cents Only) per day wef 21st January, 1995.