

INVESTIGATION REPORT ON THE FORCED LANDING
INCIDENT TO DEPARTMENT OF PLANT PROTECTION
CESSNA-185 AIRCRAFT AG-CARRYALL BEARING
REG. MK. AP-AYC WHICH OCCURRED AT DHARKI
AIRSTRIIP ON 29.9.1983 AT 11:30 HRS.

AUTHORITY : Director General, Civil Aviation
Authority Memorandum No: HQ CAA/
1901/24/FS, dated 29.9.1983.

1. Aircraft Information:

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| 1.1 Aircraft type and
Manufacturers Serial No: | Cessna AG Carryall,
No: 18502764. |
| 1.2 Registration Marks: | AP-AYC. |
| 1.3 Engine installation and
manufacturer serial No: | Continental front mounted
No:559748. |
| 1.4 Certificate of Registration | Valid. |
| 1.5 Certificate of Airworthiness | Valid. |
| 1.6 Date of construction | 1976. |
| 1.7 Total hours flown | 784.50. |
| 1.8 Total Engine hours | 784.50. |

2. Crew Information:

2.1 Pilot-in-Command:

- | | |
|-----------------------------------|-----------------------------------|
| 2.1.1 Name | Mr. Shahid Ali Muzaffar. |
| 2.1.2 Licence held
and No: | Commercial Pilot Licence.
777. |
| 2.1.3 Date of Birth | 3.3.1951. |
| 2.1.4 Total flying
experience | 1200 hours. |
| 2.1.5 Total in command | Over 900 hours. |
| 2.1.6 Total in command
on type | Approximately 90 hours. |
| 2.1.7 Flight Instructor
rating | Fletcher and Beaver |

2.2 Passenger:

- | | |
|---|--|
| 2.2.1 Name | Mr. S.I.H. Rizvi. |
| 2.2.2 Profession | Operational Pilot with
the Department of Plant
Protection. |
| 2.2.3 Purpose on board
the aircraft. | To show the locust infested
area to the operating Pilot. |

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3. History of Flight:

- 3.1 Mr. Shahid Ali Muzaffar holder of Commercial Pilot Licence No:777, employed by the Department of Plant Protection as an Operational Pilot. He was on tour to Rahim Yar Khan in connection with operational requirements. He received orders from his Headquarters to proceed to Dharki on the 29th September, 1983. On arrival at his destination he was to carry-out spray of the locust infested area.
- 3.2 In accordance with instruction received, Mr. Shahid Ali Muzaffar arrived Dharki on the morning of 29th September, 1983. Mr. Khurshid Akber, Senior Aircraft Engineer had also accompanied him to provide technical coverage to the aircraft.
- 3.3 Pesticide was loaded in the aircraft by the Plant Quarantine Inspector. After loading the pesticide, the Pilot of this aircraft started engine of Cessna A.G. Carryall to proceed on his mission. He also requested Mr. S.I.H.Rizvi, a Pilot based at Dharki, to accompany him to show to him the area to be sprayed.
- 3.4 Reaching a speed of 60 Miles per hour during take-off roll, the Pilot tried to unstick but the aircraft failed to get airborne. He commanded Mr. Rizvi, occupying the right hand seat, to dump the pesticide by pulling the dump lever.
- 3.5 Noticing the end of the runway approaching, the Pilot applied backward pressure on the control column to lift the aircraft up in the air. As a result of this action the aircraft got airborne. However it could not maintain rate of climb or a level attitude due to low speed. Noticing this, the Pilot decided to make a forced landing.

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3.6 The Pilot turned the aircraft approximately 20 degrees to the left towards a small field. The aircraft sank and settled down in this field. There was no damage to the aircraft. No one was injured or killed.

4. Injury to occupants:

4.1 Both the occupants were un-hurt.

5. Damage to the Aircraft:

5.1 The aircraft sustained no damage.

6. Other damage:

6.1 No other damage.

7. Meteorological condition:

7.1 Weather condition was fair with high ambient temperature.

7.2 Weather was not a factor.

8. Radio Aids to Navigation:

8.1 There are no Radio Aids to Navigation provided at Dharki.. It was a V.F.R. operation.

8.2 Radio Aids to Navigation were not a factor in this incident.

9. Communication:

9.1 There are no V.H.F. R/T facilities at this airstrip.

9.2 Radio communication was not a factor in this incident.

10. Aerodrome Facilities:

10.1 Not a factor in this incident.

11. Flight Recorders:

11.1 Not fitted nor required to be fitted.

12. Wreckage:

- 12.1 This aircraft was visited at the site of the incident. It was identified as AG Carryall bearing Nationality & Registration Marks AP-AYC (Appendix - F1, F2 & F3).
- 12.2 The wheels of the main landing gear were partially stuck in the mud. (Appendix 4, 5 & 6) The field in which the aircraft forced landed, had a soft surface. Due to this fact the aircraft stopped after covering a short distance (Appendix - F7 & F8).
- 12.3 Inspection of the aircraft was carried out in the presence of Mr. Shahid Ali Muzaffar and Mr. Khurshid Akber, Senior Engineer, Department of Plant Protection. No visible damage was noted.
- 12.4 The under surface of the aircraft could not be inspected due to very little space available between the belly of the aircraft and the ground under the belly (Appendix F1). This was due to the fact that both main wheels of this aircraft had partially sunk into mud. It was therefore decided to remove the aircraft to a level position for inspection.
- 12.5 After the aircraft was removed from its bogged position, the under surface and the landing gear were inspected. No damage was noted.

13. Fire:

- 13.1 No fire occurred during or after the occurrence.

14. Survival:

- 14.1 The occupants disembarked through normal aircraft exits without encountering any difficulty.
- 14.2 It was a survivable incident.

15. Test & Research:

15.1 Cessna AG Carryall gets airborne at a speed of 60 Miles Per Hour. Should the aircraft fail to lift off at this speed and Pilot elects to dump the pesticide to reduce the load, it takes a minimum of 8 to 10 seconds from the time of taking the decision and the opening of dump valve. It would therefore mean coverage of a ground distance of over 880', 88' per second being the speed of the aircraft. It would therefore mean consuming ^{the} rest of the runway before discharge of pesticide starts. It is an opinion that dumping process would not help reducing the load in time in a situation like this.

15.2 In the other two types of aircraft owned by the Department of Plant Protection, Beaver & Fletcher, the circumference of dump valve is bigger. This allows discharge at a much higher rate. Therefore if such a situation had developed during operation of Beaver or Fletcher, the Pilot would have got rid of the extra load and possibly managed to get airborne before reaching the end of the runway.

16. Observations:

16.1 Nil. - -

17. Investigations:

17.1 This incident was reported to Safety Investigation Board at 1215 P.S.T. on the day of incident. After informing the acting D.G. C.A.A. through Airport Manager, Islamabad the Investigator Incharge left at 2.P.M. by Cessna-185, owned by the Dept. of Plant Protection. The Investigator arrived Dharki at 1700 hours. A quick look was taken at the aircraft.

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However, the Investigator left for Sukkur at 1730 hours because night stop facilities were not available at Dharki.

17.2 The Investigator returned to Dharki at 0830 hours the next morning. He visited the aircraft at site, took photographs and prepared site diagram. Only those photographs have been used in this report which were considered necessary.

Statements of the Pilot-in-Command, the Second Pilot, the Senior Aircraft Engineer and the Plant Quarantine Inspector were recorded.

18. Witnesses:

18.1 Statements of the following were recorded :-

18.1.1 Mr. Shahid Ali Muzaffar Operational Pilot Deptt. of Plant Protection. Pilot-in-Command of AP-AYC. (App. 'B').

18.1.2 Mr. S.I.H. Rizvi, Operational Pilot, Deptt. of Plant Protection. Passenger on board this flight. (App. 'C')

18.1.3 Mr. Mirza Ilyas Baig Plant Quarantine Inspector. (App. 'D')

18.1.4 Mr. Khurshid Akber Senior Engineer. (App. 'E').

19. Discussions:

19.1 Mr. Shahid Ali Muzaffar holder of C.P.L. No:777 was detailed by the Department of Plant Protection to carry-out aerial spray of the area North East of Dharki. On the morning of 29th September, 1983 he arrived Dharki from Rahim Yar Khan. Mr. Khurshid Akber, Senior Aircraft Engineer of the Department of Plant Protection also arrived with him in the same aircraft to provide aircraft maintenance coverage.

19.2 On arrival at the Dharki base, the Pilot was received by Mr. Mirza Ilyas Baig, Plant Quarantine Inspector, who was posted at this base to supply pesticide to the aircraft owned by his employer. This was the first assignment of Mr. Ilyas Mirza after reassignment to this job. Five years earlier he had completed his tenure on a similar assignment. (App. 'D').

- 19.3 Mr. Mirza Ilyas Baig, the Plant Quarantine Inspector inquired from Mr. Mazaffar as to how much pesticide would be needed for the sorty. Mr. Muzaffar the Pilot indicated one barrel by raising one finger and also said one barrel, and this has been confirmed by witnesses. The Plant Quarantine Inspector, however, misunderstood and thought that he was requested to supply 100 gallons and consequently loaded this amount thus overloading the aircraft.
- 19.4 In such missions the pesticide supplied is in barrels and not in gallons. The Pilot used to phraseology of barrels, perhaps chose to speak 'one' and also confirmed it by a visual signal, which was misunderstood by Mr. Mirza Ilyas Baig.
- 19.5 In this aircraft there is no gauge or any other method to ascertain the quantity of pesticide loaded. However when the Pilot was informed that the aircraft was loaded he entered the cockpit and occupied the left hand seat. Mr. Rizvi, an Operational Pilot with the same organization, occupied the right hand seat. Being familiar with the terrain Mr. Rizvi was requested by the Pilot-in-Command to accompany him on this mission to show him the area to be sprayed.

- 19.6 The Pilot-in-Command after carrying-out checks, started the engine. He lined up the aircraft on the runway and commenced the take-off roll. Reaching a speed of 60 M.P.H., the Pilot attempted to unstick but the aircraft failed to get airborne. At this time the Pilot noticed that only 1200 feet of the runway was left. He also realized that the aircraft was heavy and perhaps it would not leave the ground. He therefore commanded the second Pilot to operate the pesticide dumping lever. On receipt of instructions from the Pilot-in-Command, the Second Pilot pulled the dumping lever.
- 19.7 Evidence at the site indicated that the dump valve fully opened little before the aircraft came to rest (App. F2 & F7). The distance from the time the Pilot decided to dump the pesticide and the position where the aircraft came to rest, was approximately 1000' (App. F9).
- 19.8 At a speed of 60 M.P.H. ground distance covered is 88 feet/second. The aircraft would therefore take 11.36 seconds to cover 1000'. It is likely that operation of dump valve which is a mechanical system may take 8 to 10 seconds after the dump lever is operated to be fully operative to discharge pesticide. The dump valve opening is also small on this aircraft. It would therefore restrict the out flow of liquid from the tank. Due to this fact, the pesticide flow did not take place till the aircraft had left the runway. The weight of the aircraft therefore did not reduce at the required time.

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19.9 The Pilot realizing that he was unable to take-off jerked the elevator control backward. By doing so he intended to force the aircraft up in the air. His intention was to skip the canal flowing immediately after the end of the runway (Appendix F10). As desired, the aircraft responded to the back pressure on the elevator control and it got airborne momentarily. In this manoeuvre the aircraft also started losing forward speed.

19.10 Once airborne, the Pilot familiar with the terrain, adjacent to the airstrip, steered the aircraft approximately 20 degrees to the left of the runway heading, to force land in an open space. As the aircraft was losing speed it started to sink being in semi stalled condition. It settled down in the open space to the left of the runway end. (App. F3, F7 & F9). The aircraft had no visible damage. No one was injured.

19.11 Weight of aircraft:

19.11.1 Authorised weight:

19.11.1.1	Empty weight of this aircraft.	1989 Lbs.
19.11.1.2	Fuel 77 U.S. Gallons	444 Lbs.
19.11.1.3	Oil 12 U.S. Gallons	22 Lbs.
19.11.1.4	Crew One	125 Lbs.
19.11.1.5	TOTAL:	2580 Lbs.
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19.11.1.6	Maximum gross take-off weight	3350 Lbs.
19.11.1.7	Essential	2580 Lbs.

PAY LOAD: 770 Lbs.
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19.12.2 Actual load on board the aircraft:

19.12.2.1	Pesticide 100 Gallons	1000 Lbs.
19.12.2.2	One Extra crew member	125 Lbs.
	TOTAL:	1125 Lbs.
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19.11.3 Over loading:

19.11.3.1	Actual load on the Aircraft.	1125 Lbs.
19.11.3.2	Pay load available	<u>770 Lbs.</u>
19.11.3.3	Over loading	<u>355 Lbs.</u>
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19.11.4 Over load in percentage:

19.11.4.1 The aircraft was over loaded by 46.10% of pay load and by 10.60% of maximum gross weight.

19.11.5 The aircraft was parked near the threshold, therefore no fuel was consumed during taxiing.

19.12 With the percentage loading worked out in the preceding para it was not possible for the aircraft to get airborne. Had the aircraft been loaded with one barrel of pesticide, the load would have been as under:

19.12.1	Pesticide one barrel (45 Gallons)	450 Lbs.
19.12.2	One Extra crew member	<u>125 Lbs.</u>
	TOTAL:	<u>575 Lbs.</u>
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19.12.3 The aircraft with the loading of 575 Lbs. would have been well within the permissible max. gross weight.

20: Findings:

- 20.1 The aircraft was properly certificated and was airworthy.
- 20.2 The Pilot held a valid Commercial Pilot Licence with Cessna AG Carryall endorsed in Group 1.
- 20.3 The accident was not caused due to any mechanical fault.
- 20.4 Runway was sufficient for take-off.
- 20.5 The aircraft was over loaded by 46.10% of pay load and 10.60% of maximum gross weight. This over-loading was caused due to misunderstanding by Mr. Mirza Ilyas Baig who understood the Pilot's signal for one barrel to be for 100 gallons.
- 20.6 The Aircraft could not get airborne due to over-loaded condition.

- 20.7 Pilot attempted to dump pesticide during take-off roll to reduce the aircraft load. Pesticide dumping commenced late, which was shortly before the aircraft came to rest.
- 20.8 Circumference of the out flow valve on pesticide tank is small and will not permit the pesticide to drain with the speed needed during the take-off run.
- 20.9 There is no gauge to show the amount of pesticide loaded in the aircraft tank.
- 20.10 The aircraft would have got airborne had the pesticide been dumped partial or fully when attempt was made.
- 20.11 Under the circumstances the Pilot made a correct decision which saved the aircraft and persons on board.

21. Cause:

The aircraft forced landed after getting airborne momentarily when it could not sustain climb or level attitude due to over-load conditions.

22. Recommendations:

- 22.1 Only one term gallons or litre must be used when loading the aircraft with pesticide to avoid misunderstanding. (Instructions have already been issued).
- 22.2 Weight and balance proforma be introduced for calculation load on aircraft. (This is being done).
- 22.3 Operators to direct their ground party to inform the pilot before departure, weight of the pesticide loaded in case gauge to show quantity of pesticide is not fitted or is inoperative on the aircraft.
- 22.4 Operator should study method/modification where by the pesticide could be dumped during take-off roll on runways having critical length.

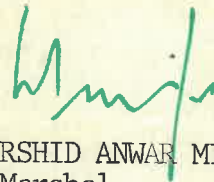
Dated: 31st March, 1984


(CAPTAIN FARMANUDDIN)
INVESTIGATOR IN-CHARGE

31/3/84

OBSERVATIONS OF DIRECTOR GENERAL, C.A.A.

1. I have gone through the Investigation Report in respect Cessna AG Carryall **type** of aircraft bearing Nationality & Registration Marks AP-AYC which forced landed near Dharki on the 29.9.1983.
2. I agree with the findings and recommendations made by the Investigating Officer. These be implemented immediately.



(KHURSHID ANWAR MIRZA)
Air Marshal,
DIRECTOR GENERAL,
CIVIL AVIATION AUTHORITY