AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

			Reference:			CA18/2/3/10387	
Aircraft Registration	ZS-OKN	**Date of Accident**		1 November 2023		**Time of Accident**	1309Z
Type of Aircraft	Beechcraft B1900 D		**Type of Operation**			Air Transport Operations (Part 135)	
Pilot-in-command Licence Type	Commercial Pilot Licence (CPL)		**Age**	33		**Licence Valid**	Yes
Pilot-in-command Flying Experience		**Total Flying Hours**		2 700		**Hours on Type**	1 650
First Officer Licence Type	Commercial Pilot Licence (CPL)		**Age**	39		**Licence Valid**	Yes
First Officer Flying Experience		**Total Flying Hours**		2 298.3		**Hours on Type**	1 526
Last Point of Departure	Bram Fischer International Airport (FABL), Free State Province						
Next Point of Intended Landing	Port Elizabeth Airport (FAPE), Eastern Cape Province						
Damage to Aircraft	Substantial						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
Port Elizabeth Airport (FAPE) apron at GPS co-ordinates determined to be 33˚59'02.62" South 025˚36'49.02" East, at an elevation of 196 feet (ft)							
Meteorological Information	Surface wind: 110º/16 kts, temperature: 20ºC; dew point: 14ºC; Visibility: CAVOK						
Number of People On-board	2 + 1	**Number of People Injured**	0	**Number of People Killed**	0	**Other (On Ground)**	0

Synopsis

On Wednesday, 1 November 2023, two pilots and a passenger who was serving as custodian of the dangerous goods (DG) on-board a Beechcraft B1900D aircraft with registration ZS-OKN were on a cargo flight from Bram Fisher International Airport (FABL) in Bloemfontein, Free State province, to Port Elizabeth Airport (FAPE) in the Eastern Cape province with the intention to later fly to Lanseria International Airport (FALA) in Gauteng province. The flight was conducted under instrument flight rules (IFR) by day and under the provisions of Part 135 of the Civil Aviation Regulations (CAR) 2011 as amended.

The aircraft was carrying cargo (DG) which comprised toxic UN2922 corrosive chemical that was stored in 20-litre (l) containers. The aircraft took off from FABL and landed safely at FAPE. During taxi, the cabin and cockpit filled with fumes and smoke due to the chemical leak. The pilot-in-command (PIC) reported that he and the first officer (FO) opened the direct-vision (DV) windows and stuck out their faces to get fresh air. The PIC stopped the aircraft at the apron situated east of the general aviation (GA) hangars before he shut down the engines. During the off-loading of the cargo, a container that had a leak was identified as the DZUS fastener had pierced its bottom; the fastener, which secured the floorboards, had come loose. No drip trays or pallets were used during the loading of chemicals. The chemical that leaked reacted with the floorboard material after a few days, which caused substantial corrosion damage to the wing spars, the floor rails and the underbelly of the aircraft. The aircraft was assessed by the manufacturer/operator and was declared unsafe, and thus, a constructive total loss or a write off.

Probable Cause

A DZUS fastener punctured one of the containers containing a corrosive chemical which leaked and seeped underneath the cabin floorboards, subsequently causing substantial corrosive damage to the main wing spars and the underbelly structure of the aircraft.

SRP date	8 October 2024	Publication date	9 October 2024

Occurrence Details

Reference Number	**:** CA18/2/3/10387
Occurrence Category	**:** Accident (Category 1)
Type of Operation	**:** Air Transport Operations (Part 135)
Name of Operator	**:** National Airways Corporation
Aircraft Registration	**:** ZS-OKN
Aircraft Make and Model	**:** Beechcraft B1900D
Nationality	**:** South African
Place	**:** Port Elizabeth Airport (FAPE)
Date and Time	**:** 1 November 2023 at 1309Z
Injuries	**:** None
Damage	**:** Substantial

Purpose of the Investigation

In terms of Regulation 12.03.1 of the Civil Aviation Regulations (CAR) 2011, this report was compiled in the interest of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and not to apportion blame or liability.

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Investigation Process

The Accident and Incident Investigations Division (AIID) was notified of the occurrence on 8 November 2023 at 1005Z. The occurrence was classified as an accident according to the CAR 2011 Part 12 and the International Civil Aviation Organisation (ICAO) STD Annex 13 definitions. Notifications were sent to the State of Design and Manufacturer in accordance with the CAR 2011 Part 12 and the ICAO Annex 13 Chapter 4. The AIID is leading the investigation as the Republic of South Africa is the State of Occurrence. Investigators dispatched to the accident site for this occurrence.

Notes:

1. *Whenever the following words are mentioned in this report, they shall mean the following:*
   Accident — this investigated accident
   Aircraft — the Beechcraft B1900D *involved in this accident*
   Investigation — the investigation into the circumstances of this accident
   Pilot — the pilot involved in this accident
   Report — this accident report

2. *Photos and figures used in this report were taken from different sources and may have been adjusted from the original for the sole purpose of improving clarity of the report. Modifications to images used in this report were limited to cropping, magnification, file compression; or enhancement of colour, brightness, contrast; or addition of text boxes, arrows, or lines.*

Disclaimer

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Abbreviation	Description
°	Degrees
°C	Degrees Celsius
ACCID	Accident
AIID	Accident and Incident Investigations Division
AME	Aircraft Maintenance Engineer
AMO	Aircraft Maintenance Organisation
CAR	Civil Aviation Regulations
CAVOK	Cloud and Visibility OK
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
CVR	Cockpit Voice Recorder
CRS	Certificate of Release to Service
DG	Dangerous Goods
FALA	Lanseria International Airport
FAOR	O.R. Tambo International Airport
FAPE	Port Elizabeth Airport
FDR	Flight Data Recorder
Ft	Feet
GPS	Global Positioning System
Kt	Knots
hPa	Hectopascal
M	metre(s)
METAR	Meteorological Aerodrome Report
MHz	Megahertz
MPI	Mandatory Periodic Inspection
PIC	Pilot-in-command
QNH	Barometric Pressure Adjusted to Sea Level
RWY	Runway
SACAA	South African Civil Aviation Authority
SACAR	South African Civil Regulation
SAWS	South African Weather Service
OM	Operation Manual
TBO	Time Between Overhaul
UTC	Co-ordinated Universal Time
VFR	Visual Flight Rules
VMC	Visual Metrological Conditions
Z	Zulu (Term for Universal Co-ordinated Time - Zero Hours Greenwich)

1. FACTUAL INFORMATION

1.1. History of Flight

1.1.1. On Wednesday, 1 November 2023 at 1309Z, a crew of two pilots and a passenger serving as the custodian of the dangerous goods (DG) on-board a Beechcraft B1900D aircraft with registration ZS-OKN were on a cargo flight, operated as flight 7579 from Bram Fisher International Airport (FABL) in Bloemfontein, Free State province, to Port Elizabeth Airport (FAPE) in the Eastern Cape province, with the intention to fly to later fly to Lanseria International Airport (FALA) in Gauteng province. The flight was conducted under instrument flight rules (IFR) by day and under the provisions of Part 135 of the Civil Aviation Regulations (CAR) 2011 as amended.

1.1.2. The pilot-in-command (PIC) stated that the intention of the flight was to transport cargo which comprised toxic Dihydrogen hexachloroplatinate [IV] hydrate or UN2922 corrosive chemical (dangerous good [DG]) stored in 20-litre (l) plastic containers to FAPE. The chemical is used in the mining sector for the purification of platinum; the origin of the cargo was from Frankfurt in Germany to the consignee at O.R. Tambo International Airport (FAOR). The aircraft carrying the cargo landed at FAOR on 31 October 2023. The cargo was inspected for integrity before it was transported on a truck to a vault in FAOR. On Thursday morning, 1 November 2023, the cargo was loaded on a truck and was reloaded on ZS-OKN aircraft. During reloading, one of the crew members observed a leakage from the cap of one of the 20l containers. The container was removed from the load, resealed and placed inside a plastic bag. Thereafter, the aircraft took off from FAOR and landed safely at FABL. After landing at FABL, the aircraft was refueled with Jet A1 fuel. Later during the day, the aircraft took off again and climbed to flight level (FL) 220, cruising at a speed of 268 knots (kts). After about 1.6 hours, the aircraft landed safely at FAPE. The PIC reported that during taxi at FAPE, the cabin and cockpit area filled with fumes and a white smoke.

1.1.3. The PIC and the first officer (FO) immediately opened the direct-vision (DV) windows and projected their faces outside the cockpit to get fresh air. The passenger left his seat, which was behind the cockpit partition, to inform the crew about a possible chemical leakage. The PIC stopped the aircraft at the apron situated east of the general aviation (GA) hangars and shut down the engines. He then directed the FO to open both the main cabin and the cargo doors to ventilate the aircraft. The crew and the passenger disembarked from the aircraft. They inspected the cabin and noticed that the corrosive chemical had spilled and had spread throughout the cabin floor. The owner of the chemical was informed of the leak when he came to the aircraft; and thereafter, they started off-loading the cargo, inspecting each container. During off-loading, the passenger informed the PIC that some of the corrosive

liquid had seeped underneath the cabin floorboards. Most of the containers were wet at the bottom. As a result, they decided to stop off-loading whilst they waited for the aircraft rescue and firefighting (ARFF) personnel to arrive.

1.1.4. After the ARFF personnel had arrived at the scene, they commenced the spillage containment procedure. However, they realised that their safety gear was not suitable to withstand the effects of the chemical. As a resolve, they requested third-party assistance. Personnel from the third party arrived and instructed everyone to stay clear of the aircraft whilst they cleaned the floorboards and removed the remainder of the corrosive chemical containers. A container with a leak was found as the personnel removed all the containers from the aircraft; it was discovered that a DZUS fastener had pierced through the container's bottom part. The leaking container was removed from the cabin. The aircraft was thoroughly cleaned, including the underside of the floorboards. The PIC notified the operator about the accident, and the aircraft maintenance engineer (AME) was dispatched from FALA to inspect the aircraft. During the inspection at FAPE, the AME did not notice any sign of structural damage or defects caused by the chemical on the aircraft, and it (the aircraft) was cleared to fly back to FALA where it landed safely.

1.1.5. The accident occurred during daylight at FAPE at Global Positioning System (GPS) co-ordinates determined to be 33º59'02.62"South 025º36'49.02"East, at an elevation of 196 feet (ft).

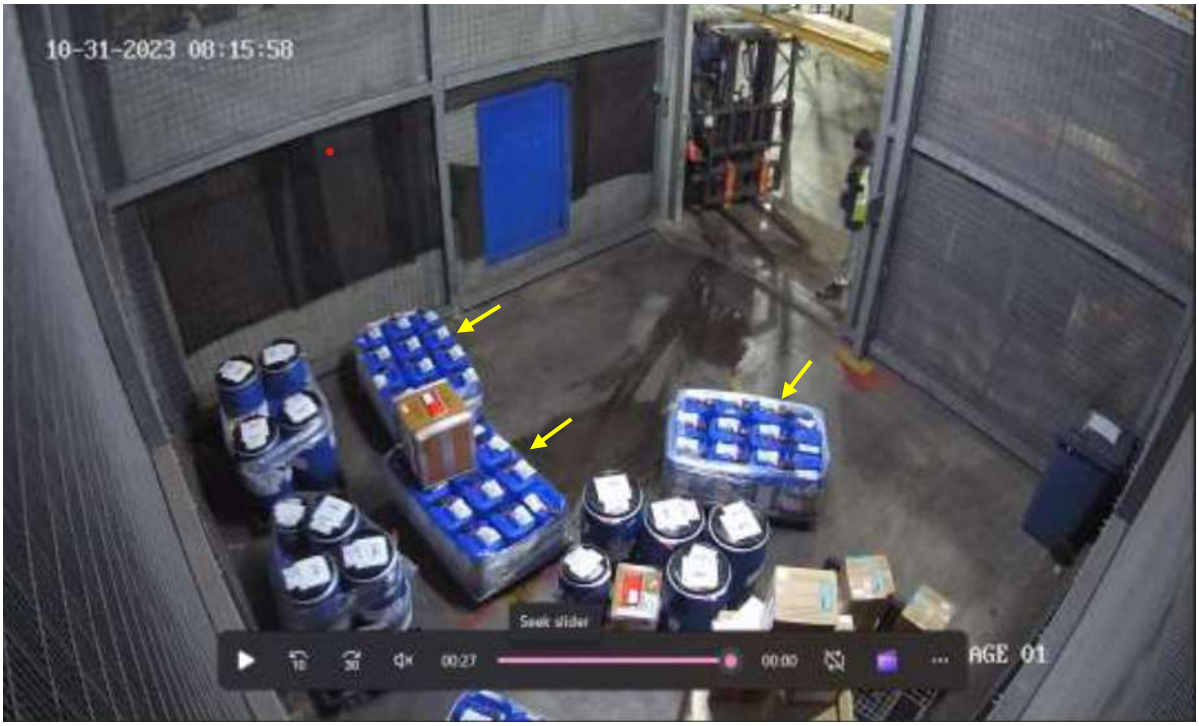

Figure 1: Close circuit television showing the cargo stored in the vault. (Source: Vault Owner)

1.2. Injuries to Persons

Injuries	Pilot	Crew	Pass.	Total On-board	Other
Fatal	-	-	-	-	-
Serious	-	-	-	-	-
Minor	-	-	-	-	-
None	2	-	1	3	-
Total	**2**	**-**	**1**	**3**	**-**

Note: Other means people on the ground.

1.3. Damage to Aircraft

1.3.1. The aircraft sustained substantial damage.

Figure 2: A picture showing the aircraft cabin with the floorboards removed to view damage. The yellow lines point to the two passenger seats behind the cockpit partitioning. (Source: Operator)

Figure 3: A closer view of the cabin area with evidence of damage on the under-fuselage skin caused by the corrosive chemical. (source: Operator)

1.4. Other Damage

1.4.1. None.

1.5 Personnel Information

1.5.1 Pilot-in-command (PIC)

Nationality	South African	Gender	Male	Age	33
Licence Type	Commercial Pilot Licence (CPL)				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Instrument				
Medical Expiry Date	31 March 2024				
Restrictions	Suitable corrective lenses				
Previous Accidents	None				

Note: Previous accidents refer to past accidents the pilot was involved in, when relevant to this accident.

Flying Experience:

Total Hours	2 700
Total Past 24 Hours	1.6
Total Past 7 Days	1.6
Total Past 90 Days	70
Total on Type Past 90 Days	70
Total on Type	1 650

1.5.2 The PIC was issued a Commercial Pilot Licence (CPL) on 30 March 2023 with an expiry date of 30 March 2024 under Part 61 of the South African CAR 2011.

1.5.3 The PIC was issued a valid Class 1 aviation medical certificate on 31 March 2023 with an expiry date of 31 March 2024.

First Officer (FO)

Nationality	South African	Gender	Male	Age	39
Licence Type	Commercial Pilot Licence (CPL)				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Instrument				
Medical Expiry Date	29 February 2024				
Restrictions	None				
Previous Accidents	None				

Flying Experience:

Total Hours	2 298.3
Total Past 24 Hours	1.6
Total Past 7 Days	1.6
Total Past 90 Days	77.5
Total on Type Past 90 Days	77.5
Total on Type	1 526

1.5.4 The FO was issued a Commercial Pilot Licence (CPL) on 20 February 2023 with an expiry date of 29 February 2024 under Part 61 of the South African CAR 2011.

1.5.5 The FO was issued a valid Class 1 aviation medical certificate on 28 February 2023 with an expiry date of 29 February 2024.

Aircraft Maintenance Engineer (AME):

Nationality	South African	Gender	Male	Age	67
Licence Type	Aircraft Maintenance Engineer				
Licence Valid	Yes	Type Endorsed	Yes		
Ratings	Group 3 and 4				
Restrictions	None				
Previous Accidents	None				

1.5.6 The aircraft maintenance engineer (AME) who inspected the aircraft at FAPE was initially issued an AME licence on 21 July 1999. The AME licence was reissued on 21 January 2023

with an expiry date of 2 February 2025.

1.6 Aircraft Information

1.6.1 Aircraft Description (Source: Pilot's Operating Handbook [POH])

The Beechcraft 1900D is a low-wing, T-tail, pressurised aircraft powered by two Pratt and Whitney PT6A-67D turbo prop engines rated at 1 279 shaft horsepower (SHP) each, driving a constant speed, full-feathering and reversing 4-blade Hartzell HC-E4A-3J model propellers. The tricycle landing gear is retractable and has two tyres per strut. The flight deck accommodates two pilots and has glass cockpit panels (electronic flight instrument system [EFIS]) equipped with highly integrated on-board avionics. The air-conditioned cabin is normally fitted with 19 single-class seats in a single-aisle layout. The aircraft provides passengers with a stand-up cabin and airline-style seating, including recline, armrests, tray tables and under seat storage. The forward door on the port side is equipped with airstrips for operation at airports with limited facilities.

The flight folio page with serial number 30528 showed that a configuration change was performed on the aircraft from passenger to cargo and was certified on 25 October 2023. Two passenger-seats remained secured to the floor rails in the cabin area.

Figure 4: File picture of the ZS-OKN aircraft. (Source: https://www.flightradar24.com/)

Airframe:

Manufacturer/Model	Beechcraft Aircraft Corporation/1900D
Serial Number	UE-23
Year of Manufacture	1982
Total Airframe Hours (At Time of Accident)	31 437.60

Last Inspection (Date & Hours)	15 September 2023	31 394.0
Airframe Hours Since Last Inspection	43.6	
CRS Issue Date	31 July 2023	
C of A (Issue Date & Expiry Date)	17 August 2012	31 August 2024
C of R (Issue Date) (Present Owner)	15 September 2023	
Operating Category	Air Transport Operations (Part 135)	
Type of Fuel Used	Jet A1	
Previous Accidents	None	

Note: Previous accidents refer to past accidents the aircraft was involved in, when relevant to this accident.

Engine No: 1 (Left side):

Manufacturer/Model	Pratt and Whitney / PT6A-67D
Serial Number	PS0094
Hours Since New	29 062.40
Hours Since Overhaul	1 220.70

Engine No: 2:

Manufacturer/Model	Pratt and Whitney / PT6A-67D
Serial Number	PS0012
Hours Since New	29 157.82
Hours Since Overhaul	373.07

Propeller No: 1 (Left side):

Manufacturer/Model	Hartzel / HC E4A-3J
Serial Number	HJ1022
Hours Since New	25 886.18
Hours Since Overhaul	1 613.23

Propeller No: 2:

Manufacturer/Model	Hartzel / HC E4A-3J
Serial Number	HJ2606
Hours Since New	10 861.00
Hours Since Overhaul	2 602.20

1.6.2 According to available information, the aircraft was registered to the present owner on 15 December 2020.

1.6.3 The last Mandatory Periodic Inspection (MPI) conducted was certified on 15 September 2023 at 31 394.0 airframe hours.

1.6.4 The aircraft maintenance organisation (AMO) that certified the last MPI was issued the AMO Certificate on 29 September 2023 with an expiry date of 30 September 2024. The AMO had category A, B, C, W and X ratings on the certificate.

1.6.5 The aircraft was issued a Certificate of Release to Service (CRS) on 15 September 2023 with an expiry date of 31 July 2024 or at 31 481.00 hours, whichever occurs first.

1.7 Meteorological Information

1.7.1 The weather information on the table below was obtained from the pilot questionnaire which detailed the weather conditions at FAPE on 1 November 2023 at 1309Z.

Wind Direction	110º	Wind Speed	16kts	Visibility	9999km
Temperature	20ºC	Cloud Cover	FEW	Cloud Base	2000 ft
Dew Point	14°C	QNH	-		

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with standard navigational equipment as approved by the Regulator (SACAA). There were no recorded defects with the navigational equipment prior to the flight.

1.9 Communication

1.9.1 The aircraft was equipped with a standard communication system as approved by the Regulator. There were no recorded defects with the communication system prior to the flight.

1.10 Aerodrome Information

1.10.1 FAPE is a manned, licensed airport with a single runway oriented 17/35.

Aerodrome Name	Port Elizabeth Airport (FAPE)	
Aerodrome Location	Eastern Cape Province	
Aerodrome Status	Licensed	
Aerodrome Co-ordinates	33º59’02.62” S 025º36’49.02” E	
Aerodrome Altitude	196ft	
Runway Headings	08/26	17/35
Runway Dimensions	1 980m X 46 m	1 677 X 46
Runway Used	N/A	
Runway Surface	Asphalt	

Approach Facilities	PAPI
Radio Frequency	122.10 MHz

1.11 Flight Recorders

1.11.1 The aircraft was fitted with a flight data recorder (FDR) and cockpit voice recorder (CVR).

1.12 Wreckage and Impact Information

1.12.1 None.

1.13 Medical and Pathological Information

1.13.1 None.

1.14 Fire

1.14.1 There was no evidence of a pre- or post-impact fire.

1.15 Survival Aspects

1.15.1 The accident was considered survivable.

1.16 Tests and Research

1.16.1 The aircraft was transporting dangerous goods (DG) whilst the passenger was seated behind the cockpit. This is in contravention with the International Civil Aviation Organisation (ICAO) Annex 18 and Part 92.00.18 of the CAR as amended in 2011.

1.16.2 The cargo which comprised toxic corrosive chemical was secured with the net to the aircraft cabin floor rails (Figure 6). No pallets or drip trays (spill trays) were used during the loading of the cargo, and the net holding the cargo was secured to the cabin floor rails. The floor panels inside the aircraft were secured with DZUS fasteners. It was discovered post-accident that one of the DZUS fasteners had pierced the bottom part of one of the 20l chemical containers; the fastener had come loose from the cabin floorboards. The aircraft was thoroughly cleaned, including the underside of the floorboards. The PIC notified the operator after the accident, and the AME was dispatched from FALA to inspect the aircraft. During the aircraft inspection at FAPE, the AME did not notice any sign/s of structural damage or defects. The aircraft was then cleared to fly back to FALA. After a few days, engineers at the operator's facility noted that the chemical had caused substantial corrosive damage to the main wing spar, the floor rails and the underbelly structure/skin. The aircraft was assessed

by the manufacturer/operator and was declared unsafe, and thus, a constructive total loss or a write off.

Figure 5: The 20l container with warning information. (Source: Operator)

Figures 6 and 7: The net used to secure the cargo (left). The type of a lock that secured the cargo to the cabin floor rail.

Figure 8: A DZUS fastener pierced through the bottom part of a chemical container.

Figures 9 and 10: A crack on lower fuselage caused by the corrosive chemical (left and right pictures). (Source: Operator)

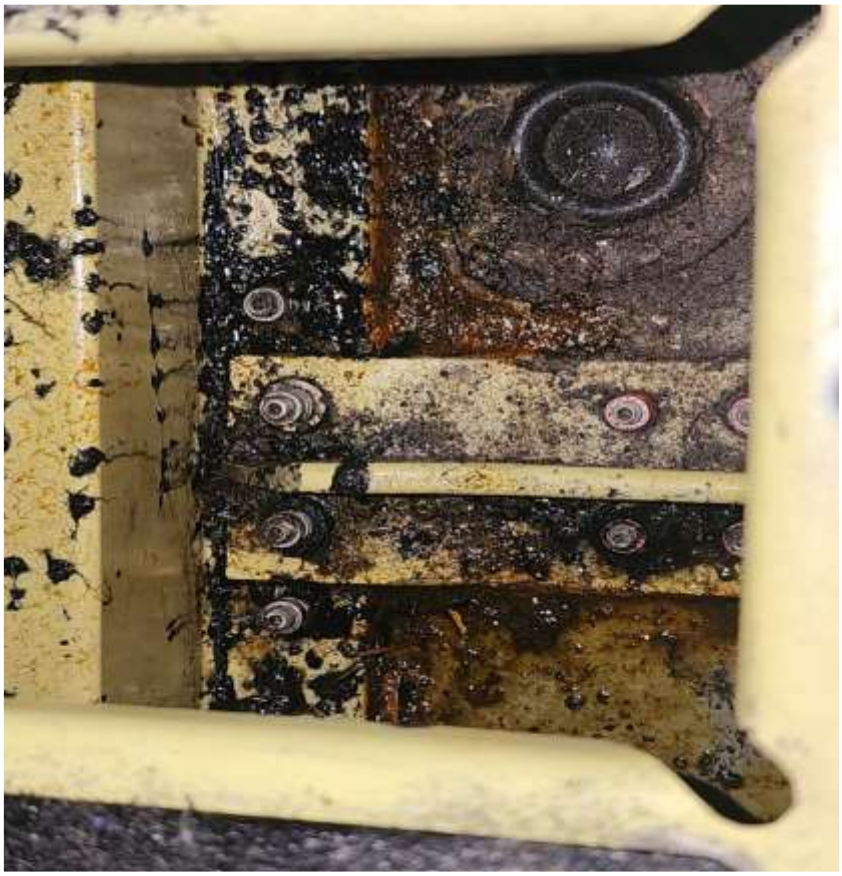

Figure 11: Corrosion on the main wing spars. Note*: The black spots are where the chemical begun to eat through the metal. (Source: Operator)

1.17 Organisational and Management Information

1.17.1 The flight was conducted in accordance with the provisions of Part 135 (Air Transport Operations) of the CAR 2011 as amended.

1.17.2 The last mandatory periodic inspection (MPI) was certified on 15 September 2023 at 31 394.0 airframe hours.

1.17.3 The AMO that certified the last MPI was issued the AMO Certificate on 29 September 2023 with an expiry date of 30 September 2024. The AMO had category A, B, C, W and X ratings on the certificate.

1.17.4 The operator was issued the Operations Specification Certificate by the South African Civil Aviation Authority (SACAA) on 11 April 2023. The Beechcraft 1900D fleet, including ZS-OKN, were listed on the Operations Specification Certificate. The Beechcraft 1900D fleet was certified to carry passengers and cargo.

1.18 Additional Information

1.18.1 Loading Restrictions in Cabin or on Flight Deck (Source: CAR Part 92.00.18)

92.00.18 *Unless otherwise provided for in Document SA-CATS 92, dangerous goods shall not be stowed in an aircraft cabin occupied by passengers or on the flight deck of an aircraft.*

1.18.2 Loading Restrictions in Passenger Cabin or on Flight Deck (Source: ICAO Annex 18)

Dangerous goods shall not be carried in an aircraft cabin occupied by passengers or on the flight deck of an aircraft, except in circumstances permitted by the provisions of the Technical Instructions.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

2.1. General

From the available evidence, the following analysis was made with respect to this accident. This shall not be read as apportioning blame or liability to any organisation or individual.

2.2. Analysis

2.2.1. The PIC was issued a Commercial Pilot Licence (CPL) by the SACAA on 30 March 2023 with an expiry date of 30 March 2024. The PIC was issued a Class 1 aviation medical certificate on 31 March 2023 with an expiry date of 31 March 2024. The PIC had the aircraft type endorsed on his licence and had accumulated a total of 2 700 hours of which 1 650 were on type. The PIC had training in dangerous goods, with this certificate issued on 22 March 2022.

2.2.2. The FO was issued a Commercial Pilot Licence (CPL) on 20 February 2023 with an expiry date of 29 February 2024. The FO was issued a valid Class 1 aviation medical certificate on 28 February 2023 with an expiry date of 29 February 2024. The FO had the aircraft type endorsed on his licence and had accumulated a total of 2 298.3 hours of which 1 526 were on type.

2.2.3. Examination of the technical records indicated that the last 100-hour MPI on the aircraft was certified on 15 September 2023 at 31 394.0 total airframe hours. The accident occurred at 31 437.60 airframe hours which indicated that it was operated for 43.6 hours since the last inspection. The AMO that certified the last MPI was issued the AMO Certificate on 29

September 2023 with an expiry date of 30 September 2024. The AMO had categories A, B, C, W and X ratings listed on the certificate. All entries in the aircraft's technical records were found to have been properly certified and records indicated that the aircraft was certified and maintained in accordance with (IAW) the existing regulations and the manufacturer's maintenance programme.

2.2.4. The investigation revealed that the cargo which comprised corrosive chemical was secured with a net to the aircraft's cabin floor rails. No pallets or drip trays were used during the loading of the cargo, and the net holding the cargo in place was secured to the cabin floor rails. The floor panels inside the aircraft were secured with DZUS fasteners. It was discovered post-accident at FAPE that one of the DZUS fasteners had pierced the bottom of one of the 20l chemical containers; the fastener had come loose from the cabin floorboards. Consequently, the chemical leaked out and caused substantial corrosive damage primarily to the wing spars, the floor rails and the underbelly structure or skin. The aircraft was assessed by the manufacturer and the operator and was declared unsafe, and thus, a constructive total loss or a write off.

3. CONCLUSION

3.1. General

From the available evidence, the following findings, causes and contributing factors were made with respect to this accident. These shall not be read as apportioning blame or liability to any organisation or individual.

To serve the objective of this investigation, the following sections are included in the conclusion heading:

- **Findings —** are statements of all significant conditions, events, or circumstances in this accident. The findings are significant steps in this accident sequence, but they are not always causal or indicate deficiencies.
- **Causes —** are actions, omissions, events, conditions, or a combination thereof, which led to this accident.
- **Contributing factors —** are actions, omissions, events, conditions or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident occurring, or would have mitigated the severity of the consequences of the accident. The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil, or criminal liability.

3.2. Findings

3.2.1. The pilot-in-command (PIC) was issued a Commercial Pilot Licence (CPL) on 30 March 2023 with an expiry date of 30 March 2024.

3.2.2. The PIC was issued a valid Class 1 aviation medical certificate on 31 March 2023 with an expiry date of 31 March 2024.

3.2.3. The PIC had training in dangerous goods (Category 10); he obtained his certificate on 22 March 2022.

3.2.4. The first officer (FO) was issued a Commercial Pilot Licence (CPL) on 20 February 2023 with an expiry date of 29 February 2024.

3.2.5. The FO was issued a valid Class 1 aviation medical certificate on 28 February 2023 with an expiry date of 29 February 2024.

3.2.6. The aircraft was issued a Certificate of Airworthiness (C of A) on 17 August 2012. The latest C of A had an expiry date of 31 August 2024. The aircraft was airworthy when it was dispatched for the flight.

3.2.7 The aircraft was issued a valid Certificate of Registration (C of R) on 15 December 2020.

3.2.8 The last mandatory periodic inspection (MPI) was certified on 31 July 2023 at 31 285.10 airframe hours. The aircraft was issued a Certificate of Release to Service (CRS) on 31 July 2023 with an expiry date of 31 July 2024 or at 31 481.00 hours, whichever occurs first.

3.2.9 The operator was issued the Operations Specification Certificate by the South African Civil Aviation Authority (SACAA) on 11 April 2023. The Beechcraft 1900D fleet, including ZS-OKN, were listed on the Operations Specification Certificate. The Beechcraft 1900D fleet was certified to carry passengers, cargo and emergency medical services.

3.2.10 The cargo loaded on the aircraft was a toxic corrosive chemical (Dihydrogen hexachloroplatinate [IV] hydrate) or UN2922 used in the mining sector.

3.2.11 A DZUS fastener pierced the bottom of the plastic container with corrosive chemical which leaked out and caused substantial corrosive damage primarily to the wing spars, the floor rails and underbelly; consequently, the aircraft was declared a constructive total loss or a write off.

3.2.12 The aircraft was transporting dangerous goods (DG) whilst a passenger was seated behind the cockpit. This is in contravention of the International Civil Aviation Organisation (ICAO) Annex 18 and Part 92.00.18 of that CAR as amended in 2011.

3.2.13 The accident was reported eight days after the occurrence on 8 November 2023. The accident occurred on 1 November 2023.

3.3. Probable Cause

3.3.1 A DZUS fastener pierced one of the containers containing a corrosive chemical. This resulted in the chemical leaking and seeping underneath the cabin floorboards, subsequently causing substantial corrosive damage to the main wing spars and the underbelly structure.

3.4. Contributory Factor

3.4.1 Unavailability of drip trays underneath the cargo that contained corrosive chemical.

4. SAFETY RECOMMENDATIONS

4.1. General

The safety recommendations listed in this report are proposed according to paragraph 6.8 of Annex 13 to the Convention on International Civil Aviation and are based on the conclusions listed in heading 3 of this report. The AIID expects that all safety issues identified by the investigation are addressed by the receiving States and organisations.

4.2. Safety Message

4.2.1 Corrective action plan taken by the operator to prevent the re-occurrence:

- Polyethylene drip trays - 6 for the aircraft and 2 for the cargo area acquired.
- Chemical spill kits, goggles, chemical breathing apparatus and gloves acquired.
- Chemical mask with chemical respirators acquired.
- Speed tape to tape any risks to the items being loaded will be used to ensure nothing can breach the cargo / DG.
- Training of all Ops Flight co-ordinators with Category A (CAT 6) training.
- Operation Manual (OM), Part 1,10 has been updated with all the DG IATA paperwork.

4.2.2 Briefings prior to the flight to ensure all crew members involved know what is being transported. The load/off load risk, the chemical and actions to be taken in the event of a leak. This has been formulated into a process to ensure all involved know the risk of the item being transported and the actions taken if an incident/accident occurs.

5. APPENDICES

5.1. None.

This report is issued by:
Accident and Incident Investigations Division
South African Civil Aviation Authority
Republic of South Africa