Aviation Safety Investigation Report 198800718

Cessna 310-R

9 June 1988

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Occurrence Number: 198800718 **Occurrence Type:** Accident
Location: 90 km NNE Maralinga SA (Lat 29o 22.2'S, Long 131o 52.8E)
Date: 9 June 1988 **Time:** 1840
Highest Injury Level: Fatal
Injuries:

	Fatal	Serious	Minor	None
Crew	1	0	0	0
Ground	0	0	0	-
Passenger	0	0	0	0
Total	**1**	**0**	**0**	**0**

Aircraft Details: Cessna 310-R
Registration: VH-DZH
Serial Number: 1657
Operation Type: Charter
Damage Level: Destroyed
Departure Point: Ceduna SA
Departure Time: 1623
Destination: Emu SA (Lat 28o 37'S, Long 132o 11'E)

Approved for Release: December 21st 1988

Circumstances:

The Cessna 310 and a Cessna 402 from the same company had been chartered to uplift a group of people from Emu. Emu lies at the eastern edge of the Great Victoria Desert, and is not equipped with radio navigation aids or aerodrome lighting. Arrangements had been made to light a signal fire and lay a flare path in case either aircraft arrived after the end of daylight, estimated to be 1818 CST on the day. The flights to Emu were originally planned for the following morning, but were brought forward by the charterer at short notice. This required rescheduling and reconfiguring of the aircraft, with the cumulative effect that they were both running late on the revised schedule. Each aircraft planned a refuelling stop at Ceduna, and while inbound to Ceduna, the pilot of VH-DZH requested a third company pilot on the ground at Ceduna to submit a flight plan on his behalf for the return flight to Emu. This plan showed a flight time interval to Emu of 72 minutes, and a fuel endurance of 300 minutes. The Ceduna weather consisted of broken low cloud associated with showers near the coast, and strong southwesterly winds. Conditions to the north of Ceduna were fine, with the strong winds abating approximately half way to Emu. VH-DZH landed at Ceduna approximately one hour before the C402. During a hurried turnaround, the pilot was observed to run from the FIS building to his aircraft, taxy out quickly, and make a rapid DEPARTURE and steep climbout. The pilot reported that he was tracking 315o on climb to 8500 ft. A considerable number of communications then ensued on a non-FIS VHF frequency between the pilot of VH-DZH, and the pilot of the C402 who was still inbound to Ceduna. During these exchanges the pilot of VH-DZH became aware that the track of 315oM he was following from the flight plan was incorrect, and should have been 334oM. The pilot of VH-DZH also enquired about the altitude of Emu aerodrome, and was given the correct altitude of 500 ft amsl. The pilot of VH-DZH was a Director and Operations Manager of the company, and the exchanges covered a variety of business matters, besides the flights to Emu. At times the exchanges included the third pilot, who by then was en route to the east. At 1639 the pilot

advised FIS that he was climbing to cruise at a non-quadrantal altitude of 10,000 ft. There was one position report to be given during the flight, and this was 100 nm Ceduna (185 km) where the track crossed the transcontinental railway line. He reported passing the position at 1657, 2 minutes later than flight planned, and gave an ETA for Emu of 1739, 4 minutes later than flight planned. As the C402 pilot had previously operated into Emu and the pilot of VH-DZH had not, he suggested to the pilot of VH-DZH that he obtain a fix at the Wilkinson Lakes between the railway line and Emu, then track to Lake Meramange approximately 10 nm (18 km) north-northwest of Emu and backtrack from there to Emu. Exchanges between the two pilots continued until the C402 landed at Ceduna. At 1721 the pilot reported on descent to Emu, and at 1740 reported in the circuit area and cancelled Sarwatch. This was the last communication between the pilot and FIS. The C402 departed Ceduna at 1743, and the pilot of this aircraft soon began to receive communications from the pilot of VH-DZH on the non-FIS frequency. At approximately 1752 the pilot of VH-DZH said that he could not find Emu and the C402 pilot suggested he climb to 10,000 ft and find Lake Meramange on his radar. However, he said he still had enough light but thought he must have gone too far north and would head towards the south, diverting back to Ceduna if he did not sight anything. The C402 pilot subsequently advised that the signal fires had been lit, and at approximately 1835 the pilot of VH-DZH reported sighting a fire and going to investigate. His last transmission to the C402 pilot was to the effect that he thought he had found Emu. Ground witnesses 43 nm (80 km) south of Emu reported later that at approximately 1840, when it was completely dark, an aircraft coming from the north or north-northeast had overflown their roadside campfire. The aircraft then orbited their position and they flashed torches at the aircraft. The aircraft's landing lights flashed off and on in apparent response. The aircraft then made a left-hand turn and overflew them again from the east at very low level with landing lights on. They had then doused their fire as the aircraft flew off to the southeast, since they knew of the flights to Emu and were concerned that the pilot of this aircraft might mistake their campfire for a signal fire at Emu. They did not see or hear the aircraft again. Wreckage of the aircraft was subsequently located 1.5 nm (3 km) from the campsite. An on scene examination showed that the aircraft had first hit a tree on top of a sand dune at an elevation of 650 ft amsl, before striking other trees and impacting the base of a large tree. The attitude at first impact was 5o left wing down, and in a shallow descent. The disintegration pattern was consistent with that of a high performance twin-engined aircraft colliding with obstructions and the ground while both engines were operating normally. A detailed examination of the wreckage did not reveal any defects or anomalies that may have contributed to the accident. The radio navigational equipment carried by the aircraft included dual ADF, and DME, and the pilot was properly rated for the use of these aids. The rated range of the Ceduna NDB over land is 110 nm by day (203 km) and 85 nm by night (157 km). At 10,000 ft the rated coverage of the Ceduna DME should have been 90 nm (167 km). The pilot was in regular IFR flying practice, and was a Director and Operations Manager of the charter company. Investigation revealed that the 19o track error on the flight plan had occurred due to a misalignment between the Tarcoola and Port Augusta WAC charts, when they were butted together by the third company pilot to measure the track. The track however, was correctly drawn on the chart. The pilot of VH-DZH did not have a Tarcoola chart, and the planning pilot had left his own copy along with the flight plan and other documentation at the FIS unit where they were subsequently collected by the pilot of VH-DZH. The pilot who prepared the flight plan had arrived at the aerodrome later than he had intended, and this additional task made him concerned about keeping his own bank run schedule which required a DEPARTURE from Ceduna at 1600. The planned time intervals to Emu were also incorrect, as the planning pilot had lost the wind grid from his navigation computer and he assumed a tailwind component of 10 kt whereas there was a headwind component of 3 kt on the correct track and 13 kt on the incorrect track. The correct time interval from Ceduna to Emu on the correct track should have been 77 minutes, compared with the incorrect interval of 72 minutes planned on the wrong track. What navigational adjustments may have been made by the pilot when he learned of the incorrect track could not be established. It was determined that he learned of the mistake prior to the 100 nm Ceduna position, and this should

have permitted interception of the correct track by ADF and DME. FIS was not advised that there was to be any change of track from 315oM. Although analyses of several alternative tracking and navigational possibilities were made during the investigation, it was not possible to define an approximate ground track of the aircraft up to the time the pilot cancelled Sarwatch. It is clear that the pilot had not found Emu when he cancelled Sarwatch, and had searched for another hour without finding it. It was also not possible to reconstruct the ground track of the aircraft during that last hour. No witnesses at Emu reported sighting or hearing the aircraft at any time, and it was established that the flares and signal fires were not lit until after last light. The witnesses 43 nm south of Emu reported that when first heard, the aircraft had approached from a northerly or north-northeasterly direction. In turn the pilot, for reasons which were undetermined, apparently believed he was north of Emu, and had advised the C402 pilot that he would head south. Although the witness reports were consistent with the pilot carrying out that course of action just prior to the accident, the aircraft had not been seen or heard at Emu and the movements of the aircraft in the intervening hour could not be established. The flight plan ETA for Emu from Ceduna would have been 1740 had forecast wind and correct track been used. The pilot gave his last ETA for Emu as 1739 and actually reported in the circuit area at 1740. It was established that the pilot normally descended at 500 fpm so that the 18 minutes allowed for the descent were not unusual given the cruising level, and altitude of Emu. Application of the wind component experienced by the C402 en route to Emu to the flight of VH-DZH produced a slightly shorter total time interval to Emu. This could mean that the aircraft may have passed Emu in the late part of the descent. However, again, witnesses at Emu did not report hearing or seeing the aircraft. The analysis of all the navigational aspects of the flight therefore, did not allow the position of the aircraft to be estimated at the time that Sarwatch was terminated. The night was very dark when the pilot overflew the campsite at low altitude on the second pass. The single light source from the campfire would not have provided sufficient visual information for the pilot to judge his height above ground level. The pilot then flew off to the southeast at the same attitude and evidently then continued turning left in an effort to relocate the campfire, unaware that it had been extinguished by the alarmed ground witnesses. A turn overshoot occurred to the extent that the aircraft crashed on a heading of 204?M whereas the pilot could have expected to sight the fire on a heading of approximately 270?M. This suggests that the pilot was not referring to the flight instruments at the time, and did not notice the 70? heading discrepancy or the shallow descent, which was occurring when the impact with the tree occurred. It is unlikely that fatigue was a significant factor in the accident. There had been no change in the pilot's normal routine in the days prior to the accident, and he apparently had no difficulty in working long hours as a matter of course. Research shows that the effects of fatigue on performance typically occur after 17 hours of wakefulness, and this pilot had been continually awake for 14 hours at the time of the accident. It was established that the pilot was accustomed to running his business from the aircraft during flight.This included the completion of paperwork, frequent calls to other aircraft of the same organisation and the use of a cellular telephone. The steady stream of communications with his other two pilots on this occasion is consistent with this pattern, although it was not established whether the telephone had been used. It was evident from his previous flying activities that normal inflight watch procedures were often displaced in favour of handing day-to-day business requirements. Operations into the remote areas of Australia require sustained concentration on navigation unless a pilot is property familiar with the particular area of operation. On this occasion the pilot had not previously been to Emu, he would have experienced glare from the setting sun, while in the month of June the long twilight shadows from the sand dunes, undulations and vegetation can present a very difficult panorama to interpret. The flares and signal fires at Emu were not lit until dark, but when they were lit they were visible to the C402 pilot from a distance of 60nm (111km). The C402 pilot remained at his cruising altitude until he sighted the fires, whereas the pilot of VH-DZH had descended before dark and before the fires at Emu had been lit. There was also not suggestion from the exchanges between the two pilots that the pilot of VH-DZH had climbed above the general altitude from which his search had been initiated. The pilot cancelled Sarwatch close to his ETA, but then continued

to search for Emu for another hour without notification to any airways unit. Such behaviour was reportedly out of character for the pilot, and the last 22 minutes of the search were carried out in complete darkness. In the light of his ample fuel reserves, his decision to spend some time searching for his destination in daylight was understandable given that he believed he was in the vicinity. In continuing to search for such a long period however, it is likely that the pilot was influenced by personality factors. It was reported that the pilot had a determined personality and disliked failure. In the circumstances, the C402 pilot already knew that he had not found Emu, and a return to Ceduna would require re-establishment of communications with FIS and a subsequent arrival at Ceduna without passengers. The alternative to a return to Ceduna was to climb and follow the suggestion of the C402pilot. The flight had been running late, and a flight plan containing significant inaccuracies had been prepared by another pilot. A hurried turnaround at Ceduna was apparently motivated by a desire to reach Emu prior to the end of daylight. Detailed attention to navigation evidently suffered due to a diversion of the pilot's attention onto other matters during the flight, and a descent was carried out in relation to the Emu ETA rather than following the suggestion of the C402 pilot of tracking to Lake Meramanqe then backtracking to Emu. When unable to locateEmu the pilot commenced a search which was extended past the end of daylight into night conditions, and eventually an isolated campfire was sighted. Believing that the campfire may have been associated with signal fires which he knew had been lit at Emu, the pilot manoeuvred the aircraft at a very low level while evaluating his discovery. The attempt to manoeuvre the aircraft safety without colliding with the ground or obstructions when in such close proximity to the ground on a dark night would be difficult. If flown solely by reference to flight instruments, then the manoeuvres were conducted approximately 1000ft below the IFR lowest safe altitude while the single light source from the campfire could not have provided sufficient visual information for the pilot to judge his height above the ground.

Significant Factors:

It was considered that the following factors were relevant to the development of the accident 1.The pilot's frequent communications with other company pilots during the flight suggests that the navigation of the aircraft may not have received the detailed attention required on the sector. 2.The pilot lacked previous experience in the area, and the descent from cruising altitude was apparently conducted solely in relation to the ETA at Emu, rather than in association with accurate position information. 3.The destination was not found, and the pilot demonstrated excessive motivation by persevering with a search into dark night conditions. 4.When there were insufficient external cues to judge height visually at night, the pilot attempted to manoeuvre the aircraft at very low level in the vicinity of sand dunes and during a turn through more than 360? the aircraft entered a shallow descent. - Bureau of Air Safety Investigation, Canberra