



VIRGINIA FLIGHT SCHOOL SAFETY ARTICLE – NO 10/09

EMRGENCY RESPONSE PLANNING – ACCIDENT INVESTIGATION

INTRODUCTION

The primary purpose of Accident Investigation at VFS is to establish causation which will enable preventative measures to be put in place to avoid a recurrence. However, during an investigation, other issues may come to light which indicate a potential breach of the organisational safety integrity. These issues may not be associated with the accident per se. Interventive measures can then also be put in place thereby enhancing the organisational safety profile.

The contemporary approach to aircraft accident investigation will be briefly outlined in this article.

CASE STUDY

A CAA report of an accident that took place in the Eastern Cape will be used as a case study to illustrate how causation is established.

		Ref: 0264			
SOUTH AFRICAN CIVIL AVIATION AUTHORITY					
INCIDENT REPORT – EXECUTIVE SUMMARY					
Aircraft Registration	ZS-IHX	Date of Incident	14/3/2003	Time of Incident	1330Z
Type of Aircraft	BEECH BARON 58		Type of Operation	Private	
Pilot-in-command License Type	Private	Age	48	License Valid	Yes
Pilot-in-command Flying Experience	Total Flying Hours	1 247.0		Hours on Type	78.0
Last point of departure	Port Elizabeth				
Next point of intended landing	Kwandwe Game Farm				
Location of the incident site with reference to easily defined geographical points (GPS readings if possible)					
Kwandwe Game Farm – North of Grahamstown					
Meteorological Information	Fine: Wind – Northerly/10kt, Visibility – Good, Temperature +30°C				
Number of people on board	1 + 1	No. of people injured	None	No. of people killed	None
Synopsis					
<p>The pilot, accompanied by a commercial pilot was on a positioning flight from Port Elizabeth to the Kwandwe Game Farm, located to the north of Grahamstown. On joining overhead it was noted that the prevailing wind was from a northerly direction.</p> <p>On short final approach the pilot noted a thorn bush/shrub approximately 2m in height on the centerline of the runway, approximately 7m from the threshold. According to the pilot: "There was nothing I could do, except fly the aircraft through the bush. The nose gear went through the middle. After hearing a loud "bumping noise", I realized that the nose gear was damaged".</p> <p>On touch down the aircraft veered off the runway to the right and come to a halt to the side of the runway with the nose landing gear folded backwards and the propellers bent.</p> <p>The aircraft was properly maintained and the last MPI (Mandatory Periodic Inspection) prior to the incident flight was certified on 24 February 2003, at 7 664.0 airframe hours. Since the MPI was certified a further 36.0 hours were flown.</p>					

CAUSE

The report states the following :

Probable Cause
On touch down the nose gear collapsed, rendering the pilot unable to maintain directional control and the aircraft veered off the runway to the right. The failure of the nose gear was attributed to the failure of the nose gear drag brace, which failed in overload when the nose gear assembly collided with a thorn bush on short final approach.

When viewing the above probable cause it becomes apparent that the narrative is a statement of findings i.e. what actually happened and not WHY it happened. We will now look at OCAO's definition of causation.

ICAO (Annex 13) DEFINITION OF CAUSE

“Actions, omissions, events, conditions, or a combination thereof which lead to the accident or incident”.

Causation requires the “why it happened” to be clearly spelt out.

EVOLUTION OF CAUSAL UNDERSTANDING

At the beginning of the aviation safety movement in the early 1900's the idea was that there was only one cause of an accident. Preventative intervention actions were put in place to address only the single cause. The problem here is that there are almost always other contributory causes that lead to the main event or “main” cause of the accident. No preventative intervention actions were put in place to mitigate the contributory causes. They therefore still remained as hazards and risks which might lead to another accident with a different single or main cause.

The next development was to accept more than one cause and categorise these causes into primary, main, contributing, underlying, root, probable, etc. This resulted in prioritisation of the causes with resultant prioritisation of preventative intervention actions. This was a better but still not an effective accident prevention system based on cause as all causes should be addressed as equally important.

CONTEMPORARY CAUSATION MODEL

For effective accident prevention we have to consider an accident from the point of view of a system i.e. the *personnel, procedures, materials, tools, equipment, facilities and software which are integrated in the intended operational or support environment to perform a given task or to achieve a specific goal or objective*. What we are saying here is that all possible deficiencies in the system surrounding the accident have to be investigated and determined to be causal or not. These causes are grouped into two categories :

1. Descriptive Causes (What happened). The entire sequence of conditions and events which, singly or in combination, lead to the accident; listed in chronological order. (CAA Baron prang)

2. Explanatory Causes (Why it happened). These are the conditions and events which explain why the descriptive causes (as explained above) existed or occurred. Explanatory causes usually form the basis for preventative intervention recommendations – the accident prevention element.

With the above in mind let's revisit the Baron accident.

BARON ACCIDENT SEQUENCE OF EVENTS/FINDINGS

1. The aircraft was properly maintained.
2. On short final approach the pilot noticed a bush on the centreline of the runway. He flew thru it as "there was nothing he could do about it".
3. A loud "bumping noise" was heard with the realisation that the nose gear was damaged.
4. After touchdown the plane veered off to the right and came to a halt next to the runway with the nose gear folded backwards and the propellers bent.

The CAA probable cause is descriptive (the what happened) and not the explanatory (the why it happened). We need to define explanatory causes in any accident to propose preventative intervention actions. If we consider the sequence of events in the Baron scenario we need to establish what single event in the chain of events actually caused the accident. The answer :

HITTING THE BUSH! – Explanatory Cause!

Determining the main cause now enables the accident to be investigated as a system. You can now look at other causes in the system that contributed to the accident and make recommendations.
