ICAO Safety Management Systems (SMS) Course

Handout Nº 2 – The Anyfield Airport accident

International Civil Aviation Organization

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SAFETY MANAGEMENT SYSTEMS (SMS) COURSE

Exercise Nº 03/01 – The Anyfield Airport accident

Scenario

In the early hours of an autumn Monday-morning, a twin-engined jet transport with 5 crew-members and 63 passengers on board while in its take-off run at Anyfield Airport collided with a small twin-engined propeller-driven aircraft, with only a single crew-member that had intruded the departure-runway. Both aircraft were severely damaged as a result of the collision. The subsequent fire destroyed both aircraft and was the death-cause for most of the passengers.

Anyfield Airport is a medium-sized airport, with a single runway which can be accessed (or vacated) by a number of intersections. It is a controlled aerodrome; the control-tower is located 400 meters north of the middle of the runway. Traffic-numbers are on the rise as quite a few commuter-type airlines have started operating to and from Anyfield.

Although the airport is in a region in which several foggy days a year are common, it is not equipped with a Surface Movement Radar (SMR), nor does it have special taxiway-lighting facilities for use under low visibility-conditions.

Air Traffic Control at Anyfield is slightly understaffed, but so far it was not thought necessary to impose restrictions on operations to and from Anyfield. There is a discrete frequency (Ground Control) to handle taxiing aircraft.

At the time of the collision, the average visibility was around 700 meters with fog-banks, which is just sufficient to allow the tower-controller to see the middle part of the runway. The controllers' view at the intersection where the intruding aircraft entered the runway however was obstructed by the newly constructed extension to the terminal building at Anyfield Airport.

The Air Traffic Controller (ATCO) was a very experienced controller. He had been working in ATC for many years, at several major facilities, and had been transferred to Anyfield to act as an OJT-instructor only eight months before the date of the accident.

At the time of the collision, the **ATCO1** was alone in the control-tower, as his Assistant / Ground Controller **ATCO2** – of far less experience – had briefly left the TWR to answer a call of nature. They were both completing their third consecutive nightshift, had come on duty at 22:00 hours the previous evening and were due to be relieved within thirty minutes when the accident occurred.

The crew of the jet-aircraft was experienced operators to and from Anyfield. From their point of view, on the morning of the accident there was nothing unusual in the way their flight was handled by ATC. They taxied to the runway with the extra caution required by the fog-conditions, and after being cleared for take-off they made certain they were lined up correctly on the runway-centerline before applying take-off power.

The pilot of the twin-engined piston-driven aircraft was unfamiliar with Anyfield Airport, having been sent there at short notice to collect an aircraft that had to divert into Anyfield two days earlier for weather-reasons.

Investigation

Although **ATCO1** was very experienced, he had only worked a limited number of solo-shifts in Anyfield TWR. Having validated his TWR-rating in early summer, he had been involved in giving on-the-job-training (OJT) instruction on most of his shifts after that. As a consequence of the staff-shortage he was required to work his share of nightshifts like all other controllers. The shift in which the accident occurred was only his second where he had worked at Anyfield TWR under foggy/low visibility conditions; the first had been the previous night, when there was hardly any traffic as it was the night from Saturday to Sunday.

A number of years ago there had been an incident at Anyfield involving runway-intrusion by a vehicle, under similar meteorological conditions as in this case. One of the recommendations at that time was the installation of a SMR, together with stop-bars at all runway-intersections. The authorities decided that in view of the limited number of days (with fog) that would warrant the use of a SMR, the benefit of having a SMR didn't match the costs of having one installed. The same applied for the installation of stop-bars, but in lieu of those, painted signs had been put in the grass next to the runway-intersections, informing those who noticed them there was a *"runway ahead".*

As the early morning-traffic began to come alive, **ATCO1** and **ATCO2** were each working an independent R/T-frequency. When **ATCO2** announced he had to visit the men's room for a second, **ATCO1** told him to go ahead, intending to work both frequencies by himself. In order to do so, **ATCO1** had to physically move between two control-positions in the TWR that are about three meters apart, for Anyfield TWR isn't equipped with a frequency-coupling installation. Transmissions on one frequency can't be heard by stations on the other frequency.

The piston-engined aircraft's pilot had arrived in Anyfield late the night before. After a short sleep he went to the airport quickly in order to waste as little time as possible, for his company wanted the aircraft back at its home base a.s.a.p. After the minimum of preparation needed, he went to his aircraft and called ATC for approval to taxi to the runway. He obtained the clearance and began taxiing, but soon found himself lost at the foggy, unfamiliar airport. The fact that there were no signs denominating the various taxiway-intersections didn't help much either.

The R/T-tapes showed that the piston-pilot then called G/C (by R/T) and asked for *"progressive taxi-instructions".* **ATCO2** replied by asking his position. The pilot said: *"I believe I'm approaching Foxtrot-intersection"*, to which **ATCO2** answered: *"At Foxtrot taxi straight ahead".* In fact the pilot had already passed Foxtrot, and should have turned onto the parallel taxiway. The instruction from **ATCO2**, though technically correct, caused the pilot to taxi onto the runway where the jet was in its take-off roll. Since the communications to both aircraft took place on different frequencies, neither pilot was aware of what was happening.

After the collision, it took **ATCO1** several minutes to realize something was wrong. Of course he hadn't observed the departing jet passing on the section of the runway that was

visible to him, but he initially blamed that on the fog patches and/or being distracted by traffic on the G/C frequency.

And apart from the fog, **ATCO1** was unable to see the part of the runway where the collision had taken place because of the newly built extension of the terminal building blocking his view. So it was not until he wanted to transfer the departing jet to the next controller (Departure Control) that he became aware things weren't as they should be, when his transmissions to the jet remained unanswered.

ATCO2, who returned shortly after the accident, at the same time reported having no contact with the taxiing twin-prop. **ATCO1** then decided to alert the fire-brigade, but as he had no idea where to send them, more precious time was lost as the rescue-vehicles tried to make their way across the foggy airport. When they finally arrived at the accident-site, they found there was little they could do as the wreckage of the aircraft had almost burnt-out completely already.

Had a SMR been installed following the recommendation after the other incident, this would have provided the following lines-of-defense (in declining order):

- Proper taxi-instructions could have been given to the *"lost"* aircraft.
- The ATCOs would have observed the runway-intrusion.
- The collision-site would have been easily identified.
- Adequate instructions could have been given to the rescue-vehicles.

This goes for the stop-bars as well. Had they been installed, the twin-prop more likely than not wouldn't have entered the runway.

At the very least, special procedures for Low Visibility Operations (LVO) at Anyfield should have been developed and in force, limiting the number of movements at the field. The ATCOs should have been trained in working with these special procedures, ideally on a simulator, to help them cope with the unusual situation once it occurred.

In their talks with the airport-authorities, ATC management should have firmly opposed the plans for extension of the terminal-building. But, as a result of not having any input from the operational ATCOs (who were not available to attend the meetings due to staff-shortage), management wasn't even aware it would constitute a line-of-vision problem from the TWR.

ATCO1 shouldn't find himself in a position where he was forced to work two positions by himself. At all times ATC-positions should be sufficiently staffed to allow the traffic to be handled in a safe manner.

The installation of a frequency-coupler might have helped prevent the collision from occurring. As it is, these systems are considered *"optional"* by the aviation-authorities, so only few ATC-facilities have them.

Management should ensure that OJT-instructors are given the opportunity to stay current at the positions where they are supposed to teach, by scheduling the instructor for duties without trainees at regular intervals. Such duties should be sufficiently challenging of nature to allow the

instructor to practice his skills (in other words: shifts without traffic may look good in a roster, but are of no value for currency-maintaining purposes)

Had there been a well-devised training-curriculum that was correlated with the duty-roster, management would have recognized that **ATCO1**, although qualified, hadn't been able to acquaint himself with working at Anyfield TWR under low visibility-conditions. Ideally, they wouldn't have scheduled him for unsupervised duty when low visibility was forecast.

Dedicated LVO-training would have made **ATCO2** aware of the dangers involved, alerting him to be more positive in guiding the lost taxiing pilot. At the very least he probably wouldn't have given the pilot irrelevant information.

It is a scientific fact that when consecutive nightshifts are worked, the performance of persons engaged in cognitive tasks (such as ATC) decreases dramatically in the second and later nights, especially between 03:00 hrs and 07:00 hrs. **ATCO1** at Anyfield was on his third nightshift in a row, which could explain why he failed to recognize a potentially dangerous situation that he wouldn't have missed under other circumstances. When designing shift-rosters for ATCOs it is advisable to keep the number of consecutive nightshifts to an absolute minimum.

Based on the meteorological forecast, and taking into account the propeller-aircraft's pilot was unfamiliar with Anyfield, it may be argued that the air operator would have done better to send two pilots to collect the aircraft. Even with limited knowledge of CRM-principles, a second pilot could have prevented the other pilot from acting the way he did.

EXERCISE 03/01

Group activity

A facilitator will be appointed, who will coordinate the discussion. A summary of the discussion will be written on flip charts, and a member of the group will brief on their findings in a plenary session.

Required task

1) Read the text related to the accident of the twin-engined jet transport at Anyfield Airport.

2) From the investigation report of the above accident, you should identify:

   a) **Organizational processes** that influenced the operation and which felt under the responsibility of senior management (i.e. those accountable for the allocation of resources);

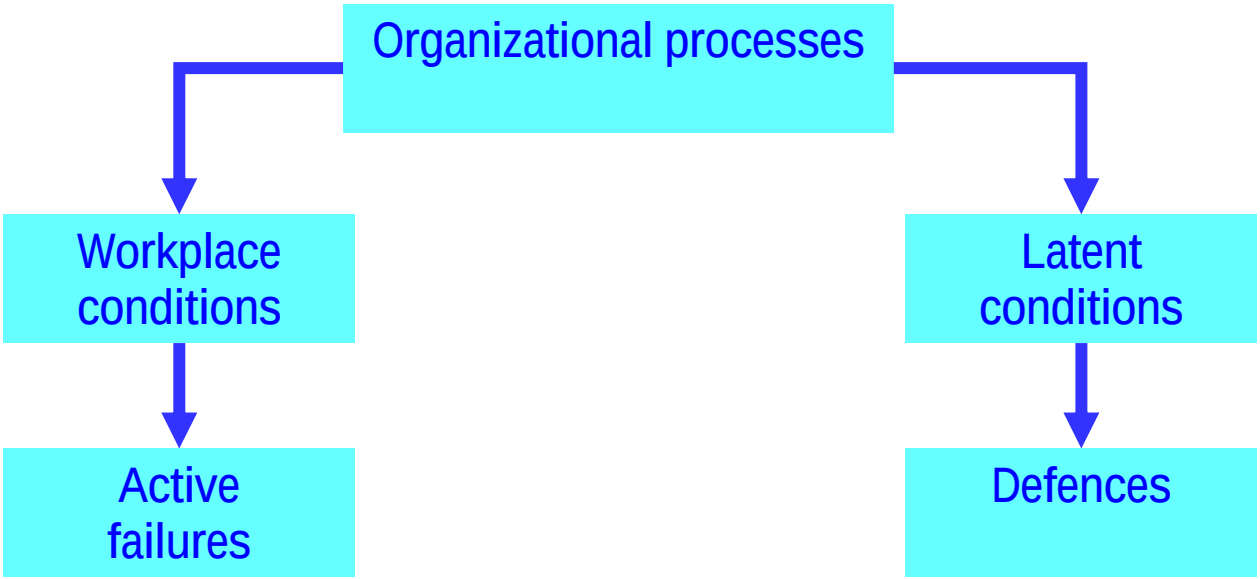
   b) **Latent conditions** in the system safety which became precursors of active failures;

   c) **Defences** which fail to perform due to weaknesses, inadequacies or plain absence;

d) **Workplace conditions** which may have influenced operational personnel actions; and

e) **Active failures**, including errors and violations

3) When you have concluded the above, your task is to complete the Table 03/01 – *Analysis* classifying your findings according to the Reason Model.



Reason Model

Table 03/01 – *Analysis*

Organizational processes *Activities over which any organization has a reasonable degree of direct control*	
Planning	
Scheduling	

Workplace conditions *Factors that directly influence the efficiency of people in aviation workplaces*
OJT

Latent conditions *Conditions present in the system before the accident, made evident by triggering factors*
ATC understaffing

Active failures *Actions or inactions by people (pilots, controllers, maintenance engineers, aerodrome staff, etc.) that have an immediate adverse effect*
ATCO did not challenge ambiguous position report by twin-engine pilot

Defences *Resources to protect against the risks that organizations involved in production activities must confront*
Progressive taxi instructions

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