ICAO Safety Management Systems (SMS) Course

Handout Nº 1 – The Anytown City Airport accident

International Civil Aviation Organization

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SAFETY MANAGEMENT SYSTEMS (SMS) COURSE

Exercise Nº 02/01 – The Anytown City Airport accident

Scenario

The following fictitious scenario, based on real-life events, fully illustrates all of the safety system components. In the late hours of a summer Friday evening, while landing on a runway heavily contaminated with water, a twin-engine jet transport aircraft with four crew members and 65 passengers on board overran the westerly end of the runway at Anytown City airport. The aircraft came to rest in the mud a short distance beyond the end of the runway. There were no injuries to crew or passengers, and there was no apparent damage to the aircraft as a consequence of the overrun. However, a fire started and subsequently destroyed the aircraft.

Anytown City is a popular summer resort. The predominant weather for a typical summer day is low stratus and fog in the early morning, which gradually develops into convective cloud as the air warms. Severe thunderstorms are common in the early afternoon and persist until the late evening hours. The whole region where Anytown City is situated is *"thunderstorm country"* during summer.

The runway at Anytown is 4 520 feet long. It is a relatively wide runway with a steep downward slope to the west. It is served by a low-power, short-range, non-directional beacon (NDB), unreliable in convective weather. Runway lighting is low-intensity, and there are no approach lights or visual approach aids. It is a classic *"black-hole"* approach during night landings.

The flight had originated at the airline's main base, 400 km away. This was the second-to-last flight for the flight crew that day. They had reported for duty at 11:30 hours and were due to be relieved at 22:00 hours. The crew had been flying a different schedule for the last three weeks. This was the beginning of a new four-day schedule on another route. It had been a typical summer afternoon, with thunderstorms throughout the entire region. Anytown City had been affected by thunderstorms during the early afternoon. No forecast was available, and the pilot-in-command (PIC) had elected to delay the departure.

The flight schedule was very tight, and the PIC's decision to delay created a number of additional delays for subsequent flights. The dispatcher working the flight did not bring to the flight crew's attention the need to consider a contaminated runway operation at Anytown, and did not review the landing performance limitations with them. After a long delay, the PIC decided to add contingency fuel and depart.

Visual conditions were present at Anytown, although there were thunderstorms in the vicinity of the airport, as well as a persistent drizzle. With no other reported traffic, they were cleared for a night visual approach. After touchdown, the aircraft hydroplaned and overran the end of the runway slightly above taxiing speed.

The PIC was a very experienced pilot. He had been with the airline for many years, accumulating several thousand hours of flying time as a second-in-command (SIC) in two other types of large jet aircraft. However, he had limited experience with the aircraft type he was flying the night of the accident. He had not had the occasion to fly into Anytown before because the larger aircraft types he had been flying previously did not operate into Anytown. This was his first month as a PIC. He was a well-balanced individual, with no personal or professional behavioural extremes.

At the time of the accident the SIC was very inexperienced. He had recently been hired by the airline and had only been flying the line for about a month. He had flown into Anytown on two other occasions with another PIC, but only during the day. His training records indicated standard performance during induction into the airline's operations.

Investigation

Initially, the investigation would focus on determining what actually happened at Anytown. It was learned that it had rained heavily at the airport and that there was standing water on the runway. Readout of the flight recorders disclosed that the PIC flew the approach with excess airspeed which resulted in the airplane touching down smoothly, but well beyond the touchdown zone, and then hydroplaning off the end. It was also determined that the PIC neglected to consult the performance charts in the aircraft flight manual for the correct landing distance on a wet runway. Also, the SIC did not make the required callouts during the approach.

These unsafe flight crew actions could in and of themselves explain the overrun and focus the investigation on a conclusion of *"crew error"* as a cause for the accident. However, if one were to investigate further into the company's operational procedures and practices and look upstream for other factors influencing the crew's performance, one could identify additional active and latent failures which were present during the flight. So the investigation should not stop at the point where the crew made errors.

If the investigation were to determine whether any other unsafe acts occurred in the operation, it would discover that not only did the dispatcher fail to brief the PIC on potential problems at the airport (as required by company procedure), but that the company's agent at Anytown had not reported to the dispatcher at headquarters that heavy rain had fallen. Inspection of the runway revealed poor construction, paving and lack of adequate drainage. It was also discovered that maintenance and inspection of the NDB was not in accordance with prescribed procedures. Over the past month, other flight crews had reported on several occasions that the ground aid had given erratic indications during instrument approaches; no attempt had been made to rectify the problem.

With these facts in mind and by referring to the Reason model, it can be seen that the actions of other front-line operators were also unsafe and had an influence upon the performance of the flight crew and the outcome of the flight. These activities can be classified as active failures and are also linked to line-management and decision-makers' performance.

Next, the investigation should determine if there were any adverse pre-conditions under which the flight crew had to operate. These can be listed as follows:

1) a night non-precision instrument approach to an unfamiliar airport;
2) a poorly lit, short, wide and steeply sloping runway;
3) poor runway pavement and drainage;
4) a lack of reliable information on the performance of the NDB;
5) a lack of reliable information about the wind conditions;
6) a flight schedule which allowed only a 15-minute turnaround at Anytown;
7) an arrival delayed by two hours, compromising crew duty-time requirements;
8) an aircraft not equipped with thrust reversers;
9) an inadequately trained flight crew, inexperienced in the type of aircraft and at the airport; and
10) inadequate crash, fire, and rescue services.

The Reason model classifies these pre-conditions as latent conditions, many of which lay dormant for some time before the accident and which were the consequences of line management and decision-maker actions or inactions. For example, pairing two pilots who were inexperienced in the type of aircraft and allowing the PIC to operate into an unfamiliar airport with a non-precision approach procedure was the result of decisions made by line management. Also, the failure to follow up on reported discrepancies with the NDB and the failure to conduct adequate inspections of the airport indicate either a lack of awareness of the safety implications or a tolerance of hazards by the line management and the regulatory authority. The investigation found that pilots were not briefed on the use of performance charts for contaminated runways, nor did they practice hydroplaning avoidance techniques. These discrepancies can be attributed to both line and upper management's failure to provide adequate training.

At the roots of this occurrence were other decisions made by both upper management levels within the company and in the regulatory authorities that had a downside. Management had decided to operate a scheduled service at an airport with known deficiencies in facilities (poor lighting and approach aids, inadequate weather services). More importantly, they chose to operate without the required level of crash, fire and rescue services available at the airport. In addition, management selected this type of airplane for this route out of marketing and cost considerations, despite its unsuitability for all-weather operations at Anytown. Compounding the problem was the decision by the regulatory authority to certify the airport for scheduled air transport operations in spite of its significant safety deficiencies.

The organizational perspective portrays the interactive nature of the conditions and failures and how they can combine to defeat the defences that one might expect to find within an organizational and operational environment. It also depicts the critical importance of identifying latent failures as they relate to the prevention of accidents.

In summary, the approach to the organizational accident encourages the investigator to go beyond the unsafe actions of front line operators to look for hazards that were already present in the system and which could contribute to future occurrences. This approach has direct implications for the prevention activities of operators and regulators, who must identify and eliminate or control latent conditions.

EXERCISE 02/01

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 Anytown City 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);

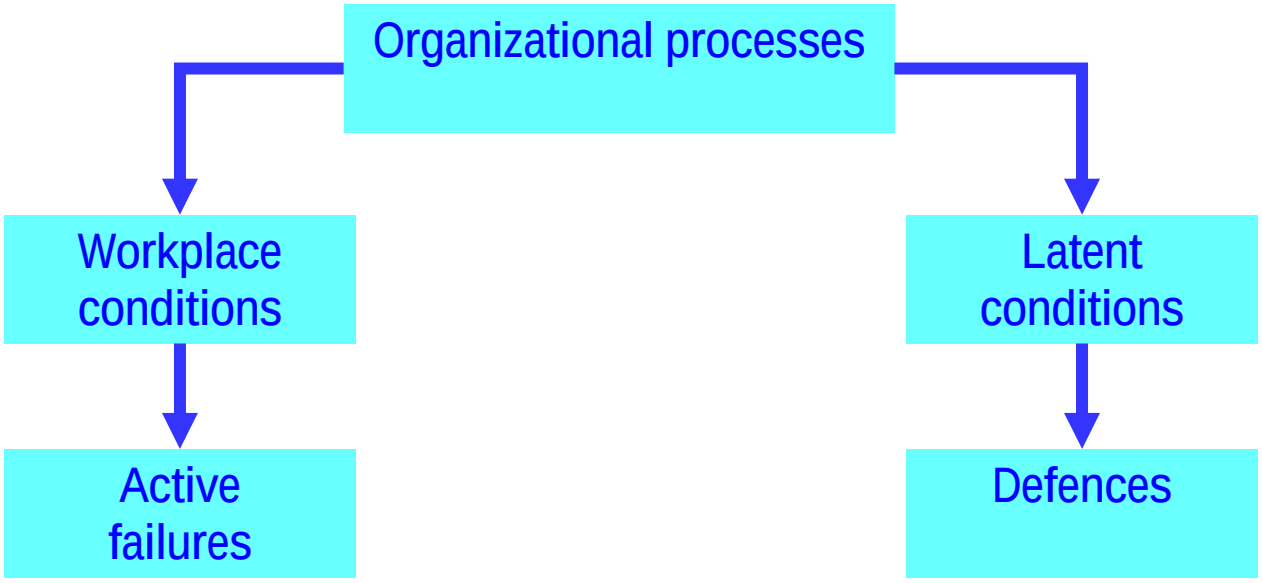
b) **Latent conditions** in the system safety which became precursors of active failures;

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 02/01 – *Analysis* classifying your findings according to the Reason Model.



Reason Model

Table 02/01 – *Analysis*

Organizational processes *Activities over which any organization has a reasonable degree of direct control*	
Certification	
Oversight	

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

Latent conditions *Conditions present in the system before the accident, made evident by triggering factors*
Runway conditions (Pavement/drainage)

Active failures *Actions or inactions by people (pilots, controllers, maintenance engineers, aerodrome staff, etc.) that have an immediate adverse effect*
Did not consult charts

Defences *Resources to protect against the risks that organizations involved in production activities must confront*
Contaminated runway operation charts

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