



AVIATION INVESTIGATION REPORT
A09W0026



RUNWAY INCURSION / RISK OF COLLISION

NAV CANADA
FORT MCMURRAY AIRPORT
FORT MCMURRAY, ALBERTA
09 FEBRUARY 2009

The Transportation Safety Board of Canada (TSB) investigated this occurrence for the purpose of advancing transportation safety. It is not the function of the Board to assign fault or determine civil or criminal liability.

Aviation Investigation Report

Runway Incursion/Risk of Collision

NAV CANADA
Fort McMurray Airport
Fort McMurray, Alberta
09 February 2009

Report Number A09W0026

Summary

At 2111 mountain standard time, a Sunwest Aviation Limited Beech 1900D aircraft (registration C-GSWZ, serial number UE 337), Flight 411 (CNK411), with two crewmembers and eighteen passengers, was taking off from Runway 25 at the Fort McMurray Airport. The visibility at the time was reported as five-eighths of a statute mile in light snow. Just before reaching the take-off decision speed/rotation speed, the crew noticed headlights on the runway in front of them and rotated immediately. The aircraft passed about 100 to 150 feet over a snowplow operating on the runway. The snowplow operator had been cleared by the flight service specialist to continue snow clearing operations on Runway 25 after a previous departure. The snowplow operator had not been instructed to vacate the runway prior to CNK411's departure, and CNK411 had not been advised of the presence of the snowplow on the runway. CNK411 was communicating with the flight service station on the mandatory frequency of 118.1 MHz, whereas the snowplow operator was communicating on the ground frequency of 121.9 MHz.

Ce rapport est également disponible en français.

Other Factual Information

Snow removal operations were being conducted at the Fort McMurray Airport. A snowplow/sweeper truck designated Truck 81 (TK81) was clearing snow from Runway 25. In anticipation of a departure, the flight service specialist (specialist) instructed TK81 at 2103¹ to exit the runway on Taxiway C. At 2105, a Bombardier CRJ2 called the flight service station (FSS) stating that it was taxiing to position on Runway 25; the specialist advised that the vehicle was off the runway and the flight departed. At 2107, TK81 was instructed by the specialist to proceed back onto Runway 25 to continue snow clearing.

After making all the mandatory radio calls on frequency 118.1 MHz while taxiing for Runway 25, CNK411 received an instrument flight rules (IFR) departure clearance from the FSS at 2109 with a restriction that the clearance was cancelled if the aircraft was not airborne by 2111. The clearance was read back and CNK411 taxied to position. CNK411 called at 2110 to report that it was rolling on Runway 25. As the aircraft was about 3400 feet down the runway and approaching the critical engine failure recognition speed (V_1),² the pilot flying (PF) noticed lights ahead on the runway and immediately rotated.³ The aircraft began climbing and passed over TK81 at an altitude estimated to be between 100 to 150 feet. The crew of CNK411 called FSS to report being airborne and inquired about the vehicle on the runway. The specialist replied that the vehicle should not have been there.

On the take-off roll, the captain of CNK411 was the pilot flying (PF) and was concentrating on tracking the runway centreline using the runway edge lights. Section 602.100 of the *Canadian Aviation Regulations* (CARs) requires the pilot-in-command to ascertain by radio communication and by visual observation that there is no likelihood of collision with another aircraft or a vehicle during take-off. On this occasion, the PF's forward vision was restricted by light snow blowing across the runway from right to left and from the glare from the aircraft's landing lights on the falling snow. The first officer was the pilot not flying (PNF) and was monitoring the instruments and power levers. Visibility was reported to be about 5/8 of a mile (3300 feet). When the PF initially saw TK81's headlights, the aircraft was in the vicinity of Taxiway D, which is 3500 feet from the threshold of Runway 25. TK81 was in the vicinity of Taxiway C, which is approximately 5400 feet from the threshold of Runway 25 (see Figure 1). The crew did not see the rotating beacon on the snowplow until they were directly overhead.

¹ All times are mountain standard time (Coordinated Universal Time minus seven hours).

² V_1 - The maximum speed during take-off at which a pilot can safely stop the aircraft on the remaining runway. This is also the minimum speed that allows the pilot to safely continue the take-off and accelerate to the take-off safety speed (V_2) even if a critical engine failure occurs.

³ V_1 and rotation speed were the same for the aircraft weight and runway conditions.

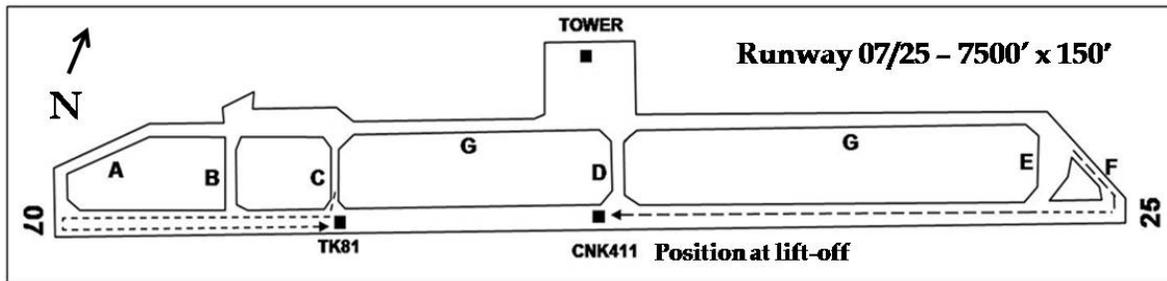


Figure 1. Fort McMurray Airport diagram

In the absence of a radio call from the specialist instructing the snowplow to vacate the runway, the driver continued working south of the runway centreline heading towards the threshold of Runway 25.

The Fort McMurray weather was provided by an automated weather observation system (AWOS), which recorded the following conditions at 2113: winds 320° True (T) at 8 knots, visibility 5/8 statute mile, light snow, vertical visibility 700 feet, temperature -14° C, dew point -17° C, and altimeter 29.67 inches of mercury. The threshold lights for each end of the runway were visible from the tower, but described as fuzzy due to the light snow.

NAV CANADA operates a control tower on weekdays from 0645 to 1815 and on Saturdays and Sundays from 0645 to 1500. It also operates a FSS that provides flight advisory and vehicle control services (VCS) ⁴ on weekdays from 1815 to 2315 and from 1500 to 2315 on Saturdays and Sundays. During the period from 2315 to 0645 daily, remote aerodrome advisory service (RAAS) and vehicle advisory service (VAS) ⁵ are provided by specialists located at Peace River, Alberta about 200 nautical miles west of Fort McMurray.

The airport control frequency/mandatory frequency (MF) is 118.1 MHz and the ground frequency is 121.9 MHz. When the tower or the on-field FSS is in operation, both frequencies are used for aircraft communications, where the ground frequency is used for communicating with both aircraft and ground vehicles. ⁶ This practice is used by NAV CANADA to relieve frequency congestion when aircraft movements increase. The ground vehicles are equipped with a single very high frequency (VHF) radio and cannot receive both frequencies simultaneously. During the hours of RAAS/VAS operations, only the MF (118.1 MHz) is used so that both aircraft and ground vehicles receive all communications to increase their situational awareness. This also serves as a defence should the communication line between the RAAS and the airport be disrupted.

⁴ Vehicle Control Service (VCS) – the provision, by flight service stations (FSS), of commands and instructions to control the movements of ground traffic on manoeuvring areas at designated uncontrolled aerodromes.

⁵ Vehicle Advisory Service (VAS) – the provision, by flight service stations (FSS) or flight information centres (FIC), via remote communications outlets, of information and advice to assist aerodrome operators in managing the movements of ground traffic on manoeuvring areas at designated uncontrolled aerodromes.

⁶ NAV CANADA Flight Services Manual of Operations (MANOPS) 401.4

At the time of the occurrence, the on-field specialist was handling all air and ground traffic, as well as having to cope with an unserviceable digital automatic terminal information system (D-ATIS). The loss of the D-ATIS resulted in a higher workload for the specialist having to issue weather, runway surface condition (RSC), and Canadian runway friction index (CRFI) reports verbally to each of the arriving and departing aircraft, instead of the aircraft receiving the taped information from the D-ATIS before contacting the FSS.

The specialist had started the scheduled shift at 1530 and had been in position in the tower for approximately two hours before the occurrence. This was the first shift after two days off. The position was staffed to unit guidelines and there was no supervisor in the tower at the time of the occurrence, nor was one required by unit guidelines. The specialist originally qualified in October 2006 and qualified at the Fort McMurray Airport site in January 2008.

Under winter conditions, snow removal equipment must frequently operate on the active runway between aircraft movements. The interval between the departure of the previous flight and the departure of CNK411 was about five minutes, which allowed TK81 to travel from Taxiway C to the threshold of Runway 07 and back to the vicinity of Taxiway C, a distance of about 4000 feet.

In this occurrence, the specialist had cleared the vehicle onto the runway as part of the normal traffic flow sequence. Two aide-memoires are used to remind Fort McMurray specialists of the presence of vehicles on the active runway:

- activation of the runway occupation display system (RODS), which displays a red light on the console; and
- cocking of the vehicle progress strip in the strip bay, where strip down means on the active runway and strip up means off runway on a taxiway.

The specialist was in the habit of using both. As a final check, specialists visually scan the runway for vehicles as per FS MANOPS 421.2.

The specialist did not remember clearing the vehicle back onto the runway and, as such, did not make use of available aide-memoires. The specialist's scan of the runway prior to CNK411's departure had noted TK81's beacon. However, as seen from the tower, the position of the vehicle could not be ascertained. TK81 had worked back to the vicinity of the intersection of Taxiway C.

An omission following an interruption is a skill-based performance error that happens when the required attention check is interrupted by some external event; the original action sequence continues, but with parts of it omitted as a result of the interruption. If a well-practiced routine is interrupted, it may never be completed, or it may be picked up again at the wrong stage.

In 1997, NAV CANADA issued Air Traffic Services Bulletin No. 9701, which identified forgetfulness as the most prevalent aspect of runway incursions. Vigilance and adherence to mandatory procedures were identified as critical mitigation techniques for avoiding incursions. NAV CANADA issued Air Traffic Services Bulletin No. 2000-2 in May 2000 in response to a review of runway incursions. The bulletin identified several strategies for preventing incursions, including scanning the manoeuvring area continuously and being wary of mental wandering through continued situational awareness and personal discipline.

Analysis

The consequences of a collision between ground vehicles and aircraft taking off or landing can be catastrophic. As a result, several defences are used to prevent ground vehicles and aircraft from conflicting with each other.

The specialist was relatively busy, communicating with airport traffic and coordinating with the area control centre (ACC). The specialist did not remember clearing the vehicle back onto the runway after the previous departure. It is likely that the other tasks at around the same time the specialist was clearing the vehicle onto the runway interrupted the specialist's normal use of available aide-memoires. Furthermore, the position of the vehicle in and around Taxiway C likely confirmed in the specialist's mind that the vehicle had not moved since the previous departure and that a clearance had not been given to the vehicle to proceed back onto the runway.

Transport Canada regulations require pilots to ensure that the runway is clear of obstacles prior to departure. This can be done by visual observation or through radio communications. In this case, it was night with reduced visibility in snow, which limited the effectiveness of visual observation.

Having both the aircraft pilot and the vehicle operator on the same radio frequency would have likely enhanced each other's awareness of their respective positions on the runway.

Findings as to Causes and Contributing Factors

1. Likely due to the interruption from other tasks at the same time the specialist was clearing the vehicle onto the runway, the flight service specialist did not use any aide-memoires as a reminder that TK81 had been cleared onto the runway.
2. The flight service specialist's visual scan was defeated by reduced visibility.
3. The reduced visibility due to darkness and falling snow resulted in neither the vehicle operator nor the pilot accurately determining the other's position on the runway.
4. TK81 and CNK411 were operating on different frequencies, removing an opportunity for the flight crew or the vehicle operator to be aware of the other's presence on the runway.

Safety Action Taken

Transportation Safety Board of Canada

On 13 August 2009, the Transportation Safety Board of Canada issued to Transport Canada an Aviation Safety Advisory A09W0026-D1-A1, entitled *Communication Frequency Assignment for Vehicle Advisory Services*. This advisory suggests that Transport Canada may want to work with NAV CANADA to explore the feasibility of a single frequency for the aircraft and vehicles occupying the manoeuvring areas.

NAV CANADA

In response to above-mentioned Safety Advisory, NAV CANADA provided the following:

- On 26 February 2009, NAV CANADA published Squawk 7700 (2009-2) titled "Reducing the risk of runway incursions." It provides the latest runway incursion statistics and reminders on some of the actions that air traffic services (ATS) personnel can take to reduce the likelihood of being involved in a runway incursion.
- NAV CANADA conducted an Operational Safety Investigation (OSI) into the event. In the weeks following the release of its investigation report, NAV CANADA examined the possibility of implementing cross coupling capability⁷ at flight service stations (FSS) as a potential mitigation to reduce the likelihood of similar occurrences.
- On 27 April 2009, a memorandum on the implementation of cross coupling was distributed. It provided directions to unit managers of FSS facilities to implement the cross coupling capability, proceed with an on-site implementation safety review, include procedures on the use of cross coupling in the Unit Operations Manual (UOM) and provide a mandatory briefing for specialists. FS evaluations and investigations inspectors are verifying the implementation of cross coupling in all units as part of their routine unit evaluations.
- Since the incident, there have been changes in the air traffic service provision at the Fort McMurray Airport (YMM). An air traffic control tower has been established and, outside the tower hours of operation, a remote airport advisory service (RAAS) through Peace River FSS is available. With respect to RAAS, vehicle advisory service is provided on the mandatory frequency (MF), which is a single frequency for both vehicle operators and aircraft.

⁷ Cross coupling of frequencies allows aircraft and vehicles to hear communications coming from each other and the specialists even when these communications take place on the frequency that they do not monitor, thus increasing their situational awareness of other vehicle and aircraft relative positions and intentions.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 30 March 2010.

Visit the Transportation Safety Board's Web site (www.bst-tsb.gc.ca) for information about the Transportation Safety Board and its products and services. There you will also find links to other safety organizations and related sites.