

AVIATION OCCURRENCE REPORT

RISK OF COLLISION

BETWEEN

INTER-CANADIEN AÉROSPATIALE ATR 42-300 C-FTCP

AND

A CONVOY OF SNOW REMOVAL VEHICLES

QUEBEC/JEAN-LESAGE

INTERNATIONAL AIRPORT, QUEBEC

10 JANUARY 1997

REPORT NUMBER A97Q0005

The Transportation Safety Board (TSB) of Canada 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.

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### *Synopsis*

Inter-Canadien Flight 1628, an ATR 42-300 (Serial No 143), was cleared to take off from runway 06. This regularly scheduled passenger flight links Quebec City, Quebec, and Baie-Comeau, Quebec. During climb-out, the aircraft flew over a convoy of six snow removal vehicles travelling in the opposite direction at the midway point of the runway. The flight crew reported the incident to the air traffic controller, then continued the climb and flew on to the destination without further incident.

*Ce rapport est également disponible en français.*

## *Other Factual Information*

At 0819, eastern daylight time (EDT), a convoy consisting of six snow removal vehicles under the direction of the maintenance supervisor (Staff 22) was authorized by the ground controller to proceed onto runway 06 via taxiway Bravo, runway 30 and taxiway Golf. At 0824, the convoy entered runway 06 and cleared it six minutes later via taxiway Alpha to allow an aircraft to land. After clearing the taxiway, Staff 22 reported to the ground controller that the vehicles were going to work on the apron and asked to be advised when the runway was available. At 0837, the aircraft landed and was cleared to leave the runway via taxiway Alpha and travel to the apron. About one minute and twenty-four seconds later, the ground controller advised Staff 22 that the runway was available. Shortly thereafter, the ground controller was relieved for a rest break, by the shift supervisor.

Staff 22 and the five other vehicles then left the apron and entered runway 06 via taxiway Alpha without requesting permission to proceed. At 0841, Inter-Canadien 1628 (ICN 1628) was cleared by the ground controller to proceed onto runway 06. The investigation revealed that the communication was heard by two vehicle drivers while the convoy was on runway 06, about 1,000 feet from the intersection with taxiway Alpha. The drivers were under the impression that the controller would warn them if they had to clear the runway. Shortly thereafter, the convoy of vehicles turned around and headed towards the right side of runway 24.

At 0845, the air controller cleared ICN 1628 to take off from runway 06. The co-pilot was at the aircraft's controls during the take-off run. At rotation speed, he noticed that there were vehicles on the runway and pitched the nose of the aircraft up more steeply than normal. Shortly thereafter, the captain reported to the air controller that there were several vehicles on the runway. In the meantime, Staff 22 advised the ground controller that an aircraft had just flown over the vehicles. The aircraft was estimated to have taken off approximately 3,000 feet from the threshold of runway 06 between 1,000 and 1,500 feet before the area where the vehicles were. The climbing aircraft flew over the vehicles at an altitude of between 200 and 300 feet. Runway 06/24 is 9,000 feet long and 150 feet wide.

The weather conditions prevailing at Quebec City at the time of the occurrence were as follows: surface winds from 090 degrees magnetic at 15 knots gusting to 20 knots; visibility ½ half mile in average-intensity and blowing snow; vertical visibility 600 feet; temperature minus 7 degrees Celsius; dew point minus 8 degrees Celsius; barometric pressure 29.36 inches of mercury; obscuring phenomenon due to snow; opacity 8/10. The runway and the apron could not be seen from the control tower because of the weather conditions.

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<sup>1</sup> All times are EDT (Coordinated Universal Time (UTC) minus five hours) unless otherwise stated.

The frequency 121.9 megahertz was used for communications between the control tower personnel and the snow removal vehicles. Use of the ground control frequency for communications with all airport vehicles is the established standard procedure. The maintenance frequency was used for communications between the snow removal personnel. This frequency is also used by all airport vehicles, but is not available to air traffic personnel. It is a work tool and helps to reduce congestion on the ground frequency. Staff 22 stated that he did not hear the ground controller clear ICN 1628 to proceed because the maintenance frequency was congested. The communication equipment was working properly at the time of the occurrence.

Controllers occupied the ground and air positions in the control tower, and there was also a shift supervisor present. Staffing met unit standards. The transfer of responsibilities between the supervisor and the ground controller for his rest break was done in accordance with standard procedures. The supervisor knew that Staff 22 had been advised that the runway was available, and he was under the impression that the snow removal vehicles would continue to work on the apron. The workload was assessed as light, with normal complexity. The personnel on duty in the control tower and the snow removal personnel were certified and qualified.

In the tower, red and green warning lights report movements and obstacles on the runways. The ground controller attends to the warning lights. A green light indicates that the runway is clear, and a red light indicates that the runway cannot be used. In the present case, the green warning light for runway 06 was lit. In addition to these lights, vehicle information is recorded and updated on red progress strips showing the number and position of vehicles and placed directly under the flight progress strips. In the present case, there was a red strip on the ground and air controllers' data blocks. At the time of the occurrence, each strip indicated that the six snow removal vehicles were on the apron. The airport is not equipped with Airport Surface Detection Equipment (ASDE). An ASDE is a very useful tool for navigation on the ground, as it can detect potential conflict situations, especially if visibility is restricted.

In performing their duties, the air traffic and maintenance personnel were using the *Snow Removal Manual 1996-1997, Jean-Lesage International Airport, 23 October 1996* and the minutes of a snow removal meeting held on 28 October 1996. At this meeting it was agreed, among other things, that, to allow good cooperation during storms and to speed up snow removal work, the head of maintenance was to be advised as soon as the active *runway* was *available*, and that care was to be taken to confirm whether authorization had been given to proceed along the whole length of the runway or with restriction. The ground controller concerned, and the maintenance supervisor had attended this meeting, and the maintenance supervisor had prepared and signed the agreed procedure. In the present case, Staff 22 did not see the need to request permission to proceed because the runway that he had just cleared was available again. Further, he thought that he could use its whole length without restriction.

The *Air Traffic Control Manual of Operations* (MANOPS) and the *Airport Traffic Directives for the Operation of Vehicles on Airport Movement Areas* (TP 2633) deal with ground traffic at airports and contain the standard phraseology to request and transmit traffic instructions to vehicles. These documents were amended following publication of an Air Traffic Services Directive (ATSD-015) issued on 16 April 1984. This directive pointed out that some phraseology was imprecise and could give rise to misinterpretations when associated with ground

vehicle movements. To remedy this situation, the directive stipulated that in future the word "cleared" would be eliminated from the phraseology dealing with vehicle movements at airports and would be replaced with an executive type of authorization. The personnel concerned in this occurrence knew the contents of these documents.

Section 4.03 of TP 2633 stipulates that before proceeding onto manoeuvring areas on a controlled airport, the vehicle operator is to contact the ground controller for permission to proceed to a specific location by a specified route. Further, section 354.4 of the MANOPS stresses that air traffic personnel must be more vigilant during periods of restricted visibility to ensure that the runway is clear for use when required, and that they must remain aware of the location of ground traffic.

## *Analysis*

During take-off, the flight crew of Flight ICN 1628 saw snow removal vehicles on the runway. The crew had not been informed of the presence of these vehicles because of the information available to the controllers on duty.

Personnel in the tower, and snow removal personnel were certified and qualified for the duties being performed, and they were current with existing procedures. In addition, the communication equipment used was operating properly, although the maintenance frequency was sometimes congested, as it was used by all airport vehicles. The frequency congestion was also made worse by use of the ground frequency.

When the vehicle convoy first proceeded onto runway 06 to begin snow removal, permission to proceed was requested and given in accordance with existing procedures. As the vehicles had to clear the runway to allow an aircraft to land, they proceeded onto the apron, where they continued snow removal work. When the ground controller shortly thereafter told the maintenance supervisor in charge of the convoy (Staff 22) that the *runway* was *available*, the six vehicles immediately proceeded onto the runway via taxiway Alpha, but without obtaining permission to proceed. The apron and the runways could not be seen from the control tower because of the restricted visibility.

The orders agreed on at the snow removal meeting prior to the winter season (in effect, that air traffic personnel were to advise maintenance personnel when the *runway* was *available*, and that everyone was to take care to confirm an authorization to proceed along the whole length of the runway, or with restriction) seemed clear and precise. In the incident, however, Staff 22 interpreted *runway available* as permission to proceed, because he had just cleared this runway. He also thought that he could use the whole length of the runway without restriction. These

orders therefore caused confusion, because, before proceeding onto manoeuvring areas on a controlled airport, as stated in TP 2633, vehicle operators are to obtain permission to proceed to a specific location by a specified route.

While the vehicles were entering the active runway without permission, the shift supervisor, who was temporarily acting as ground controller, cleared ICN 1628 to proceed onto runway 06. The controllers on duty thought that the vehicles were still on the apron, because the lights indicated that runway 06/24 was clear and the progress strips indicated that the six vehicles were still at that location. However, as stressed in the MANOPS, because visibility was restricted, the ground and air controllers could have asked for the location of the vehicles before clearing ICN 1628 to proceed and take off, although that was not mandatory. Further, an ASDE might have detected the situation.

Two vehicle operators heard the communication for ICN 1628, but they were under the impression that the controller would warn them, if necessary, to clear the runway. The congestion of the maintenance frequency might also have contributed to the fact that Staff 22 did not hear this communication.

Subsequently, the snow removal convoy headed towards the right side of runway 24, without the controllers' being aware of their movements. In the middle of the runway, to the great surprise of everyone concerned, the aircraft in climb-out flew over the vehicle convoy. After the incident, the local authorities immediately took action to prevent a similar occurrence from happening again.

## *Findings*

1. The air traffic and snow removal personnel concerned were certified and qualified to perform their duties.
2. The apron and the runway could not be seen from the control tower, because of the weather conditions.
3. The airport is not equipped with Airport Surface Detection Equipment (ASDE).
4. The maintenance frequency is used by all vehicles operating on the airport.
5. The maintenance supervisor (Staff 22) and the snow removal vehicles left the apron and entered taxiway Alpha and the active runway without requesting permission to proceed.
6. Both the strips used in the control tower for vehicles, and the warning lights, indicated that the vehicles were on the apron and that the active runway was clear.

7. The air and ground controllers did not ask for the location of the snow removal vehicles before clearing ICN 1628 to proceed and take off.
8. The air controller did not know that there were snow removal vehicles on the active runway when he cleared ICN 1628 for take off.
9. The expression "runway available", from a local order, caused confusion and contributed to the fact that the snow removal vehicles were on the active runway without permission when an ATR 42 aircraft was taking off.

### *Causes and Contributing Factors*

A dangerous situation occurred when an ATR 42 aircraft took off while there were six snow removal vehicles on the runway. The following factors contributed to this dangerous situation: visibility was considerably restricted; and the local snow removal orders caused confusion. As a result, the convoy of snow removal vehicles left the apron and was on the active runway without permission.

### *Safety Action*

After the incident, the local authorities took the following actions:

- An operating bulletin was issued by the air traffic authorities to clarify the interpretation of the term "runway available" and to set out a new procedure to prevent any ambiguity.
- A plexiglass plate was added to the ground controller's position on which to write in grey pencil the active runway and the presence of vehicles on the airport's movement areas.
- An exchange program between air traffic personnel and airport vehicle drivers was established to promote better understanding of the duties and functions of the two groups, better communication between the parties, and better understanding of each others' work.
- A refresher course on airport traffic procedures and air traffic phraseology was given to all airport maintenance vehicle operators.
- The air traffic authorities carried out an on-the-job assessment and evaluated the phraseology used by their personnel under the System Quality Assurance Program (SQAP).
- The local air traffic authorities are trying again to obtain Airport Surface Detection Equipment (ASDE) for the airport, and are proposing alternative measures.
- A document was prepared by the maintenance service to obtain an additional working frequency

exclusively for the use of snow removal crews.

*This report concludes the Transportation Safety Board's investigation of this occurrence.  
Publication of this report was authorized on 29 July 1997 by the Board consisting of Chairman Benoit  
Bouchard and Members Maurice Harquail, Charles H. Simpson and W.A. Tadros.*



*Appendix A - Diagram of the Airport*

