

Forensic response to First Air crash

Tragedy helped by military presence up North

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On Aug. 20, 2011, First Air flight 6560 prepared to leave Yellowknife, N.W.T., en route to Resolute Bay, Nunavut, a small isolated Inuit community situated 1,600 kilometres to the northeast in the Canadian Arctic. There were 11 passengers and four crew members on board.

The cargo area contained about two tons of food for Resolute Bay and its surrounding communities since marine delivery in the region is interrupted each winter due to ice build-up. To accommodate the extra cargo, First Air uses a modified Boeing 737 aircraft, which is configured to carry both passengers, sitting at the rear of the plane, and cargo stored at the front directly behind the cockpit.

Under light drizzle and mist, and while preparing to land, the plane suddenly collided with the side of a mountain about three kilometres east of the runway.

Following the impact, the aircraft bounced up and over the sloped hill and then slid downhill on the rocky ground. The plane broke into several distinctive parts: the tail, the wings and the middle fuselage, and the cockpit and front fuselage. Metal debris was strewn over an area about 300 metres long and 70 metres wide.

All of the passengers were ejected from the plane. Some were found lying on the ground while others were still secured to their seats by seatbelts. Eight passengers and all four crew members were killed. Three passengers miraculously survived the crash despite serious injuries.

Coincidentally the Canadian Forces (CF) was conducting a major annual sovereignty operation and security exercise, called Nanook 11, in Canada's Northwest Passage at the same time.

About 1,100 military personnel were participating in the exercise, including more than 300 who were working in the Resolute Bay vicinity. As part of the exercise, several Search and Rescue (SAR) planes, helicopters, a naval frigate, Canadian and U.S. Coast Guard personnel, and members of the Transportation Safety Board (TSB) were on site.

Ironically, part of the exercise was to involve a simulated major air disaster and maritime rescue. At about 12:50 p.m., report of the crash reached the military, who immediately suspended the exercise and moved into rescue mode.

CF members and local airport firefighters responded to the crash site. Three military helicopters assisted in bringing over responders including 15 medical staff. Three survivors were soon located and taken back to the CF base for medical treatment before being flown to Iqaluit on a Globemaster C-17 plane.

Rescuers searching the site located 12 deceased persons whose bodies were covered with blankets until police could process the scene.

Several armed members of the Nunavut Rangers, a volunteer unit of the CF using trained Inuit locals, were assigned 24-hour site security duties. This was done due to the presence of predators including polar bears that were likely to be drawn to the victims' bodies and the large amount of fresh food from the cargo compartment now strewn over the crash site.

The Incident Command Model was used to manage the response. The RCMP led the investigation to determine criminality. Due to the size and seriousness of the incident, additional police officers were immediately dispatched to assist the local two-member RCMP detachment and the sole forensic identification member stationed in Nunavut's capital, Iqaluit.



A team of three RCMP forensic identification specialists from Alberta and Ottawa and a collision reconstructionist and a collision support analyst from Alberta were also sent to Nunavut.

Due to the high number of casualties and the expected challenges of making positive identifications due to the seriousness of injuries, Disaster Victim Identification (DVI) protocols were used.

The main purpose of DVI operations is to conclusively identify victims under internationally approved guidelines. Visual identification by comparing a photograph, such as a driver's licence photo, with the deceased, is often unreliable. Identification is preferably performed using fingerprints, a dental chart or DNA analysis to eliminate any possible mistakes.

An event of this magnitude usually requires several days to process, so a temporary camp, including two large mobile tents, was set up by the military next to the crash site.

One tent was reserved exclusively for the use responders and equipped with a portable diesel heater to provide shelter from the severe weather conditions during meal breaks. Work was even suspended one day due to high winds and the risk of flying metal debris.

The second tent was reserved to store non-electronic equipment, the collected belongings and the exhibits, and was used by the local coroner and forensic members to examine the victims.

Access to the crash site from the airport was limited due to the rugged terrain. As a result, CF helicopters as well as all-terrain vehicles (ATVs) were used to allow for quick and easy transportation of military, police and TSB personnel each morning and at the end of the day.

As with any incidents with casualties, the first step is to properly record the scene. This was performed with ground and aerial photography and videography. The traffic collision members digitally recorded all scene measurements resulting in 750 evidentiary and topographical measurements by the end of the sixth day.

Once the photography and video portions were completed, all the deceased passengers and crew members were issued a unique identification number. Their respective locations at the crash site were precisely recorded by the traffic collision team using high-tech differential GPS-based surveying equipment.

This equipment provided much better and faster results compared to standard hand-held consumer-level GPS models.

Each victim was transported back to the second tent for closer examination. Here, forensic identification experts completed the preliminary examination of the injuries and compiled the physical descriptors and clothing description of the victims.

Fingerprints were also obtained using the black fingerprint powder, white adhesive label and clear acetate sheet method, which produces much better friction ridge detail than the standard black inking of the fingers on white paper.

All 12 victims were subsequently transported back to the CF base at the airport where a military dentist examined each individual, took dental x-rays and recorded their respective dental charts.

Once completed, the bodies were transported to Ottawa where full autopsies were performed and all were positively identified.

After the external examination of the victims was completed, the DVI team's next step was to search the site, take additional GPS measurements of the aircraft debris and the terrain before labelling and collecting all of the passengers' and crew's belongings.

Due to the large area of the crash site, a line search technique was performed using military personnel. A base line with a thick rope was stretched across the length of the entire debris field. A team of 24 military divers from the Canadian Forces and United States Navy, who were guests on the CF frigate for the Nanook exercise, assisted the DVI team in performing the ground search.

Each searcher was positioned at arm's length from one another and under the order of their unit commander slowly walked forward all in line until an object of interest was spotted.

When a new article was found, the searcher would raise his or her hand in the air to indicate the finding. The unit commander would verbally halt the group and allow the DVI team members to approach and confirm the object was personal property.

Once confirmed, the location was marked with differential GPS and the item was then labelled, photographed and collected. This approach allowed for a full and complete screening of the crash site in half a day and resulted in the collection of 225 personal items.

All recovered belongings were later turned over to a private company hired by the airline, which then cleaned (many articles were jet-fuel contaminated), photographed and catalogued each article before making arrangements to have them returned to the victims' families.

It was learned after our deployment that the airline crew's identification cards collected at the crash site and later turned in to the private company had an embedded electronic chip containing biometric data including fingerprints of the employee. Airline ID cards should therefore always be retained by police in incidents that may require the use of fingerprints for identification purposes.

The flight data recorder and cockpit voice recorder of the Boeing 737 plane were located by CF personnel during the initial response. Both boxes were transported by the military back to Ottawa for examination by engineers at TSB's laboratory. All aircraft debris at the site was subsequently removed by First Air in the months following the incident.

As with most major deployments, a list of post-mission recommendations and suggestions were compiled by the DVI team and passed on to RCMP HQ for the next major disaster. Included was the recommended deployment of forensic collision reconstructionists with differential GPS survey equipment for future crash incidents as it was found to provide invaluable data for the forensic team as well as TSB investigators.

In January 2012, TSB issued a media release with a preliminary report about the crash. Investigators classified the incident as a "controlled flight into terrain" accident, but the exact cause is still unknown.