

SERIOUS INCIDENT

Aircraft Type and Registration:	Airbus A319-111, G-EZFI	
No & Type of Engines:	2 CFM56-5B5/3 turbofan engines	
Year of Manufacture:	2009	
Date & Time (UTC):	6 January 2011 at 1955 hrs	
Location:	Belfast International Airport	
Type of Flight:	Commercial Air Transport (Passenger)	
Persons on Board:	Crew - 6	Passengers - 46
Injuries:	Crew - None	Passengers - 1 (Minor)
Nature of Damage:	None	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	39 years	
Commander's Flying Experience:	8,408 hours (of which 2,892 were on type) Last 90 days - 172 hours Last 28 days - 41 hours	
Information Source:	AAIB Field Investigation	

Synopsis

The airport's runway and taxiways had been treated with de-icing chemicals. After landing, the aircraft vacated Runway 25 on to Taxiway D, with reverse thrust still deployed. Smoke began to enter the cabin and the cabin manager advised the flight crew. As the smoke became thicker, the cabin manager recommended to the flight crew that an evacuation was necessary. The commander stopped the aircraft and the flight crew began their evacuation procedure. At the same time, the cabin manager initiated an evacuation in the cabin. When the commander heard the forward cabin doors being opened, he immediately shut down the engines. During the evacuation one passenger received minor injuries.

The de-icing chemicals were most probably the source of the smoke, the density of which was probably exacerbated by the prolonged use of reverse thrust.

The aircraft and airport operators each conducted their own investigations and made internal recommendations on the lessons learned from this incident.

History of the flight

The aircraft and crew operated from their base at Liverpool Airport to Madrid Barajas Airport and back, before departing for Belfast Aldergrove Airport. The crew consisted of the commander and co-pilot, the cabin manager and one cabin crew member seated in the forward galley, and two further members of the cabin

crew seated in the rear galley. The commander was pilot flying (PF) and there were 46 passengers on board.

During the brief cruise portion of the flight, the co-pilot, who was pilot non-flying (PNF), obtained the latest ATIS information for Belfast. It stated that the wind was calm, visibility was 2,900 metres in mist with no significant cloud, dew point and temperature were both -3°C, and the QNH was 1002 mb. Runway 25 was in use and the runway state was reported as wet in all three sections. The runway and taxiways at Belfast had been treated with potassium acetate and urea during the day, to prevent ice forming; this information was not communicated to inbound aircraft.

The cabin was secured for landing and the cabin lights were dimmed; most of the available illumination in the cabin was from reading lights which some passengers had switched on. The landing was normal; the commander had pre-selected autobrake LO and used idle reverse thrust after touchdown, as he had briefed. During the landing roll, the aerodrome controller instructed the

aircraft to continue to the end of the runway and vacate onto Taxiway D (see Figure 1) because the shorter route to the apron via Runway 35 was temporarily blocked. The controller then asked the flight crew to keep the aircraft's speed up prior to vacating.

Idle reverse thrust remained selected and, as the aircraft vacated the runway, the co-pilot carried out the after-landing scan, which included selecting air conditioning pack 2 to OFF and starting the APU. The aircraft was the first to use Taxiway D for some time and deposits of de/anti-icing products were lying on the taxiway.

Shortly after this, a smoke-like substance started filling the cabin from the overhead vents. Passengers and crew, interviewed after the event, described the smoke appearing along the entire length of the cabin, and that it was either brown or black in colour. It was impossible to ascertain precisely the volume or density of the smoke but crew and passengers reported that visibility was affected. They described the smell as being reminiscent of a bonfire or electrical burning.



Figure 1
North-western area of Belfast Aldergrove Airport

In the rear galley, both cabin crew members became aware of the smoke and prepared to don their smoke hoods. In the forward galley, both the cabin manager and cabin crew member also noticed the smoke. The cabin crew member left his seat and ran part of the way down the length of the cabin, shouting to passengers “get your heads down”, before he returned to the galley. The cabin manager, meanwhile, used the service interphone to contact the flight crew. The co-pilot answered the call, and the following dialogue took place:

Cabin manager: “HI, WE’VE GOT SMOKE IN THE CABIN”
Co-pilot: “YOU’VE GOT SMOKE IN THE CABIN”
Cabin manager: “YES”
Co-pilot: “OKAY”
Cabin manager: “OKAY”

The commander had selected the service interphone OFF on his audio selector panel and thus did not hear this exchange; he then switched it ON to hear any subsequent communications from the cabin. The co-pilot advised the commander of the cabin manager’s communication, before asking him if he could smell anything. At about the same time, the thrust levers were moved from the idle reverse thrust position to the idle position. The aircraft had travelled approximately 270 m along Taxiway D by this time and its ground speed had reduced progressively to about 12 kt.

The cabin manager then saw that the smoke was becoming thicker and made another call on the service interphone during which the following exchange took place:

Cabin manager: “I THINK WE NEED TO EVACUATE”
Co-pilot: “WE NEED TO EVACUATE”
Commander: “OKAY”
Co-pilot: “OKAY”
Cabin manager: “BYE”

The commander brought the aircraft abruptly to a stop, set the parking brake, and called for the evacuation checklist. The co-pilot made a MAYDAY call, advising that the aircraft was being evacuated. However, he had not re-selected his audio panel transmit switch from the cabin interphone position to VHF 1, so the call was made over the interphone system and was not transmitted to ATC.

The commander confirmed the first item of the checklist while, simultaneously, the cabin manager issued an evacuation command over the public address system, saying: “UNFASTEN YOUR SEAT BELTS AND GET OUT”. The cabin manager did not activate the evacuation alarm. The commander heard the forward doors opening behind the flight deck and, being concerned that evacuating passengers might be endangered by the engines, he immediately shut them down. As the engine-driven generators went off line, all lighting in the flight deck extinguished; there was very little ambient light. The flight crew found they were unable to read the evacuation checklist, so the commander carried out some items of the checklist from memory and by touch. The fire pushbuttons were operated and the extinguishing agents discharged.

The aerodrome controller called the aircraft with further taxi instructions and the commander replied, stating that an evacuation was taking place. The controller initiated the emergency plan and Rescue and Fire-fighting Service (RFFS) vehicles deployed to the aircraft.

Immediately after the evacuation command was made on the public address system, the cabin manager and cabin crew member in the forward galley checked the areas outside doors 1L and 1R for hazards and opened the doors. Both slides deployed correctly and passengers evacuated the aircraft.

On hearing the evacuation command from the cabin manager, the cabin crew at the rear galley put down their smoke hoods, checked for hazards outside doors 2L and 2R and opened those doors. The slide at door 2L deployed correctly. However, the cabin crew member who opened door 2R observed that the area outside the door was “pitch black” and he was unable to see whether the slide had deployed correctly. Bearing in mind that the aircraft was only one third full, he decided to direct passengers to the slide at door 2L. Once all passengers had evacuated, the flight and cabin crew followed them down the slides. The commander picked up a torch from its stowage as he left the aircraft. Once outside, he used his torch to identify himself to passengers and called them around him.

All the passengers and crew had evacuated the aircraft by the time the RFFS vehicles arrived. Some RFFS personnel attended to the passengers, handing out survival blankets and putting some passengers in their vehicles to keep warm. Other RFFS personnel, wearing breathing apparatus, accessed the aircraft using a ladder. Thermal imaging equipment was used inside and outside the aircraft to check for signs of heat or fire, but none were found.

Coaches were deployed from the airport terminal, to collect the passengers, and arrived at the aircraft approximately 20 minutes after the evacuation. The passengers were taken to a lounge in the terminal where they were reunited with their possessions and offered medical care. The coaches had been parked outside prior to their deployment and the windscreens were frozen over, delaying their deployment.

One passenger described sustaining bruising and suffering headaches and back pain during the evacuation, recalling that a female passenger wearing

high-heeled shoes had been pushed onto her on the evacuation slide.

Flight recorders

A record of the incident was available from the FDR and CVR. Figure 2 is a plot of salient parameters from the FDR during the landing and taxi in. Both recordings stopped shortly after the engines were shut down.

Reverse thrust

The operator advised the AAIB that other recorded flight data indicated that the commander “routinely used idle reverse thrust beyond the landing roll and onto the taxiway down to approximately 15 kt to save brake wear”.

The commander had held a command on the A319 aircraft for four years. His use of reverse thrust had not been commented upon during training or checking, or identified by flight data analysis during that period.

Runway and taxiway de-/anti-icing

Due to the inclement weather conditions, Runway 25/07 and Taxiway D had been treated with de-icing chemicals on several occasions prior to the incident. Table 1 is an extract from the log of chemical applications contained in the airport operator’s report on the incident.

The potassium acetate was in the form of a thickened liquid and the urea was in the form of prills (small pellets). Following the incident, the Airport Duty Manager identified partially dissolved prills on the final third of Runway 25.

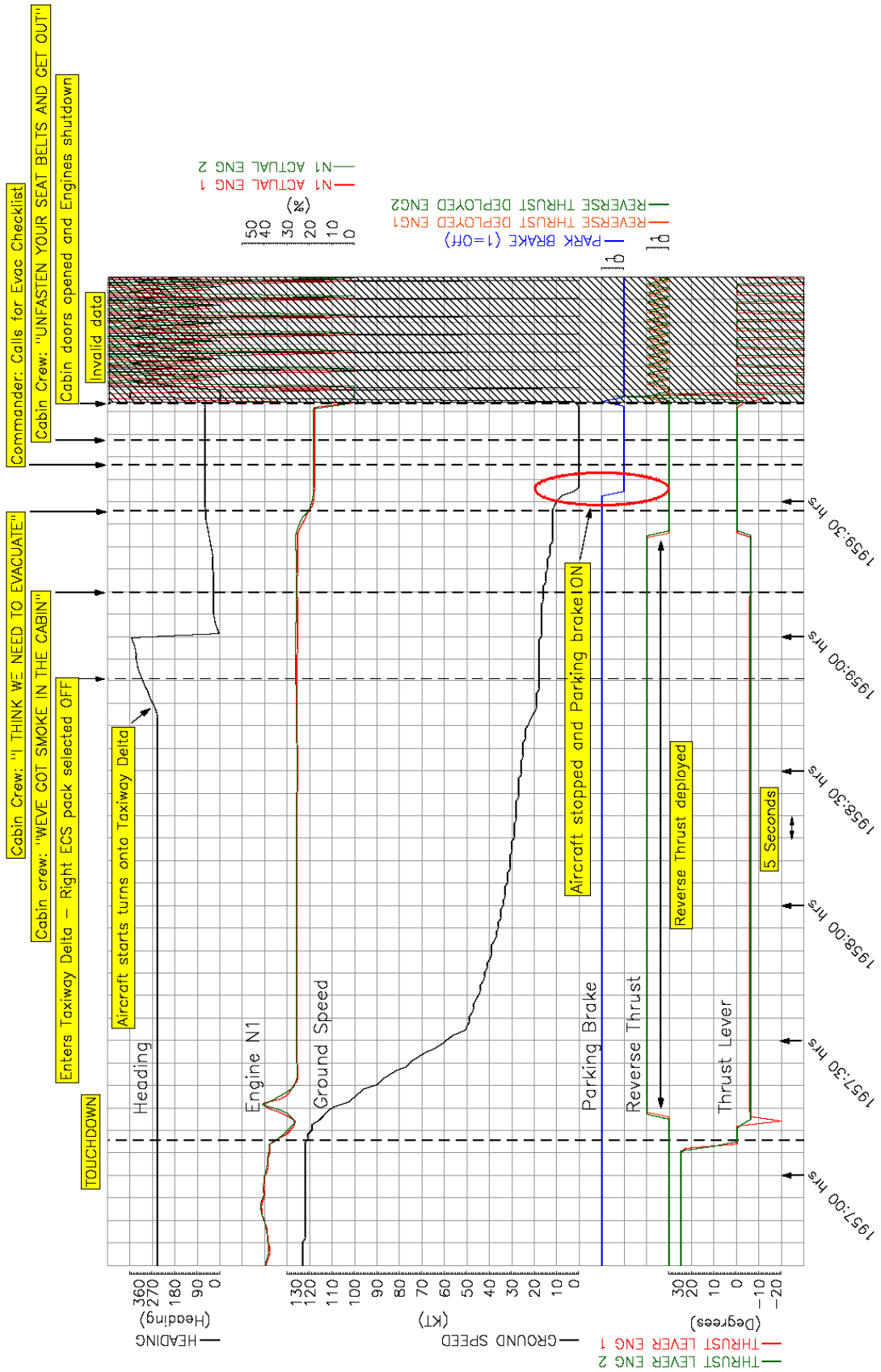


Figure 2

Recorded data for the landing and taxiing phases

Chemical applications Runway 07/25 and Taxiway D for 5th and 6th January 2011						
Date of application	Time of application	Chemical type	Application rate	Surface temp at time of application	Air temp at time of application	Surface state at time of application
05.01.11	23:28	Potassium acetate (Isomex3)	22g/m2	-1.4°C	0.0°C	Wet
06.01.11	05:55	Urea	100g/m2	-1.2°C	1.7°C	Wet
06.01.11	14:20	Urea	100g/m2	2.2°C	2.3°C	Wet

Table 1

Extract from airport operator's log of chemical applications on the manoeuvring area

Cabin air supply

During normal operation, bleed air is taken from the engine compressors and passed through an air conditioning system to provide a supply of temperature-controlled fresh air to the passenger cabin and flight deck. The air supply can also be provided by the APU or a ground source via an external connection, if required. The high temperature bleed air from the engine is cooled to approximately 200°C before entering the air conditioning system where it is further cooled to the temperature required in the passenger cabin and flight deck. A system of cabin fans and filters re-circulates the air within the cabin.

Investigation of smoke source

Engineers acting for the operator inspected the bleed air and air conditioning systems for defects and contamination. No anomalies were found and there was no recurrence of the smoke or fumes during the subsequent ground tests of the cabin air supply system.

The operator took a number of samples from the aircraft and passed them to a specialist laboratory for examination. These samples included seat headrest covers, air filters and wipes taken from the engine

compressor blades. Seat headrest covers from another aircraft were also sent to the laboratory for comparison. The results showed that the seat headrest covers from G-EZFI contained significantly more potassium and acetate than those from the other aircraft. The samples from the No 2 engine compressor blades contained more potassium acetate than the other wipes, but the laboratory noted this result could be heavily influenced by the area wiped and efficiency of collection. Concentrations were found on the air filters but as no control filter was available, the laboratory was unable to comment on this finding.

Evacuation equipment

Each of the four main doors and each pair of over-wing escape hatches is equipped with an escape slide that will deploy and inflate automatically when the exit is opened in the emergency mode. The sides are fitted with lights, which illuminate automatically on inflation, and a manual inflation handle is provided in case automatic inflation does not occur.

The four main doors were opened by the cabin crew and all four escape slides deployed and inflated normally. The crew member at door 2R reported that they could

not see the bottom of the slide as it was too dark and, as a result, they redirected passengers to the opposite door. Later, testing of the door 2R slide lights in a workshop found them to be serviceable. However, as the slide had been disconnected to recover the aircraft, no checks could be made on the integrity of the wiring connection to the slide assembly.

The cover over the operating handle of the rear right over-wing hatch had been removed but the hatch had not been opened. No attempt had been made to open any of the other over-wing hatches.

Procedures

Use of reverse thrust

Instructions and advice regarding the use of reverse thrust during and after landing appeared in a number of places in the operator's operations manual. The texts included instructions that reverse thrust should be de-selected after landing, when taxi speed was reached, and reversers should be stowed before leaving the runway to prevent foreign object ingestion. Figure 3 shows an excerpt from the operator's operations manual.

The flight crew training manual also stated:

'Stow the reversers before leaving runway to avoid foreign object ingestion.'

AT TAXI SPEED:

THRUST levers FWD IDLE

Deselect the REV position upon reaching taxi speed. On snow-covered grounds, reversers should be stowed when the aircraft speed reaches 25 kt. When deselecting REV be careful not to apply forward thrust by moving the thrust levers beyond the FWD IDLE position.

CAUTION:

On taxiways, the use of reversers, even when restricted to idle thrust, may have the following effects:

The engines may ingest fine sand and debris that may be detrimental to both the engines and the airframe systems.

On snow covered areas, snow will re-circulate into the air inlet, which may result in engine flame-out or roll back.

Except in an emergency, do not use reverse thrust to control aircraft speed while taxiing.

Figure 3

Extract from the operator's operations manual

Runways treated with de/anti-icing products

The following statement about runways treated with de/anti-icing products was included in the operations manual:

‘Engine ingestion of freshly treated runway with potassium acetate/urea may occur causing a nontoxic mist in the cabin. This mist can be misidentified as smoke. Therefore, consider briefing the Cabin Crew prior to landing.’

Smoke in the cabin (aircraft on the ground)

Cabin crew procedures

The operator’s cabin safety procedures manual included the following instructions to cabin crew, under the title: ‘Crew co-ordination’:

*‘Investigation has emphasised the importance of effective communication and coordination between the Pilots and Cabin Crew in increasing the chances of passenger survival following an emergency...

Changes in performance of the aircraft, such as strange noises, vibration, smoke or any other indication, which is considered unusual, must be reported to the Commander.’*

The cabin safety procedures manual contained the following with respect to the crew call system and interphone:

*‘If the Cabin Crew wish to speak to the pilots via the interphone, they should pick up the handset and select “CAPT”. The AIP [Attendant Information Panel] at the origin station will indicate “CAPTAIN”. In the Flight Deck, a buzzer will sound for one second, and a light on the Audio Control Panel “ATT” will flash to alert the pilots to the call.

‘In an emergency, the Cabin Crew can contact the Pilots by selecting “EMER CALL” on the interphone handset. On the AIP nearest to where the call was made, the red indicator will flash and the message “EMERGENCY CALL” will appear. In the Flight Deck, the emergency “CALL” light flashes on the overhead panel and a buzzer sounds three times.’*

Flight crew procedures

The Flight Crew Training Manual contained the following advice to flight crew (Figure 4).

COORDINATION WITH CABIN CREW
Applicable to: ALL
<p>Good coordination between cockpit and cabin crew is a key element . In case of smoke in the cabin, it is essential that the cabin crew estimate and inform the cockpit concerning the density of smoke and the severity of the situation.</p>

Figure 4

Extract from the Flight Crew Training Manual

Evacuation

Flight crew guidance and procedure

The operations manual contained the following checklist and information¹ (Figures 5 and 6).

As soon as an Emergency situation is recognised the CM1 should take control, stop the aircraft and set the parking brake on, then make a PA "ATTENTION CREW AT STATIONS". The following script details the procedure.

The checklist is to be accomplished as a crew in an orderly manner, expeditiously but not rushed.

CM1	CM2
Aircraft Stop	
Parking Brake Set ON	
PA "ATTENTION CREW AT STATIONS"	
Evaluate situation, initiate ECAM is appropriate and if necessary at any time call	Action ECAM if appropriate
"EMERGENCY EVACUATION CHECKLIST"	Locate the EMER EVAC Checklist
Notify ATC "MAYDAY MAYDAY MAYDAY callsign EVACUATING" See note 1	
	Announce "EMERGENCY EVACUATION CHECKLIST"
"STOPPED / ON"	"AIRCRAFT / PARKING BRAKE - STOP / ON"
"ALERTED"	"CABIN CREW PA - ALERT" (reminder of 'At Stations' PA)
"NOTIFIED"	"ATC NOTIFY"
"CHECKED"	"CABIN DIFF PRESSURE" - "NOT APPLICABLE" or "ZERO"
"CONFIRMED"	"ENG MASTER 1 AND 2 - OFF" If not already done move ENG MASTER 1 and /or 2 to OFF
"CONFIRMED"	"FIRE PUSHBUTTONS - PUSH" Push Engine and APU Fire pushbuttons
Order as appropriate e.g. "AGENT 1 ENGINE 1" or if already discharged "DISCHARGED"	"AGENTS - DISCHARGE" Discharge agents according to PF's command. See note 2
PA "EVACUATE UNFASTEN YOUR SEATBELTS AND GET OUT" Press EVAC COMMAND pushbutton	"EVACUATION - INITIATE"
	"EMERGENCY EVACUATION CHECKLIST COMPLETE"
EVACUATE	EVACUATE

Figure 5

Extract from operator's operations manual

Footnote

¹ CM1 – Crew Member 1 (left seat pilot); CM2 – Crew Member 2 (right seat pilot).

NOTES:

- 1 "Mayday" prefix to call not required in case of RTO.
- 2 Agents are not required to be discharged unless there are positive signs of fire.

EVACUATION SIGNAL

The primary means of initiating an evacuation remains as the PA command "Evacuate. Unfasten your seatbelts and get out." The Evacuation Signal should be activated as confirmation of an evacuation command. If the evacuation signal is heard without the "Evacuate. Unfasten your seat belts and get out." PA command, the cabin crew will check with the flight crew before initiating an evacuation unless the situation is clearly catastrophic.

Figure 6

Notes related to extract from operations manual in Figure 5

Cabin crew - guidance and procedure

The cabin safety procedures manual contained the following instructions and advice regarding evacuations:

come to a complete stop, and if the Senior Cabin Crew Member finds the pilots incapacitated then the Senior Cabin Crew Member can initiate an evacuation.'

'The decision to evacuate

Although it is normally only the Commander who may order an evacuation of the aircraft, circumstances may dictate that any other Cabin Crew member may initiate such action.

In an emergency, after the aircraft has come to rest, the Commander would normally assess the situation and make the decision as to whether an evacuation is necessary.

However, there may be other factors, perhaps unknown to the Commander at that time and if there is an obvious, immediate life threatening situation i.e. catastrophic, any Cabin Crew member can initiate an evacuation.

If there is no communication from the Pilots in an emergency situation, after the aircraft has

The cabin safety procedures manual contained the following definition of 'catastrophic':

'The term CATASTROPHIC is used to describe the situation where the aircraft has suffered serious structural damage and possible death or injury to any of the occupants.

Examples of catastrophic situations, which may require immediate independent evacuation actions by the Cabin Crew may include:

- *Ditching (landing on water)*
- *Uncontrolled cabin fire/smoke*
- *Severe structural damage to the aircraft (hole through fuselage, abnormal aircraft attitude possibly accompanied by the sound of severe scraping as the aircraft comes to a stop).*

In every case, Cabin Crew members must consider the immediate and potential consequences before initiating an evacuation; some serious injuries are likely to be sustained by the passengers from the evacuation itself.'

Under the title: 'Engine danger areas', the cabin safety procedures manual contained the following:

'Cabin Crew must be aware that if any engine is still running during a ground evacuation, then the slide immediately aft of the operating engine may be damaged and any evacuating passengers are likely to suffer injuries from the jet blast.

In the case of a slide being deployed forward of an operating engine, then the evacuating passengers would risk being drawn in to the air intake.'

The cabin safety procedures manual contained the following with respect to the evacuation alarm:

'The aircraft is equipped with an evacuation alarm. This can be activated from both the Cabin and the Flight Deck...

The switch in the Flight Deck has two positions, CAPT and CAPT & PURS.

'Company SOP's state that the switch must be in CAPT position at all times. In this position when the EVAC button is pressed in the cabin it will only give a signal in the Flight Deck. The cabin command buttons are located on the [forward attendant panel].

In the event of an evacuation commanded by the Cabin Crew they must press the EVAC button to inform the Pilots of the evacuation.'

Flight deck lighting

The operator's flight crew training manual stated that:

'...on ground with engines stopped, only the right dome light is operational and the three positions (BRT, DIM, OFF) of the dome light sw remain available, allowing the emergency evacuation procedure completion.'

Other events

A review of the CAA MOR database identified a number of previous events in which it appears that anti/de-icing products on the manoeuvring area caused smoke or fumes in the cabin. Although the brevity of some reports made any detailed analysis difficult, one report mentioned prolonged application of reverse thrust after landing. The operator's fleet experienced two similar events in January 2011, one in Budapest and the other also at Belfast. Urea was used at both airports as a runway de-icing treatment.

One report on the MOR database mentioned the CAA Notice to Aerodrome Licence Holders (NOTAL) 4/93, published in 1993, which stated:

'PAVEMENT DE-ICING CHEMICALS – POSSIBLE SIDE EFFECT

INTRODUCTION

1 Following a routine landing on a recently de-iced runway at a major UK airport, the captain of a B737 reported to ATC the presence of smoke and fumes in the aircraft. The RFFS was dispatched, the aircraft shut down and the passengers disembarked using the integral airstairs.

- 2 *Subsequent investigation determined that de-icing compound had been ingested during the landing run and that the resultant smoke and fumes were dispersed throughout the aircraft by the air conditioning system.*
- 3 *This was one of a number of similar incidents reported last winter and whilst none has so far resulted in injury to crew or passengers, premature disembarkation under such circumstances would certainly result in inconvenience and distress to passengers as well as to disruption of routine aerodrome operations.*

PURPOSE

- 4 *The purpose of this NOTAL is to draw the attention of aerodrome operators to a side effect associated with the use of certain pavement de-icing chemicals.*

SCOPE

- 5 *The problem has so far been confined to turbo-jet aircraft following a landing run, during which reverse thrust was employed, on runways recently treated with UREA pellets.*

IMPLEMENTATION

- 6 *Aerodrome operators should review their pavement de-icing procedures with a view to ensuring that de-icing chemicals are properly prepared (UREA pellets should be thoroughly wetted immediately prior to use), applied in the correct quantities and that where UREA is used, ATC staff are made aware of its use and of the possible side effect reported in this NOTAL.'*

The NOTAL was withdrawn in 2006. The CAA was not able to identify where the information contained in the NOTAL was then promulgated but commented that, because of environmental concerns, urea was much less widely used on the mainland UK after the mid-1990s.

The urea pellets applied at Belfast had not been wetted before application.

Analysis

Production of the smoke

No faults were found in the aircraft's bleed air or air conditioning systems. The relatively higher levels of potassium and acetate on the seat headrest covers were consistent with high levels of potassium acetate in the cabin environment. Both potassium acetate and urea based de-icing products had previously been applied to the runway and taxiway and they were most probably the source of the smoke/fumes. It seems likely that de-icing chemicals were ingested into the engine, before passing through the air conditioning system and entering the cabin through the overhead vents. Although evidence of potassium acetate was found in the cabin, information concerning previous and subsequent events suggested that urea pellets may also have been the source of the smoke.

Two factors probably influenced the production of smoke. First, the taxiway onto which the aircraft turned had been regularly treated during the period preceding the event but very lightly trafficked, so there was probably more de-icing product on this taxiway than on other parts of the manoeuvring area. Secondly, it is likely that the prolonged use of reverse thrust increased the volume of these products delivered to the cabin and the thickness of the smoke. The appearance of the smoke was coincident with the use of reverse thrust on the taxiway.

NOTAL 4/93 had informed aerodrome licence holders of this phenomenon but had been withdrawn without the information being incorporated into any document which would ensure its continued distribution. Of note, the NOTAL advised that urea pellets should be thoroughly wetted immediately prior to use.

Evacuation

The cabin manager's response to the smoke was driven by a concern that fire or smoke in an aircraft may be very hazardous to the occupants; the cabin safety procedures manual listed '*uncontrolled cabin fire/smoke*' as an example of a catastrophic situation which may require immediate independent evacuation action by the cabin crew.

However, at the time the cabin manager commanded the evacuation, the engines were running and the flight crew were in communication with the cabin manager. Therefore, it would have been appropriate for the cabin manager to wait for the commander to initiate the evacuation, according to the laid down procedure.

After the engines were shut down and all lighting in the flight deck extinguished, the right dome light was available to the flight crew but needed to be switched ON manually.

Communications

Effective communication between the cabin and flight crew is essential in dealing with hazardous circumstances; this was reflected in the guidance provided by the operator. The commander's attention would have been drawn to the first communication about smoke more effectively if the cabin manager had used the emergency call function of the interphone system, rather than the normal call.

In the cabin manager's second call to the flight deck, the co-pilot repeated the cabin manager's information to her, for confirmation. Both the commander and co-pilot responded to the cabin manager's statement "I THINK WE NEED TO EVACUATE" with "OKAY". In this context, the word 'okay' might have two meanings: an acknowledgement of understanding, or an agreement with the proposed course of action. It is possible that the cabin manager's subsequent actions were influenced by what she perceived to have been an agreement from the commander to evacuate.

Following a decision by the commander to evacuate, the appropriate checklist should be actioned to configure the aircraft for the evacuation. Of prime importance in this is the shutting down of the engines, which, if running, pose a significant hazard to passengers who have left the aircraft. The commander's action in shutting the engines down, immediately he heard the forward doors being opened, minimised this hazard.

Use of the evacuation alarm by the cabin manager would have provided a clear signal to the flight crew that an evacuation had been initiated.

Safety actions

Aircraft operator

The operator stated that its FDM² department would develop and implement a monitoring programme to identify non-standard use of reverse thrust. The programme would help determine whether this event was an isolated case. Also, the operator instructed the training captains on its Airbus fleet to be vigilant for *the non-standard use of thrust reverse during taxi ... and correct any misconceptions* regarding its use.

Footnote

² Flight data monitoring.

Although the operator's cabin safety procedures manual stated the importance of effective communication, it did not expand upon this by giving techniques to achieve it. The operator's safety action, in introducing a CLEAR³ briefing, appeared to address this.

The operator carried out its own investigation into the incident and published an internal report which included several safety recommendations in the following areas:

- Review of the operations manual
- Monitoring of flight data regarding use of reverse thrust
- Training in use of reverse thrust
- Introduction of a new briefing format CLEAR for cabin crew to use when communicating with flight crew in emergency situations

Airport operator

The airport operator compiled a report on the event, focussing on the airport's response to the evacuation and care of the crew and passengers. It explained that the response had been effective although it identified among other things the following difficulties:

- The buses used to transport the passengers and crew had been parked in the open and their windscreens were frozen. This delayed deployment of the buses;
- There was a further delay to the transport of the passengers to the terminal as their belongings were transported in the same buses, and recovering them from the aircraft took time;
- Although a passenger headcount was carried out after the evacuation, no headcount was carried out on the buses prior to them leaving the aircraft.

The report contained sixteen recommendations to improve the airport operator's response to a similar event in the future.

Footnote

³ Crew name; location; event; actions taken; recommendation for further action.