

Case 3

Injuries suffered by FAs from the shaking of the aircraft encountering turbulence after entering cumulonimbus clouds that suddenly developed

Summary: On Thursday July 5, 2012, a Boeing 777-200 operated by Company A took off from Incheon International Airport (Republic of Korea) for Narita International Airport as a scheduled flight. At 14:18 Japan Standard Time (JST: UTC+9hr, unless otherwise stated, all times are indicated in JST on a 24-hour clock), the aircraft was shaken at approximately 150km north of Narita International Airport at an altitude of approximately 23,000ft, and four flight attendants (FAs) working in the rear galley were thrown into the air and against the floor twice in succession due to the sudden shaking of the aircraft. Consequently, one of them was seriously injured, and the other three sustained minor injuries.

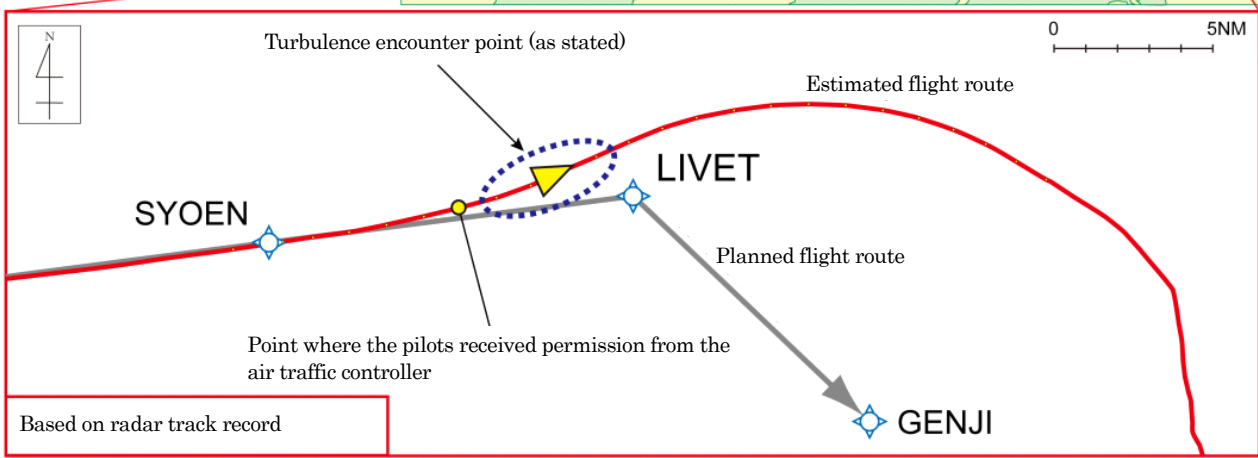
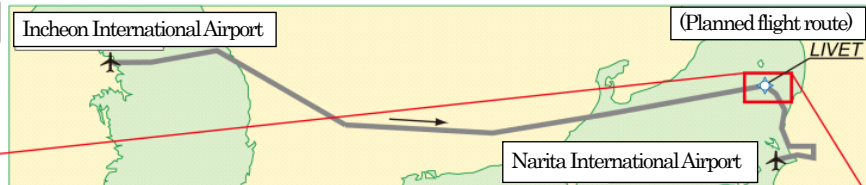
There were a total of 256 persons on the aircraft, consisting of the pilot in command (PIC), 11 other crew members, and 244 passengers.

The aircraft was not damaged.

Estimated Flight Route



Way point
(Geographical point defined for flight route)



Based on radar track record

Events leading to the Accident

Around 12:55

The aircraft took off from Incheon International Airport for Narita International Airport as a scheduled flight.

The PIC and the first officer (FO) found a small cumulonimbus to the right of the course very close to LIVET (waypoint) as the aircraft was descending before LIVET. The aircraft's weather radar displayed only green weak weather returns. It became apparent they needed to go further left to avoid it; therefore, they started to make a deviation flight to the left after receiving permission from the air traffic controller.

Because no information concerning turbulence or other bad weather conditions was reported, the PIC turned on the seat belt sign for the passengers as part of the approach and landing phase of flight shortly after the aircraft started to descend, but **he did not instruct FAs to be seated or inform them of the turbulence.**

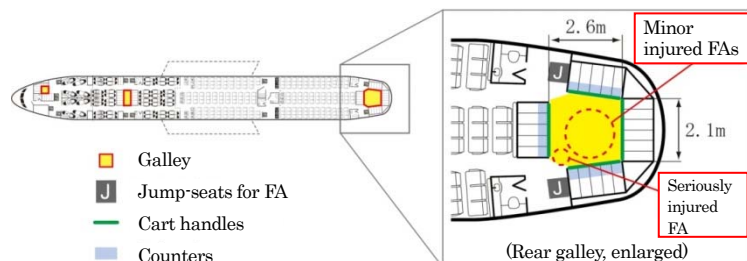
Around 14:18

The aircraft encountered a moderate turbulence when it entered some clouds while going around. Serious and slight injuries were suffered by four FAs working in the rear galley of the aircraft as a result of the severe shaking of the aircraft.

The Aircraft



In the rear galley where the four injured FAs were working



- Handholds designed specifically for the shaking of the aircraft were not equipped.
- Fixed objects such as the counters and the cart handles stored in the lower part of the galley on four sides were available to hang on as substitute for handholds.
(All of the carts had been stored when the accident occurred)
- Making the FAs and the fixed objects, which were substitute for handholds, slightly far apart.

Meteorological Information

1. General Weather Conditions

The atmosphere was in an unstable condition in eastern and northern Japan from the afternoon through the night due to the passage of a trough accompanied by a cold of minus nine degrees C or less in the vicinity of an altitude 5,500 m, and convective clouds such as cumulonimbus and cumulus developed in several places.

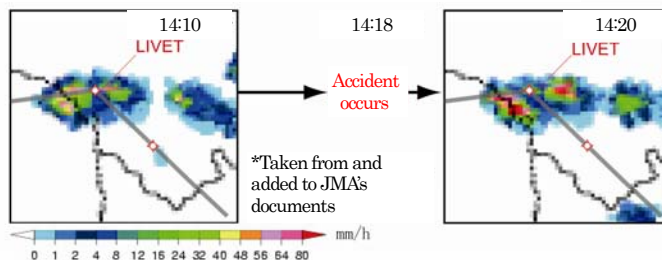
2. Weather Radar Imagery around occurrence point (Strength and Top Height)

According to the Weather Radar Imagery at 14:10: before the accident occurred, and 14:20: shortly after the accident occurred, **the echo strength increased during this period as its top height reached 26,000 ft and over.**

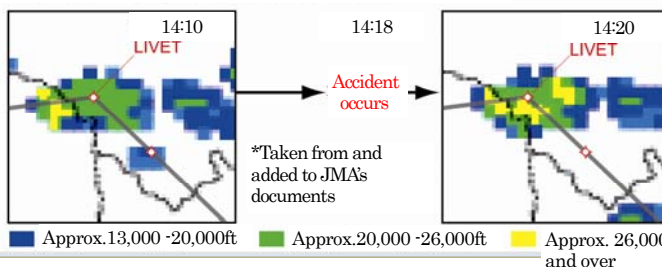
3. Prognostic Chart of Significant Weather (for domestic use)

No significant weather including turbulence was forecasted to affect the flight on their route.

Weather Radar Imagery (Strength: indicates precipitation intensity)



Weather Radar Imagery (Top height: indicates cloud height)



Flight Operations Manual of Company A contains the following description

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1. Aircraft's weather radar displays

WEATHER RADAR REFLECTIVITY DISPLAYS

Weak Echo (Green Display)

If an echo is green only (assuming no attenuation and/or severe thunderstorm shapes), it can be considered non-hazardous throughout. Expect light turbulence, with a slight chance of moderate turbulence, but no chance of severe.

2. How to respond to unexpected turbulence

Unexpected Turbulence

If moderate or greater turbulence is encountered unexpectedly:

Flight attendants must stop, drop, and hold on – sit on the floor, in the nearest customer seat or jumpseat. Securely fasten seat belts (and shoulder harnesses, if applicable). If no empty seat is available, sit on an armrest or sit on the floor and hold on to a stationary object.

Causal Factors of the Accident

●Flight Crew members' Judgment on the Weather

It is highly probable that judging from the weather information before and during the flight, the fact that the cumulonimbus discovered before LIVET did not appear to be developing, with its cloud top being low, and the fact that it was indicated as a weak return on the weather radar display, crew members expected no significant turbulence to affect the flight, but only light turbulence, during the deviation from cumulonimbus, and that they did not inform the FAs of any information about the turbulence.

●Development of Cumulonimbus

It is highly probable that the cumulonimbus the aircraft

avoided had developed quickly immediately before the time of the accident.

It is probable that the aircraft took detour the cumulonimbus to avoid it, but was forced into a part of the cloud which had developed rapidly, and then encountered its disturbance.

●Injured FAs' Response to the Shaking of the aircraft

It is probable that the four FAs working in the rear galley were thrown into the air because they had not been informed by the PIC of the turbulence in advance and were unable to hang onto fixed objects around them when the rear of the airframe sank suddenly.

It is considered somewhat likely that the FAs could have responded to the shaking of the aircraft if the PIC had informed them of some information about the turbulence.

Probable Causes : It is highly probable that the accident occurred when the FA in the rear section of the aircraft was seriously injured because it was shaken heavily.

It is probable that the aircraft was shaken heavily because it was unable to avoid the cumulonimbus which had developed so rapidly, and then entered a part of the cloud.

It is probable that the FA was seriously injured because she was unable to hang onto the fixed objects around her when the aircraft was shaken suddenly.

In order to Prevent Recurrence

Safety Actions taken by Company A after the accident occurred

➤After the occurrence of this accident, Company A strengthened the contents of Flight Attendant Operations Manual (UNEXPECTED TURBULENCE).

The investigation report of this case is published on the Board's website (issued on Mar. 29, 2013).

http://www.mlit.go.jp/jtsb/eng-air_report/N224UA.pdf

(This report is a translation of the Japanese original investigation report. The text in Japanese shall prevail in the interpretation of the report.)