

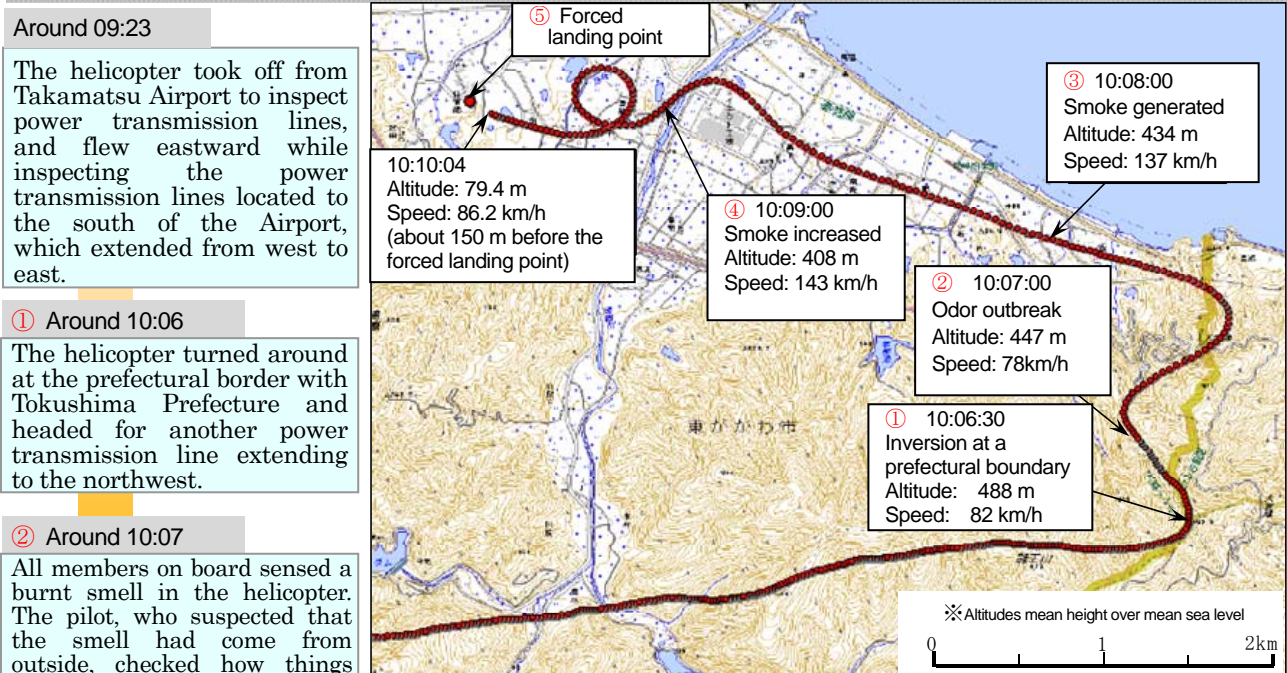
Case 6

Fire occurrence from rear hold during power transmission lines inspection flight led to a forced landing, followed by flames and destruction of the helicopter

Summary: On Thursday September 22, 2011, an Eurocopter AS350B3, operated by Company A took off from Takamatsu Airport at around 09:23 local time (UTC+9 hours) for power transmission lines inspection flight. A burnt smell and white smoke rose in the cabin during this flight, and at 10:10, the helicopter made a forced landing at a baseball field located at Hiketa, Higashikagawa City, Kagawa Prefecture.

On board the helicopter were a pilot and two passengers, but none of them suffered injury. After the forced landing, the helicopter caught fire and was destroyed.

Events Leading to the Accident



Around 09:23

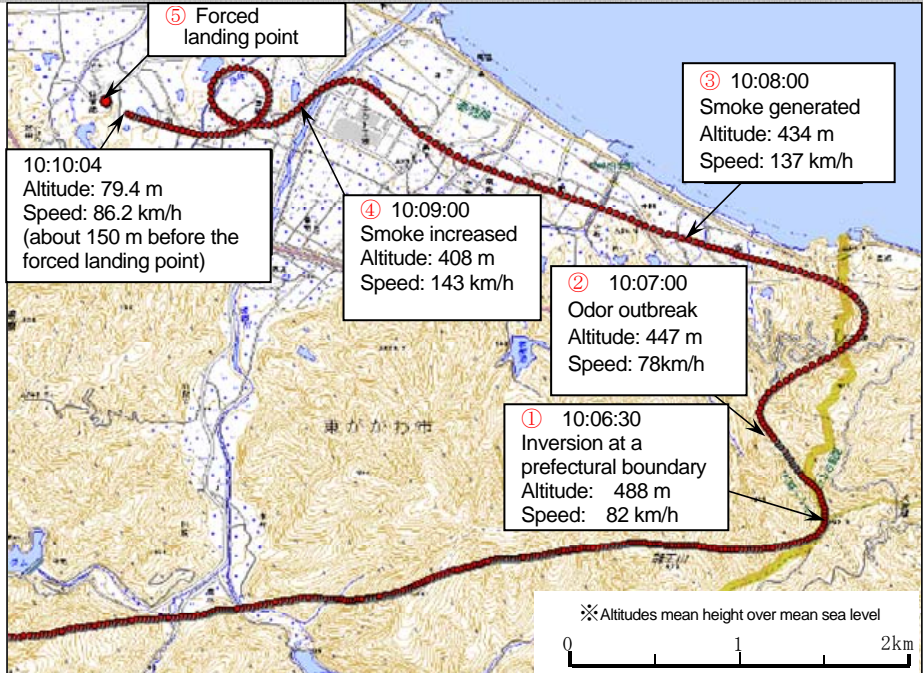
The helicopter took off from Takamatsu Airport to inspect power transmission lines, and flew eastward while inspecting the power transmission lines located to the south of the Airport, which extended from west to east.

① Around 10:06

The helicopter turned around at the prefectural border with Tokushima Prefecture and headed for another power transmission line extending to the northwest.

② Around 10:07

All members on board sensed a burnt smell in the helicopter. The pilot, who suspected that the smell had come from outside, checked how things were on the ground, but did not see anything unusual, including smoke. At the same time, he suspected a trouble in the electrical system and switched the generator on and off and tried other operations. Since the smell in the cabin continued, he decided to fly back to the airport.



Estimated Flight Route (From Geospatial Information Authority of Japan)

③ Around 10:08

Immediately after the helicopter turned its nose toward Takamatsu Airport, smoke started to rise from near the floor of the rear seats.

④ Around 10:09

The pilot attempted to increase speed and fly to wherever allows the landing, and he decided to land a baseball field.

⑤ Around 10:10

The cabin had been filled with white smoke that made instruments invisible, but it made a forced landing on the field.


Condition after the forced landing

Around 10:12



Flames and gray smoke were arising from near the rear hold and the tail boom fell off.

Around 10:19



The flames and black smoke became increasingly furious.

Around 10:23



Wrapped in roaring flames and large amounts of black smoke, the helicopter was no longer visible.

The pilot stopped the main rotor. But the tail rotor stopped before the main rotor did, and it is probable that before the main rotor stopped, the tail rotor drive shaft was severed and became stuck. Judging from these events, it is probable that it would have been difficult to land safely if the landing had been delayed by several seconds.

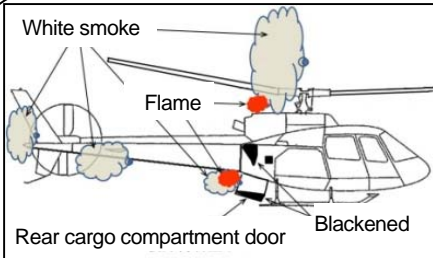
Condition of the fire during flight

Condition during the approach to the forced landing site

A continuous wisp of white smoke was coming out from near the floor of the rear hold of the helicopter and that part of the right external plates of the hold had become black.

Condition just before landing

The left door of the rear hold was open and dangling, and the hold was emitting white smoke upward with flames sometimes seen to come out. White smoke was blowing out from also the horizontal stabilizer and the back end of the tail boom. Part of the rear hold door also became black.



Based on **situation immediately after landing** and **condition of the fire during flight**, it is highly probable that the fire occurred at around the rear hold of the helicopter.

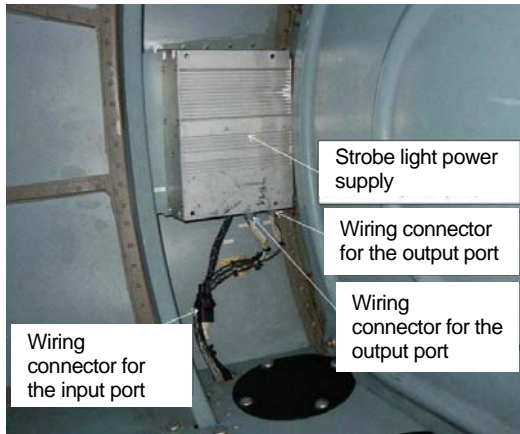
Condition just before landing (depicted based on a video image by an eyewitness)

Analysis on Fire Outbreak in the Rear Hold

【 Condition of the Strobe Light Power Supply 】

The strobe light power supply (*1) was installed at the back of the right side in the rear hold with its input and output wiring extending from the main body of the power supply to the floor. The wires were not protected by rigid housing or similar goods from contact with the embarkation.

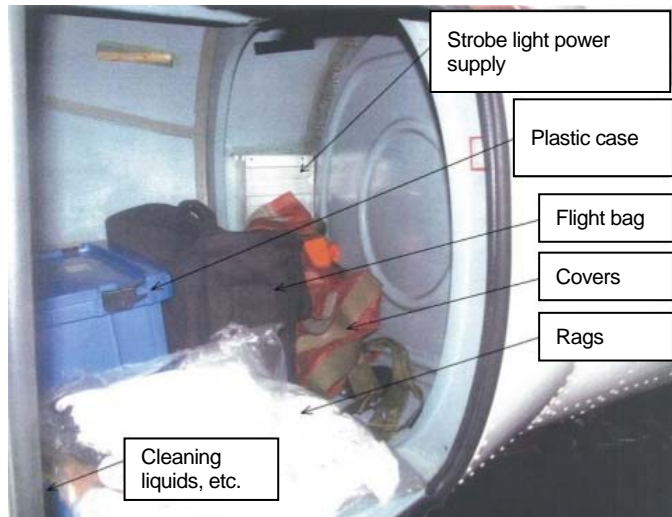
*1: A device which supplies power to strobe lights installed in both ends of a horizontal stabilizer to prevent collisions.



The airworthiness standards applicable to the helicopter type require for wiring in a compartment not to be damaged by the movement of cargo in the compartment, and their breakage or failure will not create a fire hazard.

【 Condition of embarkation in the rear hold 】

The rear hold was filled with so many inflammable items such as extra oils, plastic cases, documents, flight bag, covers, rags and cleaning liquids that are almost no room to stand, and they were not covered with a floor tie-down net to prevent them from moving. However, it was confirmed no abnormality by the flight mechanics during the preflight inspection.



Condition of embarkation in the rear hold (Reproduced based on the mechanic's memory using the type of helicopter)

The flight manual for the helicopter requires for the external checks that *"if applicable: open door, net hooked in place, close door"*.

It is highly probable that wiring came into contact with embarkation when the latter was moved inside or brought into or out of the hold.

It is probable that the embarkation moved unrestrictedly if the airframe was vibrated or accelerated violently. It is highly probable that the fire spread to these items after it occurred.

Probable Causes

Regarding a fire in the rear hold, it could not be identified the ignition source; nevertheless it is possible that a fire occurred from the wiring connected to the strobe light power supply, which was installed in the rear hold, and that it spread to inflammables placed around the power supply.

This is because the wiring was not designed and structured so that it was fully protected so as to prevent it from being damaged due to the movement of embarkation and preclude a risk of occurring a fire even if it was damaged or destroyed.

It is also possible that since the embarkation was not covered with nets to prevent its movement, embarkation in the rear hold damaged the wiring, which was not fully protected from damage due to the movement of the embarkation.

Other Safety Related Findings

【 Transport of Explosives and Other Goods 】

In the rear hold of the helicopter, there were four items which fell into the category of “explosives and other goods” as provided in Article 194 of the Ordinance for Enforcement of the Civil Aeronautics Act. It is probable that one of the four items was not transported using the method prescribed by the standards.

When transporting explosives and other goods applicable, the relevant standards should be followed after confirming what is prescribed in the notification.

【 Information on Emergency Procedure in the Flight Manual 】

It is probable that the pilot did not remember the procedures he should follow when it was not identified where the smoke arose because he assumed that it would be sufficient to look at the checklist for necessary operations.

The Flight Manual does not specify emergency procedures that should be memorized so that they can be performed immediately.

It is probable that the pilot would have memorized them and could have performed appropriate procedures swiftly and reliably in the state of emergency he experienced if the Flight Manual had specified procedures that should be memorized.

In order to Prevent Recurrence (Recommendations)

In order to contribute to prevention of reoccurrence of similar accidents, based on the result of investigation of the accident, the Japan Transport Safety Board recommended, in accordance with the provisions of Article 27 Paragraph 1 of the Act for Establishment of the JTSB, Company A as follows.

(1) Embarkation on board

When having embarkation in the rear hold of Eurocopter AS350B3, Company A should take measures to prevent its movement as provided in the Flight Manual in order to prevent an unforeseen event due to the movement of embarkation. In addition, when transporting items that fall into the category of explosives and other goods, the company should confirm the content of the pronouncement and meet the standards specified therein.

(2) Establishment of a system that enables pilots to perform emergency procedures of aircraft without failure

The company should establish a system that enables pilots, when operating helicopter, to perform appropriate emergency procedure of the helicopter swiftly and reliably even in a state of emergency mainly by memorizing those which must be performed immediately.

Meanwhile, the JTSB recommended following to the European Aviation Safety Agency (EASA) which has a responsibility for airworthiness of the type of the helicopters.

(1) Electrical equipment and its wiring in the baggage compartment

The EASA should make it mandatory to modify the rear hold of the Eurocopter AS 350 series so that electrical equipment and its wiring are fully protected.

(2) Establish the system to ensure emergency procedures take place

The EASA should provide instruction to the designer and manufacturer of the helicopter to specify items in the emergency procedures requiring memorization so that they can be performed immediately.

Safety Actions Taken in Response to the Recommendation (Completion Report)

Company A has taken following actions in response to the recommendations.

Recommendation (1)

- Company A has re-disseminated to relevant personnel in its Aviation Headquarter the requirements to implement necessary actions to prevent embarkation movement as stated in the Flight Manual, and for a pilot to open a rear hole door and check to ensure net(s) are secured in place prior to his/her flight.
- The company has re-disseminated to relevant personnel in the Aviation Headquarter that in case transporting items that fall into the category of explosives and other goods, the content of the pronouncement as well as the observance to the standards specified therein are confirmed.

Recommendation (2)

In terms of a periodic check, the company has instructed to all pilots and ensured awareness to verify an immediate execution of appropriate operation in a state of emergency as one of the periodic checklists. The company has also instructed the designated qualified auditors to perform verification to the checklist.

The investigation report of this accident case is published on the Board's website (issued on June 28, 2013).

http://www.mlit.go.jp/jtsb/eng-air_report/JA6522.pdf

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