AA2014-3

AIRCRAFT ACCIDENT
INVESTIGATION REPORT

ILAS AIR SERVICE CO., LTD.

J A 1 0 6 Y

June 27, 2014

The objective of the investigation conducted by the Japan Transport Safety Board in accordance with the Act for Establishment of the Japan Transport Safety Board and with Annex 13 to the Convention on International Civil Aviation is to determine the causes of an accident and damage incidental to such an accident, thereby preventing future accidents and reducing damage. It is not the purpose of the investigation to apportion blame or liability.

Norihiro Goto
Chairman,
Japan Transport Safety Board

Note:

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

AIRCRAFT ACCIDENT INVESTIGATION REPORT

CRASH INTO SEA SURFACE
ILAS AIR SERVICE CO., LTD.
ROBINSON R44II (ROTORCRAFT), JA106Y
ON SEA SURFACE NEAR THE KOURI BRIDGE,
NAGO CITY, OKINAWA PREFECTURE, JAPAN
AROUND 15:48 JST, DECEMBER 31, 2013

May 30, 2014

Adopted by the Japan Transport Safety Board

Chairman	Norihiro Goto
Member	Shinsuke Endoh
Member	Toshiyuki Ishikawa
Member	Sadao Tamura
Member	Yuki Shuto
Member	Keiji Tanaka

1. PROCESS AND PROGRESS OF THE INVESTIGATION

The Japan Transport Safety Board designated an investigator-in-charge and an investigator on January 1, 2014 to investigate the accident. An accredited representative of United States of America, the State of Design and Manufacture of the helicopter involved in the accident, participated in the investigation. Comments were invited from parties relevant to the cause of the accident and relevant State.

2. FACTUAL INFORMATION

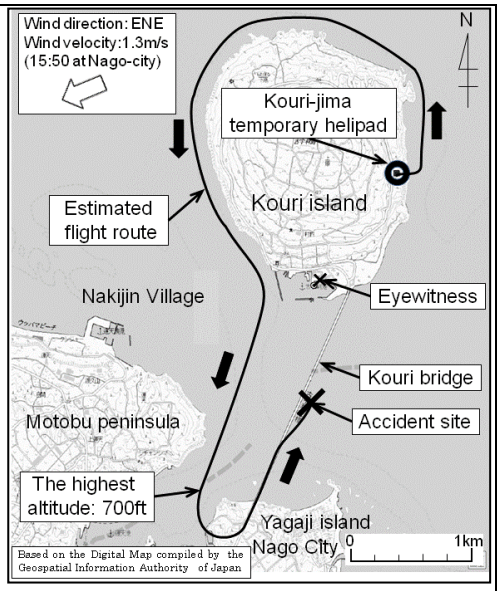
2.1 History of the Flight

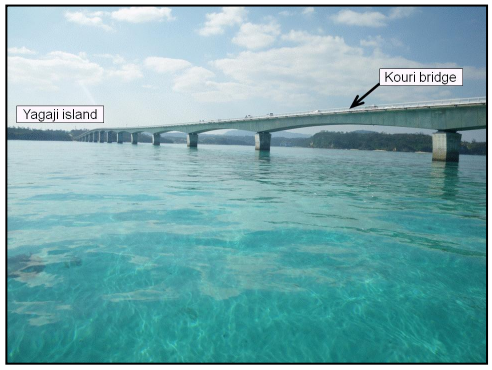
According to the statements of the captain, the passengers, the witness and the rescuer, the event developed as follows:

On December 31, 2013, a Robinson R44II, registered JA106Y, operated by ILAS Air Service Co., Ltd. (hereinafter referred to as "the Company"), had performed local sightseeing flights using Kouri-jima temporary helipad in Kouri island, Nakijin-son, Okinawa prefecture.

The helicopter had performed eight sightseeing flights in the morning on the day. After refueling, the helicopter took off for a sightseeing flight revolve encircling Kouri island in a counter clockwise direction at around 15:43 (Japan Standard Time: UTC+9 hrs). Onboard

the helicopter were the captain in the front right seat, the passenger A in the front left seat and the passenger B in the after left seat, total three people fastened their seatbelts.





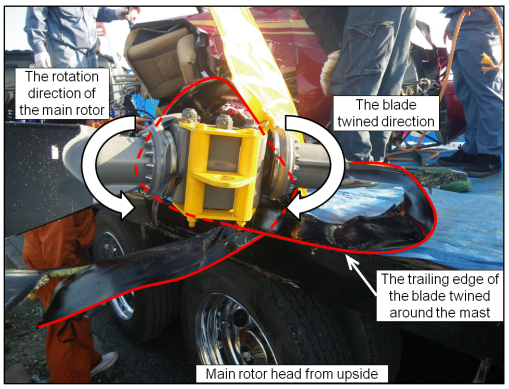
Though coral reefs seen from sky over 1,000 ft on fine day are more beautiful usually, they were not seen well because it was cloudy on the day. Therefore, although it was not in the plan, the captain decided to extend the flight to Yagaji island, Nago city, where they could see beautiful Kouri bridge as special service for the passengers, at the south point of Kouri island after flying halfway counter clockwise around the island while climbing. The helicopter passed around the point reaching Yagaji island at 700ft, the highest altitude in this flight, and headed to Kouri bridge while descending. The helicopter flew above the bridge while descending from Yagaji island to Kouri island for a while, and then moved on the right side of the bridge since the distance from the bridge shrunk. The captain continued descending at about 120kt as not to exceed the V_{NE} (never exceed speed) of 130kt until they could see the bridge girders just beside. When the Kouri bridge was visible to height just beside, the captain wanted to know the passenger B's reaction and checked expression. Since close to sea surface, the captain raised the collective pitch lever, controlling the lift magnitude of the main rotor, but didn't pull back the cyclic pitch lever, controlling the lift direction of the main rotor, because he was afraid of the tail touched sea surface. The helicopter crashed into sea surface at the moment the captain thought it did not climb as expected.

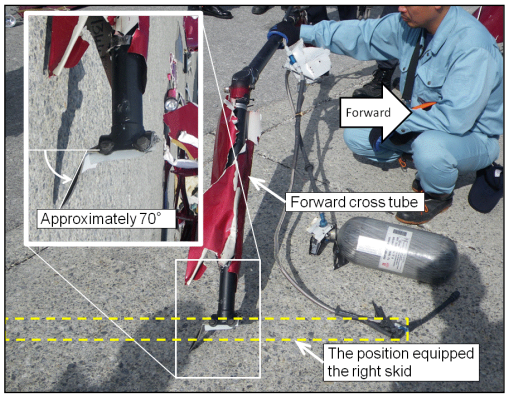
The helicopter was destroyed to pieces. The captain and the passenger A came to the surface soon after the crash. The passenger B unfastened the seatbelt by herself, and then came to the surface. The captain found a floating lifejacket on the way to the passenger B after rescued the passenger A. The captain had the passenger A cling to the inflated lifejacket and went to the passenger B. They waited for the rescue at the sea surface while clinging one lifejacket with three people.

An eyewitness working at the wharf of Kouri fishing port saw the helicopter flying from over Yagaji island to Kouri island. It was descending

	gradually along the bridge. While he thought it was excessively low, it moved east and disappeared from his sight hiding behind the bridge; soon he saw a splash over the bridge with a big bang. The eyewitness went to rescue the people on the helicopter using a fishing boat with a fellow working together. They arrived at the accident site about two minutes, pulled up the three people, return to the port and handed them over to ambulances. The captain made low pass flights until sea surface similar to the accident flight many times in sightseeing flights on the day. The captain said that he guessed the differences between the flight involving the accident and other low pass flights were too high speed, too high descending rate and slight delay of the transition control to climb. Moreover, the captain said that he thought he descended lower altitude than he expected as a result of visual misjudgement of altitude. He tried to fly 150 m away from the bridge to keep the minimum safety altitude. On the day of the accident, the captain's physical condition was normal. The helicopter crashed into sea surface at around 15:48. No anomalies of the helicopter were found until then.
2.2 Injuries to Persons	The captain and two passengers : Serious injury
2.3 Damage	Extent of damage: Destroyed - Main rotor Breakage - Fuselage Breakage - Landing gear Falling off and breakage (skids and after cross tube were missing) - Empennage Partially Damaged
2.4 Personnel Information	Captain Male, Age 39 Commercial pilot certificate (rotorcraft) August 12, 2003 Type rating for single-engine piston (land) July 5, 2002 Class 1 aviation medical certificate Valid until: September 11, 2014 Total flight time 1,880 hr 46 min Total flight time on the type of aircraft 58 hr 51 min
2.5 Aircraft Information	Type: Robinson R44II Serial number 13441 Date of manufacture February 27, 2013 Certificate of airworthiness No. Dai-2013-072 Valid until: May 12, 2014 Category of airworthiness Rotorcraft, Normal N Total flight times 142 hr 14 min
2.6 Meteorological Information	The values observed by the Automated Meteorological Data Acquisition System (AMeDAS) located in Nago city, about 11 km South-southwest from the accident site, were as follows: 15:50 East-northeast wind at 1.3 m/s, Maximum instantaneous

	wind speed 2.7 m/s, No precipitation, No sunshine duration, Temperature 17 °C
2.7 Other Information	(1) Detailed Information on Damage The helicopter found on the sea bed about 70 m from Kouri bridge. Details of its damage were inspected after pulled up from the sea. It was destroyed not only skin but also structure except empennage and tail rotor component; especially the cabin front suffered extensive damage. Flight control systems were broken under the front seats. All spark plugs of engine were inspected and not found anomalies. The one of two main rotor blades was broken at 134 cm from the root; on the other hand, another one was twined around the mast 1.4 rotates clockwise when viewed from above with delamination and deformation. The landing gear was lost except the forward cross tube; There are two cross tubes, forward one and after one, between body and skids. A portion of upper part of a skid was remained in the back of the forward cross tube to be connected to right skid; it was bent about 70 degrees on the lower side. (2) The Accident Site Description The accident site was a sea area of about 3 m water depth with high degree of transparency in coral reefs near the Kouri bridge spans between the Kouri island and Yagaji island, where billows did not enter from the open sea. The highest point height of the Kouri bridge is 25 m (about 83 ft) from sea surface (Nearly Highest High-water Level[1]). (3) Survival Equipment The helicopter did not equipped with a lifeboat which shall be onboard when a single engine helicopter transporting passengers as air transport service flies over the sea beyond points where it can make emergency landing to ground by autorotation[2].





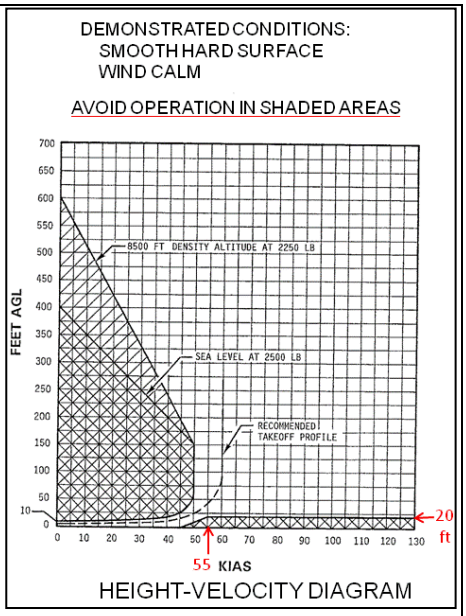
[1] "Nearly Highest High-water Level" refers to sea level expected not higher in high tide and used as a reference plane upon indicating the height of the lowest of the structure on the water surface.

[2] "Autorotation" " is a flight condition where the main rotor blades are driven by the force of the relative wind passing through the blades while descending, rather than by the engine.

	(4) Information of Standard Operation Procedure The Company did not prepare Standard Operation Procedures which provide details of flight procedure on each flight works. (5) Provisions on the Minimum Safety Altitude The Civil Aeronautics Act provides as follows: *(Minimum Safety Altitude)* *Article 81 No aircraft shall be flown, except during taking off or landing, at an altitude lower than that specified by Ordinances of the Ministry of Land, Infrastructure, Transport and Tourism, taking into consideration the safety of persons or objects on land or water as well as the safety of aircraft.* (Omitted) The Ordinance for Enforcement of the Civil Aeronautics Act provides as follows: *(Minimum Safety Altitude)* *Article 174 The minimum safety altitude pursuant to Article 81 of the Act shall be as follows:* *(i) In the case of aircraft navigating on a visual flight rules shall take any of the highest of altitude at which landing is feasible, when power system only has stopped during a flight, without causing danger of persons or objects on the ground or on water and the following altitudes:* (Omitted) *(b) In the case of above an area without human beings or houses, an altitude at which an aircraft can continue flight while maintaining a distance of 150 meters or more from persons or objects on the ground or on water.* (Omitted below) (6) Description of the Company's Aircraft Operation Manual on the Minimum Safe Flight Altitude *8-1 Minimum Safe Flight Altitude* *(1) Minimum Safe Flight Altitude should be decided so that communication with air traffic control authorities or the company aviation radio station can be established as possible, considering the features of terrain and turbulence of the route. In addition, if should be decided so as to land safely to airport or such field suitable for land even an engine failure in the case of multi engine aircraft, and to forced landing field depending on the aspect ratio of the aircraft even the engine failure in the case of single engine aircraft. The altitudes should be complied as following sections.* *(2) Minimum Safety Altitude shall be the altitude provided in article 81 of the Civil Aeronautics Act and article 174 of the Ordinance for Enforcement of the Civil Aeronautics Act.* (Omitted below)

(7) Description of the Height-Velocity Diagram

According to the Height-Velocity Diagram drawn on the Flight Manual which illustrates combinations of height and velocity that should be avoided for a safe landing in the event of engine failure, below altitude of 20 ft is within the range of "Avoid operation" at above 55 KIAS (knot: Indicated Air Speed).



(8) Description of the Safety Notice

Safety Notice attached to the Flight Manual for the helicopter provides as follows:

Safety Notice SN-19

FLYING LOW OVER WATER IS VERY HAZARDOUS

Many helicopter accidents have occurred while maneuvering low over water. Many pilots do not realize their loss of depth perception when flying over water. Flying over calm glassy water is particularly dangerous, but even choppy water, with its constantly varying surface, interferes with normal depth perception and may cause a pilot to misjudge his height above the water.

MAINTAIN 500FEET AGL WHENEVER POSSIBLE AND AVOID MANEUVERS OVER WATER BELOW 200 FEET AGL.

(9) Description of the Operation Plan

There is a description with regard to flight altitude, "*above 500 ft and enough altitude to make safe landing to a preselected forced landing field*" in the operation plan attached to the temporary helipad taking off and landing permit application for using the Kouri-jima temporary helipad applied to the Osaka Regional Civil Aviation Bureau to use in these sightseeing flights by the Company and permitted.

3. ANALYSIS

3.1 Involvement of Weather	No
3.2 Involvement of Pilots	Yes
3.3 Involvement of Helicopter	No
3.4 Analysis of Findings	(1) Appearance of the Sea Surface According to the moderate wind at the time of the accident and high

degree of transparency sea surface vicinity of the accident site in the area where billows didn't enter from the open sea, it is highly probable that decision of altitude by visual sense was extremely difficult because discrimination between the sea surface and the sea bed was difficult.

Shot the floating fishing boat used rescue vicinity of accident site from Kouri bridge on January 2,2014 (sunny weather).

(2) Analysis from Damage of the Helicopter

According to the damage that they were not only skin but also frame, especially the cabin front suffered extensive damage and the portion remained in the back of the forward cross tube to be connected to right skid was bent about 70 degrees on the lower side; therefore, it is highly probable that the helicopter crashed into the sea surface with forward roll at the same time when the skids touched the sea surface.

Besides, according to the finding no anomalies in all spark plugs and a main rotor blade twined around the mast in the opposite direction to rotation; consequently, it is highly probable that the engine was operating when the helicopter crashed into sea surface and the main rotor blades beat the sea surface and stopped.

(3) Involvement of the Pilot

a. It is highly probable that the captain try to descend at about 120 kt until they could see the Kouri bridge, the highest point height is 25 m (about 83 ft) from sea surface (Nearly Highest High-water Level), just beside, for special service to the passengers. According to the Safety Notice, low altitude flight is very dangerous, not to mention the flight at excessive speed and descent rate until close to sea surface is extreme in hazard. It is highly probable that the captain's action significantly lacked safety considerations.

b. It is probable that the captain tried to fly 150 m away from Kouri bridge to keep the minimum safety altitude. However, it is highly probable that the helicopter had away only about 70 m from the bridge when it crashed into sea surface. To observe strictly the minimum safety altitude by visual sense, the pilot must fly with enough margin of separation from obstacles. Though the flight altitude is above 500 ft (150 m) in the operation plan for this sightseeing flight, it is highly probable that the captain did not try to follow this restriction.

c. The captain made the sightseeing flights to descend until close to sea surface many times on the day. It is highly probable that the flight involving the accident was different from these flights and flew exceeded speed and descent rate than the captain's thought. It is also highly probable that the captain misjudged the altitude over calm

	and high degree of transparency sea surface, delayed the transition from descent to climb and crashed into sea surface. d. Though the captain did not pull back the cyclic pitch lever in transition to climb since he afraid of the tail hit the sea surface, it is probable that the helicopter could climb immediately by pulling back the cyclic pitch lever since it had enough speed, about 120kt. (4) Rescue The helicopter did not equip with a lifeboat which shall be onboard in this accident flight. It is highly probable that the situation was dangerous that could result in loss of human life without recue activities properly and quickly by the witness and the rescuer. Emergency equipment to be equipped with an aircraft in accordance with the provisions of regulations shall be onboard without fail. (5) Safety Management System of the Company Since the Standard Operation Procedure which described detail flight procedure in the Company were not provided, it is highly probable that concrete flight procedure of sightseeing flight was left to the captain's discretion. It is necessary to develop Standard Operation Procedures describing detail flight procedure of each flight operation, make well known the contexts of Standard Operation Procedures to employees and execute educations and trainings for crews based on these manuals. The Company should take a deep flaw in the safety management system that they had been unable to block the captain's unsafe actions of them and make an effort concerted to revise the safety management system toward cultivating a safety culture in-house.

4. PROBABLE CAUSES

It is highly probable that the accident occurred as the helicopter during sightseeing flight descended at excessive speed and descent rate until close to sea surface, the captain misjudged the altitude over calm and high degree of transparency sea surface, delayed the transition from descent to climb, crashed into sea surface and the helicopter was destroyed.

Regarding the helicopter descended at excessive speed and descent rate until close to sea surface, it is highly probable that the Standard Operation Procedures which described detailed flight procedure in the Company were not provided and flight procedure of each flight operation was left to the captain's discretion. Moreover, the captain did not try to follow the laws and regulations and significantly lacked safety considerations.

5. SAFETY ACTIONS

Safety Actions Taken by the Company

(1) Prevention of Hazardous Flight

- The Company made description in Operation Manual of the Company concerning minimum safe flight altitude in the accordance with the Manual for Approval of Operation Manual.
- The Company made description of minimum cruising altitude of 1,000 ft from sea level except takeoff and landing in Standard Operation Procedure of "Sightseeing Flight" and "Passenger

Transportation" and adding a limit to the speed to be able to transfer to autorotation in the case of emergency, flight route, minimum safe flight altitude, decision altitude and weather requirements.

- The Company specified "Reporting System" in Standard Operation Procedure which described that employees who are on the scene shall check all sightseeing flights and passenger transportation flights based on the instruction on the Director of Operation, report to the Director of Operation and a special education shall be made to the captain who has any problem discovered.

(2) Reinforcement of Operation Monitoring System

- The Company established a system to make three documents, "Flight Management Table" (The request contents of flight are described), "Flight Directives" (Directives of the flight details) and "Flight Implementation Report" (Records of the flight details), in a related manner.
- The Company specified "Reception Service Manual," "Receptionist" and "The Handling of Boarding for Infants, and others" in Standard Operation Procedure to prevent confirmation deficiencies of age or the number of passenger in the reception service.
- The Company added an item of "Flight Monitoring and Change of Flight Plan" in Operation Manual.

(3) Reinforcement of Safety Management System

- The Company implemented "President Admonition" and "Special Education" in order to educate compliance and ensure safety immediately after the accident.
- The Company introduced the Chief Safety Management Officer address in morning assembly on every Monday.
- The Company established the system that the Chief Safety Management Officer will collect field employees' opinions directly and correct if discrepancy is found.
- The Company provided performing education of safety management system twice a year in each department in addition, accepting potential incident reports and corresponding to it in "Safety Management Manual."
- The Company decided "Raising Compliance Awareness" as safety target and provided "Safety Action Guidelines".
- The Company decided to hold a safety meeting once a month in accordance with the Operation Manual.
- The Company provided "Safety meeting" in Standard Operation Procedure to distinguish clearly the stance of safety meeting in operational division from workplace safety meeting mandated by the Safety Management Manual.
- The Company provided "Terminology used in emergency" in Emergency Work Processing Manual (accident processing) in order to respond quickly in case of emergency situations.