AA2018-3

AIRCRAFT ACCIDENT INVESTIGATION REPORT

JAPAN COAST GUARD

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March 29, 2018

JTSB Japan Transport Safety Board

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.

Kazuhiro Nakahashi
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

ROTORCRAFT DAMAGE DURING LANDING
JAPAN COAST GUARD
AGUSTAWESTLAND AW139 (ROTORCRAFT), JA968A
AT AROUND 15:08, AUGUST 9, 2016
AT SHITI-GA-HAMA TOWN, MIYAGI-GUN
MIYAGI PREFECTURE, JAPAN

March 9, 2018
Adopted by the Japan Transport Safety Board
Chairman Kazuhiro Nakahashi
Member Toru Miyashita
Member Toshiyuki Ishikawa
Member Yuichi Marui
Member Keiji Tanaka
Member Miwa Nakanishi

1. PROCESS AND PROGRESS OF INVESTIGATION

1.1 Summary of the Accident	On Tuesday, August 9, 2016, an Agustawestland AW139 registered JA968A, operated by Japan Coast Guard, landed on the sandy beach at Hanabuchi-hama of Shichi-ga-hama Town, Miyagi-gun, Miyagi Prefecture, Japan, without extending the landing gear down and suffered damages to the rotorcraft.
1.2 Outline of the Accident Investigation	On August 10, 2016, the Japan Transport Safety Board (JTSB), upon receiving the report of the accident occurrence, designated an investigator-in-charge and one other investigator to investigate this accident. An accredited representative and the adviser of Italy Republic, as the state of Design and Manufacture of the rotorcraft involved in this accident, participated in this investigation. Comments were invited from parties relevant to the cause of the accident and from the relevant state.

2. FACTUAL INFORMATION

2.1 History of the Flight	According to the statements of a captain, a co-pilot (describes in 2.8 (2), later), and staff assisting at the ground (hereinafter referred to as "the Land Team") and based on the recordings of the flight data and cockpit voice recorder(combined CVR/FDR), the history of flight up to the accident was summarized as below; On August 9, 2016, an Agustawestland AW139 (hereinafter referred to as "the Rotorcraft") registered JA968A, operated by Japan Coast Guard (hereinafter referred to as "the JCG"), upon receiving a request of sea rescue, was dispatched from Sendai Air Base of the JCG located at Sendai Airport with the captain, the co-pilot, a flight mechanic (hereinafter referred to as "the Mechanic", a flight communicator (hereinafter referred to as "the Communicator"),an Airman and 2 mobile rescuers, total 7 persons on board. The Rotorcraft arrived at above the rescue site approximately 22 km northeast of the Airport at around 14: 43 Japan Standard Time (JST; UTC + 8 hours; unless otherwise stated, all times are indicated in JST using a 24-hour clock). Around the rescue site and the accident site, strong wind immediately after a typhoon passing was blowing with fluctuation from northwest to over the highland of the cove, causing strong downdraft and creating big wave splashed at wave dissipating block where the two survivors in need of help were waiting. While letting the Rotorcraft descend for the rescue, aural warning (hereinafter referred to as "the AWG", describes later in 2.8 (5)) were sounded to inform that the landing gear was not extended at an altitude of approximately 150 ft, but the captain thought it might hinder the rescue operation, so he instructed the co-pilot to silence the sound. The captain, as predicting the up and down motions of the Rotorcraft because of strong downdraft with fluctuation, was operating with his paying attention to "overtorque[1]" in order to maintain the altitude and was instructing the co-pilot to monitor the torque. At the same time, the captain was coordinating how to

[1] "Overtorque" means a torque exceeding a maximum allowable value which indicates and engine output level required to drive a rotor.

	deliver the survivors in need of help to the Land Team via the radio communication by the Communicator. The Rotorcraft, while hovering with its nose facing the wind at an altitude of about 60 ft, hoisted the two survivors in need of help one by one by the hoisting device and took them into the cabin. Then, while keeping an altitude with the nose facing the wind, the captain moved the Rotorcraft to the sandy beach. The captain had decided to land on the sandy beach of the seashore in order to deliver the survivors in need of help on the spot as the request of the Land Team, instructed the Mechanic to monitor flying debris because of downwash[2] at the ground and landed at around 15:08. Prior to the landing, because the captain had to pay attentions to a lot of the things like changing the delivery spot from Sendai Airport of initial choice to the sandy beach of seashore, operating while paying attention to the strong downdraft with fluctuation, and securing the safety of landing site concerning regulations to exclude swimmer from the beach, or by monitoring the flying debris due to the downwash, he forgot to confirm the landing procedure by performing the checklist. Also the co-pilot was focusing to monitor so that he was not aware that the AWG was silenced and he should carry out the checklist. The sandy beach as the landing site was sloped slightly, therefore the captain made to touch the ground with more care than normal, but he did not aware that the landing gear was not extended. After the touchdown, because he felt that his eye level was lower than a normal situation, as he had checked the landing gear position handle lever, landing gear indicator lights and landing gear warning device, for the first time, he found out that the landing gear was not extended. The co-pilot and other people on board realized that the landing gear was not extended as the captain told them after the landing. The Land Team thought that the Rotorcraft had landed normally. Two Mobile Rescuers deplaned and accompanied the two

[2] "Downwash" means an airflow passing thorough rotor down to the ground. When the rotorcraft weight is heavier, downwash becomes stronger and when the ground speed is slow, an effect to the surrounding becomes bigger.

	survivors in need of help in order to hand over to the Land Team. During the time, the captain lifted the Rotorcraft once and landed again with the landing gear extended as checking the Rotorcraft condition. At the time, the captain and the Mechanic had not deplaned to check the external condition of the Rotorcraft, but they judged that the Rotorcraft would have no trouble to fly. Two Mobile Rescuers returned to the Rotorcraft and flew back to Sendai Airport, during the flight, the Rotorcraft had no trouble to be confirmed. After returning to the Base, inspecting the Rotorcraft in details, there were no abnormality at the landing gear system and the landing gear warning device, but damages on the bottom structures of the fuselage were confirmed. The accident occurred at the sandy beach at Hanabuchi-hama, Shichi-ga-hama Town, Miyagi-gun, Miyagi Prefecture (N38º17'45", E141º04'40") at around 15:08 on August 9, 2016.
2.2 Injuries to persons	None
2.3 Damage to Aircraft	Extent of damage to the Rotorcraft; substantial ① Deformed outer skin panel, deformed frame at the fuselage bottom and the damaged Heli-Tele antenna ② VHF (No.2) antenna; damaged ③ upper cover parts of the Hoist light device; collapse and, deformed ④ Search light glass; cracked  **Figure 1 Damaged Locations of the Rotorcraft**

2.4 Personnel information	(1) Captain Male, Age 48 Commercial pilot competence (Rotorcraft) April 11, 1995 Specific pilot competence Expiration date of piloting capable period; November 6, 2017 Type rating for Agusta-Bell AB139 December 5, 2013 Class 1 aviation medical certificate Validity; November 8, 2016 Total flight time 5,170 hours 15 minutes Flight time on the type of Rotorcraft 827 hours 50 minutes Total flight time in the last 30 days 45 hours 20 minutes (2) Co-pilot Male, Age 24 Commercial pilot competence (Rotorcraft) January 11, 2013 Specific pilot competence Expiration date of piloting capable period; January 11, 2016 Type rating for single-piston engine(land) January 11, 2016 Class 1 aviation medical certificate Validity; December 2, 2016 Total flight time 238 hours 50 minutes Flight time on the type of Rotorcraft 76 hours 35 minutes Total flight time in the last 30 days 9 hours 00 minutes
2.5 Aircraft information	Type; Agustawestland AW139 Serial Number; 31360, Date of Manufacture; August 5, 2011 Airworthiness Certificate; No. Tou-27-586, Validity March 28, 2017
2.6 Meteorological information	The weather data of the accident date were as follows; ①Japan Meteorological Agency "Automated Meteorological Data Acquisition System (AMeDAS)" (Shiogama) (The weather data at approximately 7 km northwest of the accident site, converted wind velocity in kt) Maximum instantaneous wind speed: 27 kt (northwest) Wind velocity at 15:00: 9 kt (west- northwest) ②According to the statements of the Captain; Wind speed at the time of the landing: 25 kt (northwest)
2.7 Accident Site	The accident site was an inlet of sandy beach, which had a sea shore at the south side and sheer hills at both sides of the inlet.

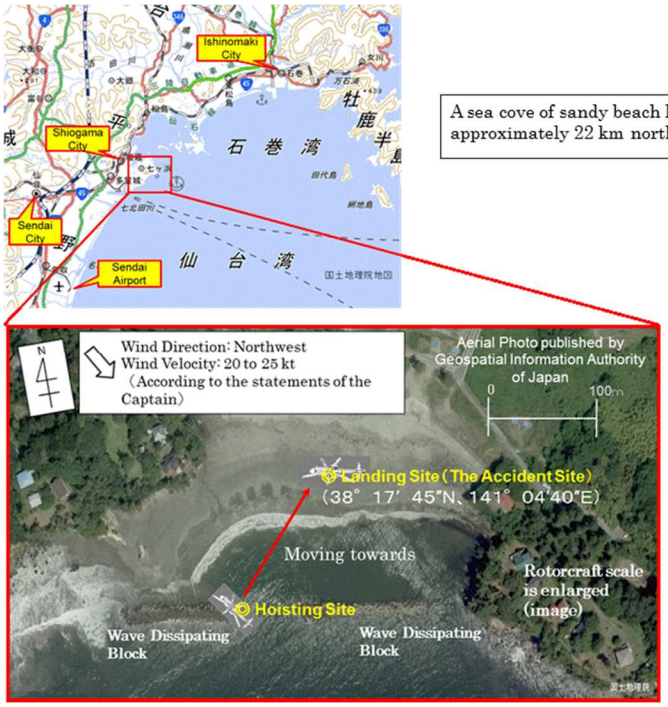

Figure 2 The Situation of the Accident Site

2.8 Additional information

(1) Division of responsibility of crew member

The division of responsibility of crew member (seating position) was as below, based on the Aircraft Operating Manual of Agustawest AW239 (hereinafter referred to as "the Operating Manual".the internal regulation).

① Captain; pilot flying (the right pilot seat)

② Co-pilot; monitoring flight condition and ATC communication (left pilot seat)

③ Flight Mechanic ; operating Hoist, guiding the Rotorcraft, operating to open/close of the sliding doors and safety monitoring (right passenger seat of the second row)

④ Flight Communicator; duties radio communication, Heli-Tele operations and recordings of the rescue images (left passenger seat of the second row)

⑤ Mobile Rescuer; rescue "survivors in need of help" and deliver to the Land Team (left and center seat of the third row)

⑥ Flight Crew; assist to hoist and record a rescue operation (right passenger seat of the third row)

(2) Co-pilot

The Rotorcraft could be operated by one pilot based on the flight

	manual, but the JCG operates it by two personnel as a captain and a co-pilot following the division of roles provided in the Operating Manual. According to the JCG, to the personnel who meets the appointing requirements specified in the "Details of Aircraft Personnel Service Regulation Guidelines" (Internal Regulation), the head of Air Base certifies an personnel who received the training and passed the test specified in the subjects of instruction (paper test and skill test) of "Training Standard for a certification of a co-pilot and others" as a co-pilot. Also, duties of a co-pilot is provided by "Official Order for Aircraft Crew Member" (Internal Regulations) of the JCG as assisting a captain to operate rotorcraft, but according to the JCG, duties of a co-pilot on board of the Rotorcraft which could be operated by one man is mere supporting jobs done under the surveillance of captain and not including any operating works and not required to pilot the Rotorcraft without having a pilot competence certificate. (3) Checklist Checklist was provided in Operating Manual. Normal checklist was provided in the chapter of "Normal Operation" of Operating Manual and Mission checklist was in the chapter of "Duty Flight Manual". "Normal Operation" shall be applicable mutatis mutandis pertaining the flight for the search and rescue works by the JCG, which has "descending / sling work (hoist work) manual" and others. According to the manual, as initiating a checklist upon a request of captain or personnel in charge of pilot flying, it is performed by a personnel who reads out each item of checklists and the personnel who operates or confirms. After completing the duty flight, based on "Duty Flight Manual", every setup or the configurations changed for the duty flight shall be returned to the normal flight settings and the after-mission checklist should be performed following the manual when the flight become stable as breaking away and accelerating to climb. Furthermore, after performing before-landing checklist and final-approach checklist (equivalent of the before-landing checklist provided in the flight manual) provided in "Normal Procedure" of

	the Operating Manual, the landing gear condition and others should be confirmed, but at the time of accident, these checklists were not performed. (4) CRM Training The JCG provides "the CRM[3] initial training" to the personnel in charge of duty flight and provides "the CRM developed training" to the personnel who completed the initial training. Also, at the Air Base and others, "the course to train and educate CRM instructor" is provided in order to educate CRM instructor from captains, mechanics and communicators as its target. Furthermore, thorough a year, providing the CRM periodical training standard syllabus, checking the CRM situation after a flight and implementation of self-estimation should be done. At the Base, annual training schedule is created to implement CRM training and the captain, the co-pilot and each crew on board had received appropriate CRM trainings required for each one. (5) Landing Gear Warning Device Landing gear warning device inform with LANDING GEAR and AWG when radio altitude of approximately 150 ft without being extending landing gear. AWG is silenced by switching LOW HT AWG switch to INHIBIT, but LANDING GEAR will be illuminated until the landing gear will be lowered and fixed. (Characters enclosed is this sentences indicate the displays of the instrument panel or the switch displays.)

3. ANALYSIS

3.1 Involvement of weather	Yes
3.2 Involvement Of pilot	Yes
3.3 Involvement of equipment	None

[3] "CRM" means Crew Resource Management. Utilizing available resources within a cockpit (human, devices, information and others) effectively and efficiently, gather the power of the team member in order to improve the performance.

3.4 Analysis of known items	(1) Effects of downwash; At the vicinity of the accident site at that time, because northwest wind of maximum instantaneous wind speed 27 kt were resulted in irregular downdraft, it is probable that it was necessary to pilot with full attention not to generate an overtorque in order to fly stably than normal. (2) Situation up to the Rotorcraft damaged; It is probable that the captain forgot to perform before -landing checklist provided in Flight Manual and to confirm the landing gear condition, because various tasks were concentrated into a short time, his high workload condition were continued for some time and he did not have any spare time to switch his mind from rescue work to landing procedure. It is probable that because the co-pilot, while his attention was focusing on monitoring torque and did not receive the request from the captain to initiate checklist, he did not aware that he did not perform the before -landing check provided in Flight Manual. Based on these, it is highly probable that the Rotorcraft landed without lowering the landing gear and suffered damages to its fuselage bottom surface. (3) Division of roles in the Operating Manual and utilization of CRM; It is somewhat likely that according to the Operating Manual, the co-pilot shall monitor the flying condition, but he was preoccupied with monitoring torque so he did not see the overall condition of the flight, therefore he could not assist the captain fully. Furthermore, the JCG prevents the accident and others by implementing CRM education to the personnel in charge of duty flight, but if each personnel on board gets preoccupied with own duty, it is somewhat likely that the coordination becomes insufficient and CRM did not function sufficiently, as the results, it is somewhat likely that he could not report to the captain about that the before-landing check was not done and the landing gear was not lowered.

	(4) Safety Action; It is desirable that the JCG should secure the full function of CRM corresponding to the flight works of the JCG by confirming the division of roles for each flight crew and pilot at the time of briefing in order to secure the safety flight as planning to decrease the workload of pilots in charge of duty flight. (5) Decision whether the maintenance work should be required or not, after the accident; At this accident, the captain and the Mechanic as being on board checked the condition of the Rotorcraft and decided that the Rotorcraft was able to continue the flight and made a fly back to the Base, however, regarding the cases like these, it is desirable to enhance the technical support system in order to determine whether to continue a flight or not, systematically and carefully.

4. PROBABLE CAUSES

It is highly probable that this accident occurred as the Rotorcraft suffered damages because it had landed without extending the landing gear.

Regarding why it had landed without extending the landing gear, it is probable that various tasks were occurred in short time span and at same time other crews on board were also focusing on their own various tasks, so that they could not carry out necessary corporation or support, and because the workload of the captain continued to be high, there were not enough time for the captain to shift his mind from the rescue operation to the landing procedure, as the result, he forgot the check prior to the landing prescribed in the flight manual and did not check the landing gear condition.

5. SAFETY ACTION

After the accident, as implementing action meetings and investigations, the JCG executed and are executing the following safety action with the relevant parties and concerned organization as follows;

(1) Re-educating, re-training and examining flight for captains and co-pilots;

(2) Re-education of Sendai Air Base personnel concerning the implementation of CRM;

(3) Checklists and briefings should be surely implemented;

(4) Continuations of Periodical CRM training and Sharing the contents of each flight debriefing systematically to utilize those for practical CRM education;

(5) Disseminate works of co-pilots concerning the compliances with Operating Manual

and the division of role of pilot (revise the Operating Manual);
(6) Ensuring safety flights based on positive advises among the government offices, ships and Rotorcrafts;
(7) Continuation of safety audit and training for the case;
(8) Systematic safety management at the time to judge to take-off or land at a temporary helipads and at others (specified in the Operating Manual);