

AIRCRAFT SERIOUS INCIDENT INVESTIGATION REPORT

August 8, 2025

Adopted by the Japan Transport Safety Board



Chairperson RINOIE Kenichi
Member TAKANO Shigeru
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Company	Shin Nihon Helicopter Co., Ltd.
Type, Registration Mark	Bell 412EP (Rotorcraft), JA6412
Incident Class	Case where a slung load, any other load carried external to the aircraft, was released unintentionally. Item (xvi), Article 166-4 of the Regulation for Enforcement of the Civil Aeronautics Act of Japan.
Date and Time of the Occurrence	At about 15:15 Japan Standard Time (JST: UTC+9 hours), Oct 10, 2024
Site of the Serious Incident	Joetsu City, Niigata Prefecture

1. PROCESS AND PROGRESS OF THE SERIOUS INCIDENT INVESTIGATION

Summary of the Serious Incident	On Thursday, October 10, 2024, at around 15:15, while flying over Sugawa, Yasuzuka Ward, Joetsu City, Niigata Prefecture, the helicopter unintentionally dropped ready-mix concrete from a bucket hanging outside the helicopter. There was no damage to people or objects on the ground.
Outline of the Serious Incident Investigation	On October 10 and 14, 2024, the Japan Transport Safety Board (JTSB) designated an investigator-in-charge and two other investigators. Comments on the draft Final Report were invited from parties relevant to the cause of the serious incident and the Relevant State.

2. FACTUAL INFORMATION

Aircraft Information	
Aircraft type:	Bell 412EP
Serial number: 36561	Date of manufacture: October 7, 2010
Airworthiness certificate: No. DAI-2023-750	Validity: April 11, 2025
Personnel Information	

Captain: Age 48

Commercial pilot certificate (Helicopter)

August 12, 2002

Pilot competency assessment/confirmation

Expiration date of piloting capable period

February 22, 2026

Type rating for Bell 212

June 26, 2013

Class 1 aviation medical certificate

Validity: August 10, 2025

Total flight time

6,023 hours 28 minutes

Total flight time on the type of aircraft

408 hours 38 minutes

Flight time in the last 30 days

8 hours 03 minutes

Pilot: Age 35

Commercial pilot certificate (Helicopter)

March 12, 2010

Pilot competency assessment/confirmation

Expiration date of piloting capable period

February 22, 2026

Type rating for Bell 212

February 2, 2023

Class 1 aviation medical certificate

Validity: September 26, 2025

Total flight time

3,974 hours 25 minutes

Total flight time on the type of aircraft

120 hours 48 minutes

Flight time in the last 30 days

16 hours 15 minutes

Onboard mechanic: Age 55 cargo transport experience About 32 years and 4 months

Ground operator A: Age 25 cargo transport experience About 4 years and 3 months

Ground operator B: Age 24 cargo transport experience About 3 years and 4 months

Meteorological Information

According to the statements of the captain and the pilot, at Yasuzuka No. 2 operation site in Sugawa, Yasuzuka Ward, Joetsu City, Niigata Prefecture (hereafter referred to as the "operation site"), there was a southwesterly wind of approximately 4 m/s, with a visibility of more than 10 km.

Event Occurred and Relevant Information

(1) History of the Flight (Figure 1)

According to the flight crew members as well as the record of the flight data recorder, from around 12:30 on October 10, 2024, the helicopter was transporting cargo for the construction of the new lift at Cupid Valley Ski Resort in Sugawa, Yasuzuka Ward, Joetsu City, Niigata Prefecture, by hanging a bucket filled with ready-mixed concrete from a 5-meter sling rope and hook attached to the external cargo sling rigging, and unloading

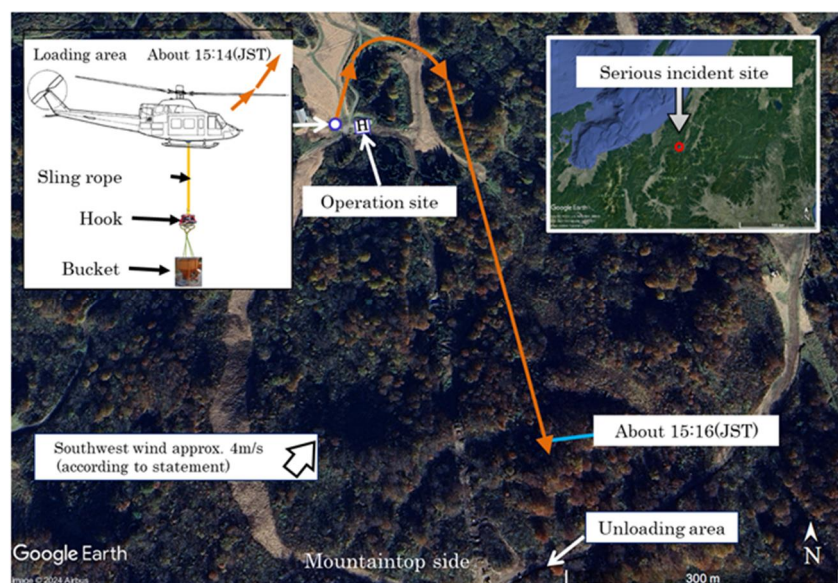


Figure 1: Estimated Flight Route

the ready-mixed concrete from a loading area near the operation site at an unloading area on the

mountaintop about 500 meters to the south.

The pilot, who was undergoing training to transport cargo, was in the right seat and piloted the helicopter, the captain was in the left seat as the pilot's training instructor, and the on-board mechanic, who was responsible for guiding the helicopter, was in the left rear seat. In addition, as the helicopter was using two buckets alternately, while the helicopter was transporting one bucket containing ready-mixed concrete, the two Ground operators were cleaning and inspecting the other bucket, filling it with 0.3 m³ (approximately 700 kg) of ready-mixed concrete, in preparation for the next cargo transport.

At around 15:14, the helicopter lifted the bucket containing ready-mixed concrete at the loading area for its 29th cargo transport, then made a right turn while climbing northeast, and headed for the unloading area at the top of the mountain on the southern side.

At around 15:16, as the helicopter approached the unloading area, the onboard mechanic opened the left rear door to check the condition of the load, noticed that the ready-mixed concrete in the bucket had been gone, and reported it to the captain and the pilot.

The captain, upon receiving the report from the on-board mechanic, confirmed through a mirror attached to the exterior of the helicopter that there was no more ready-mixed concrete in the bucket, and decided that the helicopter would not be able to continue cargo transporting and that they should return to the operation site. The helicopter retraced its flight route and searched for the location where the ready mixed concrete would have fallen but was unable to find it. The helicopter then landed at the operation site at 15:28. Also, after landing, the on-board mechanic checked the bucket and found that the bottom plate of the bucket was slightly open.

(2) Damage Caused by Falling Ready-mixed Concrete

When obtaining permission obtained pursuant to the proviso of the Civil Aeronautics Act (CAA) Article 79 (place for take-offs and landings) and the CAA Article 81 proviso (minimum safe altitude) for the helicopter to transport cargo by slinging, the helicopter had set a flight route that would not endanger people or objects on the ground, and actually flew along that route. The fallen ready-mixed concrete was not found, but there was no report of damage to people or objects on the ground as a result of the fallen ready-mixed concrete.

(3) Overview of Buckets (Figure 2)

Shin Nihon Helicopter Co., Ltd. (hereinafter referred to as "the transport company") has a contract with a bucket manufacturer (hereinafter referred to as "the manufacturer") and uses buckets whose links are adjusted by the manufacturer. The manufacturer has adjusted to the state, in which the fulcrum connecting the two struts is initially adjusted to be 10 to 15 mm inward from the position where the struts are connected in a straight line (hereinafter referred to as "over-centering"), and the links are then adjusted so that there are no gaps when the bottom plate is closed.

According to the bucket maintenance manual (hereinafter referred to as the "Manual") prepared by the manufacturer, the bottom of the bucket is equipped with a base plate covered with soft rubber that can be opened and closed to prevent gaps when the opening is closed.

In normal operation, when the on-board operation switch is set to ON (OPEN), an electrical signal is sent to supply carbon dioxide to the gas cylinder connected to the opening/closing handle, which extends the gas cylinder and moves the link to open the bottom plate. In addition, the bucket used by this helicopter has a small internal volume and places less load on the bottom plate, therefore the bottom plate is supported only by the links. In addition, there is no locking mechanism to prevent the bottom plate from opening unintentionally, but when the bottom plate

is closed, the bottom plate is designed not to open easily due to the over-centering locking mechanism.

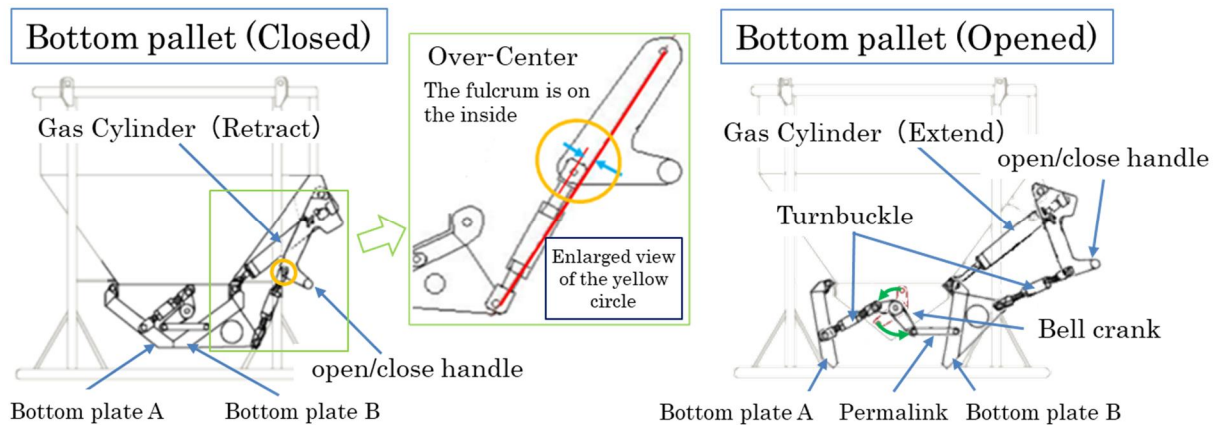


Figure 2: Link Movement when Opening and Closing the Bucket

According to the manual, the longer the time of service of the bucket, the more the play in the links is generated because the soft rubber attached to the bottom plate wears and deteriorates, so the links need to be adjusted according to the condition of the bucket. Also, if the bucket bottom plate opens during transportation, it is likely that the over-centering lock is not working effectively or the force holding the over-center is weak, so the transport company would adjust the links at the site of use as necessary.

(4) About the Bucket Involved in This Serious Incident

The bucket involved in this serious incident had been used to transport ready-mixed concrete approximately 100 times after the maintenance check performed by the manufacturer on September 9, 2024 until this serious incident occurred after the bucket was delivered to the loading site on September 10, 2024, during which time no link adjustments had been made.

After this serious incident, the bucket was moved to the transport company's hangar and examined in detail. No abnormalities were found in the opening and closing operation, but the fulcrum had recessed inward by approximately 9 mm, which was shallower than that at the initial adjustment.

(5) Statements from People Involved

The captain was closely watching the operation of the pilot, who was in training, and the helicopter's instruments after the helicopter hoisted the bucket at the loading area until it completed its right turn. Although the wind blew strongly at times, it was not strong enough to shake the bucket, and when the captain looked it in the mirror attached to the outside of the helicopter during the climb after hoisting the bucket, there was no abnormality such as leakage of ready-mixed concrete from the bucket.

The pilot felt the helicopter lifted slightly while making a right turn, but at the time thought it was due to the influence of the wind.

The onboard mechanic opened the left rear door of the helicopter and visually monitored the bucket from the time the helicopter began the sling work until it climbed and began turning to the right, but no abnormalities such as ready-mixed concrete leaking from the bucket had been found.

Ground operator A and Ground operator B had conducted a pre-use inspection, such as checking for over-centering, in accordance with the procedures in the work manual and bucket instruction manual established by the transport company, and no abnormalities had been found

on the bucket. In addition, when preparing to fill the bucket with ready-mixed concrete, they had washed the inside of the bucket and the opening and closing part of the bottom plate with water and visually checked the over-centering, and found no abnormalities that would cause ready-mixed concrete to leak.

(6) Opening and Closing Operations on Board the Helicopter

The onboard switches for opening the bucket bottom plate were installed in the instrument panel and above the left rear door, and both were designed so that the switches could not be operated unless the guards to prevent accidental operation were deliberately opened. In addition, the electrical wiring from the switches to the bucket was completely isolated from other equipment on the helicopter, and no abnormalities were found in the electrical wiring when the electrical continuity was checked after this serious incident.

3. ANALYSIS

The JTSB concludes that it is most likely that while the helicopter was flying with a bucket of ready-mixed concrete slung over, the bottom plate of the bucket opened unintentionally, causing the ready-mixed concrete to fall. Regarding the unintentional opening of the bottom plate of the bucket, it is more likely that as the service time of the bucket increased, the soft rubber attached to the bottom plate began to wear and deteriorate, generating play in the links, causing the fulcrum to be recessed and shallower, and preventing the lock from working properly. As a result, it is more likely that the load on the bottom plate increased due to centrifugal force as the helicopter turned right, and the bottom plate was no longer able to withstand the load, causing the bottom plate to temporarily open.

On buckets with bottom plate supported only by links, the locking function may not work properly due to subtle differences in the way the fulcrum is inserted. Therefore, it is essential to regularly check the condition of the links and adjust them as necessary.

In addition, even if the helicopter flies in an area where there is no risk of damage to people or objects on the ground, it is desirable to install a locking mechanism to prevent the bottom plate of the bucket from opening unintentionally, as a preparation against unforeseen circumstances.

4. PROBABLE CAUSES

The JTSB concludes that the probable cause of this serious incident was that the bottom plate of the bucket most likely opened unintentionally while the helicopter was flying with a bucket of ready-mixed concrete slung over, causing the ready-mixed concrete inside the bucket to fall.

Regarding the unintentional opening of the bottom plate of the bucket, it is more likely that as the service time of the bucket increased, the fulcrum of the link became shallower, preventing the lock from working properly, in addition, as the load on the bottom plate increased due to centrifugal force as the helicopter turned right, the bottom plate was no longer able to withstand the load.

5. SAFETY ACTIONS

(1) Safety Actions Required

As shown in 3 Analysis, on buckets with bottom plate supported only by links, the condition of the links must be checked regularly and adjusted as necessary. In addition, it is advisable to install a locking mechanism to prevent the bottom plate of the bucket from opening

unintentionally, in case of unforeseen circumstances.

(2) Safety Actions Taken by the Company after the Serious Incident

The transport company has revised its procedures to install a locking mechanism on the bucket, where a locking arm is attached to the bucket and will only lock if it is over-centered within a specified value, to prevent the bottom plate from opening unintentionally and to confirm that the locking arm is securely engaged before the ready-mixed concrete is poured.

The transport company has also revised its procedures to thoroughly inspect buckets delivered to the site to make sure they are over-centered before delivery.