FINAL REPORT

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In accordance with the provisions of SI 205 of 1997, the Chief Inspector of Accidents, on 11/01/06, appointed Mr Jurgen Whyte as the Investigator-in-Charge to carry out a Field Investigation into this occurrence and prepare a Synoptic Report.

Aircraft Type and Registration:	Sikorsky S 61 N, EI-SAR.
No. and Type of Engines:	2 x General Electric CT58-140-2.
Aircraft Serial Number:	61143.
Year of Manufacture:	1962.
Date and Time (UTC):	17 January 2006 @ 11.10 hrs.
Location:	Conningbeg Lightship, 5 nm south south west of the Saltee Islands, Co Wexford.
Type of Flight:	Training.
Persons on Board:	Crew - 5 Passengers - Nil
Injuries:	Crew – 1 (Minor) Passengers - Nil
Nature of Damage:	Extensive to two main rotor blades and cockpit canopy.
Commander's Licence:	Irish ATPL(H).
Commander's Details:	Male, aged 36 years.
Commander's Flying Experience:	3,980 hours of which 2,225 hours were on type.
Information Source:	Pilot Report Form and Reports submitted by SAR crew.

SYNOPSIS

While conducting a routine winching training exercise on the Conningbeg Lightship, the hoist cable snagged, then sheared and recoiled under load back up towards the helicopter, where damage was inflicted to the main rotor blades and the cockpit canopy. The helicopter recovered back to Waterford Airport (EIWF) without further incident. The Winch Operator suffered a laceration injury to his hand.

FINAL REPORT

1. FACTUAL INFORMATION

1.1 History of the Flight

1.1.1 General

The Search and Rescue (SAR) helicopter took off on a training sortie from its SAR base at Waterford Airport (EIWF) at 09.30 hrs with a total of 5 crew onboard. The crew was made up the Commander, Co-Pilot, a Winch Operator, a Winchman and a Winchman (female) under instruction. The weather was benign.

Following a number of circuits to various targets over the water, the decision was made (as briefed) to conduct transfers to the Conningbeg Lightship that was anchored approximately 5 nm south south west of the Saltee Islands. On carrying out a reconnaissance of the lightship, it was decided that the bow section was the most suitable area available for transfer under the prevailing conditions. On completion of a briefing and dummy approach to hover, the transfer commenced.

The Winchman was lowered to the deck and landed facing the foot of a steel ladder in the very bow of the ship where the sides are raised to provide a sheltered deck. The vessel was rising on a 2-metre swell and, as the Winchman attempted to release from the hoist hook, he was thrown off balance by the falling bow. To steady himself, the Winchman had to grasp the ladder with one hand, while at the same time trying to release from the hoist hook. During this process, a coil of cable looped around a small steel protrusion welded to the side of the ladder (**Photograph No 1**).

On seeing that the Winchman had disconnected, the Winch Operator started to winch in the cable. At the same time, the bow of the ship pitched down, load was put on the unseen snagged cable and the cable sheared just above the hook attachment point.

A loud bang was heard and a heavy vertical jolt was felt through the helicopter. Simultaneously, the front and upper cockpit Plexiglas was struck by the recoiled cable, with the outside air temperature (OAT) probe falling inwards and a hole appearing above the heads of the two pilot's.

The Winch Operator, who had received a laceration to his hand following the recoil of the cable, reported that the cable had sheared, but that the Winchman was secure on the deck. The helicopter cleared away from the lightship, turned towards the coastline and transitioned slowly forward.

The decision was made by the Commander to recover the helicopter directly back to their SAR base at Waterford Airport (approximately 18 nm distance). This decision was based on the facts that, there were no abnormal vibrations or cockpit indications, the Winch Operator required medical attention, the Winchman was secure on the deck, and a run-on landing at Waterford Airport, with minimum attitude change was preferable.

The co-pilot made a PAN call on VHF (Waterford Tower) and FM (Rosslare Coastguard) for cover during the helicopters transit (at minimum power speed of 60 kts) to the Airport, where at 11.28 hrs it carried out an uneventful landing.

The Winchman remained on the deck of the lightship and was later recovered back to Dunmore East Harbour on a rubber inflatable boat (RIB) from the Naval Vessel, Le Orla, which was operating in the area at the time.

2. DAMAGE

A visual inspection of the helicopter at Waterford determined that following the cable shear, the cable apparently travelled directly upwards striking both the black and white main rotor blades[1]. Following the initial blade strike, the cable whipped the upper section of the cockpit canopy, breaking a 4-inch hole into the pilot's overhead observation window. The centre windscreen window was also broken around the OAT probe. The probe was left hanging into the cockpit, causing a 6 to 8 inch hole. The cable then came to rest on top of the cockpit section forward of the UHF and FM antennas, and trailed down the left side of the forward fuselage, along the hull and left hand undercarriage sponson. The co-pilot's wiper/washer tube was found to be missing.

The white blade (S. No 61-M-3886-3355) had extensive damage to pocket 17 and 18. Scoring was found to the leading edge spar forward of pocket 17 and 18. A tear was also found in the pocket up to the rear of the blade spar (**Photograph No. 2**).

The black blade (S. No 61-M-3860-3637) had a hole/tear on its upper surface at pocket 21 up to the rear of the blade spar. There was some scoring at the leading edge of the spar and on the upper surface of the spar in the same area (**Photograph No. 3**).

Due to the extent of the damage, the blades were returned to an overhaul facility for further examination and repair.

The overhead pilot's observation (eye-brow) window was broken beyond repair.

An examination of the rescue hoist determined that the only damage suffered was to the stop plate (lower surface distorted) as a result of the sheared cable passing through the hole. The hoist was returned to the manufacturer for further examination and repair.

The hoist cable sheared just above the hook attachment point.

The onboard Health and Usage Monitoring System (HUMS) was downloaded and analyses carried out on all parameters were found to be satisfactory. A slight rise in main rotor head lateral vibration (due blade damage) was observed in the analysis but the reading remained well below the threshold.

No fault was found with any other part of the aircraft.

3. WINCH HOOK ASSEMBLY

The winch hook is made up of a stainless steel hook, a keeper plate with safety locks on either side, a hoist ring, and an end of travel hoist spring/weight (**Photograph No. 4**).

The keeper plate, in the secured position, ensures that the winchman does not become detached while on the hoist hook. When the winchman requires to detach from the hook, he/she has to depress the safety locks on either side of the keeper plate and then pull the plate back to create and open hook. The hook is then tilted to drop the 'D' ring (winchman attachment point) off the hook while it is held open.

[1] The rotor assembly contains a total of 5 main rotor blades.

The hoist ring is located above the hoist hook and is primarily used as a handgrip. However, it does also add additional weight to the hoist hook assembly, thereby reducing the tendency for the hook to drift when free.

3. COMMENT

The winchman recalled that because of the need to stabilise himself against the ladder with his left hand, he had to open the hoist hook and disengage from it with his right hand. He considered that this created a delay in getting off the hook and thus giving time to ensure the safe passage of the hook and cable over the side and clear of the vessel.

The inclusion of a ring on the hoist hook is generally optional on purchase of the hoist. No commonality exists among SAR Units world wide with regard to the inclusion or non-inclusion of the ring on the hoist hook. The SAR operator associated with this particular occurrence has some helicopters fitted with hoists rings and others without. EI-SAR at Waterford is one of the helicopters fitted with a ring on the hook.

One factor that can hinder quick single-handed operation of the hoist hook is the obstruction caused by the hoist ring. The ring can impede easy access to the hook as the hook can only be grasped from below the ring. This spoils the natural grip on the hook and latches, and although appearing as a minor matter, it may be critical in a situation where fractions of seconds count. The ring also increases the profile of the hook assembly, creating a larger snagging hazard in confined areas.

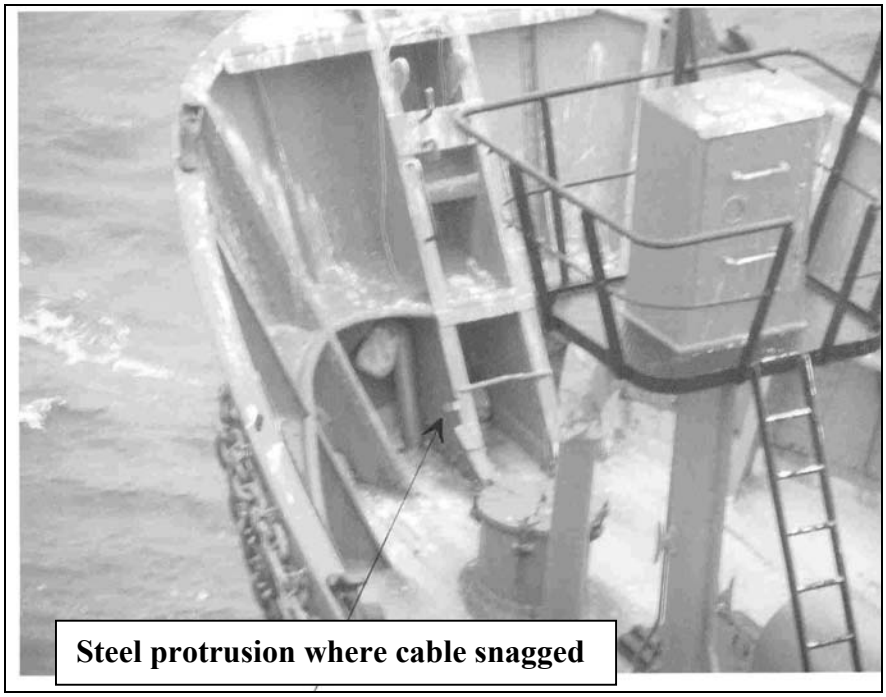
In discussions with the Operator, it has been confirmed that the Company has reviewed the matter of the hoist ring and have decided to standardise all hoists (to a ring-less hook) within their fleet. The Investigation is supportive of this initiative.

The helicopter SAR Crews provide a vital and effective life saving service to the State. Whether engaged in operational or training exercises, there will always be risks associated with winching operations.

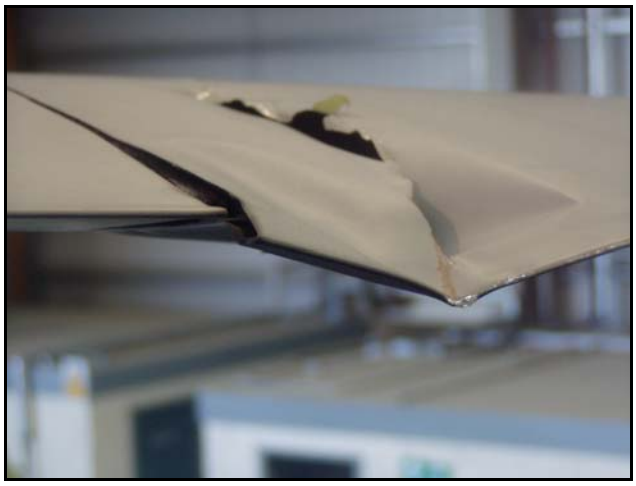
Training exercises such as this one carried out on the Conningbeg Lightship, form an integral element of maintaining SAR Crews proficiency. The benefit of such training far outweighs the associated risks, and while this particular incident was serious, it is not a common occurrence and must be viewed as part and parcel of the unpredictable helicopter SAR environment.

4. SAFETY RECOMMENDATIONS

This Report does not sustain any safety recommendations.

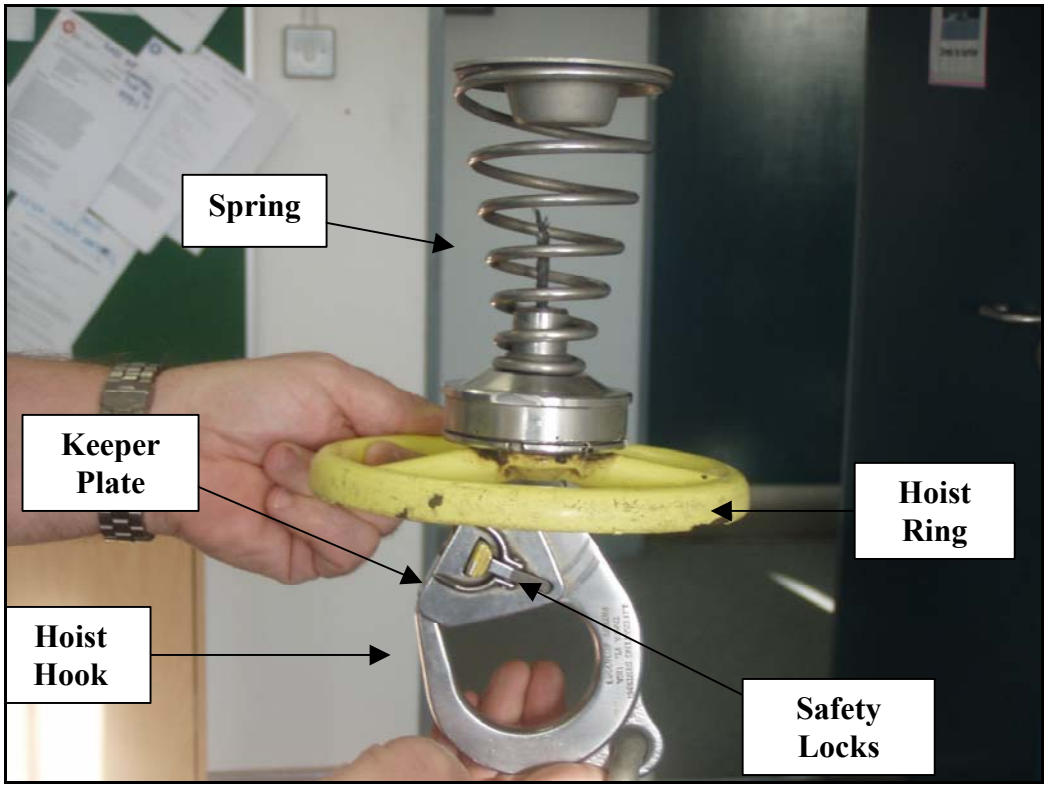


Photograph No. 1



Photograph No. 2 - Damage to White Blade

Photograph No. 3 - Damage to Black Blade



Photograph No 4 - Hoist Hook Assembly.

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