MINISTRY OF TRANSPORT, CONSTRUCTION AND REGIONAL DEVELOPMENT OF THE SLOVAK REPUBLIC
Air Accident and Incident Investigation Board
Nám. slobody 6, P.O. BOX.100, 810 05 Bratislava 15

File No: SKS2010003

F I N A L R E P O R T

on investigation of the serious incident

of helicopter type **Eurocopter AS-355N**

reg. No. **OM-IKM**

Date: 23.09.2010

Place: Ružín dam

A. I N T R O D U C T I O N

The investigation of air accident [AA], serious incident [SI], has been conducted pursuant to Art. 18 of the Act No 143/1998 on Civil Aviation (Civil Aviation Act) and on Amendment of Certain Acts.

The final report is issued in accordance with the Regulation L 13 that is the application of the provisions of ANNEX 13 Air accident and Incident Investigation to the Convention on International Civil Aviation and with the Council Directive 94/56/EC, establishing the fundamental principles governing the investigation of civil aviation accidents and incidents.

The exclusive aim of investigation is to establish causes of an accident or serious incident and prevent their occurrence, but not to refer to any fault or liability of persons.

This final report, its individual parts or other documents related to the investigation of the air accident have informative character and can only be used as recommendation for the implementation of measures to prevent occurrence of other air accidents and serious incidents with similar causes.

Operator / Owner:	Heli Company s.r.o. / Grafobal Group
Type of operation:	Flight training with instructor
Type of aircraft:	Eurocopter, AS-355N

Registration No:	OM-IKM
Place of take off:	Airport Prešov / LZPW
Place of training landing:	Kojšova Hoľa
Flight phase:	After take off

Date and time of occurrence detection: 23.09. 2010 at 13:20

Note: All time data in this report are stated in the UTC time.

B. INFORMATIVE SUMMARY

The crew was making a training flight with take off from the airport LZPW, training landing in the mountain area of Kojšova Hoľa and return to the airport LZPW.

Some 15 seconds after a training landing in the mountain area and subsequent take off the helicopter, the crew registered helicopter vibrations generated by the anti-torque rotor, with upward tendency.

The instructor evaluated the situation as a problem with anti-torque rotor, took over and started the descent to decrease the anti-torque rotor load, while searching for a suitable emergency landing ground.

The instructor made an emergency landing on the nearest suitable ground without causing any further damage to the helicopter or injury to the crew in the area of the Ruzin dam.

The following persons were appointed as investigators of the serious incident:

Ing. BENEK Igor

Ing. JANDURA Igor, member of the Permanent investigation commission

The report is issued by:

Air Accident and Incident Investigation Board of the Ministry of Transport, Construction and Regional development of the Slovak Republic

C. MAIN PART OF REPORT

1. FACTUAL INFORMATION

1.1 History of the flight

On 23 September 2010 the helicopter crew completed the pre-flight preparation with focus on a landing with Gmax and take off from the mountain area of Kojšova Hoľa.

At 10:10 the helicopter crew made a training flight with take off from the airport LZPW Prešov, training landing in the mountain area of Kojšova Hoľa and return to the airport LZPW Prešov, without a flight plan, in VFR conditions, outside of the area of MCTR LZPW, on a radio frequency Bratislava Info 124,300 Mhz.

Crew's decision for landing on the known and frequently used landing ground of Kojšova Hoľa was made in the standard manner according to the helicopter landing manual with Gmax from an altitude of 4,500 ft ALT.

According to the instructor's testimony, the final approach, the descent and the arrest of the helicopter occurred without any special events, with all systems and devices showing standard data.

Before the helicopter touchdown the crew registered a soft metallic sound recalling a contact of ski undercarriage with a stone. The instructor took over and made a control take off, but he did not register any vibrations or parameters out of the tolerance range of the helicopter, so the crew continued the flight. After some 15 seconds of flight the crew registered vibrations with a transfer to the azimuthal control.

The instructor evaluated the situation as a problem with anti-torque rotor, took over and started the descent to decrease the anti-torque rotor load, while searching for a suitable emergency landing ground in the direction of Kojšova Hoľa - Košická Belá.

At 11:20 the instructor made an emergency landing on the nearest suitable ground near the Ružín dam without causing any further damage to the helicopter or injury to the crew. When the engines had stopped the helicopter crew detected damage to the anti-torque rotor.

As the ground was not accessible by land vehicles, the helicopter was slung under the helicopter Mi-8 and transported to the airport LZPW.

The serious incident was reported to the APP/TWR Košice by police, which informed about the occurrence the Integrated Aviation Rescue Coordination Centre („IZKSL“) in Bratislava. IZKSL reported the occurrence to the Air Accident and Incident Investigation Board of MTCRD SR.

Day time: Day

Time of serious incident: 13:20

1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	-	-	-
Serious	-	-	-
Minor	-	-	-
None	2	-	

1.3 Damage to aircraft

The tail-rotor boom was slightly damaged by vibrations from the anti-torque rotor.

The anti-torque rotor of the helicopter was damaged and will have to be replaced.

1.4 **Other damage**

The Air Accident and Incident Investigation Board was not informed about circumstances with potential claims for compensation of other damages toward a third party.

1.5 **Personnel information**

Pilot-in-command – instructor
a citizen of SR, aged 44, holder of the pilot licence CPL (H) No: 07060015 issued by the Civil Aviation Authority of the Slovak Republic, with validity until 7 February 2011.

Qualifications:

Helicopter types:	Mi-2, AS-350S, Schweizer 269C, AS 355/355N
Instructor:	Mi-2, Schweizer 269C, AS 355N

Medical certificate of 1st class with validity until 7 February 2011.

Flying experience:

Total flying hours:	3602 h	30 min	and	12431 flights
Total flying hours for previous 90 days:	88 h	10 min	and	323 flights
Total flying hours for previous 90 days-type AS 355:	74 h	20 min	and	242 flights
At the date of the serious incident:	02 h	10 min	and	10 flights

Pilot - cadet

a citizen of SR, aged 34, holder of the pilot licence – cadet licence No: FTO 1/2010-51, issued by the flying school Heli Company.

Qualifications:

Pilot-in-command of helicopter Mi-2, Mi-24 holding the licence MPL(H) II No 0309002601 with validity until 25 November 2014.

Medical certificate of 1st class with validity until 2 November 2010.

Flying experience:

Total flying hours:	905 h	00 min	and	2644 flights
Total flying hours for previous 90 days:	46 h	20 min	and	118 flights
Total flying hours for previous 90 days-type Mi-24:	6 h	45 min	and	20 flights
Total flying hours for previous 90 days-type AS 355:	39 h	35 min	and	98 flights
At the date of the serious incident:	2 h	10 min	and	10 flights

1.6 Aircraft information

a) Airframe

Type:	AS-355N
Registration No:	5708
Year of manufacture:	2002
Manufacturer:	Eurocopter

Total flying hours from the year of manufacture: 1522 h 00 min

Certificate of airworthiness No: 0829 issued on 10 November 2008 with validity until 1 November 2010.

b) Engines

Type:	Arrius 1A
Serial No:	2380 – left-side engine
Serial No:	2378 – right-side engine
Manufacturer:	Turbomeca

The engines were built in the helicopter in 2002.

Total hours of operation: 1522h 00 min from manufacturing
543h 00 min from G/O (general overhaul)

c) Propeller (anti-torque rotor)

Type:	355A12-0050-04
Serial No:	8500
Manufacturer:	Eurocopter

The rotor was built in the helicopter in 2002.

Total hours of operation: 1522 h 00 min

d) **Helicopter weight at the time of occurrence**:

Empty weight of helicopter		1651.0	kg
Weight of crew		210.0	kg
Weight of luggage		0.0	kg
Weight of fuel	approx. 0 l x 0.72 kg/l	234.0	kg
Weight of oil	approx. 0 l x 0.90 kg/l	14.0	kg
Total helicopter weight at the time of occurrence:		2109.0	kg

The maximum permissible take off weight of helicopter according to the Flight Manual is 2,600 kg.

Beside of the crew, the helicopter was carrying no other load or cargo which could have affected the change of c.g. position or centring.

At the time of occurrence the helicopter weight was within the permitted range.

The helicopter underwent a regular overhaul after 1,500 hours of flight and no faults or defects in relation to the air accident were detected.

Type of used fuel: JET A1.

1.7 Meteorological information

METAR LZKZ 230900Z VRB02KT CAVOK 18/11 Q1023 NOSIG=

METAR LZZU 230900Z VRB02KT 9999 FEW033 18/12 Q1023=

METAR LZSL 230900Z VRB 01KT 5000 BR SCT003 13/10 Q1023=

METAR LZTT 230900Z 130004KT 090V180 9999 FEW023 16/09 Q1023 NOSIG=

1.8 Aids to navigation

VHF Comm/Nav/GPS 1	GNS 530	1x
VHF Comm/Nav 2	KX 165	1x
Marker	KR 21	1x
ADF/1 Radio compass	KR 87	1x
Transponder	KT 71	1x
ICS Crew and Pas.	KMA 24H	1x
Alticoder	8800T	1x
Radioaltimeter	KRA 405B	1x
Gyrohorizon	H 140	1x
STBY horizon	AI804	1x
Compass gyro	KCS 55A	1x
DME	KN 63	1x
Emergency locator	C406-2HM	1x
CDI	KI 206	1x
RMI	KNI 582	1x
Autopilot	SFIM	1x
Coupler	SFIM	1x
STBY altimeter		1x

1.9 Communications

The helicopter was equipped by an aircraft radio station to allow two-way radiocommunication with all air stations at any moment of the flight.

1.10 Aerodrome information

Not applicable.

1.11 Flight recorders

The helicopter is not equipped by any flight recorder.

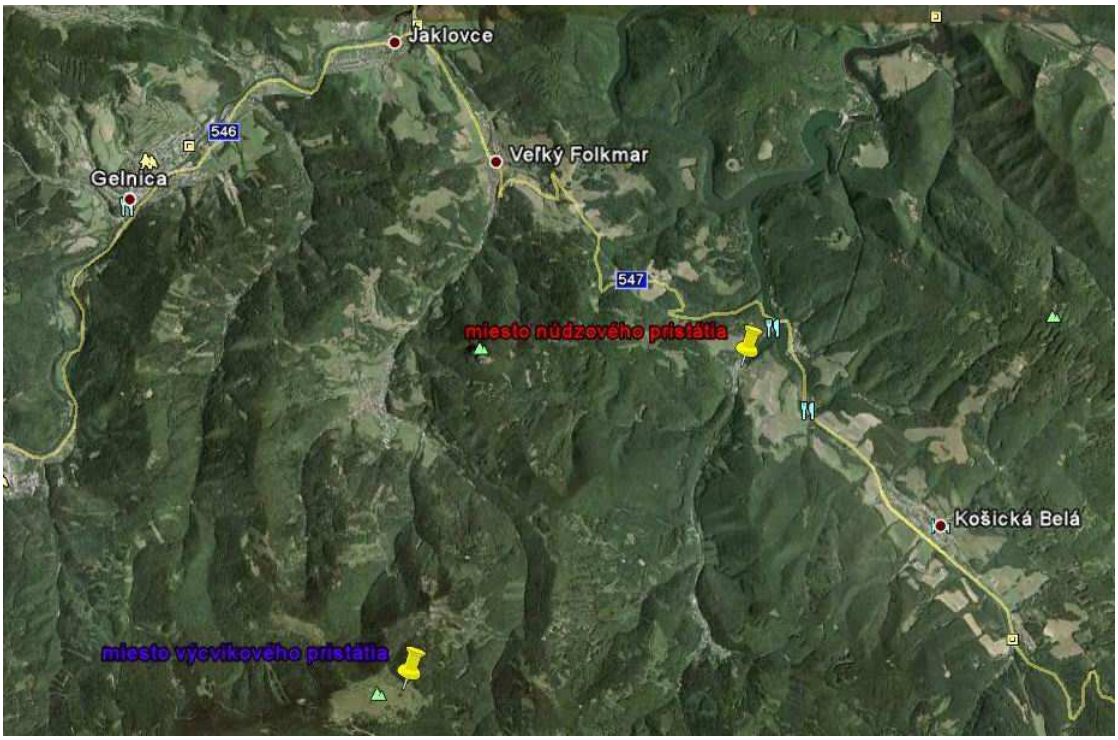
1.12 **Wreckage and impact information**

Geographic co-ordinates of the ground of training landing of the helicopter in the mountain area of Kojšova Hoľa:

N: 48°46´ 56´´ E: 020°59´ 38´´

Geographic co-ordinates of the ground of emergency landing of the helicopter near the Ružín dam:

N: 48°49´ 33,65´´ E: 021°04´ 02,61´´



1.13 **Medical and pathological information**

Not applicable.

1.14 **Fire**

Not applicable.

1.15 **Survival aspects**

The search and rescue with use of the SAR means were not necessary.

1.16 **Test and research**

Not applicable.

1.17 **Organizational and management information**

Not applicable.

1.18 **Additional information**

Not applicable.

1.19 **Useful or effective investigation techniques**

Standard investigation methods were used.

2. ANALYSIS

2.1. **Flight history**

The helicopter crew was making the ground landing training, with a special focus on landing with Gmax. At the moment of landing, the anti-torque rotor became into contact with a stone which could not have been detected on the ground by the crew at that flight phase.

The helicopter skid was unable to prevent a contact between the anti-torque rotor and a stone, because the helicopter skid sank under the level of a hidden stone.

The emergency landing was only caused by the fact that the crew had evaluated the metallic noise issued by ski undercarriage as a normal phenomenon and when the helicopter started they solved the emergency situation by a ground landing.

2.2. **Crew**

According to submitted documentation the instructor of helicopter AS-355N had valid qualifications for flights on given helicopter type.

The instructor had sufficient flying experience for ground landing training flights.

At the time of occurrence the helicopter crew was not under influence of alcohol, drugs or common medicaments which might have decreased their attention during flight.

2.7 **Meteorological condition**

The critical flight of helicopter AS-355N was made in an environment that can be described as stable weather from the meteorological point of view – with decaying thermal currents and excellent visibility without meteorological effects likely to negatively influence the helicopter flight during a ground landing training.

Based on the aforesaid it can be concluded that meteorological situation at given moment of the serious incident could not participate in its occurrence.

3. C O N C L U S I O N S

The cause of the serious incident was the anti-torque rotor getting caught on a stone, which was not registered by the helicopter crew during ground landing training.

The helicopter skid at the critical moment sank under the level of hidden stone on the ground and did not prevent the anti-torque rotor from getting caught on the stone.

The crew evaluated the situation as a slight metallic noise recalling a slight collision of ski undercarriage with the ground during landing manoeuvre.

The instructor made a control take off with the helicopter during which he registered no vibrations or parameters outside of the helicopter tolerance range.

The crew noticed problems with anti-torque rotor some 15 seconds after the take off, which they solved as an emergency situation with ground landing.

4. SAFETY RECOMMENDATIONS

Following the investigation of causes of the serious incident of

Helicopter type **AS-355 N**
Registration No: **OM-IKM**
Date of occurrence: **23.09.2010**

the helicopter operator took the following preventive measures:

to implement reconnaissance of selected grounds before the start of training flights with cadets for ground landing training, with a special focus on landing with Gmax.

Bratislava, 15.12.2010