The original of the Final Report was issued in the Slovak language.
In case of inconsistency original version in Slovak language is applicable.

MINISTRY OF TRANSPORT, CONSTRUCTION AND REGIONAL DEVELOPMENT OF THE SLOVAK REPUBLIC

Aviation and Maritime Investigation Authority
Námestie slobody 6, P.O.BOX 100, 810 05 Bratislava 15

Reg. No. : SKA2013001

F I N A L R E P O R T

on investigation of accident

of helicopter type **EUROCOPTER EC 120B Colibri**

Registration No **OM-ECI**

Date: 03.03.2013

Place: Vinohrady nad Váhom

The investigation of occurrence 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 and in accordance with the Regulation (EU) No. 996/2010 of the European Parliament and of the Council on investigation and prevention of civil aviation accidents and incidents, governing the investigation of civil aviation accidents and incidents.

The final report is issued in accordance with the Regulation L 13 that is the application of the provisions of ANNEX 13 Aircraft Accident and Incident Investigation to the Convention on International Civil Aviation.

The exclusive aim of investigation is to establish causes of accident, incident and to 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 occurrence in question have an informative character and can only be used as recommendation for the implementation of measures to prevent occurrence of other accidents and incidents with similar causes.

A. INTRODUCTION

Type of operation:	general aviation / recreational flight
Type of helicopter:	EUROCOPTER EC 120B Colibri
Registration No:	OM-ECI

Operator/Owner:	Quantum Invest, s.r.o.
Flight phase:	cross-country flight
Place of accident:	river Váh near the community Vinohrady nad Váhom
Date and time of accident:	03.03.2013, 16:04

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

B. INFORMATIVE SUMMARY

During the cross-country flight the helicopter came into collision with a steel rope stretched over the river Váh in a height of 5-7 m.

The pilot and two passengers were slightly injured and one passenger was killed in this accident.

The commission composed of the following members was appointed for investigation of the air accident:

Ing. Igor BENEK
Ing. Zdeno BIELIK

The report is issued by:
Aviation and Maritime Investigation Authority
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 3 March 2013 the pilot with helicopter type EUROCOPTER EC120B Colibri, registration No. OM-ECI, flew on the route “Donovaly – Bratislava“.

In a place and time not specified, according to the pilot´s and passengers´ accounts, one of the signal lamps on the CWP (Caution Warning Panel) went on. It allegedly signalled a technical fault of unspecified nature, without change of engine performance, helicopter control or its flying qualities. The pilot was even unable to indicate the colour of this signal lamp.

Based on further information provided in the statements of the pilot and passengers, accompanying signs of the fault were weak vibrations and monotonous noise in the earphones.

At that moment the pilot remembered problems with impurities in the transmission system (GB CHIP) of the helicopter, which manifested themselves in the past, his reaction was to search for the most suitable landing site. For this reason he decided to descend to the ground level altitude over a water surface, where he reportedly felt safer to make potential emergency landing with the helicopter.

When descending to the ground level altitude in the final flight phase, according to the radar record the pilot increased the flight speed from 36 km/h to 186 km/h at the time between 16:02:16 and 16:03:48.

In the area between the communities Vinohrady nad Váhom and Horný Čepeň the helicopter nose hit a steel rope stretched over the river Váh. After the impact the rope slipped over the cockpit to the rotor compartment, which caused the dihedral of the nose of the helicopter, lowering of its tail section, rupture of the rope and fall of the helicopter to the water level.

The cockpit of helicopter was not equipped by a cutting tool to cut the rope in case of helicopter getting stuck on the rope during flight in ground level altitude.

During this collision of the helicopter with the water level its tail section containing antenna of the device "ELT KANNAD 406 AF-H" (Emergency Locator Transmitter) broke off first, which made transmission of its signal impossible. After the impact of the fuselage on the water the helicopter partially submerged and the river stream carried it to a distance of 670 meters, where it stopped in shallow water.

One passenger was killed in the accident.

The air accident was reported by phone to the Aviation and Maritime Investigation Authority of MoTCRD SR on 3 March 2013.

Daytime: Day
Flight rules: VFR

1.2 Injuries to persons

Injury	Crew	Passengers	Other persons
Fatal	-	1	-
Serious	-	-	-
Minor	1	2	-
None	-	-	

1.3 Damage to helicopter

The helicopter was destroyed in the accident.

1.4 Other damage

No circumstances with potential claims for compensation of other damage toward a third party were notified to the Aviation and Maritime Investigation Authority.

1.5 Personnel information

Pilot:

A citizen of the Slovak Republic, male, aged of 40 years
Holder of the private PPL(H) pilot licence No. SK 06110079 issued by the Civil Aviation Authority of the Slovak Republic on 20.05.2011.

Medical certificate of 2nd class with marked validity until 17.09.2014.

Qualifications: EC-120 with marked validity until 30.06.2013
R44 with marked validity until 31.05.2013
VFR night

Flying experience: Total flight hours: 248 h 01 min and 609 flights

1.6 Helicopter information

Airframe**:**

Type: EC 120B
Serial No: 1592
Year of manufacture: 2009
Manufacturer: EUROCOPTER

Total operating hours since manufacture: 229 h 13 min (until 22.01.2013)

Certificate of airworthiness No. 1066/01, issued by the Civil Aviation Authority of the Slovak Republic , without time limitations.

Third-party insurance: Allianz - Slovenská poisťovňa, No. 411014445.

1.7 Meteorological information

On 3 March 2013 at 16:05 the community Vinohrady nad Váhom had weather similar to that in the community of Sereď at 16:00, i.e. half-covered sky, north wind with average speed of 7 m/s and gusts of up to 11 m/s.

The air temperature was approximately 4.0 °C. The horizontal visibility was about 25 km. A fog, storm, precipitation or other dangerous meteorological events were not observed. The ground surface was wet.

Area pressure forecast (QNH) for 3 March 2013:
FXSQ52 SXLM 031450
LZBB 15/18 1012 hPa 759.1 MM =

Time in UTC	15:00	16:00
Air temperature [°C]	5,5	4,0
Relative air humidity [%]	60	65
Wind direction [°]	345	350
Wind speed (gusts) [m/s]	6,5 (9,0)	7,0 (11,0)
Cloud (amount [0 to 8/8] and type)	6 Sc a Cu	5 Sc
Cloud (ceiling, cloud base [m])	1200-1300	1300-1400
Visibility [km]	30	25

1.8 Aids to navigation

N/A

1.9 Communications

The helicopter was equipped by onboard radio station enabling two-way communication with all air stations at every moment of the flight.

1.10 Aerodrome information

N/A

1.11 Flight recorders

The helicopter was not equipped by a flight recorder (FDR, CVR) or other type of recording device.

Secondary radar record was used for determination of the flight trajectory.

During detection of causes of the air accident the record from flight parameter recorder VEMD (Vehicle and Engine Multifunction Display) was obtained and evaluated.

The data from this recorder were obtained in cooperation with the French authority responsible for safety investigations into accidents or incidents in civil aviation – BEA (Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile).

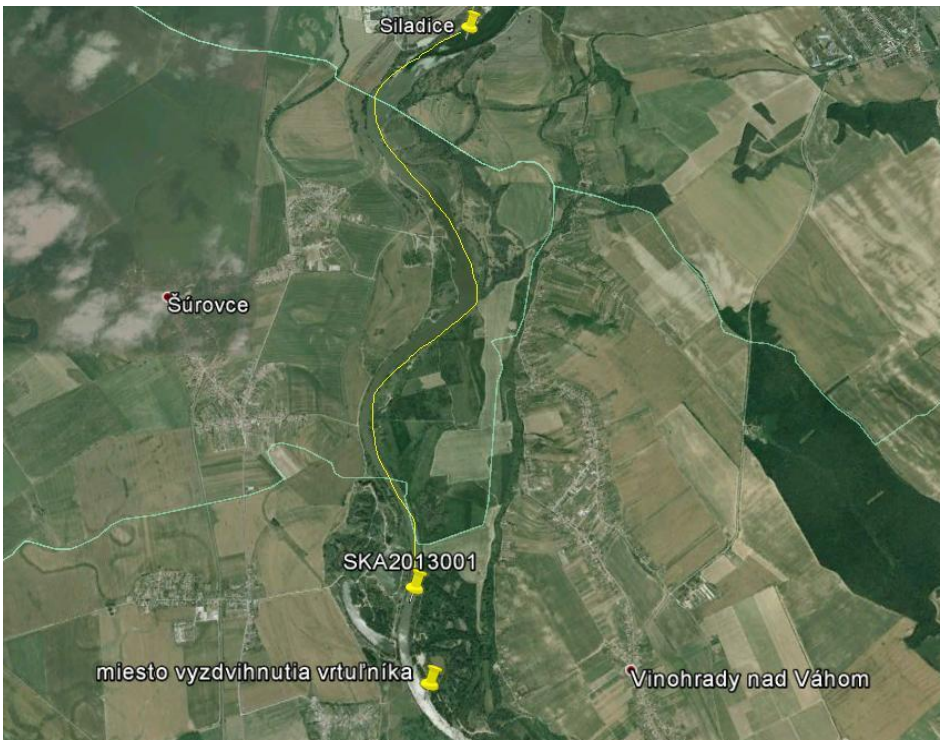
1.12 Wreckage and impact information

The helicopter landed in the river Váh.
Geographical coordinates of the place of accident:

N 48°18´43.29´´ E 17°44´33.37´´

Geographical coordinates of the place of collection of the wreckage of helicopter from the river Váh:

N 48°18´21.23´´ E 17°44´38.85´´


Siladice
Súrovce
SKA2013001
miesto vyzdvihnutia vrtuľníka
Vinohrady nad Váhom

1.13 **Medical and pathological information**

N/A

1.14 **Fire**

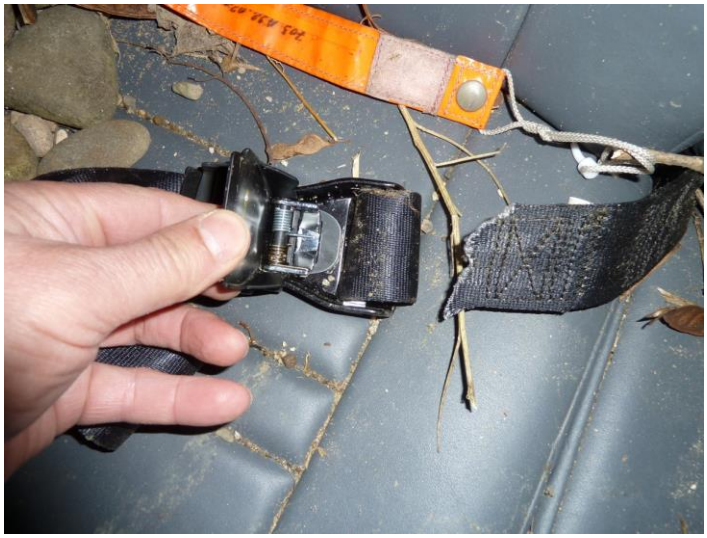
No fire broke out.

1.15 **Survival aspects**

The rescue operations were carried out by local inhabitants and members of the Fire and Rescue Corps.

The pilot and the passengers (except for the passenger from the right rear seat) of helicopter unfastened their safety belts on their own. Then they started to free the passenger who did not succeed to unfasten his safety belt. The impossibility to unfasten the safety belt in the attempts at rescue of the passenger by the crew was probably caused by the exalted situation, stress and effects of ice-cold water. In particular the last mentioned may have caused such numbness and lack of feeling in their fingers that none of them was able to properly disengage the belt unlocking lever and rescue the trapped passenger from drowning. If a suitable tool for cutting of the safety belts was available in the helicopter, the trapped passenger probably could have been rescued.

The inspection of the safety belt locking mechanism after the air accident did not detect any faults or damage and the lock was fully functional.



1.16 **Tests and research**

1.16.1 BEA implemented the external and internal visual check of VEMD. Visually the device seemed to be in a good condition after the air accident, although it was full of water.

VEMD is a multiple-function display that enables the pilot to see at the first sight the main parameters of helicopter and engine presented on a LCD display installed on the dashboard and serves for recording of the engine condition during flight. It is equipped by a two-channel system. Each channel (or module) contains a 32 KBytes EEPROM memory where data are recorded. Both modules from the device were dried for 48 hours at a temperature of 90°C. The memory chip on each board was cleaned and two binary files were created: OM-ECI_VEMD_AV1-1-1 and OM ECI_AV2_VEMD_AV2_1-1.

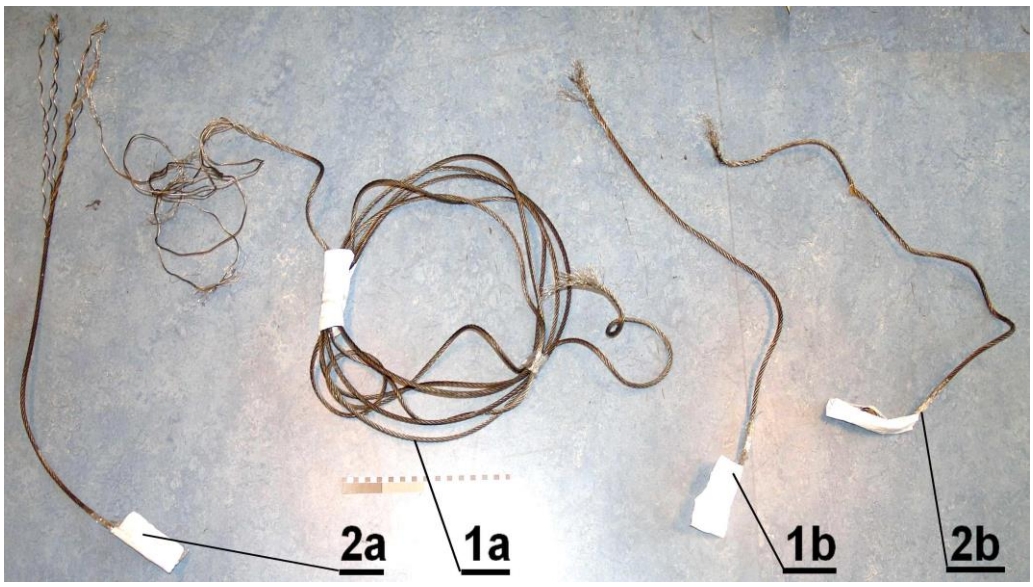
Data from the files were generated and decoded using software Eurocopter and consisted of flight data and error data.

The last flight was recorded under number 339 and the last recorded time was 42 min 52,5 s. The flight data obtained from VEMD during flight were consistent with permitted engine parameters before the air accident.

VEMD recorded a large number of errors concerning different independent chains, which started to occur in a short time interval. These faults occurred due to the collision f the helicopter with the steel rope and the fall of the helicopter in the river.

Note: VEMD is not a flight recorder; it is used for maintenance purposes only.

1.16.2 Four parts of steel rope were submitted for expertise to verify whether a part of the rope that was attached directly to the primary rotor of helicopter matches the parts of the rope found on the bank of the river Váh.



In case of all examined parts of the steel rope the type conformity was demonstrated, i. e. in all these parts belonged to a rope with the same construction and the same dimensions – all parts of the rope had a diameter of 8 mm and diameters of all wires lied within a range of, 0.48 to 0.50 mm. Moreover, all parts of the rope showed a regular right-hand lay

and all parts wereproduced in accordance with the standard STN 024322.

The untwisted ends of parts of steel ropes found on the bank of river Váh (evidence No. 1a and 2a) by their character of damage and common area of discovery suggested that they may have formed one unit before the rupture of rope. The end of rope found on a tree was untwisted and the strands did not show any signs of secondary deformation, but retained the spiral form.

The other end of rope submitted as evidence No. 1a showed signs of forceful twisting at the time of occurrence of damage: visible reduction of the spiral lead of rope strands or even higher density of threads of individual rope strands per unit of its length just in front of the point of rupture (see the area marked by an arrow). It is obvious that this part of rope must have been in contact with a rotating part of the helicopter at the time when it was damaged. It is also clear that rupture of the rope at this point occurred later; the rope got broken in the area between parts 1a and 2a first.

From the mechanism of damage to this part of rope with a marked twisting component it can be concluded that it was connected to a partially untwisted end of rope No.1b, found from the front section of the helicopter, which fully corresponds to the fact that if we damage the rope with marked twisting component by loading it, a higher rate of winding of rope strands will be observed on one side of the damaged area and untwisting of rope strands on the other side.

The damaged end of part of the rope submitted as evidence No. 2b again showed signs of forceful rope twisting.

1.17 Organizational and management information

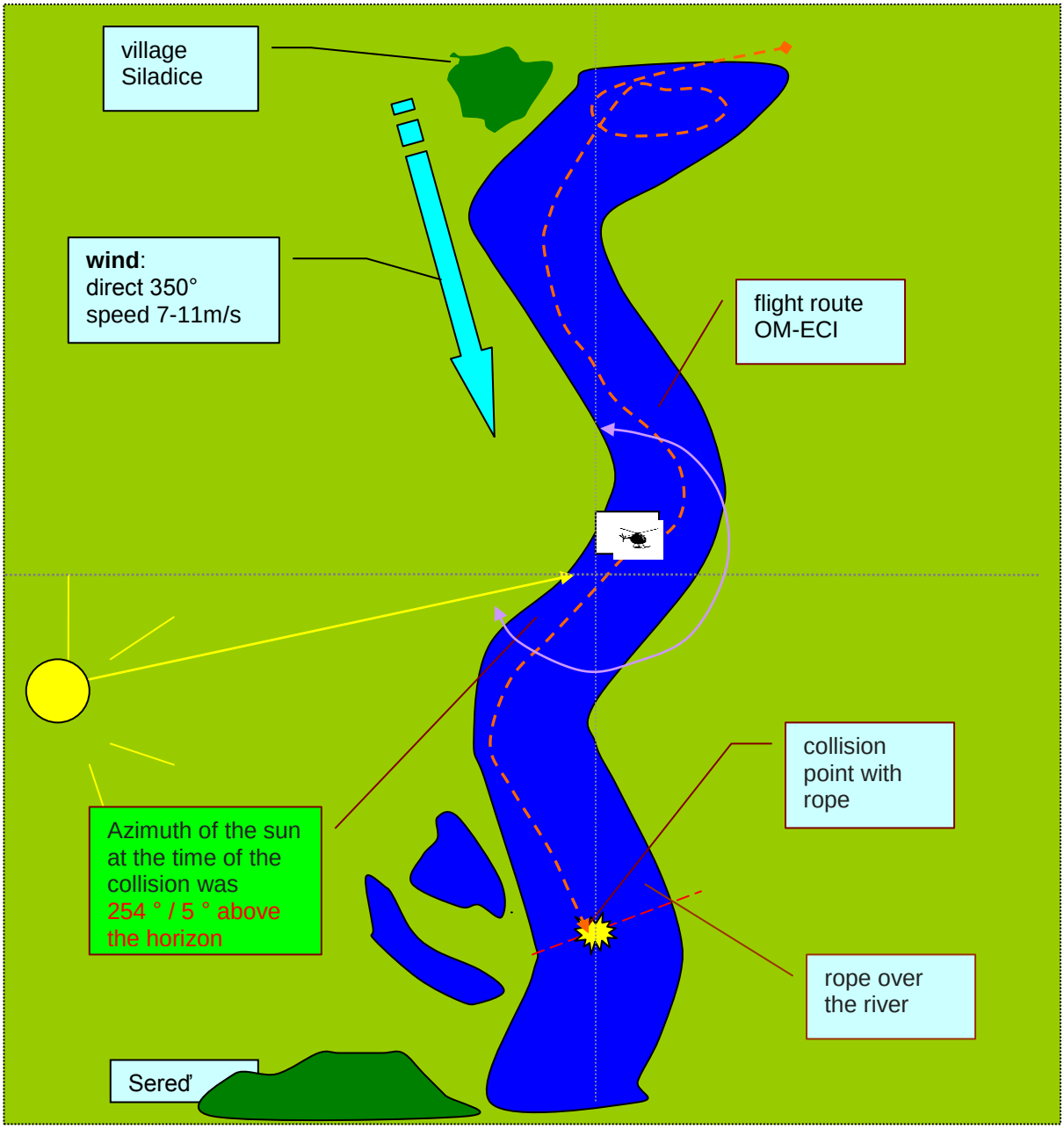
N/A

1.18 Additional information

1.18.1 During investigation of accident the inspectors examined the potential effect of setting Sun which at that time was low above the horizon and under certain circumstances could back-light the dashboard. In this case the pilot may have gotten impression that warning lights of CWP went on. The experienced flight instructor, working in the company DSA Hradec Králové, also admitted this possibility in his statement..

At 04:05 PM in Sereď the Sun had an azimuth of 254° and was in a height of 5° above the horizon. The Sun disk could be seen through the thinning clouds on the western to south-western horizon.

In the point of Sereď the Sun sank below the horizon at 16:36 in an azimuth of 260°.



1.18.2 At accidents involving helicopters the tail section is often detached from the fuselage, which causes (if the antenna is installed in the tail section and ELT in the fuselage)

disconnection between ELT and the antenna. Consequently, the signal is not transmitted on a frequency of 121.5 Mhz and the system KOSPAS-SARSAT (*Kosmičeskoje spasenije-Search and Rescue Satellite Aided Tracking*) is unable to locate the place of accident, determine its position and transmit the signal to the control centre and to the ground stations.

1.18.3 In the past the helicopter had a technical fault, when metallic chips (GB CHIP) occurred in the lubrication system of the primary or rear rotor (GB CHIP). The operator handled this fault in cooperation with the service organisation, but this technical fault (and its handling) was not entered into the helicopter log and handled in accordance with procedures recommended by the service organisation DSA a.s. in this case.

1.19 **Useful or effective investigation techniques**

Standard investigation techniques were used.

2. ANALYSIS

The pilot and the passengers indicated in their statements potential technical problems during flight onboard the helicopter before its collision with steel rope stretched over the river, which however they were unable to specify and which could not be proved by further expertise, because VEMD does not record the type of errors indicated by the pilot and the passengers in their statements.

After occurrence of indicated technical problems the pilot handled the situation by descending to the ground level altitude above the water surface and continuing the flight in a segment of time not specified above the water level at a high speed, until the collision between the helicopter and the steel rope stretched over the river.

This handling of situation was unusual and inconsistent with generally established procedures or procedures described in the FLIGHT MANUAL, Part 3 EMERGENCY PROCEDURES), where in case of all emergencies it is stated that the pilot should land either immediately (in case of engine fire, drop of oil pressure in the engine system, thrust loss of

anti-torque rotor and contamination of the fuel filter), or as soon as possible in case of other serious failures. During training the pilots are trained in handling of emergency situations and potential ground landing. In this training the pilots are instructed to choose a suitable area for safety or emergency landing.

Potential effects of the sunshine (see the figure above) on back-lighting of one of the fields of CWP cannot be excluded either. However, in this case these effects would cease after the change of flight course, in view of the trajectory of the flight.

The examination of records from VEMD did not confirm the occurrence of any technical fault of the helicopter or its systems during the critical fight.

3. CONCLUSIONS / Cause of accident

3.1 **Findings**

- The pilot had valid qualifications for performance of the critical flight,
- The helicopter had valid documentation and did not show any fault before the takeoff and during the flight to be recorded by VEMD until the moment of collision with steel rope,
- The helicopter fulfilled the conditions of airworthiness before the critical flight.

3.2 **Causes of air accident**

- The collision of the helicopter with steel rope stretched over the river Váh,
- The descent to the ground level altitude over the river Váh at high forward speed.

4. SAFETY RECOMMENDATIONS

The final report from investigation of the air accident does not contain any recommendations.

Bratislava, 18.10.2013