MINISTRY OF INFRASTRUCTURE DEVELOPMENT

ACCIDENT INVESTIGATION BRANCH

CIVIL AIRCRAFT ACCIDENT No. CAV/ACC/3/05

REPORT ON THE ACCIDENT TO ILYUSHIN IL-76TD AIRCRAFT REGISTRATION ER-IBR WHICH OCCURRED ON 23 MARCH 2005 IN LAKE VICTORIA NEAR MWANZA, TANZANIA

Contents

GLOSSARY OF ABBREVIATIONS

ACC	-	Area Control Centre
agl	-	Above ground level
AIB	-	Accident Investigation Branch
A.M.C.	-	Aircraft Maintenance Centre
AMO	-	Aircraft Maintenance Organization
APU	-	Auxiliary Power Unit
ATPL	-	Airline Pilot's License
CAA	-	Civil Aviation Authority
CB	-	Cumul - Nimbus
CVR	-	Cockpit Voice Recorder
FDR	-	Flight Data Recorder
GPWS	-	Ground Proximity Warning System
hPa	-	Hecto Pascals
IAC	-	Interstate Aviation Committee
in	-	inches(s)
kg	-	kilogram(s)
km	-	kilometer(s)
kph	-	kilometers per hour
kt	-	knot(s)
METAR	-	Aviation routine weather report
NDB	-	Non Directional Beacon
PAPI	-	Precision Approach Slope Indicator
QFE	-	Atmospheric pressure at aerodrome elevation
QNE	-	Indicated height on landing with subscale set to 1013.2 hPa
QNH	-	Corrected mean sea level pressure
UPS	-	Universal power Supply
UTC	-	Coordinated Universal Time
VOR	-	Very High Frequency Omni range

TANZANIA ACCIDENT INVESTIGATION BRANCH

Ministry of Infrastructure Development

Civil aircraft accident No:	CAV/ACC/3/05
Aircraft type:	Ilyushin IL-76TD
Nationality and Reg. Marks:	ER-IBR
Operator:	Air Trans Incorporation 2, Airport, Suite 9, Kichinev, 2026 Moldova.
Crew:	Pilots - 2 killed Navigator - 1 killed Flight Engineer - 1 killed Radio Operator - 1 killed Loadmaster - 1 killed
Supernumerary Crew:	Ground Engineer - 2 killed
***Place of Accident*:**	Lake Victoria, about 1.1 km beyond the end of runway 30 of Mwanza Airport. (02 26.65**S** 32 55.45**E**)
Date:	23 March 2005
Time:	2005 hours (11:05 pm Local Time)

ALL TIMES UTC

SYNOPSIS

The accident was notified to the Tanzania Accident Investigation Branch by the Mwanza Air Traffic Services shortly after it occurred. The investigations began on the same day.

The State of design, the State of manufacture and the State of registry were represented by the Interstate Aviation Committee (IAC) who took part in the investigation and provided the technical expertise and facilities necessary for decoding and evaluating flight recorder information. The IAC report is contained in the annex to this report.

The aircraft was taking off from Mwanza airport, Tanzania, for a flight to Khartoum, Sudan. The ground roll appeared normal and ER-IBR was observed to take off towards the end of runway 30. However, the aircraft disappeared from sight shortly after take off. Efforts to raise the aircraft on the radio failed. The wreckage was later seen by fishermen in Lake Victoria, about 2 km beyond the end of runway 30. There was no fire but all the 8 occupants were killed. The aircraft was destroyed by the impact with water.

The report concludes that the aircraft went into descent after take off and the initial climb due to the failure of the crew to react correctly as indicated by the flight instruments.

1. FACTUAL INFORMATION

1.1 History of the Flight

On 23 March 2005 at 0533 hours an Ilyushin IL-76 cargo jet with the Republic of Moldova registration letters ER-IBR landed at Mwanza on a flight from Benghazi, Libya. It was carrying a crew of 8 including 2 ground engineers. All the 8 crew members were later involved in the accident.

While at Mwanza, some 50,000 kg of fish was uplifted. At 1930 hours the commander filed a flight plan for Khartoum. The endurance was 0450 hours. The cargo manifest showed that ER-IBR was operating Air Trans Inc. Flight RIN 982 from Mwanza to Osijek, Croatia, with refueling stops at Khartoum and Benghazi.

At 2000 hours the aircraft was given information relevant for take off as well as the departure clearance. ER-IBR subsequently advised that he was starting the take-off roll. This was the last communication received from the aircraft.

The aircraft was observed to execute a normal take-off roll from runway 30. This runway ends 120m short of Lake Victoria. After observing that the aircraft was airborne, the controller who was handling the flight reported that he turned to complete the flight progress strip. Having done so, he lost visual contact with the aircraft that was supposed to be in a climb profile over the lake. Efforts to raise the aircraft on the radio failed. In about two minutes from the time that the aircraft was airborne, he saw a fire tender speeding along runway 30. It was then that he realized that the flight may have crashed.

The Mwanza Airport Rescue and Fire Fighting Services were not equipped for operations in the lake. They were therefore unable to reach the aircraft, which was more than 1 km away from the shore.

It was the fishermen at the lake shore near Mwanza airport who saw the aircraft going down in the lake. They proceeded to the crash site in fishing boats and brought back some documents (flight manuals and wiring diagrams) which they found floating near the wreckage.

1.2 Injuries to persons

INJURIES	CREW	PASSENGERS	OTHERS
Fatal	8	-	-
Serious	-	-	-
None	-	-	N/A

1.3 Damage to the aircraft

The aircraft was destroyed by impact with water.

1.4 Other damage

There was fuel spillage in the lake around the catchment area for the Mwanza airport water system.

1.5 Personnel information

It was not possible to get all the required information about the crewmembers immediately after the accident. In fact there was no information about the crew for one week after the accident. Only single names were available with the exception of one crewmember whose crew card was found among the floating documents. The eight crewmembers including two ground engineers had proceeded to town without going through the Mwanza airport customs and immigration. Earlier reports said that they remained either in the aircraft or on the cargo apron during their 14 hours stay at Mwanza.

The information below was obtained from the accredited representative of the Moldova CAA. The details of the crew ratings other than the accident aircraft and their previous accident records were not available.

The crew rest periods on the day of the accidents were obtained from the hotel where they stayed in the city of Mwanza.

1.5.1 Commander:

Date of Birth	19 November 1950
License:	MDTA (ATPL)
Validity of License:	Technical -16 August 2009
	Medical - 25 August 2005
Total flying Experience:	11,609 hours
Flight hours during the last one month:	70
Experience on the type:	8,939 hours
Aircraft Ratings:	Ilyushin IL-76
	Other ratings - Unknown

1.5.2 First Officer

Date of birth:	15.12.1964
License:	MDTA (ATPL)
Validity of License:	Technical -19 August 2005
	Medical - 25 August 2005
Total flying Experience:	4,769 hours
Flight hours during the last one month:	70
Aircraft Ratings	Ilyushin IL-76
Other ratings	Unknown

1.5.3 Navigator

Date of birth:	26 August 1953
License:	Navigator
Validity of License	Technical - 26 May 2005
	Medical - 26 August 2005
Total flying Experience:	11,129 hours of which 3,929 were on type
Flight hours during the last one month:	70
Aircraft Ratings:	Ilyushin IL-76
Other ratings	Unknown

1.5.4 Flight Engineer

Date of birth:	25 December 1953
License:	Flight Engineer
Validity of License:	Technical - 26 May 2005
	Medical - 26 August 2005
Total flying Experience:	11,129 hours of which 3,929 were on type
Flight hours during the last one month:	70
Aircraft Ratings:	Ilyushin IL-76
	Other ratings - Unknown

1.5.5 Radio Operator

Date of birth:	13 February 1971
License:	Radio Operator
Validity of License:	Technical - 29 May 2005
	Medical - 29 May 2005
Total flying Experience:	3,218 hours of which 3,218 were on type
Flight hours during the last one month:	70
Aircraft Ratings:	Ilyushin IL-76
Other ratings	Unknown

1.5.6 Load Master

Date of birth:	1 January 1965
License:	Load master
Validity of License:	Technical - 29 May 2005
	Medical - 29 May 2005
Total flying Experience:	3,936 hours of which 2,096 were on type
Flight hours during the last one month:	70
Aircraft Ratings:	Ilyushin IL-76
Other ratings:	Unknown

1.5.7 Crew rest times

It has been established that all the crew members arrived at a beach hotel in Mwanza (*Tunza Lodge)* between 0730 and 0800 hours (10:30 am - 11:00am local time). They checked in the hotel, each taking a room.

They had some drinks and, subsequently, some lunch between 1000 and 1100 hours after which the commander, the first officer, the load master and possibly the navigator went to bed.

The manager of the hotel said that the commander and the co-pilot did not take any alcohol during their stay. He also said that the crew of this aircraft was well behaved and were not "drinkers". The hotel meals bill did not show any strong drink order. There were no individual drink orders.

The commander was briefly awakened from his sleep to answer a phone call at about 1200 hours. The load master was picked at 1500 hours for cargo loading. The rest were picked at 1600 hours.

It would appear therefore that the pilot and the first officer had a rest period of 13 hours including 5 hours of horizontal rest.

According to the information presented by the operator, Air transportation Inc, the crew had proper flight operation experience with IL-76 and they passed all the necessary procedures before the flight.

1.6 Aircraft information

The aircraft was registered in Moldova two months before the accident. The detailed history of the aircraft including that of registration, ownership and maintenance could not be found.

The following aircraft details were obtained from the Moldova CAA:

Aircraft type: Ilyushin IL-76
Serial number: 0043454623 Ser 4106
Date of manufacture: 1984
Total flight hours: 2615
Total flight cycles: 1548
Engines: 4 D30KP-2

Serial Numbers	*hrs/New*	*cyc/new*	*hrs/OH*	*cyc/OH*
No.1 engine: 0304401111515	2787	1512	1253	336
No.2 engine: 0304401212507	1453	1486	814	260
No.3 engine: 3053048502035	4953	1444	814	250
No.4 engine: 0304404112807	2240	914	958	254

Authorized maximum take-off weight: 190 tons
Authorized maximum landing weight: 151 tons
Authorized maximum cargo loading: 50 tons

The Tanzania AIB was informed that the aircraft maintenance organization was based in Sharja in the United Arab Emirates. An AIB inspector of accidents visited the premises of the Aircraft Maintenance Centre (A.M.C.) at Sharjah Airport and established that ER-IBR visited the outfit for check F1 in September 2004 at 2278

hours and 1334 cycles. The records submitted by A.M.C. showed that this check was carried out from 9 September 2004 to 20 September 2004. The Certificate of Release to Service dated 5 October 2004 showed that check F1 was carried out and the aircraft was considered fit for release to service for 333 +30 flight hours (or 4 months +15 days) whichever occurred earlier.

At the time of the accident (23 March 2005) the four months' validity of this certificate had expired.

It was established that Aircraft Maintenance Centre was contracted to do only one check (check F1), which they completed in October 2004. (A.M.C has the approval of the Moldova CAA to work on this type of aircraft). ER-IBR did not return to the company after this job. A spokesman for A.M.C said they were not the aircraft AMO and therefore they did not possess the aircraft log books.

In the circumstances, there were no maintenance records available in the company to support the figures above.

1.6.1 Weight and balance:

It was not possible to establish the exact weight of the aircraft at the time of take off. The last weighing report of this aircraft was not available. It was thus not possible to establish its current basic empty weight. The relevant log books were also not available.

It was also not possible to know the load that was on the aircraft when it arrived at Mwanza and how much was off loaded during its stay at the airport. This is because the aircraft was not inspected by the Mwanza Airport Customs on arrival. It was also not inspected just before loading. There was no inspection report or any records to show how much cargo was on board prior to the loading operation that took place at Mwanza on the day of the accident.

The commander did not leave behind any copies of his load sheet which could have shown his calculations for aircraft weight and balance before his departure. All the aircraft documents prepared by the pilot were destroyed in the accident.

The cargo manifest submitted by the handling company showed that ER-IBR was carrying 7383 packets of fish fillet weighing a total of 50,000 kg. This 50,000 kg is the maximum load allowed on this type of aircraft. There is no record of any other load on the aircraft.

The document produced by the Mwanza Customs Officer showed that the cargo comprised of 6943 boxes of Fresh Nile Perch Fillets weighing 41925 kg as well as 440 boxes of Fresh Nile Perch, headless and gutted fish weighing 8075 kg. This represented a total of 7383 boxes weighing 50,000 kg.

The owner of the consignment submitted the airway bill of the cargo which tallied with the contents of the Mwanza Customs Office.

A few days after the accident some headless fish started to surface from the wreckage. It would appear therefore that the Mwanza Customs document was the accurate one.

The aircraft was not refueled at Mwanza. The operator said that ER-IBR landed at Benghazi with 12 tons of fuel remaining. It uplifted 70 tons for a total of 82 tons. It was further calculated that the fuel burn for the flight to Mwanza was 44 tons.

Consequently, the aircraft should have landed at Mwanza with 38 tons of fuel remaining. Taking into account taxiing and APU running during loading before take off, the remaining fuel should have been 36-37 tons. These agree with the flight plan data (36 tons) and the reported 0450 hours endurance. The aircraft take off weight was arrived at as follows:

Aircraft and crew (Service weight):	92.079 tons
Fuel (0450hrs)	36.8
Cargo	50
Take-off weight (estimate)	**178.879 tons**

Mathematical simulation for runway 30 gave a maximum allowed take off weight of 184 tons.

The position of the centre of gravity was deduced from the stabilizer angle of -3.3 degrees adjusted, recorded by the FDR. This corresponds to the centre of gravity of 30%. The stabilizer position did not change during the take-off and there is no evidence of the shift of the position of the centre of gravity.

Mwanza airport had no cargo Terminal. There were no weighing scales and there was no weigh bridge. It was therefore not possible for the airport personnel to monitor cargo weights. Further more, the loading was made from the contactor's vehicles using his own personnel.

1.7 Meteorological information

The weather at the time of take-off was described as fair. The METAR report at 2000 hrs indicated that the temperature was 20 degrees Celsius and the dew point was 19 degrees Celsius. The wind was calm and the visibility was 10 km. The QNH was 1018.3 hPa (30.07 in); QFE 888.1 (26.22 inches) and QNE 3,600 feet. The cloud base was given as Few 019, Few CB at 2,000ft and Broken Clouds at 10,000 ft.

At the time of take off there was a tail wind of 1.5m/sec and the crew took this into account in their calculations.

The water temperature in Lake Victoria at the time of the accident was not measured. It is known that land cools faster than water. For this reason, it is possible that at 2000 hours (11:00 pm local time) the water temperature may have been higher than the

temperature obtaining on the runway. There is no record of previous flights being affected by the land-water temperature gradients.

There were some reports that the temperature of water in the lake at that time was 28 degrees Celsius as opposed to the runway temperature of 20 degrees. It has since been proved that the temperature of the water at the time of the accident was not measured.

The Tanzania Meteorological Agency does not provide air crew with information about Lake Victoria water temperature and the air temperature over the water surface including night time.

Performance calculations based on the FDR results showed that the water temperature had no bearing on this accident.

1.8. Aids to Navigation

Mwanza airport has runway and taxiway lights for night operations. There are also approach lights for runway 30. There are however, no approach lights for runway 12 whose approach path is over the lake. Navigation equipment such as VOR and NDB are provided and were working at the time of the accident. There is also provision of Precision Approach Position Indicator (PAPI).

1.9. Communications

The communications between the aircraft and the Mwanza Tower were not recorded by the installed recording equipment in the Mwanza Tower. It was reported that there was power failure at Mwanza airport at 1900 hours which disabled the UPS. The power supply at Mwanza airport was not reliable.

However, the cockpit voice recorder and its back-up recorder were retrieved from the wreckage in the lake. One of these units did not record any sound. However, the other device did in fact record all the conversations till the last second.

The aircraft raised the Tower before engine start up and was eventually cleared for taxiing and take-off from runway 30. The pilots were heard reading check lists and calling the target speeds till the aircraft became airborne. Among other things the commander said that the take off weight was 174 tons, balance weight 30%, decision point 230 kt, safe take off 280 kt, flap retracting 360 kt, slats 370 kt, stabilizer set for take-off -4 degrees. There was no distress call. However, during the last second the co-pilot is heard saying 'Stop! Something is dropping. The end of the recording was abrupt.

Flight RIN 982 was the last flight out of Mwanza on the night of 23 March 2005. When the take-off was initiated and the commander called "ROLLING" the Controller acknowledged "ROGER" and moved to the Tower balcony in order to make a physical watch of the aircraft as it rolled down the runway. He watched the aircraft as it took off near the Tower, about 300–350 metres before the end of the runway. The Controller said that the climb was shallow but he added that this was normal for heavily a loaded cargo aircraft. He subsequently returned to his desk to complete the flight progress

strip and to watch it climbing over the lake. The aircraft was not seen. It also failed to answer repeated calls. It was during this time when he saw a fire tender speeding along runway 30. Efforts to contact the fire tender and the fire station on walkie-talkie also failed. He was thus convinced that Flight RIN 982 had crashed. He therefore initiated alerting action.

At 2020 hours information was received from the Area Control Centre in Dar es Salaam (ACC) that the aircraft was observed on radar flying safely and was in contact with Entebbe in Uganda. Shortly after the information was passed to the Civil Aviation Manager and the Airport Manager, the ACC called again and cancelled their previous information. They admitted to have received misleading information.

1.10 Aerodrome information

Mwanza airport, elevation 3763ft (1147m), has one runway, 12/30, which is 3,300m long and 45m wide. The surface is tarmac and was in very good condition at the time of the accident. Lake Victoria is about 120m beyond the end of runway 30. It was reported that cargo aircraft, notably Il-76s, prefer to take-off from runway 30 except when there is a strong tail wind. The controllers at Mwanza said that the Il-76s used to cover nearly the whole runway during take-off. However, since the 23 March 2006 accident, the freighters were taking off in the middle of the runway.

The official hours of operation at Mwanza airport are 0300 to 2100 hours and 24 hours for Air Traffic Services.

The airport had rescue and fire fighting facilities for land only. It had no facilities for water operations. No official assistance could be provided to passengers and crew involved in accidents off shore.

1.10.1 Lake Victoria

Lake Victoria, elevation 3720 feet, (1134m) is the largest tropical lake and the second largest fresh water lake in the world. It covers a surface area of 68,800 square km, and is one of the shallowest lakes. The mean depth is 40m and the maximum depth is 85m. There is an accumulation of mud on the lake bed which makes diving operations particularly difficult. The lake is shared between Tanzania, Uganda and Kenya.

1.11 Flight recorders

The aircraft was fitted with one MSRP-64 Flight Data Recorder as well as one quick access recorder. The quick access recorder was not recovered from the wreckage.

The aircraft was also fitted with an MS-61B Cockpit Voice Recorder (CVR). There was also a back-up cockpit voice recorder. Both units were recovered.

The relevant tapes from the recorders were taken to the Interstate Aviation Committee Laboratory in Moscow for readout. The readout was made under the observation of the Tanzania Accident Investigation Branch.

1.11.1 Flight Data Recorder

This unit recorded 15 functions from engine start-up to the time of the accident. It was evident from the recorded parameters that the crew made the correct configuration for take-off. The flaps were selected at 31.9 degrees.

The aircraft maintained a constant heading of 296.4 degrees which was the direction of the runway till the time of impact.

The altitude as recorded from the aircraft radio altimeter showed that the aircraft took off and climbed to 29 meters above the ground in 9 seconds. It leveled at this height of 29m for 4.5 seconds after which it started to descend. The descent to earth took 5.5 seconds. The crew, however, did not take any immediate action to arrest the descent for 4.5 seconds. They did so in the last one second.

All the engines did in fact maintain take off power up to the time of impact. The aircraft accelerated normally to the rotation speed of 263kph (142kt), took off from ruway 30 and reached a speed of 280 kph at an altitude of 10m a.g.l. The lake shore was passed at an altitude of 20m subsequent to which there was a smooth decrease of the elevator and pitch angles. At an altitude of 29…30m, according to the FDR, the speed reached 293…300 kph. The elevator position was -2.5 deg, pitch 8 degrees.

The aircraft subsequently started descending with a speed of 317 kph (171kt). Pulling the control column (deflection of the elevator for pitching up) at less than 20m a.g.l. did not prevent collision with the water surface.

The aircraft was airborne for 19 seconds in which time it covered a total distance of 1.53 km as estimated from the speed plot, using the trapezoid rule. Assuming that the aircraft took off 300 metres before the end of the runway, then the point of impact with the water should be 1.23 km beyond the end of the runway or 1.11 km beyond the shore along the extended centre line of runway of 30.

The flight recorders did not show any technical malfunctions.

The readout from this unit is contained in the in annex1 of the Interstate Committee Report.

1.11.2 Cockpit Voice Recorder

The cockpit voice recorder was serviceable and recorded all communications till the time of impact. The crew received the start-up and take-off clearances as expected. They were also heard making the routine checklist readings and calls for target speeds. There was no emergency or distress call. It was in the last second that the co-pilot said: "Stop! Something is dropping."

1.12. Wreckage information

The aircraft broke into four main pieces: the cockpit, the mid fuselage section, the tail unit and the wing assembly. The two wings are joined together into one unit that is built on top of the fuselage.

Divers reported that the nose section of the aircraft was almost completely crushed. This appeared to be the reason why the only parts of the navigator's body were recovered. The navigator sits alone in the lower bulge of the nose section. This nose section is considered to be the most dangerous part of the aircraft. The brief time that crew realized that the aircraft was descending meant that the navigator had no time to leave for less dangerous locations in the aircraft.

The pair of wings was the only part that remained afloat, though partially submerged. It had separated from the fuselage on impact but remained attached to it by cables. Fuel was spilling out of the wing tanks.

At first it appeared that the flaps were up. Further examination showed that the flaps were extended to some angle that looked smaller than 31 degrees. The actual angle of flap extension at the time of impact will be assessed when the wreckage is retrieved out of the water.

The commander ordered the retraction of the flaps during the descent. However, the flight recorder did not record any changes in the flap angle.

The wing pair assembly had to be towed to some position near the shore for the purpose of de-fueling. Fuel spillage was threatening the safety of water in the area. The engines separated from the wings in the accident sequence. Their positions have not been located.

The flight recorder showed that the engines were developing take-off power at the time of impact. It was therefore not necessary to recover the engines for the purpose of accident investigation.

1.13 Medical and pathological information

The crew had valid medical certificates. A post mortem examination conducted at the Bugando Medical Centre established that drowning was a factor in seven deaths.

The body of the navigator was not recovered. However, both arms and some abdominal organs floated. They were recovered and identified to be those of the navigator. His body appears to have been crushed when the nose of the aircraft disintegrated on impact.

The body of the commander had fractures on both lower limbs. These injuries would point to the commander as the person who was handling the aircraft. He also sustained chest injuries.

Four bodies were recovered by divers from the wreckage. Three more bodies floated on the lake a few days after the accident. One of these three bodies was recovered by fishermen after five days. It was found floating 25 km north west of the crash site. It had leg injuries and both arms were stretched. It was considered that this person died while trying to swim.

1.14 Fire

There does not appear to have been any fire. Fishermen who arrived at the crash site about 30 minutes after the accident said that they saw no fire despite the fuel spillage in the lake.

There was no formal rescue operation immediately after the accident. This was because the airport was not equipped for waterborne rescue operations. Fourteen hours after the accident a local mining company supplied a boat with divers who recovered four bodies from the wreckage.

1.15 Survival aspects

This accident is not considered to be survivable although there was some speculation that one occupant may have tried to swim after the accident.

1.15.1 Injuries to persons

All the occupants suffered multiple fractures. These injuries could have made swimming impossible even if they survived the initial impact with the water

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1.16 Tests and Research

Not applicable.

1.17 Additional information

Recovery of Wreckage from water

At the time this report was made public the wreckage had not been retrieved from the lake. The reason for this was that the owner (and the operator) had not made arrangements for its salvage and disposal.

Regulation 5-(3) of the Civil Aviation (Investigation of Accidents) Regulations, 1983 stipulates that:

When an accident occurs in or over Tanzania and the Minister is of the opinion that the aircraft involved in the accident is likely to be a danger or obstruction to the public or to air navigation or to other transport, he may order the owner of such aircraft to remove it to such a place as the Minister shall indicate, or, in the absence of the owner or in the event of non-compliance with such an order, the Minister shall be empowered to remove the aircraft himself and in either case, the expenses incurred in removing such aircraft shall fall upon and be recoverable from the owner of such aircraft and the Minister shall not be liable for any damage occurring to such aircraft during its removal in accordance with the provisions of this paragraph.

The owner of the aircraft has so far not been found. The operator has also failed to honour the obligation accruing to his aircraft.

The wreckage should be removed from the water for the purpose of accident investigation. It is also in the catchment area of the Mwanza airport water supply and therefore poses serious pollution problems.

2 ANALYSIS

The Flight Data Recorder and the Cockpit Voice Recorder readout results indicate that the flight preparations were normal. The aircraft started its engines on the cargo apron and taxied out to the runway without any problems.

The weight of the aircraft at the time of take off was mentioned by the co-pilot as 174 tons. The stabilizer position set by the crew was -3.3 degrees which corresponds to the aircraft take off weight of about 174 tons. However, the submitted documents for the aircraft loading showed that the take off weight was 178.879 tons. Calculations based on the IL-76 aerodynamic characteristics gave a take off weight of 182.16 tons. However, the weight limitations of the aircraft were not exceeded. The maximum allowed take off weight for the conditions obtaining at Mwanza at the material time was calculated to be 184 tons.

There was no control of the loading process at Mwanza Cargo Terminal. There were no weighing scales for trucks and cargo and the ramp loading was left to contractors who worked without official supervision. This can easily lead to overloading.

Performance calculations established that ER-IBR had adequate energy to continue climbing at the rate of at least 3 metres per second and the values of flight parameters did not exceed the limitations given in the aircraft flight manual.

So why did the aircraft fail to climb beyond 29 metres? Did the pilots intend to first level at 29m to gain longitudinal speed before initiating the climb to cruising altitude?

It was reported by controllers at Mwanza that it was the practice of many IL-76s to take off towards the end of runway 30 and level after a short climb. They would then proceed to accelerate over the lake before initiating the final climb out.

This would appear to be the probable flight profile chosen by the crew of ER-IBR although, to be sure, the 29m altitude appears too low for leveling off after the initial climb. The aircraft lifted off the runway at 263 kph after rolling for about 2800 metres. It subsequently climbed to 29m at which altitude it leveled off for 4.5 seconds. ER-IBR started to descend at 20:04:14.5 hours when the elevator position was -2.4 degrees. Four seconds into descent, the commander ordered the retraction of flaps. By this time the aircraft was already descending at the rate of 3.5m/sec and the speed was increasing. This would indicate that the crew was not aware of the fact that 5H-IBR was descending.

In fact the crew did not notice the imminent collision with the water till about one second before impact when the co-pilot said "*Stop, something is dropping*". They suddenly initiated a climb but it was too late for the aircraft to respond.

That the descent was inadvertent can be seen from the fact the elevator angle was allowed to continue increasing during the descent. Had the crew maintained the elevator angle at -2.2 degrees, level flight would have been maintained at 29m whilst building air speed. On the other hand, smaller elevator angles would have put the aircraft in sustained climb.

The reason for the crew failing to monitor altitude at this critical moment has not been established. It is possible for the crew to become disoriented as a result of flying over the flat water surface without visual cues at night. At these altitudes the ground proximity warning system (GPWS) does not function.

Fatigue was also considered as a contributory factor. The crew had been on duty during the early hours of the morning of 23 March 2006. They had spent the day in Mwanza and had about 5 hours of horizontal rest at the hotel. It was also argued that it was a noisy cluster hotel which would not allow comfortable rest during day time. In fact, as is now known, the commander's sleep was interrupted when he was waken up at least once to answer a phone call in the lobby.

3 Conclusions

(a) *Findings*

i) Details of crew licenses were supplied by the Moldova CAA. The crew was properly licensed and qualified to undertake the flight. However, details of their flying history (before acquiring the Moldova licenses) and their previous accident records were not available.

ii) The aircraft documents including log books and the maintenance certification were not available. The maintenance organization supporting this aircraft was not identified. The last available maintenance data indicated that the aircraft had operated beyond its release to service period.

iii) The history of the aircraft registration and ownership was not available.

iv) The owner of the aircraft could not be located

v) The exact weight of the aircraft at the time of take off was not ascertained. While the aircraft documents showed that the aircraft take off weight was 178 tons, calculations based on its aerodynamic characteristics gave a take off weight of 182 tons. However, the maximum allowed take off weight was not exceeded.

vi) The aircraft took off from runway 30 and climbed to a maximum height of about 29 meters above the water level.

vii) The aircraft failed to maintain climb or level flight because the crew inadvertently continued to lower the pitch angle.

viii) The crew attempted to arrest the descent and initiate climb at an altitude that allowed no time for the aircraft to respond.

ix) The aircraft impacted water at 317 kph and broke up on impact.

x) The FDR did not show any technical problems that could have contributed to the accident.

(b) *Cause*

The accident was caused by aircraft colliding with the water surface shortly after take off.

While the aircraft had gathered sufficient energy to sustain climb, the crew failed to monitor altitude and react correctly in the short time that the aircraft was airborne. This resulted in the aircraft going into descent till it reached an altitude where recovery was not possible.

The possibility of crew fatigue as a contributory factor in this accident cannot be ruled out.

4 SAFETY RECOMMENDATIONS

It is recommended that:

i) Airport operators with airports near water should build capability to conduct water borne rescue operations.

ii) Mwanza airport Authorities should control and monitor all cargo operations on the cargo apron. Weighing scales should be provided.

iii) The government should build search and rescue capability in the uniformed forces which should include boats and helicopters.

iv) Cargo aircraft arriving at Mwanza should be subjected to customs inspection and the occupants should go through immigration formalities. The same should hold for departing aircraft.

v) Steps should be taken to build some back-up capability in the recording system of the Mwanza Tower in order to make it serviceable at all times.

vi) Mwanza airport should improve the reliability of its power supply through efficient management of its stand-by generators.

vii) The Tanzania Meteorological Agency should develop capacity to measure water temperature and the temperature over water surface as required by ICAO Annex 3, International Flights Meteorological Services, Part I Chapter 4 Recommended Practice 4.6.8.1.

viii) The Tanzania Civil Aviation Authority should ensure that all aircraft permitted to land in the country meet the requirements of the Tanzania Air Navigation Regulations, 2003.

ix) Foreign operators conducting aviation businesses in Tanzania should be required to have local representatives.

x) States which are signatory to the Chicago Convention on International Air Transport should comply with regulations and rules in States where they are operating as stipulated by article 12 of the Chicago Convention.

xi) Crew members taking off from airports near water should always take into account the temperature differences over land and over water.

xii) Crew members taking off from coastal aerodromes should monitor pilot instruments (pitch, roll, speed, altitude, VSI to avoid illusions caused by the lack of visual reference).

xiii) Operators, notably those of airlines, should ensure that crew members get

adequate rest in comfortable accommodation before undertaking flights.

xiv) Tower should maintain continuous visual contact with a departing aircraft till when it clears the upwind leg or has initiated a turn, whichever is occurs first.

J Nyamwihura
Inspector of Accidents
Tanzania Accident Investigation Branch

Appendix A

Report of the Interstate aviation Committee