

[National emblem of Poland]



Copy No 2

**Remarks**  
**Of the Republic of Poland**  
**as:**  
**the state of registration and operator**

on the draft Final Report  
regarding  
the investigation into the accident of the Tu-154M tail number 101 aircraft  
which occurred on 10 April 2010  
drafted by  
the Interstate Aviation Committee (IAC)

*These remarks were drafted originally in Polish.*

*If there are any inconsistencies between the translation and the original document, the Polish version shall prevail.*

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**Warsaw, 19 December 2010**

Translated by

## GENERAL INFORMATION

On 10 April 2010, in the area of the temporarily open Smolensk “Severny” aerodrome of, there was an accident involving an aircraft Tu-154M with tail number 101, belonging to the State Aviation of the Republic of Poland, while conducting a flight in the course of service in order to carry the President of the Republic of Poland and a delegation to an anniversary ceremony in Katyn.

According to Chapter 5.1 of Annex 13 to the Convention on International Civil Aviation (hereafter Annex 13), the Russian Federation, as the state where the accident occurred, is responsible for investigating the accident. The Russian Federation did not exercise its right under the second sentence of clause 5.1, to delegate the conducting of the investigation into the accident, wholly or partly, to the Republic of Poland.

According to the provision under clause 5.4 letter d) of Annex 13, the Russian Federation, as the state responsible for carrying out the investigation, has an obligation to complete a final Report on the investigation of the accident.

On 20 October 2010, the Russian Federation sent the Republic of Poland, in accordance with clause 6.3 of Annex 13, a draft Final Report.

The Republic of Poland, as the State of Registry and of the Operator, pursuant to clause 6.3 – third sentence – Annex 13, has the right to prepare and send its comments to the draft Final Report prepared by the Russian Federation.

**The Republic of Poland hereby submits its comments to the draft Final Report on the investigation into the accident of the Tu-154M aircraft with tail number 101, requesting that these be reflected in the Final Report.**

**At the same time, the Republic of Poland declares its readiness to provide further explanations regarding its position in respect of the contents of the draft Final Report.**

**If the Russian Federation declines to consent to any changes to the findings in the draft Final Report on the investigation into the accident of the Tu-154M aircraft with tail number 101, the Republic of Poland requests that the comments be included to the Final Report to the extent they have not been reflected therein, to which the Republic of Poland is entitled pursuant to the third sentence of clause 6.3, Annex 13.**

**LIST OF DEFINITIONS**  
**(Russian abbreviation in parentheses)**

36 splt	- 36 <sup>th</sup> Special Transport Air Regiment
AIP	- Aeronautical Information Publication
ARP / (KTA)	- Aerodrome Reference Point
ASKIL	- ASKIL navigation point
BRL / (BPRM)	- middle marker beacon
BSKP	- ATC Near Control Place
Claris	- inquiry concerning diplomatic consent
CVR	- Cockpit Voice Recorder
DRL / (DPRM)	- Distant beacon
DS	- Runway
DSKL	- ATC Distant Control Place
DSS	- lever engine control
FAPPPGosA	- Federal Aviation Provisions regarding State Aviation Flights
FMS	- Flight Management System
GKL	- Flight Management Group at the Smolensk “Severny” Aerodrome
HDG	- aircraft course
ICAO	- International Civil Aviation Organisation
IUL	- Instruction
CATC / (RP)	- Chief Air Traffic Controller
KM	- Magnetic course
KSB	- Near Zone Controller
KSL / (RZP)	- Landing Zone Controller
LT	- local time (Moscow). UTC + 4.00
IAC	- Interstate Aviation Committee investigating the accident
METAR	- information concerning meteorological conditions
NDB	- Non-directional Beacon
PCz-3	- fire fighting unit
PIC	- Pilot in Command
PKL	- CATC Assistant
PLF 031	- call sign of aircraft Yak-40 tail number 044
PLF 101	- call sign of aircraft Tu-154 tail number 101
PRL	- radar indicator
QAR	- quick access recorder
Report	- draft Final Report of the Interstate Aviation Committee
RSL / (RSP)	- radar landing system
RW	- radio altimeter

SIL	- Aircraft Engineering Service
SKL	- Aircraft Control Position at the Smolensk “Severny” Aerodrome
TAF	- Terminal Aerodrome Forecast
TAWS	- Terrain Awareness and Warning System
TWA	- adverse atmospheric conditions
USL / (OSP)	- approach system with two NDB beacons and light system
UTC	- universal time (GMT)
WA	- atmospheric conditions
ZWA	- normal atmospheric conditions

**LIST OF REQUESTS BY THE POLISH PARTY FOR DOCUMENTATION**

The Polish party, via the Accredited Representative of the Republic of Poland, for purpose of exercising its rights pursuant to clause 5.25 of Annex 13, submitted the following requests to the Russian party:

<b>Date of request</b>	<b>Documents requested and questions directed to the Russian party</b>	<b>Date of submission of information by the Russian party or other information explaining the position of the Russian party</b>
<b>19.04.2010</b>	Request for: Documents confirming the authorisations of the landing and take off controller and the near zone controller	The Polish party received documentation regarding the training of staff of the Smolensk "Severny" aerodrome in September 2010
	Documents confirming the authorisations of the landing system controller	The Polish party received documentation regarding the training of staff of the Smolensk "Severny" aerodrome in September 2010
	Documents regarding tests of radars and systems in the Smolensk "Severny" aerodrome confirming that all aerodrome security equipment was in good working order and ready for use before and after the disaster	The Polish party received documents regarding tests of flight safety equipment before the disaster dated 25 April 2010 and a document dated 5 April 2010 regarding checking the aerodrome for purposes of special flights with VIPs
	Documents with all details concerning the "Severny" Aerodrome in Smolensk	The Polish party received only approach maps and no further details
	Documents specifying work rules and rules regarding use of safety equipment in the "Severny" aerodrome in Smolensk	Not received
	Documents containing relevant details regarding military aerodromes (relating to the "Severny" aerodrome in Smolensk)	Not received
	Document specifying minimum conditions for landing of the "Severny" Aerodrome in Smolensk	Not received
	Statements by the Russian crew of the IL-76 aircraft	Not received
	Materials regarding objective flight control from the position of controlling flights on 10 April 2010 (video recording)	Not received
	Description of obligations of persons in controlling and safety functions	Not received
	Materials regarding objective flight control: -data on all recorders of parameters of the flight of aircraft Tu-154M tail number 101 -recording of conversations in the cabin of aircraft Tu-154M tail number 101	The Polish party holds the data of all recorders, and a copy of recording of conversations in the cabin (May and June – correction)
	Copies of correspondence in channels recorded on tapes number 9 and 5 on electronic media	The latest version of recordings not received The Polish party recorded the tapes number 9 and 5 in Smolensk
All photos and films of the place of the accident	Not received	
Diagram of the location of the accident	Not received	
Results of past technical and contractor expertise	Fuel and lubricants – September 2010 Some instruments – October 2010	

<b>20.04.2010</b>	Request for original recordings of conversations of the crew of aircraft Tu-154M number 101	Copy received
<b>02.05.2010</b>	Air traffic service data, held by the Russian and Belorussian parties, regarding the actual position of the aircraft Tu-154M on its flight route on 10 April 2010, from the crossing the border of the Republic of Poland until the approach toward landing at the “Severny” aerodrome at Smolensk.	Not received
	Documentation confirming the authority to perform two functions simultaneously as controller (CATC and near zone controller)	Not received
	Entries in registration books of near and distant non-directional beacons (NDB) and statements by persons on duty on 10 April 2010	Not received
	Timetable of all aviation operations at the “Severny” aerodrome in Smolensk on 10 April 2010	Not received
	Copies of correspondence from channels recorded on tape No 9 – channels: 1, 4, 7, 8 and on tape: 5 – channels: 4 and 7, recorded in Smolensk	Not received
	Results of all technical expertise carried out	The Polish party has not received a report by a technical expert actually carried out by the Russian party
	Photographic documentation of the place of the accident including photos taken directly after the accident	Not received
	Details of the MSRP-64 recorder together with analysis carried out	Recording of parameters was received 31 May 2010
	Details of the MARS recorder and analysis carried out	The working version of the recordings of correspondence – May 2010 and recordings in May and June
	Details of the KBN recorder and analysis carried out	Recorder details received – May 2010
	Does the Committee hold dispatches of the AFTM system regarding flights on: 7 and 10 April 2010 and an explanation (indication) which was collected from the above mentioned dispatch at the “Severny” aerodrome in Smolensk, if so by whom and who was it delivered to?	Not received
	Was there any attempt to land any kind of aircraft before the landing of the Polish Yak-40 aircraft on 10 April 2010?	No response received
	At what altitude over the sea is the runway (DS) at the Severny aerodrome of Smolensk located and are meteorological measurements taken more often than every 3 hours? If so, please provide all measurements and observations dated 10 April 2010 from 04.00 hours to 07.00 hours UTC – including QFE and QNH.	Not received

	Did the radar and lights safety equipment differ on 10 April 2010 at the “Severny” aerodrome in Smolensk the safety status of this aerodrome on 7 April 2010 (during the aviation operations carried out by the crew of aircraft who were flying Prime Ministers Tusk and Putin). If so what were the differences?	No response received
	What is the magnetic declination in the region of Smolensk “Severny”?	No response received
	Please provide: Additions to the statement by the <i>Aviatsionnovo Dispietchera</i> (AD), who was on duty on 10 April 2010 at the Smolensk “Severny” aerodrome (to whom the Polish party was introduced) in the form of answers to the following questions: - Does the AD compile all meteorological information in some form of binding documentation and does he have a duty to forward such document to anybody, and if so, to whom? - Is the information about the planned crossing of the “ASKIIL” navigation point by an aircraft flying to the Smolensk “Severny” aerodrome obtained at this aerodrome from the staff of the Yuzhny Smolensk aerodrome and why? - Did AD know that the Tu-154M aircraft had a VIP on board and if so on what basis and who informed him of this? - What actions should AD take and did he take such actions after the atmospheric conditions worsened at the Smolensk “Severny” aerodrome below the minimum requirements?	Not received
	Possibility of conversations with the crew of the IL-76 aircraft, which on 10 April 2010 carried out a test landing on the Smolensk “Severny” aerodrome (before the Tu-154M disaster) and access to details from the flight recorders of this aircraft.	One conversation with the captain of the aircraft No details from the recorder made available
	Description of (identification) by the manager of the meteorological station (based on reference diagrams specifying visibility at the Smolensk “Severny” aerodrome), of the ones that were not visible from the place of observation of visibility.	No detailed information received
<b>14.05. 2010</b>	Request for documents which the Polish party requested and had not received as at 13 May 2010 . Documents containing authorisations of starting and landing flight controllers and near zone controllers	Received in September 2010
	Documents regarding the authorisation of the landing controller	Received in September 2010

	Documents confirming the authority to fulfil two controller functions simultaneously (CATC and near zone controller)	Not received
	Results of survey carried out after the accident of the radar and other systems at the Smolensk "Severny" aerodrome	Not received
	Documents containing details regarding the Smolensk "Severny" aerodrome , in particular: <ul style="list-style-type: none"> <li>• Diagram of location of electric and light fittings</li> <li>• Diagram of locations of radar (RSP-6M2) and radio-navigation equipment (DPRM-PAR-10, BRPM-PAR-10)</li> </ul> <p>Together with documents regarding their uses.</p>	Not received
	Video recording with radar display at the position of the landing system controller (approach of aircraft Yak-40, IL-76 and Tu-154) of 10 April 2010	Not provided
	List and scope of obligations of persons fulfilling CATC and security functions at the Smolensk "Severny" aerodrome	Not received
	Materials regarding objective flight control, including: <ul style="list-style-type: none"> <li>- MARS (CVR) recorder details and analysis carried out</li> </ul>	Received copy of data from MRSP-64 (FDR) recorder without results of analysis conducted by the Russian party Received copy and recording of correspondence – May 2010
	Transcription of correspondence in channels recorded on tape No 9 – channels: 1, 4, 7, 8 and on tape No 5 – channels: 4 and 7, recorded in Smolensk	Available in IAC office
	Photographic documentation of the location of the accident including photos made directly after the disaster band films from the place of the accident	Available in IAC office
	Diagram of the place of accident	Received – May 2010
	Details of the flight route controllers consisting of radar recordings of the flight route of the aircraft Tu-154M on 10 April 2010 as of the moment it entered FIR MINSK to the time of the disaster at the Smolensk "Severny" aerodrome	Received
	Copies of the registration books of the near and distant beacons and statements by persons on duty at the NDB on 10 April 2010	Not received
	Timetable of all aviation operations at the Smolensk "Severny" aerodrome on 10 April 2010	Not received
	Results of all technical expertise conducted	The Polish party has not received a list of the technical expertise actually carried out by the Russian party



	Data from the KBN recorder and analysis carried out	Received without analysis – May 2010
	All dispatches of the AFTM system regarding flights at the “Northern” aerodrome in Smolensk on 7 and 10 April 2010 and an explanation of which of the above dispatches were collected at the Smolensk “Severny” aerodrome and if so by whom and were they sent to anybody	Not received
	Data from the on board recorder of the IL-76 aircraft, which on 10 April 2010 did a test landing at the Smolensk “Severny” aerodrome (before the Tu-154M disaster).	Not received
	Description by the meteorological station manager (based on a diagram of benchmarks indicating the visibility at the Smolensk “Severny” aerodrome), of which ones are visible from the place of visibility observation	Not received
	Request for an answer to the following question: What standards should a first class military aircraft fulfil?	Not received
	At what altitude above sea is the runway (DS) of the Smolensk “Severny” aerodrome located and are meteorological measurements carried out there more often than ever 3 hours? If so, please provide all measurements and observations made 10 April 2010 from 04.00 hours to 07.00 hours UTC – including QFE and QNH.	Not received
	What is the magnetic declination in the region of the Smolensk “Severny” aerodrome ?	Not received
	Please provide: Completion of the statement by the <i>Aviatsionnovo Dispietchera</i> (AD) who was on duty on 10 April 2010 at the Smolensk “Severny” aerodrome who the Polish party was introduced to, consisting of answers to the following questions: - does AD compile all meteorological information in some form of binding documentation and does he have a duty to forward such document to anybody, and if so, to whom? - Is the information about the planned crossing of the navigation point “ASKIIL” by an aircraft flying to the Smolensk “Severny” aerodrome obtained at this aerodrome from the staff of the Smolensk Yuzhny aerodrome and why? - Did AD know that the Tu-154M aircraft had a VIP on board and if so on what basis and who informed him of this? - What actions should AD take and did he take such actions after the atmospheric	No answer received

	conditions worsened at the Smolensk “Severny” aerodrome below the minimum requirements? Please also provide photocopies of the entire statement with the completed answers.	
	Copy of lists of information received by AD from 9 and 10 April 2010 if he does have a duty to make a note of them (applies to arriving flights on 10 April 2010 and all flights on the date of the accident)	Not received
<b>17.05.2010</b>	Please provide answers to these questions: Who, when and with what means initiated the flight rescue system and the ground rescue?	Not received
	The time and operation of the flight rescue system (time and location of disaster victims, and wreck and components separating from the aircraft before hitting the ground)?	Not received
	Organisation and operation of the aerodrome rescue system ?	Not received
	Is a consent for landing given at military aerodromes where atmospheric conditions are below the minimum for the aerodrome and the life of the aircraft crew is not in danger?	Not received
	How should the term – <i>posadka dopolnitelno (landing to be advised)</i> be understood?	Not received
<b>25.05.2010</b>	Renewed request for documents not received to 13 May 2010 (reference to letter dated 14 May 2010) Please provide written answers and reasons for not providing the materials mentioned in letters dated 14 May 2010 – regarding recordings from objective control sources at the position of the landing zone controller	Information provided: On 10 April 2010 a photo of the counter shaft PAU-476 was not taken; the video cassette was taken by the State Prosecutor of the Russian Federation and when photos were sought the information “no recording found” was obtained. The cassette was forwarded to specialists for examination. The Russian party has stated that the results of this examination will be provided to the Polish party.
<b>05.07.2010</b>	Please provide the minutes of the survey of radio engineering equipment at the Smolensk “Severny” aerodrome, carried out on 15 April 2010 Please provide written reasons as to why materials have not been provided to the Polish party	Not provided
<b>15.07.2010</b>	Please provide flight parameters from the on board recorder IL-76 MD No 78817 from the flight on 10 April 2010 during which an approach to land at the Smolensk “Severny” aerodrome was carried out. Specific ID parameters - 105, 101, 132, 134, 317, 307, 312, 451, 770, 2807, 5108, 5110, 3101, 4509, 3111, 3547, 3548, 5302, 5149, 5150 and duration.	On 22 July 2010 the Accredited Representative of the Republic of Poland was informed that no recording from the recorder of the aircraft IL-76 would be obtained, since according to the Russian party the analysis of this flight has not bearing on the investigation into the reasons for the Tu-154M disaster

<b>20.07.2010</b>	Please explain the following: The Polish party has not received any response to questions asked previously – sent on 14 May and later. When can we expect answers?	No reply
	To date we have only been provided with recordings of correspondence on tape No 9, channels 1, 4 and 7. When can we expect copies of these recordings?	Not received
	To date we have not received recordings from the recorder of the aircraft IL-76, which carried out two unsuccessful landing attempts before Tu-154M landed. When can we expect these recordings? We reserve the right, after these recordings are analysed, to ask the crew of this aircraft further questions.	Not received
	We request that the tapes of the MARS recorder be examined where the recordings are distorted in all channels and both directions of the recording	Examination carried out at IAC office - September
	To date we have not received the results of the tape recording from the objective control position. The Russian party asserts that there are no recordings on the tape and that the tape has been forwarded for further processing. To date we have not received any results of such examinations. Are attempts still being made to obtain recordings from the tape. If so, when will they be completed? Who may the Polish party contact to obtain the tape in order to carry out tests in Poland. The Landing Zone Controller has stated that he has checked the recording equipment's working condition by switching on the video recorder and according to the display the recorder was working.	Not received
	To date we have not received, as per our earlier request, the "Flight Instructions for the Smolensk "Severny" aerodrome". In connection with the lack of this document, would it be possible for specialists from Poland to read this instruction in the presence of the Russian party?	Not received
	Since the Polish party does not accept the results of the test flight at the Smolensk "Severny" aerodrome presented on 17 June 2010, we request a full copy of the minutes. We also submit an official protest against the fact that Polish specialists have not been allowed to participate in this test flight by observing the radar indicators from the ground and listening to radio correspondence.	Not received
	To date the Polish party's request for additional discussions with the CATC, the Landing System Controller and Colonel	Not provided

	Krasnokutski have not been granted.	
	Please provide an explanation as to why certain persons fulfilling important functions from the point of view of flight safety were not aware of the “A” status of the flight of aircraft Tu-154M? The CATC was not aware of this, however the ensign on duty at the BPRM and the CATC of Minsk RDC were aware of it.	Not explained
	Please explain why in the copy of document point “4.4 METEOROLOGICAL LANDING CONDITIONS AT THE AERODROME DO NOT MEET THE LEVEL OF PREPARATION OF CREW COMMANDERS” in point 4.4.1 after the words “ <i>and register the regiment commander</i> ” there is a break in the text and the text then continues from ... <i>landing</i> ”?	Not explained
	Please explain why we have received only a part of the telegram No 134/3/11/102 dated 13 March 2010 regarding the safety of landing aircraft at the Smolensk “Severny” aerodrome from commander JW 21350 to commander JW 06755	Not explained Document not provided
<b>26.07.2010</b>	Information regarding the failure by the Accredited Representative of the Republic of Poland to exercise its rights under point 5.25 of Annex 13 to the Chicago Convention	On 29 July 2010 the Russian party provided a response to the Accredited Representative of the Republic of Poland, with among others the following information: <ul style="list-style-type: none"> <li>– the Polish party was granted access to the location of the accident and also other objects at the Smolensk “Severny” aerodrome ;</li> <li>– inspections were carried out jointly and an outline of the debris from the aircraft as well as an analysis of damage</li> <li>– with the participation of Polish representatives, readings were taken from ground and board control as well as TAWS and FMS. Copies of these data were provided to the Polish party. The recordings on the flight recorder of the flight parameters were read in Poland;</li> <li>– representatives of the Polish party participated in hearings with persons fulfilling functions at the Smolensk “Severny” aerodrome who were in charge of flight safety enforcement. The Polish party was provided with copies of these hearings and written explanations were provided in response to additional questions;</li> <li>– at the place of the accident the Accredited Representative of the Republic of Poland participated in daily clearance;</li> <li>– in the registered office of IAC representatives of the Polish party participated in an initial analysis of data</li> </ul>

	Request for written justification of all decisions refusing access to documents and information	<p>from the flight recorders;</p> <ul style="list-style-type: none"> <li>– The Accredited Representative of the Republic of Poland signed preventative recommendations;</li> <li>– At a special meeting the Polish party was presented with the results of the test flight of the aerodrome’s radio technical equipment and the results of a reading of TAWS and FMS data;</li> <li>– The Accredited Representative of the Republic of Poland and a Polish specialist participated in the preparation of an evaluation of the psychological and emotional state of the crew of the aircraft, <ul style="list-style-type: none"> <li>– an experiment was carried out in a simulator in which the Accredited Representative of the Republic of Poland participated,</li> <li>– the Accredited Representative of the Republic of Poland received copies of many documents relating to issues (reports by senior officers, data from the flight of the aircraft in the zone of responsibility of Russian and Belorussian flight control, data concerning weather forecasts and actual weather conditions, aero navigational and other data).</li> </ul> </li> </ul> <p>In addition the Russian party asserts that the Accredited Representative of the Republic of Poland and his advisers had the opportunity to read the contents of other documents relating to this issue.</p> <p>The position of the Russian party will be included in the draft final report and sent to the Polish party, who will have 60 days to submit its comments to the draft.</p> <p>Since most of the replies to the questions of the Polish party and the request for documents relate to the competence of the Ministry of Defence of Russia and restrict the access, decisions concerning their availability shall be taken by relevant bodies responsible for law enforcement.</p>
<b>29.07.2010</b>	Request for the presentation by the Russian party specifying the minimum conditions of the aerodrome	Not provided
<b>20.08. 2010</b>	Request for information and opportunity to: Question the CATC, the Landing Zone Controller and Colonel Krasnokutski at a place and time convenient for the latter.	Not provided
	Hearing of all persons located on 10 April 2010 in Command Positions of the Smolensk “Severny” aerodrome including in particular: Assistant CATC, CATC and the persons described in the record 4 as “principal commanders”.	Not provided

	Identification of persons in Command Positions at the Smolensk "Severny" aerodrome on 10 April 2010 between 8.40 am and 10.43 am and the functions they fulfilled in the flight control system.	Not all information has been provided
	Identification of the reason why so many persons were in Command Positions on 10 April 2010 between 8.40 and 10.43.	Not explained
	Analysis of the impact that the decisions by persons in Command Positions and responsible persons in Moscow had on the decisions by the CATC in the scope of directing the TU-154M aircraft to the reserve aerodrome and granting consent to a test approach to land in meteorological conditions in which landing an aircraft was practically impossible to execute. Request to provide the results of such analysis.	Not provided
	Identification of the competence of the CATC in the presence of his superiors in Command Positions	Not provided
	Completion to the recording of 4 path from the Command Position by identifying the callers and the contents of information transmitted.	Not provided
	What role and in what safety process at the Smolensk "Severny" aerodrome on 10 April 2010 did Vladimir Ivanovich perform, whom Colonel Nikolai Jevgenievich Krasnokutski briefed of the situation in the aerodrome and the course of the arriving aircraft (tape 9 channel 4 from SKL Smolensk "Severny" aerodrome position on the tape around 1 h 16 min and 1 h 45 min).	Not provided
	Was there any decision by persons responsible in Moscow at the suggestion of CATC regarding worsening atmospheric conditions. The persons responsible in Moscow also had information concerning atmospheric conditions prevailing at the "Northern" aerodrome in Smolensk from the crew of the Transaero 331, (tape 9 channel 4 from SKL of the Smolensk "Severny" aerodrome position on the tape around 1 h 32 min)?	Not explained
	What role and in what scope in the safety process of flights arriving to the Smolensk "Severny" aerodrome on 10 April 2010 did Oleg Nikolayevich perform, whom Colonel Nikolai Jevgienievich Krasnokutski briefed of the situation in the aerodrome and the course of the arriving aircraft (tape 9 channel 4 from SKL Smolensk "Severny" aerodrome position on the tape around 1 h 58 min)?	Not explained

	What authority to conduct radio correspondence did Colonel Nikolai Jevgienievich Krasnokutski have and what was his function which entitled him to join the radio correspondence between the CATC and the crew of the Tu-154M flight?	Not explained
	What authority to control flights, as the controller of the visual contact zone, did the CATC Colonel Pavel Pliusnin have, when did he obtain these and when was the last time before 10 April 2010 that his practical skills were verified?	No response received
	What authority (procedural, radar) to control flights as a near zone controller did the CATC Lieutenant Colonel Pavel Pliusnin have, when did he obtain these and when was the last time before 10 April 2010 that his practical skills were verified?	No response received
	What radar qualifications to control flights as the landing zone controller did Mr Viktor Ryzenko have, when did he obtain these and when was the last time before 10 April 2010 that his practical skills were verified?	Received in September 2010
	Were tests and trainings carried out, pursuant to the telegram set out below (No 134/11/102) at the place of work relating to the control of flights by the safety crew arriving at the Smolensk "Severny" aerodrome, if so when and where were they documented and what was the result?	Received in September 2010
	What are the requirements in Articles 216, 55-262, 271, 562 of the FAPP GA document and in the ordinance of the Air Force Commander of 1992 No 143 according to the contents of the above mentioned telegram?	No response received
	What are the results of tests of samples of fuel and oil collected from the wreck of the Tu-154M No 101 aircraft at the place of the accident?	Results received in September 2010
	What technical tests were carried out relating to the Tu-154M No 101 aircraft debris and what report regarding such tests does IAC have?	No list of such tests received
	What are IAC's future plans with respect to technical tests of the Tu-154M No 101 aircraft debris?	No written information received
	Was an analysis carried out regarding the impact of switched on mobile phones on board the Tu-154M No 101 aircraft on the equipment on board and does IAC have this type of expertise?	No reply received

	<p>Provide the Accredited Representative of the Republic of Poland and his advisers the opportunity to read TAWS and FMS construction documentation regarding the Tu-154M No 101 aircraft in order to obtain information regarding the following:</p> <ul style="list-style-type: none"> <li>- Cooperation between TAWS and FMS;</li> <li>- Cooperation between FMS and ABSU;</li> <li>- Transmitters and systems from which the data is transmitted to TAWS;</li> <li>- Report or results of tests which were conducted after the disassembly of TAWS and FMS systems on board.</li> </ul> <p>Provide the Accredited Representative of the Republic of Poland and his advisers the opportunity to read in the presence of the Russian party the operational instruction of the Smolensk "Severny" aerodrome and to provide answers to the following questions: What was the operational minimum of the Smolensk "Severny" aerodrome for aircraft of category "D" for approaching to land in the direction of 259° on 10 April 2010 with proper safety in the aero navigation and lighting systems (presented in the enclosed photographs)?</p>	<p>Received in September 2010</p> <p>No documents provided, a presentation which is unsatisfactory to the Polish party was provided, of which the Russian party has been informed</p>
	<p>What was the minimum clearance above obstacles on the final approach segment of the path of descent (2°40') shown in the card handed to one of the advisers on 4 May 2010?</p>	<p>Not provided</p>
	<p>Does the lighting system LUCZ-2MU located on the Smolensk "Severny" aerodrome on 10 April 2010 have the following type of lighting:</p> <ul style="list-style-type: none"> <li>- approach (at what distance from the runway threshold and what is the lighting intensity);</li> <li>- edges;</li> <li>- thresholds;</li> <li>- end of runway.</li> </ul>	<p>Not provided</p>
	<p>What was the location and regulation of the approach radar system RSP-6M2 with factory number 9672 to the Smolensk "Severny" aerodrome on 10 April 2010?</p>	<p>No reply</p>
	<p>What were the technical parameters of the approach radar system RSP-6M2 with factory number 9672 which was located in the Smolensk "Severny" aerodrome on 10 April 2010?</p>	<p>No parameters provided</p>
	<p>Did the approach radar system RSP-6M2 with factory number 9672 which was located in the Smolensk "Severny" aerodrome on 10 April 2010 comply with the technical requirements for a precision approach radar system according to Annex 10 Volume 1 of the Chicago Convention?</p>	<p>No response provided</p>



	What were the technical requirements for the approach radar system RSP-6M2 with factory number 9672 which was located in the Smolensk "Severny" aerodrome on 10 April 2010 in respect of accuracy of: azimuth, elevation and distance according to the cited documents?	No response provided
	What was the category of the Smolensk "Severny" aerodrome on 10 April 2010 and based on which documents was the scope of fire protection determined?	No response provided
	What was the rescue equipment of the Smolensk "Severny" aerodrome on 10 April 2010?	No response provided
	What efforts and resources were used and during what period were they used in the search and rescue operation after the Tu-154M aircraft disaster?	No response provided
	According to what procedures and provisions were the minimum requirements for the Smolensk "Severny" aerodrome specified?	In the presentation provided no information relating to all procedures and provisions setting out minimum requirements were provided. The Polish party has requested an opportunity to read the methods according to which minimum requirements are set for aerodromes in the Russian Federation.
	What type of radar services were secured by staff of the Smolensk "Severny" aerodrome (CATC and KSL) on 7 and 10 April 2010?	No response provided
	Did the procedures of the military air traffic services of the Russian Federation permit the staff of the "Northern" aerodrome (CATC and KSL) 10 April 2010 securing to provide radar services without establishing (carrying out) the radar identification of the aircraft?	No response received
	Did the procedures of the military air traffic services of the Russian Federation permit the staff of the "Northern" aerodrome (CATC and KSL) 10 April 2010 securing to provide radar services without informing the crew of the aircraft Yak-40 and Tu-154M about the type of approaches they were to perform?	No response received
	Did the procedures of the military air traffic services of the Russian Federation permit crew of the aircraft to start the approach to land without informing them of the binding height and the minimum clearance over obstacles?	No response received

	Did the procedures of the military air traffic services of the Russian Federation permit on 10 April 2010 for KSL to provide radar services to the Smolensk “Severny” aerodrome without informing the crew of the aircraft of the point at which the approach with the assistance of radar would end?	No response received
	Was Colonel Nikolai Jevgienievich Krasnokutski, as of 10 April 2010, authorised to change decisions of CATC and to return the Tu-154M aircraft (tape 9 channel 4 from SKL of the Smolensk “Severny” aerodrome at around 1 h 45 min)?	No response received
	Why did Colonel Nikolai Jevgienievich Krasnokutski fail, on 10 April 2010, to take a decision to interrupt the approach of the Tu-154M aircraft shortly before the beginning of the descent to the runway since the visibility was 200 m and the next time the CATC suggested it was unreasonable for the aircraft crew to start a descent (tape 9 channel 4 from the SKL of the Smolensk “Severny” aerodrome at around 1 h 58 to 2 h 01 min)?	Not explained
	What provisions set forth an obligation for the crew of the aircraft to confirm to the CATC command the actual height of the flight?	No documents presented
	In what manner (based on what procedures) was the visibility on the runway (RVR) specified during the approach of the aircraft to the Smolensk “Severny” aerodrome on 10 April 2010?	No response provided
	What glide path values (in degrees and minutes) according to which the KSL provided information to the crew of the aircraft was on their display on 10 April 2010?	No response
	According to what rules (based on what documents) was the radio correspondence carried out by staff (CATC and KSL) of the Smolensk “Severny” aerodrome on 10 April 2010?	No response received
	According to what rules (based on what documents) was the approach of aircraft secured by staff (CATC and KSL) of the Smolensk “Severny” aerodrome on 10 April 2010?	No response received
	Has the military air traffic services of the Russian Federation proved document CAO Doc 4444 Procedures for Air Navigation Services and if so to what extent is it being applied?	No response received

	<p>Why was the Smolensk “Severny” aerodrome not closed because of the atmospheric conditions threatening the safety of aircraft flights on 10 April 2010 in breach of part 50 clause 2 of the Aviation Code of the Russian Federation?</p> <p>Why did CATC not carry out the procedure of returning the aircraft to the reserve aerodrome given the atmospheric conditions were below the minimum for the aerodrome according to the Instruction regarding Flight Operations in the Region of the Smolensk (Northern) Aerodrome and the procedure set out in the part Procedure for Directing VS to the Reserve Aerodrome (airfield)?</p>	<p>No response received</p> <p>No response received and no document provided</p>
	<p>Why was a consent granted to approach to land to an aircraft of category “D” in a situation where the atmospheric conditions were below the minimum for the aerodrome to land in breach of the Federal Aviation Rules of Flights in the airspace of the Russian Federation chapter III clause 10?</p>	<p>No response received and no document provided</p>
	<p>Why was the crew granted a consent to enter the aerodrome region by the aviation staff controlling the flight in a situation where the atmospheric conditions were below the minimum for the aerodrome given it had not lost contact with the controlling air traffic authority and did not act in an emergency situation and on board the aircraft there was sufficient reserve fuel to fly to the reserve aerodrome in breach of the Federal Aviation Rules of Flights in the airspace of the Russian Federation chapter X clause 74?</p>	<p>No response received and no document provided</p>
	<p>Failure to act by the authority controlling flights at the aerodrome at the landing without permission by the Yak-40 aircraft in breach of the Federal Aviation Rules of Flights in the airspace of the Russian Federation chapter X clause 66?</p>	<p>No response received and no document provided</p>
	<p>Was a NOTAM issued, cancelling NOTAM No M2157/09 regarding the permission for the Smolensk “Severny” aerodrome to be operational? If so, when, what did it contain and was it distributed to operational use?</p>	<p>No response received</p>
	<p>Why are the geographical coordinates on maps for approaching the Smolensk “Severny” aerodrome inaccurate despite the CK-95 system, binding as of 28.07.2000, and consistent with the Global Navigation Satellite Systems, the Coordinates system, methods of transforming coordinate points – GOST standard P 51794 – 2008 clause 4.3 note clause 2?</p>	<p>No response received and no document provided</p>

	Request for: recordings from the flight recorder of aircraft IL-76, which carried out two unsuccessful landing attempts prior to the landing of Tu-154M.	Information was provided, that no data concerning the flight of aircraft IL-76 will be available to the Polish party because they are unrelated to the disaster involving aircraft Tu-154M No 101.
	Minutes of the examination of the recording on the tape pursuant to an objective control from the Command Position. The Russian party asserts that there are no recordings on the tape and the tape was forwarded for further inspection. If it is impossible to obtain any data from the tape, the Accredited Representative of the Republic of Poland has requested that the tape be forwarded to the Polish party for further examination. The Landing Zone Controller stated that he checked the working order of recording equipment by switching on the video recorder and the display indicated that the equipment was working.	Not received
	Since the Polish party has not accepted the results of the test flight presented by the Russian party carried out at the Smolensk “Severny” aerodrome on 15 April 2010 after the Tu-154M disaster and submitted 17 June 2010, the Accredited Representative of the Republic of Poland repeats its request to access the full minutes from the test flight.	Not received
	Please explain why in the copy of document point “4.4 METEOROLOGICAL LANDING CONDITIONS AT THE AIRDROME DO NOT MEET THE LEVEL OF PREPARATION OF CREW COMMANDERS” in point 4.4.1 after the words “ <i>and register the regiment commander</i> ” there is a break in the text and the text then continues from ... <i>landing</i> ”?	Not explained
	Please explain why we have received only a part of the telegram No 134/3/11/102 dated 13 March 2010 regarding the safety of landing aircraft at the Smolensk “Severny” aerodrome from commander JW 21350 to commander JW 06755	Not explained Document not provided
	Request for the Accredited Representative of the Republic of Poland to participate in all informational deliberations regarding the progress of investigations according to the provisions of 5.25 of Annex 13 to the Chicago Convention.	Not facilitated

<b>22.09.2010</b>	Response to a letter from the Russian party to the Accredited Representative of the Republic of Poland dated 29 July 2010 indicating the areas which to date have not been sufficiently explained and comprising: The status of the Smolensk “Severny” aerodrome on 10 April 2010 and the impact thereof on the possibility of carrying out safe landings and take offs.	No detailed information received
	Equipment of the aerodrome in terms of radio technical resources and their tactical and technical ability to ensure safe landings and in particular in atmospheric conditions approaching the minimum conditions for the aerodrome	No detailed information received
	Arrangement of services to safeguard flights, among others such as meteorological and logistical safety services.	No detailed information received
	Identification of persons present on 10 April in aerodrome command positions of the “Severny” aerodrome of Smolensk and details of their positions and duties	No detailed information received
	Identification of persons in Command Positions for decisions to flight controllers regarding consent to aircraft Tu-154M to approach for landing in atmospheric conditions below the minimum for the aerodrome, aircraft and crew.	No detailed information received
	Information flow regarding atmospheric conditions prevailing at the Smolensk “Severny” aerodrome before the consent was granted for the Tu-154M aircraft’s attempt to approach in atmospheric conditions decidedly below the minimum for the aerodrome, crew and aircraft.	No detailed information received
	Repeated request to exercise the rights of the Accredited Representative of the Republic of Poland and his advisers pursuant to the provisions of Annex 13 to the Chicago Convention, comprising: Hearing of all persons who had conversations on 10 April 2010 between 08.40 hours and 10.40 hours in Command Positions at the Smolensk “Severny” aerodrome and persons in other positions to which the situation was reported or who were approached in any other manner.	Not facilitated
	Additional hearing of the CATC, the Landing Zone Controller and Colonel Krasnokutski, in connection with the inconsistencies arisen between the documents presented by the Russian party regarding the preparation for the flights on 10 April 2010 and the statements made by certain of these persons.	Not facilitated

	New copies made in laboratory conditions of the recordings from channels 1, 4 and 7 on 10 April 2010 obtained from the tape recorder located at the Command Position of the Smolensk “Severny” aerodrome	Not facilitated, despite initial consent granted for this purpose
	<p>Explanation as to why despite many shortcomings in the equipment of the Smolensk “Severny” aerodrome confirmed during the test flight at this aerodrome of 5 April 2010, in order to accept special flights a consent was granted for the landing of aircraft with VIPs on board – flights designated “A”.</p> <p>The shortcomings include:</p> <ul style="list-style-type: none"> <li>- at the aerodrome there is no control tower (KDP) and flights are directed with SKP (Starting Point of Command), why does the CATC have no possibility of controlling the situation on the ground of the aerodrome</li> <li>- The list of equipment is not entirely consistent with the standards for operation of a state aerodrome (FAP NGEAGoS A-2006) or the Instruction for Operation of Aerodromes in the scope of radio electronic apparatus (FAP REA-2006);</li> <li>- At the work station of the Landing Zone Controller there is no metric display on the RSL radar station. The command headquarters of the aerodrome there was no such equipment;</li> <li>- several persons in the CATC Group have access to such instruments;</li> <li>- objective control equipment (3 P-500 tape recorders and magnetic tape) according to the technical state do not comply with the requirements pursuant to normative documents and should be written down.</li> </ul>	Not explained
	Please provide the Polish party with the minutes from the test run of all radar equipment at the Smolensk “Severny” aerodrome carried out on 15 April 2010.	Not provided
	Please provide results of tests of units and instruments from the Tu-154M tail number 101 aircraft.	Provided in October 2010
	Please allow participation in deliberations. The participation by the Accredited Representative of the Republic of Poland was limited by the Russian party to three briefings which took place in Smolensk.	Not facilitated
	Copies sent by the Russian party of documents were not prepared with the participation of representatives of the Polish party and did not have any formal confirmation as to what makes them inadequate as evidence.	The Russian party has not adopted a position with respect to this issue
<b>7 October 2010</b>	Repeated request for details of test run of radar equipment performed on 15 April 2010	Not received

	Request to carry out a joint analysis of the actions of persons in positions of senior command.	Not carried out
	Request for copies of transcripts of conversations by persons in the position of CATC at the Smolensk “Severny” aerodrome .	Not received
	Request for new copies made in laboratory conditions of recordings from channels 1, 4 and 7 on 10 April 2010 obtained from tape recorders located at command Positions in the Smolensk “Severny” aerodrome .	Not facilitated
	Request for access to results of tests of selected aggregates and instruments on board carried out on 23-27 August.	Results received – October 2010

In addition the Polish party made a request in June 2010 to the Russian Federation for access to documents, data and information, including:

<b>IDENTIFICATION OR DESCRIPTION OF DOCUMENT OR CONTENTS THEREOF</b>	<b>Details of information provided by the Russian party or other information explaining the position of the Polish party</b>
Document(s) specifying the Rules for radio correspondence binding in the Armed Forces of the RF during approach to landing operations of the type occurring on 7 and 10 April 2010	Not received
Technical requirements for military aerodromes binding in the RF (part regarding requirements for identifying the aerodrome approach zone).	Not received
Federal Aviation Regulations regarding Operation of Civil Aerodromes ( <i>Federalnyie aviatsionniye pravila normy godnosti k eksploatatsyi aerodromov Gosudarstvennoi Aviatsii</i> ) FAP NGEAGosA and the equivalent for military aerodromes	Not received
Aerodrome Operation Instructions in the Scope of Radar Equipment ( <i>Federalnyie aviatsionniye pravila po radioelektronnoj aparature</i> ) FAP REA for civil and military aviation	Not received
Recorders with parameters of the flight of aircraft Tu-154M (tape)	Not received
MARS-BM recorder from the aircraft Tu-154M (tape)	Not received
KBN recorder from the aircraft Tu-154M (tape)	Not received
Certified copy of data from flight recorders of the IL-76 aircraft of 10 April 2010 (including unsuccessful attempt to approach the Smolensk “Severny” aerodrome)	Not received
Instructions for test run of communications equipment of the air force of the Russian Federation ( <i>Radio-Tekhnicheskoye Obespecheniye – RTO</i> )	Not received

<p>Video recordings from the position of the landing zone controller:                  - test flight security measures by aircraft An-12 carried out on 25 March 2010;                  - progress of approach to landing of aircraft on 7 and 10 April 2010;                  Test flight security measures by aircraft An-26 carried out after the disaster involving the Tu-154M aircraft on 15 April 2010.</p>	<p>Not received</p>
<p>Video recording made on board the An-26 aircraft by Colonel Sergei Yakinienko from the progress of test flight security measures carried out after the Tu-154M disaster on 15 April 2010</p>	<p>Not received</p>
<p>Minutes from the test flight security measures at the Smolensk “Severny” aerodrome carried out after the Tu-154M disaster on 15 April 2010</p>	<p>Not received</p>
<p>Documents regarding CATC:                  - authority to control in the visual contact zone;                  - authority to control in the near aerodrome zone;                  - Scope of obligations                  - technology (procedure during test flight security measures in both the above mentioned zones;                  - permission to carry out obligations at the Smolensk “Severny” aerodrome .</p>	<p>Not received in a sufficient scope – part of the information was included in the document prepared by the Flight Control Group</p>
<p>Documents regarding the landing zone controller:                  - authority to control in the landing zone;                  - scope of obligations                  - technology (procedure during test flight security measures in both the above mentioned zones;                  - permission to carry out obligations at the Smolensk “Severny” aerodrome.</p>	<p>Not received in a sufficient scope – part of the information was included in the document prepared by the Flight Control Group</p>
<p>Radar (video) recordings and/or radar screenshots of the course of the Tu-154M flight on 7 and 10 April in FIR Belarus and the Russian Federation with coordinates (degrees, minutes, seconds) and transponder flight data SSR (height, speed, course) including the basis for the recording time.</p>	<p>Not received</p>
<p>Operational Instructions of the Smolensk “Severny” aerodrome (INOP) regarding:                  - aerodrome security in the field of air traffic services;                  - minimum conditions of the aerodrome with regard to functioning means of radio navigation and lighting for flight security;                  - aerodrome security in the form of rescue and fire fighting services;                  - aerodrome fire protection category ;                  - navigational and operational details of the aerodrome;                  - conditions under which the aerodrome is closed;                  - safety procedure for aircraft classified “HEAD” (according to the Russian procedures, “LITERA A”).</p>	<p>Not received</p>
<p>Document with information concerning the declination in the area of the Smolensk “Severny” aerodrome.</p>	<p>Not received</p>
<p>Document describing the rescue equipment at the Smolensk “Severny” aerodrome on 10 April 2010.</p>	<p>Not received</p>



Document with search and rescue measures after the disaster of the Tu-154M aircraft on 10 April 2010 containing information regarding the efforts and resources utilised during these measures.	Not received
Reports/statements describing the course and measures of the search and rescue team during the activities connected with the Tu-154M aircraft disaster.	Not received
Document specifying the rules of organisation and operation of the legally binding aircraft rescue system in the Russian Federation.	Not received
Document specifying the conditions under which the aerodrome is closed and the binding procedure of the air force of the Russian Federation	Not received
Transcripts of radio correspondence: - crews of aircraft: Yak-40, IL-76, Tu-154M; - positions of flight control (all available channels, with telephone communication channels and so-called “hands free” calling and “background” calling of the flight control positions on 10 April 2010)	Not received
Recording from the recorder of the parameters of the FDR flight (containing data regarding altitude PALT, RALT, progressive speed, speed of descent, courses, inclination, and tilt) and recording from the CVR recorder of the IL-76 aircraft relating to the 2 approaches to landing carried out on 10 April 2010 at the Smolensk “Severny” aerodrome.	Not received
Documents containing procedures relating to flights with “HEAD” status (“LITERA A” according to Russian procedure) in the Russian Federation.	Not received
Hearing/statement of the “ <i>Aviatsionogo Dispatchera</i> ” on duty on 7 April 2010 and 10 April 2010 at the Smolensk “Severny” aerodrome.	Not received
List of aerodrome security staff on 7 and 10 April 2010 and hearings/statements of those persons.	Not all information requested has been received
Copies of diaries of the positions and staff of aerodrome security relating to the proper functioning of the flight radio navigation and lighting equipment on 7 and 10 April 2010	Not received
Timetable of all flight operations at the Smolensk “Severny” aerodrome on 10 April 2010	Not received
Minutes of hearings with CATC drafted by the public prosecutor of RF	Not received
Minutes of conversations and interviews (interrogations), statements, reports of CATC.	Copies of interrogations from April 2010 received – Smolensk and May 2010 – Moscow – did not include everything requested
Minutes of hearings of KSL drafted by the public prosecutor of RF	Not received

Minutes of conversations and interviews (interrogations), statements, and reports of KSL.	Copies of interrogations from April 2010 received – Smolensk and May 2010 – Moscow – did not include everything requested
Hearings of service personnel in BRL and DRL positions drafted by the public prosecutor of RF	Not received
Minutes of conversations and interviews (interrogations), statements, and reports of service personnel in BRL and DRL positions collected by IAC.	Incomplete
Hearings of persons responsible for aerodrome security on 7 and 10 April 2010 drafted by the public prosecutor of RF.	Not received
Minutes of conversations and interviews (interrogations), statements, and reports of persons responsible for aerodrome security on 7 and 10 April 2010 collected by IAC.	Copies of interrogations from April 2010 received – Smolensk and May 2010 – Moscow – did not include everything requested
Hearings with pilots performing flights in the Smolensk “Severny” aerodrome on 7 and 10 April 2010 drafted by the public prosecutor of RF.	Not received
Minutes of Hearings with pilots performing flights in the Smolensk “Severny” aerodrome on 7 and 10 April 2010 collected by IAC.	Copies of interrogations from April 2010 received – Smolensk and May 2010 – Moscow – did not include everything requested - not received with respect to conversations with the persons in command of flight IL-76
Document containing a list of persons and aerodrome safety resources on 7 and 10 April 2010	Not received
Copies of diaries of the positions and staff of aerodrome security relating to the proper functioning of the flight radio navigation and lighting equipment on 7 and 10 April 2010	Not received
Radio correspondence and record of radar course of flight in the airspace of the Russian Federation	Data includes radio correspondence on CVR. No records of radar have been provided.
AIP of the Russian Federation regarding the rules of performing flights in the airspace of the Russian Federation by foreign civil and state airline aircraft, and national provisions applicable in relation to such flights.	Received
Minutes of survey of the place of the accident.	Not received
Drawing of the place of the accident	Received – May 2010
Film material prepared at the place of the accident immediately after the disaster	Not received
Film material documenting the inspection and activities carried out following the disaster.	Not received
Photographic documentation from the place of the accident prepared immediately after the disaster	Not received
Photographic documentation prepared of the inspection and activities carried out at the place of the accident.	Not received
Drawing of the place of the accident	Received – May 2010

Photographic and film documentation of the aircraft wreck from the place of the accident documenting the movement of the debris.	Not received
Photographic and film documentation of the aircraft wreck from the place of the accident documenting the progress of the aeroplane wreck reconstruction.	Not received
Photographic and film documentation documenting the location and technical state of the aerodrome equipment – including lighting, BRL and DRL.	Not received
Film and photographic materials collected by the informational agency at the place of the accident.	Not received
List of expertise of technical equipment, systems and devices used on board conducted.	Not received
List of expertise of technical equipment, systems and devices used on board conducted in progress including the completion date thereof.	Not received
List of planned expertise of technical equipment, systems and devices used on board conducted including starting and ending dates.	Not received
Results of expert tests of samples of fuel, oils and hydraulic fluid collected at the wreck.	Received – September 2010
Maintenance book of the Tu-154M aircraft, which was on board the aircraft and was found at the place of the accident.	Received – September 2010
Technical documentation of the Tu-154M aircraft (made available to IAC)	Received
Staff documents connected with the preparation for and realisation of the flight found at the place of the accident.	Received – September 2010
Statements and notes from conversations with witnesses of the accident (list should include persons on the Polish side located in the aerodrome at Smolensk as well as witnesses on the side of the Russian Federation, including persons participating in the rescue effort).	Not received
TAF and METAR messages recreated by the meteorological services in Belarus and Russia of the surroundings of the aerodrome forwarded to the AFTN network on 7 and 10 April 2010.	These were available for civil aerodromes.
List of hourly data about the weather from the synoptic station of Smolensk Yuzhny – dated 10 April 2010	Information received
Statement by staff or meteorological services of the Smolensk “Severny” aerodrome regarding changes in conditions.	Received
Document containing information as to whether there were other stations recording atmospheric conditions (e.g. road stations, university stations, other) in direct proximity with the aerodrome, and details of such stations.	Not received
METAR messages from the Moscow – Vnukovo, Minsk and Vitebsk aerodromes dated 10 April 2010	These were available in the AFTN system

Minutes of the court medical section (inspection) of corpses of members of the crew and persons in the cockpit.	Not received
Results of biochemical and toxicological tests on the crew and persons in the cockpit.	Not received
Minutes of measures and tests identifying the victims of the disaster	Not received
Expert opinions, results of analyses relating to the activities of the crew at critical moments of the flight.	Received – analysis of activities of the commanders of the aircraft
Expert opinions, results of analyses relating to correspondence and conversations in the cabin.	Received – analysis of activities of the commanders of the aircraft
Expert opinion relating to the psychological profile of specific members of the crew.	Received – analysis of commanders of the aircraft
Expert opinion, results of analyses relating to an evaluation of the CRM of the crew.	Received – analysis of activities of the commanders of the aircraft
Expert opinion, results of analyses relating to the level of training of the members of the crew.	Not received
Expert opinion, results of analyses relating to the level of training of CATC, KSL, AD, BRL and DRL support staff.	Not received
Expert opinion, results of analyses relating to evaluation of the activities of CATC, KSL, AD, BRL and DRL support staff.	Not received

## DETAILED REMARKS

### General

The Polish party requests that the text on page 12, first paragraph, be amended:

*“(36 regiment of the Air Force of the Republic of Poland, hereafter the special air force regiment)”*

to read as follows:

*“(36<sup>th</sup> special air transport regiment of the Air Force of the Republic of Poland, hereafter the Special Air Regiment)”*.

### 1. Factual information

Having read the draft Final Report prepared by IAC (hereafter the Report), the Polish party asserts that the specific chapters of the Report are not written according to the requirements in the document **ICAO Doc 9756 Manual of Aircraft Accident and Incident Investigation, part IV Reporting**. According to the method of preparing reports of investigations into aircraft accidents, described in the above document, chapter **1 Factual information** should not contain evaluation and analyses, instead these elements should be included in chapter **2 Analysis**.

#### 1.1 History of the flight

This chapter is missing significant amounts of information that should be included in it pursuant to the form set out in Annex 13 and the recommendations contained in the document , **ICAO Doc 9756 Manual of Aircraft Accident and Incident Investigation, part IV Reporting**.

Among others the following information is missing:

1. Selected radio commends with the time of their transmission, which are important to understand the course of the flight.
2. Many facts regarding the progress of the flight, which are often mentioned in chapter **2 Analysis**, but which are missing from this chapter.
3. Information which was known or not known to the crew before the accident and had an impact on its course.

#### 1) regarding pages 15 and 16 of the Report

*The letter of the Embassy of the Republic of Poland in the Russian Federation contained a request to provide handling at Smolensk aerodrome as well as “up-to-date aerodrome charts and procedures”. The Polish side requested to provide a navigator on board the aircraft (...)  
(...)there was no leaderman-navigator on board the aircraft.<sup>1</sup>*

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<sup>1</sup> Citation from the draft MAK report were distinguished by the use of font: font – Times New Roman; size – 10; style – italics; colour – blue.

On 9 April 2010, the Ministry of Foreign Affairs of the Russian Federation sent a letter to the Embassy of the Republic of Poland in the Russian Federation with a flight permission (letter reference 176 CD/10 with a flight permission for flight PLF 101 and letter reference 177 CD/10 for flight PLF 031). In these permissions, **there is no reference to the request for up to date aerodrome charts and procedures.** In the latter part of the Report no information is provided as to whether such details were provided to the Polish party. **There is also a lack of information regarding the acceptance of the Polish party's decision not to use the presence of a "leaderman-navigator" on board the Polish aircraft.**

In the opinion of the Polish party the flight permissions, in view of the failure to comply with the requirements formulated in clause 3.9 of Russian AIP GEN 1.2-9, the waiver of which may not be justified by the waiver of the presence of a leaderman-navigator on board the aircraft received from the 36 splt cannot be justified.

**2) regarding page 16 of the Report**

*On 10 April 2010 the crew of the special air force regiment of the Polish Air Forces including the PIC the co-pilot, the navigator and the flight engineer conducted a non-scheduled international flight PLF 101 Category "A".*

At no point in the IAC Report is there any indication of the provisions that specify the status of the flight in the RF (designation "K" and "A"), what they mean and what type of special treatment is applied to this status.

**3) regarding page 16 of the Report**

*Besides the 4 flight crew members there were 3 cabin crew members...*

On board the aircraft there were 4 cabin crew members. The BOR functionary was a member of the staff on board – a stewardess. She had relevant training and competence. The composition of the staff on board was presented several times to the IAC committee complete with explanations and documentation.

**4) regarding page 17 of the Report**

*Considering the provisions of the Russian AIP, the Controller cleared the crew to approach but later warned the crew not to descend below 100 m and required them to be ready for missed approach from that altitude*

The cited text analyses the actions of the CATC, and does not describe the facts. This type of wording should be contained (in accordance with the methods of preparing reports of investigations into aircraft accidents, described in the document **ICAO Doc 9756 Manual of Aircraft Accident and Incident Investigation, part IV Reporting**) in chapter **2 Analysis**. In fact, the CATC, having ensured that there was a sufficient reserve of fuel and reserve aerodromes, provided the crew of the Tu-154M aircraft with

information concerning the meteorological conditions prevailing at the Smolensk “Severny” aerodrome including the fact that there were no landing conditions. Subsequently, he accepted information from the crew of the intention to carry out an attempt to approach and took control of the flight in order to guide the aircraft in the approach zone. Information concerning the restrictions on the permission to descend to 100 m and the readiness to make another circle was forwarded by CATC to the crew at 10:35:28.5 LT (according to the transcript of conversations recorded by the flight voice recorder of the Tu-154M aircraft processed by IAC), as the aircraft made a third circle at an altitude of 500 m.

### 1.5.1. Details of the aircraft crew

The details cited in this sub clause are inconsistent with the statement in clause **1.16.10** (page 133 of the Report) regarding the fact that the PIC had from 2000 flown a Tu-154M aircraft as co-pilot (whilst also flying a Yak-40 aircraft as co-pilot). This is inconsistent with the actual timing of flights with this type of aircraft, since he started flying as co-pilot of the Tu-154M aircraft only in 2002.

The number of flights carried out by individual members of the crew is in some places inconsistent with the information of the Polish party based on personal flight diaries and squadron records of the flights carried out by the 36 spt.

In the tables below the differences regarding the hours flown by the crew of the Tu-154M aircraft.

<b>Hours flown compared (crew’s designation)</b>	<b>Polish party</b>	<b>IAC</b>
Total hours flown	3531 hours 38 minutes	3400 hours
Hours flown by persons in command	608 hours 53 minutes	Not calculated
Hours flown in Tu-154	2906 hours 55 minutes	Not calculated
Hours flown by persons in command in Tu-154	492 hours 21 minutes	530 hours
Hours flown as co-pilot on board Tu-154	1794 hours 8 minutes	1663 hours
Hours flown as navigator on board Tu-154	620 hours 26 minutes	656 hours
Hours flown in Yak-40	433 hours 56 minutes	Not calculated
Hours flown by persons in command on board Yak-40	116 hours 32 minutes	72 hours
Hours flown as co-pilot on board Yak-40	317 hours 24 minutes	Not calculated
Hours flown on board TS-11	190 hours 47 minutes	Not calculated
Hours flown in the last 90 days	54 hours 30 minutes	Not calculated
Hours flown in the last 30 days	17 hours 7 minutes	17 hours 7 minutes
Hours flown in the last 3 days	Not calculated	2 hours 56 minutes
Hours flown on the day of the accident	Not calculated	1 hour 14 minutes

<b>Hours flown compared (co-pilot)</b>	<b>Polish party</b>	<b>IAC</b>
Total hours flown	1909 hours 8 minutes	1700 hours
Hours flown by persons in command	222 hours 23 minutes	Not calculated
Hours flown in Tu-154	475 hours 6 minutes	Not calculated
Hours flown as co-pilot on board Tu-154	193 hours 32 minutes	198 hours
Hours flown as navigator on board Tu-154	281 hours 34 minutes	277 hours
Hours flown in Yak-40	1219 hours 34 minutes	1192 hours
Hours flown by persons in command on board Yak-40	222 hours 23 minutes	Not calculated
Hours flown as co-pilot on board Yak-40	997 hours 11 minutes	Not calculated
Hours flown on board TS-11	187 hours 15 minutes	Not calculated
Hours flown on board PZL-130	20 hours 48 minutes	Not calculated
Hours flown on board M-28	6 hours 25 minutes	Not calculated
Hours flown in the last 90 days	58 hours 10 minutes	Not calculated
Hours flown in the last 30 days	35 hours 27 minutes	35 hours 27 minutes
Hours flown in the last 3 days	Not calculated	1 hour 14 minutes
Hours flown on the day of the accident	Not calculated	1 hour 14 minutes

<b>Hours flown compared (navigator)</b>	<b>Polish party</b>	<b>IAC</b>
Total hours flown	1074 hours 18 minutes	1060 hours
Hours flown on board Tu-154	59 hours 19 minutes	Not calculated
Hours flown as navigator on board Tu-154	59 hours 19 minutes	59 hours
Hours flown on board Yak-40	302 hours 15 minutes	389 hours
Hours flown as co-pilot on board Yak-40	302 hours 15 minutes	Not calculated
Hours flown on board TS-IL	251 hours 13 minutes	Not calculated
Hours flown on board PZL-130	461 hours 31 minutes	Not calculated
Hours flown in the last 90 days	71 hours 36 minutes	Not calculated
Hours flown in the last 30 days	12 hours 15 minutes	7 hours 40 minutes
Hours flown in the last 3 days	Not calculated	1 hour 14 minutes
Hours flown on the day of the accident	Not calculated	1 hour 14 minutes

<b>Hours flown compared (technician)</b>	<b>Polish party</b>	<b>IAC</b>
Total hours flown	330 hours 6 minutes	320 hours
Hours flown on board Tu-154	330 hours 6 minutes	320 hours
Hours flown as technician on board Tu-154	330 hours 6 minutes	59 hours
Hours flown in the last 90 days	47 hours 25 minutes	Not calculated
Hours flown in the last 30 days	7 hours 10 minutes	9 hours
Hours flown in the last 3 days	Not calculated	1 hour 14 minutes
Hours flown on the day of the accident	Not calculated	1 hour 14 minutes



## 1.5.2. Evaluation of the professional training of members of the crew and organisation of aviation work

### 1) re page 28 of the Report

*The provided data that the PIC underwent international flights training from 14.01.2005 to 24.04.2005 at LOT Airline are dubious as at that period the PIC was extensively engaged in flights...*

In this sub-chapter, the IAC committee expresses misgivings concerning the training of the persons in command between 14 January to 24 April 2005 and the theoretical course to obtain a ATPL(A) license, arguing that during the training the pilot carried out operational flights, which lasted 32 days. The IAC committee thus suggests that the person in command of the crew could not have participated in the course while at the same time carrying out flights.

It is the opinion of the Polish party that the suggestion in the text is erroneous. The course comprised 308 hours of lessons, which were conducted mostly in the afternoon, as well as on Saturdays and Sundays. The course took place in the training premises of PLL LOT SA. Bearing in mind that 101 days were designated for this program, there is no basis for making such conclusions. If the Training Centre had established that the pilot was not participating in the required number of hours of training, then it would not have issued a Certificate regarding participation in the course. IAC's statement is an unjustified disparagement of the credibility of the training provided in the Certified Training Centre.

### 1.5.3. Details of the ground crew

1) In the table regarding CATC headed **Medical examination before shift** the following text appears:

*At 05:15, authorised for air traffic control by the doctor on duty of Military Unit 06755*

2) In the table regarding KSL headed **Medical examination before shift** the following text appears:

*At 06:50, authorised for air traffic control by the doctor on duty of Military Unit 06755.*

In his statements made before the public prosecutor on 10 April 2010 between 2 and 4 PM, KSL stated that the medical unit was closed at this time. The statement contains the following text: *“I felt good on 10 April 2010. Around seven o'clock that day, Plusnin and I underwent a medical examination at the Military Health Facility unit 06755: / - **NB Translator: before the word “underwent” the word “did not” is added / as a result of which it was concluded that I was in good health / NB Translator: the deleted words are deleted in the original minutes/**, since there was nobody at the medical unit, but as I already stated, I felt good and nothing happened that would affect my ability to carry out my official duties.”*

The above statement is inconsistent also with provisions in the medical examination log, according to which Pavel Plusnin underwent an examination at 5.15 and Viktor Ryzhenko at 6.50.

3) in the table regarding KSL headed *Experience in the last 12 months: (...), as landing zone controller – 9 shifts.*

An analysis of the document entitled “*Preparation of GKL to control traffic*” shows that in the period of the last 12 months (10 April 2009 – 9 April 2010), Viktor Ryzhenko worked as KSL:

- in 2010: 7 April; 1 April; 11 March; 16 February; 9 February; 12 January,
- in 2009: 10 November; (entry changed), 26 August;
- only once in TWA (9 February 2010).

The above indicates that he worked in this position very rarely.

It is not specified during how many shifts (periods on duty) the radar landing system RSP-6M2, used in the Smolensk “Severny” aerodrome, was used.

In the document entitled “*Training of GKL for flight control*” on page 53: Chapter IL – “*Permission to control flights*” – KSL: - the last entry is made on 17 December 2007 without reference to aircraft of the Tu-154M type (types of aircraft referred to: An-12, An-22, An-26 and IL-76).

On page 62 of the document “*Training of GKL for flight control*” permission to control flights “*Verification of the ability to control flights in the KSL position*” was verified **only during day-night, ordinary atmospheric conditions. There is no entry whatsoever concerning verification of the KSL function at the Smolensk “Severny” aerodrome.**

During hearings by IAC, on 18 April 2010, KSL stated that KSL worked at the Smolensk “Severny” aerodrome for the first time with flight security on 7 April 2010.

4) The report does not contain any information about the qualifications or authority of the CATC assistant – Major V.V. Lubancev.

## **1.6. Information about the aircraft**

1) *Basic data concerning the aircraft: “Certificate of release of flights – Polish party has not provided.*

No up to date “Technical of Airworthiness” was issued for the aircraft Tu-154M factory number 90A837 tail number 1010.

The principal document regulating the rules for technical aviation maintenance in the Armed Forces of the RP is the “Aviation Engineering Service Instruction of the Air Force of the Armed Forces of the RP.

Part I” (DWLiOP, Poznan 1991, ref. WLOP 21/90), **according to which there is no requirement to issue such a document.**

The formal **manner of evaluation to airworthiness of an aircraft** is set out in the above mentioned “Aviation Engineering Service Instruction of the Air Force of the Armed Forces of the RP. Part I” (DWLiOP, Poznan 1991, ref. WLOP 21/90):

- clause 12, which reads as follows:

*“An airworthy aircraft is an aircraft on which the works as provided in regulatory documents are carried out, from which faults confirmed during flights and discovered on the ground are removed, and which has adequate technical reserve resources”;*

- clause 13, which reads as follows:

*“A combat ready aircraft is an aircraft which is ready to fly and equipped with combat equipment or other equipment in accordance with the combat task at hand”.*

- clause 384, which reads as follows:

*“Only equipment in good technical order may be used for flights, prepared in accordance with the instruction documents and additional requirements in connection with the tasks at hand.”*

It arises from Clause 385.1 that anybody who allows the use of an aircraft in the air:

*“Aircraft shall be allowed for use in the air by (in the scope of their respective areas of specialisation) commanders of special group of GOL or SIL staff from above the key technique, confirming the airworthiness of the aircraft and preparation according to JZOT with their signature in the service book of the aircraft. Commanders of the special group of GOL, .... shall supervise maintenance and be responsible for its implementation”.*

Abbreviations mean:

SP - aircraft

GOL – flight maintenance group(s);

SIL – flight engineering service;

JZOT – uniform set of technical maintenance (e.g. RO-86)

The Polish party did not confirm the airworthiness in the preparation of the aircraft according to the above mentioned provisions in the “Instructions...”.

In addition, the staff of the 36 splt also fulfilled the requirements set by the “Instructions for organisation of flights of aircraft with “HEAD” status” (Warsaw, 2009, ref. WLOP 408/2009), taking certain verifying measures (including a test flight) on 7 January 2010 and a commissioned test flight on 6 April 2010.

The confirmation of the maintenance work is included in the aircraft documentation provided by the IAC committee.

On 10 April 2010 the Tu-154M aircraft was permitted to fly by the Senior Warrant Officer K. F. at 05.40 (in accordance with the contents of the statement submitted), who made an appropriate entry in the “Aircraft maintenance log No 101 90A837” (RWD 343/14) in the “Flight technical report. Parameters” on page 20, in part I “General information. Permission and approval of the plane”, in the column headed “Permission to fly”, and the headings “Name” and “Signature”.

The maintenance work on the aircraft Tu-154M No 90A837 tail number 101 was carried out (according to RO-86) by aviation engineering staff of the 36 splt comprising the following:

**a) airframe and engine specialist (PiS):**

- senior key PiS technician – Senior Warrant Officer K. F. – supervising PiS work;
- aircraft technician – Sergeant P. L. – carrying out PiS work;

**b) aviation equipment specialist (O):**

- senior key equipment technician – Junior Warrant Officer R. R - supervising the work with special equipment;
- aircraft technician – Senior Warrant Officer R.B. – carrying out work relating to special equipment;

**c) radio electronic equipment specialist (URE):**

- senior key URE technician – sergeant J. F. – supervising the URE specialist work;
- senior aircraft maintenance N.C.O. – Senior Cprl. L. M. – carrying out the URE specialist work.

In the process of preparing the aircraft for flight senior technicians also participated – Warrant Officer Andrzej MICHALAK (according to the “Instructions for organisation of flights of aircraft with “HEAD” status” (Warsaw, 2009, ref. WLOP 408/2009).

Senior Warrant Officer K. F. supervised the activities in the scope of on-going maintenance of the airframe and engines of the aircraft by Sergeant P. L. who confirmed that the maintenance measures had been carried out with his own signature in the “Aircraft maintenance log No 101 90A837”, in the “Technical flight report. Parameters” carried out on 10 April 2010 on page 20, in part VI “Confirmation

of technical maintenance and supervision”, in the columns “Inspection A<sub>2</sub> P<sub>s</sub>”, “Signature”, under the headings “Airframe”, “Engines” and “Złanie odst.”.

Senior Warrant Officer R. B. confirmed the completion of maintenance measures with his own signatures in the “Aircraft maintenance log No 101 90A837”, in the “Technical flight report. Parameters” carried out on 10 April 2010 on page 20, in part VI “Confirmation of technical maintenance and supervision”, in the columns “Inspection A<sub>2</sub> P<sub>s</sub>”, “Signature”, under the headings “Electric” and “Devices”.

There was no section “Aircraft maintenance log No 101 90A837” containing the signature of Junior Warrant Officer R. R. in the “Technical flight report. Parameters” on page 20, in part VI “Confirmation of technical maintenance and supervision”, in the columns “Inspection A<sub>2</sub> P<sub>s</sub>”, “Signature”, under the headings “Electric” and “Devices”. (only his initials were found under the headings in the columns “Supervision” and “Name”).

Senior Cprl. L. M. confirmed the completion of maintenance measures with his own signature in the “Aircraft maintenance log No 101 90A837”, in the “Technical flight report. Parameters” carried out on 10 April 2010 on page 20, in part VI “Confirmation of technical maintenance and supervision”, in the columns “Inspection A<sub>2</sub> P<sub>s</sub>”, “Signature”, under the heading “Radio”. There was no section “Aircraft maintenance log No 101 90A837” containing the signature of Sergeant J. F. in the “Technical flight report. Parameters” dated 10 April 2010 on page 20, in part VI “Confirmation of technical maintenance and supervision”, in the columns “Inspection A<sub>2</sub> P<sub>s</sub>”, “Signature”, under the headings “Radio”. (only his initials were found under the headings in the columns “Supervision” and “Name”).

The Senior Flight Maintenance Technician – Warrant Officer Andrzej MICHALAK tested the engines. In the “ No 101 90A837”, in the “Technical flight report. Parameters” carried out on 10 April 2010 on page 20, in part VII “Damage discovered during maintenance not included in the set. NB pilot and supervisors” the Senior Flight Maintenance Technician – Warrant Officer Andrzej MICHALAK wrote:

*“The main engines were ignited on low power. The process of ignition and parameters of low power are compliant with WT. The engines were switched on 5 minutes on the ground. SWC progress: 1) – 34 seconds, 2) – 36 seconds, 3) – 33 seconds”* and confirmed the completion of the test with his signature.

Senior Warrant Officer K. F. (according to his statement) confirmed in the “Aircraft maintenance log No 101 90A837” that all PiS works had been completed.

There was no section “Aircraft maintenance log No 101 90A837” containing the signature of Senior Warrant Officer K. F. in the “Technical flight report. Parameters” on page 20, in part VI “Confirmation of technical maintenance and supervision”, in the columns “Supervision”, “Signature”, under the headings “Airframe”, “Engines” and “Zlanie odst.” (only his initials were found under the headings in the columns “Supervision” and “Name”).

There was no section “Aircraft maintenance log No 101 90A837” containing the signature of Senior Warrant Officer K. F. in the “Technical flight report. Parameters” on page 20, in part VI “Confirmation of technical maintenance and supervision”, in the columns “Completed”, under the headings “Date” and “Time” and “Signature” confirming the completion of maintenance works in all areas of specialisation.

The aircraft was released by Senior Warrant Officer K. F. at 05.40 (the time was specified in his statement) who made the relevant entry in the “Aircraft maintenance log No 101 90A837” in the “Technical flight report. Parameters” on page 20, in part I “General. Permission and approval of the aircraft”, in the column “Permission to fly” under the headings “Name” and “Signature”.

In addition, according to clause 388 “Aviation Engineering Service Instruction of the Air Force of the Armed Forces of the RP. Part I” (DWLiOP, Poznan 1991, ref. WLOP 21/90):

*“Readiness of an aircraft to fly shall be confirmed by, in addition to SIL staff, the flying crew. The approval of the aircraft for the flight shall be confirmed before each flight by the commander of the crew (pilot) by a signature in the maintenance book upon the completion of all controlling and verifying measures required pursuant to technical piloting instructions of the relevant aircraft...”*

**In view of the above it can be concluded that the aircraft Tu-154M factory number 90A837 tail number 101 was adequately prepared for the flight by the SIL staff and airworthy as at 10 April 2010.**

**2) Basic information about the aircraft: “Total hours flown - by 8 April 2010: 5143 hours, 3899 landings”.**

The Polish side noted the differences in the calculation of the flying time and the number of landings in relation to those reported in the “Form of aircraft TU-154M No 837. Part I. Planner and systems included.”

do wykazanych w „Формуляр самолета ТУ-154М Но 837. Часть 1. Планер и входящие в него системы”.

	Flying time according to the Commission's calculations	Flying time according to the documentation	Difference	The number of landings according to the Commission's calculations	The number of landings according to the documentation	Difference
Until the first MO	1133 h 05 min	1133 h 00 min	00 h 05 min	1067	1070	-3
Between the first MO and the second MO	1350 h 38 min	1350 h 33 min	00 h 05 min	1045	1036	9
from the beginning of operation until the second MO	2483 h 43 min	2483 h 33 min	00 h 10 min	2112	2105	7
Between the second MO and the third MO	2517 h 46 min	2522 h 21 min	-04 h 35 min	1718	1718	0
from the beginning of operation the third MO	5001 h 29 min	5003 h 54 min	-02 h 25 min	3830	3833	-3
From the third MO until the day of the crash inclusively	140 h 43 min	140 h 43 min	00 h 00 min	77	77	0
From the third MO until 08.04.2010 inclusively	139 h 29 min	139 h 29 min	00 h 00 min	76	76	0
from the beginning of operation until the day of the crash inclusively	5142 h 12 min	5144 h 37 min	-02 h 25 min	3907	3900	7
from the beginning of operation until 08.04.2010 inclusively	5140 h 58 min	5143 h 23 min	-02 h 25 min	3906	3899	7

The differences in the calculation of individual flying time and landings, as stated above, are insignificant. Errors committed by the person making the entries in the documentation did not exceed the operating restrictions imposed on the airframe, its systems and engines, and had no effect on the decisions about the performance of overhauls.

In order to clarify the data it is proposed to replace the entry “On 08.04.2010: 5143 hours, 3899 landings” with the following entry: “On 08.04.2010: 5141 hours, 3906 landings.”

**3) Basic aircraft information: “Remaining service life and remaining life between overhauls – remaining service life: 24857 hours of flight, 11101 landings, 5 years, 8 months. Remaining life between overhauls 7360 [sic] hours of flight, 4424 landings, 5 years 8 months”**

The Polish party proposes to replace the entry “**Remaining service life and remaining service life between overhauls** – remaining service life: 24,857 hours of flight, 11,101 landings, 5 years, 8 months. Remaining life between overhauls 7360 hours of flight, 4424 landings, 5 years 8 months.” with the following entry:

“**Remaining service life and remaining service life between overhauls** – remaining service life: 24859 hours of flight, 11094 landings, 5 years, 8 months. Remaining service life between overhauls 7361 hours of flight, 4424 landings, 5 years 8 months.”

**4) Basic aircraft information: “Last line maintenance - According to the flight log on 02.04.2009, service time 134 flight hours after last overhaul, 71 landings, form F-B, in accordance with Maintenance Regulation PO-86.**

F-B maintenance was performed on 06.04.2010 (it started on 02.04.2010 and completed on 06.04.2010 (and not in 2009).

B + Pp maintenance started after the return of the aircraft from its flight en route KRK-WAW, made on 01.04.2010. By 03.00 hours on 02.04.2010 three (3) B maintenance tasks were completed. The work was continued on the same day between 08.00 and 12.50 hours and consisted of another 52 (fifty two) tasks, including supplementing of oil in the engines and the TA-6 auxiliary power unit, replacing engine fuel filters and hydraulic filters. The work under B maintenance was completed with the performance of a remaining 8 (eight) tasks on 06.04.2010 at 13.30 hours. The database of KLN89B and UNS1D devices were updated and required tests were performed (engine installations tightness tests).

This information can be found in the logbook of the aircraft found at the scene of the air incident, which was subject to the analysis of the IAC Commission.

**5) Basic aircraft information: “Insurance - Insurance policy not provided.”**

Chief of Staff - Deputy Commander of the Air Force provided information in the letter No. 1030/10/SZTAB dated 22.04.2010 that the Tu-154M aircraft was not insured. A copy of the letter was submitted to a representative of IAC on 30.04.2010. It should however be noted that, according to the legal regulations of the Republic of Poland, the Tu-154M aircraft, tail No. 101 was treated as a state aircraft and as such was not subject to compulsory insurance.

**6) regarding the entry on page 36 of the Report.**

*“The Maintenance Organisation Certificate was not provided by the Polish side.”*

Admission to the performance of maintenance work on aviation equipment by a military unit is based on the Order of that Military Unit Commander, authorising the personnel of the Aviation Engineering Service to self-handling maintenance work on a given type of aircraft within their military areas of specialisation. In the 36th Special Regiment of Aviation Transport the same personnel both line maintenance and special maintenance on the Tu-154M aircraft as well as interim maintenance, admitted for performance within the military unit (level FI, FIK). The regulations existing in the Polish Air Force Armed Forces do not provide for the issuing of a maintenance organisation certificate.



**7) regarding the entry on page 37 of the Report.**

*“The last base maintenance form F-1K-86 was conducted 23.03.2010. Service time since last overhaul by then was 114 flight hours, 61 landings. The number of maintenance sheet was not recorded in the flight log.”*

The Polish side determined that maintenance sheets were not kept in the 36th Special Regiment of Aviation Transport. Each maintenance work is recorded in the following “Records of periodic maintenance” which were made available to the IAC Commission:

- “Records of periodic maintenance second operational segment of airframes and engines, first squadron of military unit 2139,” Signature RDI 61/32;
- “Records of periodic maintenance of Tu-154M aircraft. Electrical equipment and flight instruments. Part I. Periodic maintenance No. 1K.” Signature RDI 388/28;
- “Records of periodic maintenance formation REE, first flight squadron of military unit 2139.” Signature RDI 282/13.

Checks carried out during maintenance work are recorded in the following documents:

- “Records of Tu-154M aircraft parameters.” Signature RDI 61/33;
- “Records of Tu-154M aircraft parameters. Periodic maintenance 1, 1K. Airframe Systems” Signature RDI 388/33;
- “Records of Tu-154M aircraft parameters. Periodic maintenance 1, 1K. Electric installation” Signature RDI 388/35;
- “Records of Tu-154M aircraft parameters. Periodic maintenance 1, 1K. Flight instruments” Signature RDI 388/34;
- “Records of Tu-154M aircraft parameters. URE formation” Signature RDI 282 / 7;

Moreover, the performance of individual service points in accordance with TO RO-86 was recorded in the “Aircraft maintenance logbook No. 101 90A837” (registered under RDI No. 393/13).

**8) regarding the entry on page 37 of the Report.**

*“According to the records in the flight log, found at the accident site, the last line maintenance form F-B in accordance with RO-86 was conducted on 02.04.2010 with service life after overhaul of 134 flight hours, 71 landings. Information on the maintenance personnel authorisation was only provided for one out of eleven specialists.”*

The last line maintenance form F-B, which was performed on 02 to 06.04.2010 in accordance with TO RO-86, was carried out by 13 (thirteen) technical specialists and not 11 (eleven) as stated in the IAC report. The adjustment is based on data contained in The aircraft maintenance logbook of Tu-154M, located on board the “101” aircraft en route from WAW-Smolensk on 10 April 2010 and found at the accident site.

The group of 13 members of technical personnel involved in the maintenance form F-B consisted of ten (10) technicians and three (3) supervisory employees in their various areas of specialisation - A&E (airframe-engine), REE (radio and electronic equipment) and aviation equipment.

The following table (along with the numbers of the Daily Commander's Orders) presents the full composition of the technical staff performing maintenance form F-B and supervisors, along with their permissions to perform maintenance of Tu-154M aircraft as well as the basis and the date of their issue (Daily Orders of 2139 Military Unit Commander) .

No.	Surname, first name	Nature of Work	Rank	Area of specialisation	Position	Obtaining permission to perform maintenance of Tu-154M, order No.
1	B. G.	technician	sergeant major	A&E	senior technician	<i>Daily Order No. Z-97/2005 of 29.05.2005.</i>
2	F. K.	technician	senior warrant officer	A&E	senior technician	<i>Daily Order No. 210/95 of 02.11.1995.</i>
3	K. D.	technician	senior corporal	A&E	non-commissioned officer	<i>Daily Order No. Z-105/2008 of 30.05.2008.</i>
4	K. D.	technician	senior warrant officer	Equipment	technician	<i>Daily Order No. 247/2004 of 21.12.2004.</i>
5	K. T.	supervisor	senior warrant officer	A&E	group leader	<i>Daily Order No. 210/95 of 02.11.1995.</i>
6	L. T.	technician	senior platoon leader	A&E	technician	<i>Daily Order No. 147/06 of 02.08.2006</i>
7	L. P.	technician	Sergeant.	A&E	technician	<i>Daily Order No. Z-89/2007 of 09.05.2007.</i>
8	O. P.	technician	senior corporal	A&E	non-commissioned officer	<i>Daily Order No. Z-130/2008 of 04.07.2008.</i>
9	P. M.	technician /supervisor	sergeant	Equipment	technician	<i>Daily Order No. 206/98 of 23.10.1998</i>
10	R. R.	supervisor	junior staff sergeant	Equipment	technician	<i>Daily Order No. 175/96 of 10.09.1996.</i>
11	T. A.	supervisor	senior warrant officer	REE	technician	<i>Daily Order No. 99/99 of 24.05.1999.</i>
12	W. A.	technician	civilian	REE	technician	<i>Daily Order No. Z-126/2005 of 01.07.2005.</i>
13	Z. R.	technician	sergeant	A&E	technician	<i>Daily Order No. 7.-221/2005 of 16.11.2005.</i>

Confirmation of the above technical staff qualifications (copies of the Daily Orders of Commander):

a) B. G. – extract, Daily order No. Z-97/2005 of 29.05.2005, the text:

*“ Upon completion of the examinations on construction, maintenance and operation of Tu-154M aircraft in the field of specialisation airframe and engine with an overall rating “good “ I authorise, as of 20.05.2005, the below mentioned professional soldier to self – perform maintenance of the Tu-154M aircraft in the above mentioned field of specialisation / another type /: sergeant major B. G.*

*Signed: COMMANDER /-/Colonel qualified pilot T. P.”*

b) F. K. - extract from the Archives of Air Force, Daily Order of 2139 Military Unit Commanders No. 210/95 dated 02.11.1995.

Text:

*“Upon completion of the examinations on construction, maintenance and operation of airframe and engine of Tu-154M aircraft with an overall rating “good” dated 30.10.95 I authorise the below mentioned to self-perform of airframe and engine of Tu-154M aircraft:*

**Junior warrant officer F. K.**

Junior warrant officer K. R.

Junior warrant officer K. T.

*At the same time I assign to the above mentioned, as of 30.10.95, technical uniforms, technical board “110”, additional remuneration direct maintenance of equipment.*

*Signed: COMMANDER /-/Colonel qualified pilot R. L.”*

c) K. D. - extract, Daily order No. Z-105/2008 of 30.05.2008

Text:

*“ Upon completion of the examinations on construction, maintenance and operation as well as safety rules during operation and maintenance of Tu-154M aircraft in field of specialisation / airframe and engine / with an overall rating “good “, which was scored by the below mentioned, I authorise, as of 30.05.2008:*

*- Corporal. K. D.*

*To self – perform maintenance of Tu-154M aircraft in the field of specialisation mentioned above.*

*Signed areas of specialisation: COMMANDER /-/ Colonel qualified pilot T. P.”*

d) K. D. - extract, Daily order No. 247/2004 of 21.12.2004

Text:

*“Upon completion of the examinations on construction, maintenance and operation of Tu-154M aircraft in field of specialisation equipment with an overall rating “good” I authorise, as of 21.12.2004, senior warrant officer D. K. to self – perform maintenance of airframe and engine of the Tu-154M aircraft in the above-mentioned areas of specialisation. Signed: COMMANDER /-/pp Lt. Col. engineer K. K.”*

e) **K. T.** - extract from the Archives of Air Force, Daily Order of 2139 Military Unit Commanders No. 210/95 of 02.11.1995.

Text:

*“Upon completion of the examinations on construction, maintenance and operation of Tu-154M aircraft in field of specialisation airframe and engine with an overall rating “good” I authorise, as of 30.10.95, the below mentioned to self-perform maintenance of Tu-154M aircraft in the above mentioned field of specialisation:*

*Junior warrant officer F. K.*

*Junior warrant officer K. R.*

**Junior warrant officer K. T.**

*At the same time I assign to the above mentioned, as of 30.10.95 technical uniforms, technical board “110”, additional remuneration direct maintenance of equipment.*

Signed: COMMANDER /-/ Colonel qualified pilot R. L”

f) **L. T.** - extract, Daily order No. Z-147/2006 of 02.08.2006.

Text:

*“Upon completion of the examinations on construction, maintenance and operation of Tu-154M aircraft in field of specialisation airframe and engine with an overall rating “good” I authorise, as of 03.08.2006, the below mentioned soldiers to self-perform maintenance of Tu-154M aircraft in the above mentioned field of specialisation:*

***senior platoon leader L. T.***

*senior platoon leader P. Z.*

*Signed: COMMANDER /-/pp Lieutenant Colonel pilot R. R.”*

g) **L. P.** - extract, Daily order No. Z-89/2007 of 09.05.2007.

Text:

*“Upon completion of the examinations on construction, maintenance and operation as well as safety rules during operation and maintenance of Tu-154M aircraft in field of specialisation / airframe and engine / with an overall rating “good”, I authorise, as of 10.05.2007, the below mentioned professional soldier to self – perform maintenance of Tu-154M aircraft in the field of specialisation mentioned above.*

*Corporal L P.*

*Signed: COMMANDER /-/ Col. pilot T. P.”*

h) **O. P.** - extract, Daily order No. Z-130/2008 of 04.07.2008.

Text:

*“ Upon completion of the examinations on construction, maintenance and operation as well as safety rules during operation and maintenance of Tu-154M aircraft in field of specialisation / airframe and engine / with an overall rating “good”, I authorise, as of 04.07.2007,*

*Corporal O. P.*

*to self – perform maintenance of Tu-154M aircraft in the field of specialisation mentioned above.*

*Signed: COMMANDER /-/ Colonel qualified pilot T. P.”*

i) **P. M.** - extract, Daily order No. 206/98 of 23.10.98, the

Text:

*“ Upon completion of the examinations on construction, maintenance and operation of Tu-154M aircraft in field of specialisation equipment with an overall rating “good” I authorise, as of 22.10.1998, warranty officer P.M., to self-perform maintenance of an aircraft in the above mentioned field of specialisation / another type of aircraft /*

*Signed: COMMANDER /-/ Colonel qualified pilot R. L”*

j) **R. R.** - extract from the Archives of Air Force, *Daily Order of 2139 Military Unit Commanders No. 175/96 of 10.09.1996.*

Text:

*“Upon completion of the examinations on construction, maintenance and operation of Tu-154M aircraft equipment with an overall rating “good” I authorise, as of 04.09.1996, to self – perform maintenance of Tu-154M aircraft equipment.*

**warrant officer R. R.**

*Signed: COMMANDER /-/ Colonel qualified pilot R. L”*

k) **T. A.** - extract, *Daily order No. 99/99 of 24.05.1999*

Text:

*“Upon completion of the examinations on construction, maintenance and operation of Tu-154M aircraft in field of specialisation REE with an overall rating “good” I authorise, as of 21.05.1999, junior warranty officer A. T. to self-perform maintenance of Tu-154 aircraft in the above mentioned field of specialisation.*

*Signed: COMMANDER /-/ Colonel qualified pilot K. M.”*

1) **W. A.** - extract, *Daily order No. 1-126/2005 of 01.07.2005*

*Text:*

*“Upon completion of the examinations on construction, maintenance and operation of Tu-154M aircraft in field of specialisation REE with an overall rating “good” I authorise, as of 01.07.2005, Mr. W. A. to self-perform maintenance of Tu-154 aircraft in the above mentioned field of specialisation.*

*Signed: COMMANDER /-/ pp Lieutenant Colonel pilot R. R.”*

M) **Z. R.** - extract, *Daily order No. Z-221/2005 of 16.11.2005*

*Text:*

*“Upon completion of the examinations on construction, maintenance and operation of Tu-154M aircraft in field of specialisation airframe and engine with an overall rating “good” I authorise, as of 16.11.2005, senior platoon leader Z. R. to self-perform maintenance of Tu-154 aircraft in the above mentioned field of specialisation.*

*Signed: COMMANDER /-/ Col. pilot T. P.”*

Based on the information listed above it can be stated that **all technicians, performing maintenance form F-B of Tu-154M aircraft, tail No. 101 on 02 to 06.04.2010 had appropriate authorisation / approval / to carry out maintenance of Tu-154M aircraft.**

**9) regarding the entry on page 37 of the Report.**

*“The Polish side provided a list of maintenance personnel who conducted maintenance of Tu-154M aircraft, tail number 101 on 10.04.2010 According to the provided information, only three out of six persons were authorised for this kind of maintenance.”*

On 10.04.2010, immediately before the flight to Smolensk, **A2 + AE** maintenance was performed (work commenced at 04.00hours) of Tu-154M aircraft tail No. 101. Maintenance works were performed by 6 (six) specialists of technical staff.

The following table (along with the numbers of the Daily Orders of Commander) presents the full composition of the team of supervisors and technicians performing **A2 + AE** maintenance along with their permissions to perform maintenance of Tu-154M aircraft as well as the basis and the date of their issue (Daily Orders of 2139 Military Unit Commander).

No.	Surname, first name	Nature of Work	Rank	field of specialisation	Position	Obtaining permission to perform maintenance of Tu-154M, order No.
1	F. J.	supervisor	Sergeant	REE	senior technician	Daily orders No. Z-106/2006 of 05.05.2006.
2	F. K.	supervisor	senior warrant officer	A&E	senior technician	Daily Order No. 210/95 of 02.11.1995.
3	L. P.	technician	Sergeant.	A&E	technician	Daily Order No. Z-89/2007 of 09.05.2007.
4	R. R.	supervisor	junior staff sergeant	Equipment	technician	Daily Order No. 175/96 of 10.09.1996.
5	M. L.	technician	senior corporal	REE	non-commissioned officer	Daily order No. Z-96/2008 of 16.05.2008.
6	B. R.	technician	senior warrant officer	equipment	technician	Daily Order No. 80/99 of 26.04.1999.

Confirmation of the above technical staff qualifications. (copies of the Daily Orders of Commander):

**F. J.** - extract, Daily order No. Z-106/2006 of 05.05.2006,

Text:

*“Upon completion of the examinations on construction, maintenance and operation of Tu-154M aircraft in field of specialisation REE with an overall rating “4.5” I authorise, as of 02.06.2006, the below mentioned soldier to self-perform maintenance of Tu-154 aircraft in the above mentioned field of specialisation / another type /: Sgt. F. J.*

*Signed: COMMANDER /-pp Lieutenant Colonel pilot R. R.”*

**B. R.** - extract, Daily order No. 80/99 of 26.04.1999

Text:

*“Upon completion of the examinations on construction, maintenance and operation of Tu-154M aircraft in field of specialisation equipment with an overall rating “4.5” I authorise, as of 16.04.1999, warrant officer R. B. to self-perform maintenance of Tu-154 aircraft in the above mentioned field of specialisation.*

*Signed: COMMANDER /- Lieutenant Colonel qualified pilot K. M.”*

**M. L.** - - extract, Daily order No. Z-96/2008 of 16.05.2008

Text:

*“3) Upon completion of the examinations on construction, maintenance and operation as well as safety rules during operation and maintenance of Tu-154M aircraft in field of specialisation / REE / with an overall rating “good”, which was scored by the below mentioned, I authorise, as of 17.05.2008, Corporal M. L. to self – perform maintenance of Tu-154M aircraft in the field of specialisation mentioned above.*

*Signed: COMMANDER /-pp Lieutenant Colonel qualified pilot R. R.”*

Confirmation of qualifications of the remaining technical personnel (listed in the table above) performing **A2 + AE** maintenance on 10.04.2010 was presented in the content of the comments made in point 8).

Based on the foregoing, it should be noted that **all technicians performing A2 + AE maintenance of Tu-154IM aircraft, tail number 101, on 10.04.2010, had appropriate authorisation / approval / to carry out maintenance of Tu-154M aircraft.**

**10) regarding the entry on page 37 of the Report:**

*“According to the information in the Explanation of the Head of Maintenance of Tu-154M tail No. 101 aircraft in the period from 08.04 to 10.04.2010 underwent maintenance of random damaged by bird strike on 08.04.2010. There was no information provided by the Polish side on the type of damage, ways of troubleshooting as well as about release to service.”*

IAC. refers to the vague “Explanation of the Head of Maintenance.” According to the Polish side, it is the statement quoted below, which IAC received together with other required documentation:

*“Warsaw, 20.04.2010*

*Head of Aviation Technology of Air Squadron, Captain M. S.*

**STATEMENT**

I certify that from 08.04 to 10.04.2010 Tu-154M aircraft tail No. 101 did not undergo any maintenance except for the maintenance of the radome damaged by bird strike during the return flight of the aircraft to its home aerodrome on the night of 08 to 09.04.2010.

*Cpt. M. S.*

*(Signature on original copy)*

IAC received and has full documentation of the event, containing the following items:

1. 2139 military unit letter No. 1018/10/fax of 09 April 2010, regarding “aircraft bird strike,” addressed to the Head of Joint Chiefs of Aviation Technology in the Inspectorate for Armed Forces Support and Head of Aviation Technology Department of the Joint Chiefs of Air Force, signed by the Head of Logistics, Colonel M. G. K. The letter includes, inter alia, the following information:

*a. effects of impact - the impact marks on the lower surface of the nose of the fuselage (radar shield), chipping paint in the place of impact*



- b. conclusions - a review of the nose of the fuselage was performed and chipping paint was found on the surface with dimensions of 70x100 mm. The review of the intake tunnels, the blades of directing vanes and the compressor blades of the first low pressure stage were reviewed - there was no damage or foreign bodies. An analysis of OKL materials was performed - the technical parameters of the aircraft propulsion systems did not deviate from the technical conditions.*
2. 2139 military unit letter No. 1224/10 of 09 April 2010, on “air incident in the 36th Special Regiment of Aviation Transport” addressed to the Ministry of Defence Inspectorate for Flight Safety and the Chief of Air Force Flight Safety signed by the Commander, Colonel qualified pilot R. R. The letter includes, inter alia, the following information:
- a. basic circumstances of the incident - after taking-off from Prague Ruzyně aerodrome at an altitude of about 4000 ft a bird strike occurred, causing damage to the nose of the radome. Landing at the home aerodrome without consequences.*
3. 2139 military unit letter No. 1422/10 of 23 April 2010, constituting the “Charter of the air incident,” containing, inter alia, “*Description of the incident, causes and preventive actions applied - after take-off from Prague aerodrome at an altitude of approximately 4000 ft. a bird strike occurred. After inspecting the engine operating parameters and the flight properties of the aircraft the crew commander decided to continue the flight. Landing at the home aerodrome without consequences. Visual inspection revealed slight damage to nose the aircraft (radome). Photographic documentation was prepared. Repair and painting of the damaged item was performed. **The aircraft is fit for operation.***” Charter approved by Commander, Colonel pilot R. R. 22.04.2010.
4. Entry in the LOGBOOK OF Tu-154M aircraft maintenance “101” Doc. RDI No. 393/14, the other side of the card No. 20 - “*While performing A2 + AE maintenance, surface damage of the radome (aircraft nose) was revealed on the bottom right side with the dimensions of 7x10 cm, caused by bird strike. Review of the aircraft was performed, remains of a bird were found on the right side of the radar and on the bottom surface of slot on the right side of the wing. No damage to the airframe. HV and first stage of compressor were reviewed. Without comments. Performed and signed P., checked and signed L., 09.04.2010*”
5. The entry in the RECORDS OF EQUIPMENT REPAIRS in the group (department) OF mechanical workshop, Doc. RDI No. 306/15:
- a. Description of commissioned repair - repair of aircraft nose Tu-154M 101 aircraft nose, date - 09.04.10, ordering officer - warrant officer K. (Signature), effort - 3 working hours, used materials - adhesives of different types (epoxy resin), chemically setting putty, paint, signatures of the technician performing the repair and the ordering officer*

6. Statements of technicians performing the repair of radar shield, employees of the mechanical workshop of the Technical Service Team, Mr senior warrant officer C. K., senior corporal M. Ch. and civilian employee B. O. Summary of the statements below:

- a. *repair method was determined by senior warrant officer C. K. and operation engineer Cpt. G. W. On the basis of Repair Manual of Tu-154M Aircraft (“Tu-154M Rukowodstwo po kcipitalnomu remontu” [transcript of Russian]), Section 53.50.01, page 403 entitled “aircraft nose shield - repair of defects” release date – 17 March 1982*
- b. *repair, on the basis of the guidelines was performed by senior corporal M. Ch. and B. O. (civilian employee)*
- c. *inspection and acceptance of work was performed by squadron leader major D. B. and operation engineer Cpt. G. W.*

**11) regarding the entry on pages 38 of the Report:**

*The aircraft take-off weight, considering about 500 kg of fuel burnt during taxiing, was about 85800 kg (maximum take-off weight is 100000 kg)–and the centre of gravity was 25.3% MAC (the centre of gravity range on takeoff is 21-32% MAC). At the time of the accident there remained about 11 tons of fuel on board, the estimated landing mass was about 78600 kg.*

There is no indication of the source of data used for these calculations. Determination of the aircraft take-off weight then effects determination of landing mass and is the subject of the Russian comments about exceeding the landing mass. According to the knowledge of the Polish side the original load and balance sheet was not preserved. Therefore the data, quoted by IAC, require verification and indication of the method by which these calculations were made.

**1.6.1. Special features of interest in the aircraft information**

**1) regarding the entry on page 39 of the Report:**

*“The minimum number of cabin attendants, in accordance with Para. 2.3 of the FCOM is 4 persons. In fact, along with the passengers and flight crew, there were three cabin attendants on board and a security officer.”*

There was more than just one officer of the Government Protection Bureau. One of these officers served as a cabin attendant. She had appropriate training for this purpose and was a full member of the crew, in accordance with the regulations applicable in the Republic of Poland, which was repeatedly explained to the professionals from the IAC.

## **1.7. Weather information.**

The information in this section contains only a chronological description of activities performed by the meteorological station manager of Smolensk “Severny” aerodrome, the values of measured and observed meteorological parameters, developed weather forecasts and provided meteorological information. It also contains a description of data and meteorological bulletins that were held by the crew of Tu-154M aircraft.

Weather data were not published in the form of METAR messages.

### **1.7.1. Temperature inversion in the lower atmosphere layer**

Section 1.7.1 contains general observations about the process of fog creation on that day in Smolensk region. There is no information about the deterioration of visibility due to the smoke from burnt meadows and peat bogs, and there are no isolines (isochrones) of fog occurrence time - which clearly shows that the fog zone arises from the south-east.

## **1.8 Aid to navigation**

### **1) regarding the entry on page 59 of the Report:**

*The personnel engaged at the Department for Communication and Aid to Navigation of Military Unit 06755 on 10 April 2010 was authorised for flight servicing by the Order No. 264 of the Chief of Military Unit 06755 of 25 November 2009 and for unsupervised operation of the aid to navigation and communication by order of Chief of Military Unit 06755 No. 319 of 31 December 2009.*

The ATC personnel and equipment was not certified according to ICAO standards, the Polish side was not presented with the abovementioned orders. The LZC did not have approvals to service landings of Tu-154 aircraft for Smolensk “Severny” aerodrome and TWA.

### **2) regarding the entry on page 59 and the chart on page 60 of the Report:**

*The approach chart for runway 26*

The approach chart attached on page 60 does not come from the documentation that was held by the crew. The approach, published on page 60 (Fig. 9) of the report is different from the charts that were available to the crew by an important detail. The release date is indicated on the lower right margin. The page number is indicated on the upper margin.

The approach charts provided by the Polish Embassy in Moscow to the Board of Air Traffic Control Services in 2009 lack this information. It is very important as the published date of issue of this document and its number can serve for proper identification.

### **The Russian side did not refer in the Report to the above stated discrepancies.**

The findings of the Polish side reveal that the documents, prepared this way, were sent (provided) by the Russian side in 2009.

**3) regarding the entry on page 59 and 61 of the Report:**

*...current NOTAMs valid at the time of the accident*

NOTAMs series “M” are not distributed outside the Russian Federation. The Russian side should have been aware of this and, in response to a letter requesting valid charts and procedures that were most recent after preparing the document entitled “*Technical Review Act of Smolensk “Severny” Aerodrome with the purpose of special flights*” of 5 April 2010, it should have provided these charts and procedures along with diplomatic consents to the Polish Embassy on 9 April 2010.

**4) regarding the entry on page 62 of the Report:**

*The PAR-10C locator (NDB), MSN 7643, released to service in 1981 with an E-615.5 marker, MSN 0147, manufactured in 1981, is located at an actual distance of 1050 m from the runway 26 threshold, which complies with regulations, concerning the positioning.*

In accordance with the minutes of interrogation, dated 3 May 2010, of Yak-40 crew commander, which landed at the Smolensk “Severny” aerodrome on 10 April 2010 (Before the arrival of the Tu-154M aircraft), the middle NDB did not work reliably. Indications varied within  $\pm 10^\circ$ . The probable cause of unstable performance of the NDB were trees growing in the beacon antenna field, by far exceeding the height of the antenna mast, the presence of an overhead power line and the ravine in the immediate vicinity of the NDB. These factors may have affected the NDB antenna pattern.



*Differences in the state of tree - the area of the NDB, around 1000 m from the threshold of runway 26*

## **1.10 Aerodrome information.**

### **1) regarding the aerodrome description contained on page 67 of the Report:**

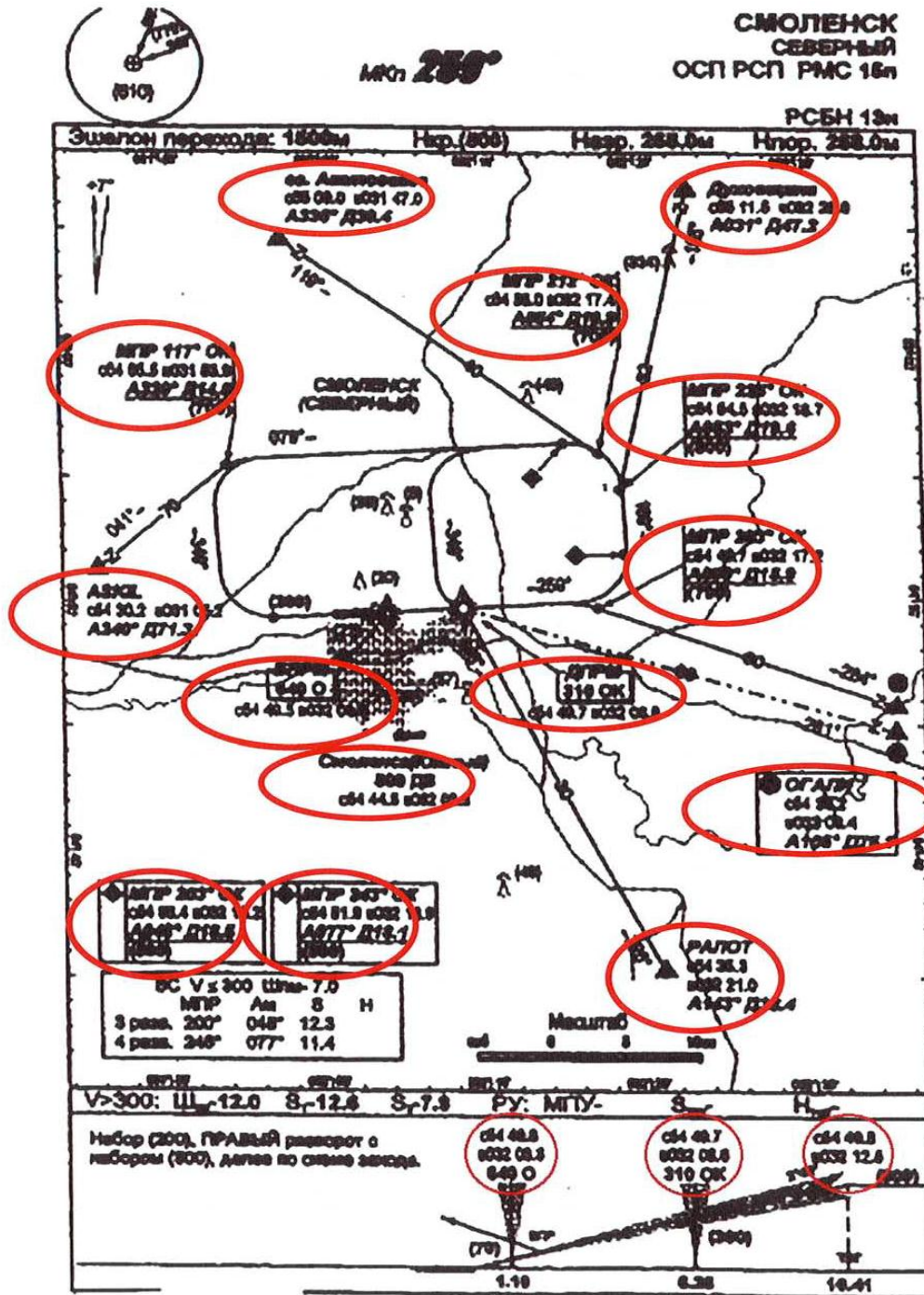
According to the Russian side, Smolensk “Severny” aerodrome met the requirements of Class 1 aerodrome (*“Technical Review Act of Smolensk “Severny” aerodrome with the purpose of special flights”* of 5 April 2010). The data provided on the aerodrome are actually unverifiable for the Polish side, due to the fact that the Russian site failed to provide source materials, including: *“Flight operation manual for the aerodrome”*, *“aerodrome Master Plan”* and/or similar documents. The Report does not provide detailed schematics of the aerodrome, the display of restricting area and the cross section along the axis of the runway as well as the approach areas surface. The Russian side failed to provide the Polish side with any materials or legislation, defining the classification rules for state aviation aerodromes and military airfields requirements for each class. This prevents the Polish side from comprehensive verification whether the required parameters for class I military airfields had been ensured for Smolensk “Severny” aerodrome. This in particular regards the restricting area, which is determined for each aerodrome in order to ensure the safety of aircraft traffic operating on aerodromes and which defines the maximum allowable height for buildings and terrain objects, located in the vicinity of the aerodrome. Objects which parameters exceed the values defined by the above mentioned area should be removed, or (in case of inability to remove) should be identified as air traffic obstacles and marked accordingly.

The available information indicates that the data on the aerodrome provided to the Polish side, including the coordinates of the ARP, runway threshold coordinates and the coordinates of the outer and middle NDB aeriels (all coordinates on the approach chart), are expressed in the SK-42 coordinates system and not in currently generally accepted for aviation WGS-84 system. The Polish side was not informed about this fact by the Russian side upon submission of the approach charts by the latter.

The form of recording the coordinates in both systems is similar, but nevertheless the two systems are not identical. Treatment of the coordinate expressed in SK-42 system as the coordinates of WGS-84 system resulted in the input of erroneous data to the flight systems (GPS / FMS) of Tu-I54M aircraft.

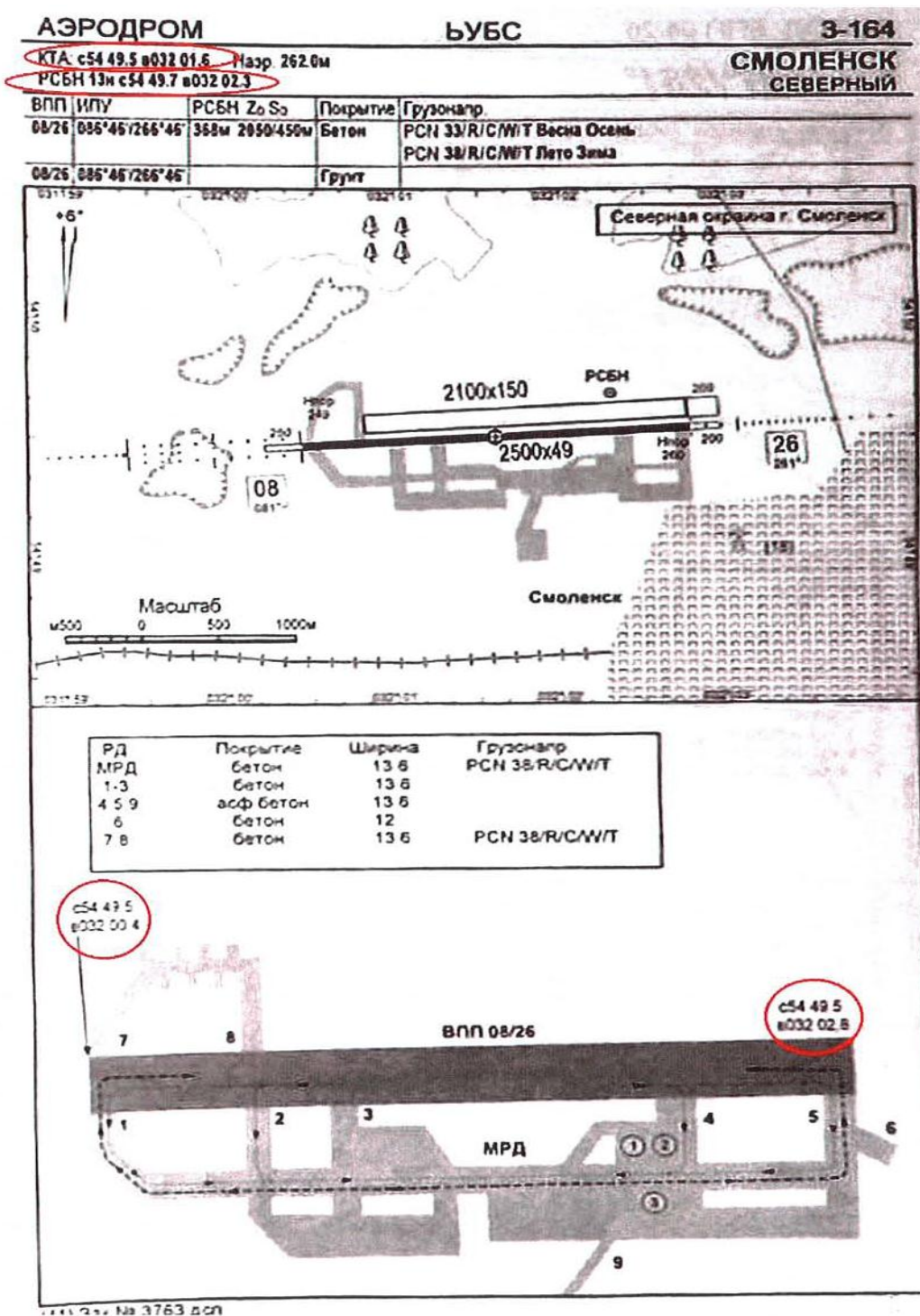
**For a full comment of the Polish side on the content of this subsection, access to the following documentation is essential (which has been requested by the Polish many times):**

- Standards approvals for operation of the National Aviation aerodromes (FAP NGEA Gos A-2006);
- “Flight operation manual for Smolensk “Severny” aerodrome”;
- “Smolensk “Severny” aerodrome master plan”.



The approach chart from 259° provided to the Polish side in 2009, indicating the coordinates of devices and waypoints

(without indicating reference system)



Smolensk "Severny" aerodrome diagram provided to the Polish side in 2009, indicating the geographical coordinates of runway thresholds and the ARP (without indicating reference system)

**2) Note regarding entry on page 69 of the Report:**

*According to the documents of ICAO (PANS-OPS, Volume II, Part I, p. 5.4.6 "Protection for the visual segment of the approach procedure")*

In the current issue of the PANS-OPS documentation the quoted point is not present.

### 1.11.5. ATM Quick Access Recorder

#### 1) regarding entry on page 81 of the Report:

*The installation of the QAR was not agreed upon with the aircraft manufacturer (“Tupolev” Design Bureau) or the MSRP-64 FDR designer (“Pribor” Enterprise).*

According to the findings of the Polish side, in 1991 a Quick Access Recorder ATM-QAR/R128ENC was built into the Tu-154M aircraft tail number 101. Since that time the aircraft was repaired three times by Russian aviation companies. Each of these repairs was supervised by the “Tupolev” Design Bureau. Moreover, over the space of several years repeated numerous maintenance works were conducted at WARZ-400 in Moscow. The same type of recorder was built in the mid-nineties on the Tu-154M aircraft tail number 102, which has also undergone frequent repairs and service works in the Russian Federation.

The ATM-QAR/R128ENC recorder was built into the Tu-154M aircraft by installing an AVM-219 system used for measuring the vibration of engines D-30KU. The installation was carried out based on a bulletin No. 251-062-000 M T51 “**agreed upon with the main designer of ANTK Tupolev on 05.08.1992 and the main constructor of POMKB on 31.10.2002.**” The bulletin covered all Tu-154M aircraft series.

#### 2) regarding entry on page 81 of the Report:

*The ATM record finished 2.5 seconds earlier than the records of the KS-13 and MLP-14-5 of the MSRP-64 FDR.*

The differences between the records of the ATM-QAR and KBN were largely due to errors resulting from recording on a magnetic tape KS-13 (KBN). ATM-QAR recorder is a solid state recorder with memory so errors in data record virtually do not occur.

ATM-QAR recorded all the information in the same way as KBN and MLP-14-5. When reading the ATM-MEM15 s/n 158/91 cassette of the QAR recorder in the Air Force Institute of Technology, a routine process that does not allow obtaining a record from an incomplete data frame was applied. Subsequent modification of the program reading the cassette record (changing the buffer of the cassette stack memory) made it possible to obtain a complete record of data from the flight until the time of the disaster (the ATM-QAR finished recording at 08:41:02.5 UTC).



### 1.11.7. Ground Recorders

Pages 81-82 of the Report contain the following information:

*The aids to communication and navigation at Smolensk “Severny” aerodrome are equipped with standard recorders:*

- *Two tape recorders P-500 No. 08/806, No. 19/600;*
- *Tape recorder MS-61 No. 03/400;*
- *Three tape recorders MN-61 No. 24/013, No. 15/681, No. 465/18;*
- *Two tape recorders P-503P No. 600058, No. 699140;*
- *Two cameras PAU-476 No. 540116, No. 1522L1;*
- *Camera PAU-476-1A No. 1532K3;*
- *Tape marking Device UML-1-400 No. 089085.*

*Additionally, the landing zone controller’s working station is equipped with a non-standard Sony SLV-X711 video recorder with a video surveillance camera.*

According to the *Protocol of Inspection of the aerodrome of 27 March 2010*, the technical condition of the photographic film for PAU-476M did not meet regulatory requirements. The JW 06755 establishment did not provide for a section of objective control and a photo-laboratory. In this case, on 10 April 2010 the cameras were not used.

The working station of the landing zone controller was equipped with a Sony SLV-X711 video recorder with a video surveillance camera.

**p.83.** *The playback of the video tape revealed that the record was missing. During the preflight preparation on 10 April only the operability of the recorder was checked with no assessment of the record quality. The analysis revealed that the record was not made due to twisting (bridging) of wires between the video camera and the video recorder. After the wires were insulated the video recording was resumed.*

In the light of the information about the missing recording of the process of approach to landing on the PRL indicator, the quotation of data related to the location of the blips of the aircraft on the glide path on the PRL indicator raises serious doubts. An explanation is required for the following statements included in the Report:

**p.174:** *Note: During the approach of the Yak-40 that was on glide path until the distance of 1 km in accordance with the LZC’s information, its actual position with reference to the runway threshold was above the target one which confirms the data above. The CATC instructed the crew to go around. However, the Yak-40 crew did not follow this instruction but landed.*

**p. 180** from the following paragraph, onwards: *“At 6 km the aircraft was actually higher than the glide path (considering the indication inaccuracy the aircraft blip was on the top boundary of the glide path tolerance area for glide path angle of  $\sim 3^{\circ}10'$ ”).*

**p. 183** from the following paragraph, onwards: *“At 10:40:13 the landing zone controller informed the crew: ‘4, on course, on glide path’. Actually, at the distance of 4 km the aircraft was at the height of 260 m (for this distance: on glide path with angle  $2^{\circ}40'$  – 200 m, glide path tolerance area – 35 m) while the aircraft blip on the radar considering the abovementioned inaccuracies, did not go beyond the top boundary of the glide path tolerance area.”*

**p. 183** from the following paragraph, onwards: *“At 10:40:27 the landing zone controller informed the crew: ‘3, on course, on glide path’. The aircraft was at a distance of about 3500 m from the runway and was on the  $\sim 3^{\circ}10'$  glide path (on the upper boundary of the glide path tolerance area of the  $2^{\circ}40'$  glide path). Thus, the landing zone controller was watching the aircraft on the radar as being exactly on glide path.”*

**p. 184** from the following paragraph, onwards: *“At 10:40:39 the landing zone controller informed the crew: ‘2, on course, on glide path’. At that time the aircraft was at a height of about 115 m with reference to RWY 26 threshold, which was almost corresponding to the missed approach height. Considering the indication inaccuracies the aircraft blip on the radar was almost at the lowest boundary of the glide path tolerance area.”*

**p. 172** from the following paragraph, onwards: *“At 10:39:10” the controller informed the crew they were 10 km from the runway threshold and had reached the glide path entrance point.”*

Page 83 of the Report:

*The data were copied from tracks 1, 4, 5, 8 of reel No. 9 and tracks 4, 7 of reel No. 5 in cooperation with aviation experts of the Republic of Poland. The readout revealed that track 7 (Loudspeaker CATC – weather station) on reel No. 5 missed information of the CATC’s communication with the weather information service on 10 April 2010 but contains an old record of October-November 2009 which indicates the failure of erasing and recording heads of this track.*

The process of copying of the information from reel No. 9 – tracks 1, 4, 5, 8 and tracks 4, 7 of reel No. 5 of P-500 tape recorders took place without observing technical standards. Among other things, improper matching of the output impedance of the tape recorder with the input impedance of the recording device as well as the failure to provide an adequate (shielded) cable for data transmission. Due to the poor quality of recordings obtained during ripping, the Polish side has requested for a re-ripping of the abovementioned recordings in a laboratory. Initially, this initiative was accepted, but later the Russian side forwarded a message stating that the re-ripping would not provide any new information into the case.

The Report does not contain information about the reasons for so many unread fragments of conversations on the BSKP. This is even more confusing as some fragments of conversation omitted are clearly audible at playback. In the case of on-board recorders, attempts to recover the information were described. There is no such record in the case of ground means.

### **1.12 The Status of Aircraft Components and Their Position on the Site**

In the description contained in the Report there is information about the detachment of a **4.7 m** long portion of the left wing. According to measurements made on site by representatives of the Polish side, the detached fragment of the left wing was approximately **6.1 m** long (length of the preserved part). It can be assumed that taking into account the crushed fragments of the wing following a collision with a tree, the length of the fragment detached from the body was 6.4 to 6.7 m.

The report specifies that at the moment of collision with the ground, the aircraft was tilted at an angle of **200-210** degrees. According to the Polish side, this angle was smaller, approximately of **160°**.

#### Grounds

Traces of the impact at the scene indicate that the first elements of the aircraft that hit the ground were the remaining part of the left wing and the crew cabin. At an angle greater than 180° a clear sign of the right side of the wing contacting the ground would be expected. However, such trace was not found. It was found that there were damaged trees and shrubs at a height of several metres above the ground on the left side of the axis of the aircraft fuselage impact with the ground. According to the Polish side, the trees were damaged by the right side of the wing, which was at this point a few metres above the ground.

The angle of about 200°-210° may have been the result of the approximation of the earlier speed of rotation to the left initiated by the detachment of the left wing tip. High rotation speed to the left was caused by the difference between the lift force generated by the complete right wing and the left wing with the missing tip. Wing lift force depends inter alia on the angle of approach, which, after reaching a maximum of about 20°, decreased in the last phase of flight. This was a result of changes in the position of the column and rudder pull-off a substantial part of the left horizontal stabiliser with rudder height. The smaller absolute lift force resulted in a decrease in the difference in power produced by each wing. Consequently, the speed of rotation to the left was reduced just before the collapse of the aircraft. This is confirmed by traces of collision between the aircraft and subsequent trees.

Description of the place of the incident and the scattered parts corresponds to the data gathered at the scene by the Polish side.

### **1.13 Medical information and a summary of results of the forensic examination**

**concerning entry on page 99 of the Report,** *“The Chief ATC and landing zone controller who were controlling the aircraft passed examination before duty at 05.15 and 06.50 respectively.”*

In the first hearing, KSL testified that he did not undergo a medical examination because the medical point was closed. Hence, handwritten corrections in the medical assessment book also raise serious doubts.

#### **1.13.1. Medical Tracing Examination**

It is impossible for the Polish side to refer to the contents of this section of the Report because of the Russian side’s failure to provide the following information:

- documentation of forensic examination of the crew of the aircraft, together with the results of toxicological and identification examination;
- report of the inspection of the site (the Polish side has no knowledge as to where the specific inspection areas were located and how they were marked).

Analysis of the properties of the mechanism of aircraft collision with the earth’s surface and causes of injuries of the crew of the aircraft is adequate with the available knowledge in the field of aviation medicine and forensic medicine.

### **1.14. Data on the Survival of Passengers, Crew Members and Others of the Aircraft Incident.**

This subsection should be numbered **as 16** and have the title: **Survival Factors**. Notes as in section 1.13.1.

### **1.15 Actions of Rescue and Fire Teams.**

#### **Source material.**

The Report provides no information as to the basis on which a description of the rescue actions taken at the scene of the incident was made. The Polish side has not received transcripts of radio and telephone communication or situational plans, documented reports of all participants of the rescue and fire fighting actions, photographic documentation, including film footage, which has a huge impact on the assessment of the security level of Smolensk “Severny” aerodrome regarding fire fighting and medical security as well as performance of the rescue operations.

Due to the lack of access to required documentation concerning Russian military aerodromes, the ICAO requirements were treated as a basis in the relevant field.

### **Meteorological conditions in terms of rescue operations.**

Meteorological conditions, clearly deteriorating in the expected time of landing of Tu-154M, were an indication of the declining safety of the performance of the aircraft operation. There is no information about the announcement of increased combat readiness for rescue units and emergency response time (i.e. time since the announcement of the first alarm to the arrival of the first rescue unit to the scene and administration of at least 50% of the required efficiency of extinguishing agent) to each point of the runway used for operational purposes. Due to lack of access to documentation pertaining to Smolensk “Severny” aerodrome, these requirements are reported in based on standards contained in Annex 14 to the Convention on International Civil Aviation.

### **Alarms and availability of emergency rescue units.**

There is no information on alarms alerting the fire-fighting department of JW 06755 about the accident of Tu-154M aircraft, directly by the aerodrome GKL. The chief of JW 06755 informed the officer on duty of the Regional Search and Rescue Service about the loss of communication with the aircraft at 6:42 UTC, i.e. one minute after the accident, but there is no information that he alerted the fire department subordinate to him. The report does not state who informed the commander of JW 06755 about the accident. At 6:43 UTC the officer on duty of the Regional Search and Rescue Service (2 minutes after the accident) gave an order to the shift on duty to depart. The vehicles dispatched were a fire truck Kamaz 42108 of the fire fighting service of JW 06755 (departure 6:46 UTC, i.e. 5 minutes after the accident) from Smolensk “Severny” aerodrome and a GAZ 4795 car of the Regional Search and Rescue Service from Smolensk “Yuzhny” aerodrome (departure 6:48 UTC, i.e. 7 minutes after the accident).

At 6:50 UTC rescue units of Smolensk region were alerted and at 6:51 UTC they departed (i.e. as late as 9 and 10 minutes after the accident, respectively). The Report does not explain why the PCz-3 unit was not alarmed immediately after the accident, but as late as 6:50 UTC. According to the Report, on 10 April 2010 PCz-3 was on duty at the Smolensk “Severny” aerodrome since 6:00 UTC.

In addition, as is evident from the correspondence inside SKL, at 6:41:48 UTC Colonel Krasnokutski, Deputy Commander of the Air Base, stated, realizing the gravity of the situation: “*Damn, send the fire fighters there, where are they, damn it!*”. The answer he received at 6:42:49 UTC was: “*It fell on the nearer, left side of the road*”. For the Polish side it is unacceptable that the personnel of SKL, knowing that the Tu-154M had “fallen”, did not announce the alarm immediately for all rescue units located at the Smolensk “Severny” aerodrome and did not provide information about the accident to rescue units of the Smolensk district. The report does not provide a scheme of alerting and disposing of rescue units at the Smolensk “Severny” aerodrome. There is also no information about emergency vehicles being equipped with means of communication to interact with SKL.

### **Equipment and personnel provided and the arrival of rescue units on the scene.**

There is no clear information about the route taken by the rescue units to the accident site. The Report states that Kamaz 42108, a vehicle of the fire fighting department of JW 06755 (a group of 5 people) left for the accident site, but does not specify that it ever arrived there. In the “Record of conversations of 16.04.2010”, a witness Pavel Plusnin states that: “*in accordance with the rules adopted at the aerodrome, four fire vehicles with their crews, a Ground Exploration Group, a group of technical assistance with equipment and medical ambulances with medical personnel were sent to the accident site (...)*”. However, the report shows that in fact only one vehicle was dispatched to the scene of the accident.

The GAZ 4795 vehicle of the Regional Search and Rescue Service of the Smolensk “Yuzhny” aerodrome reached the scene of an accident after driving through the city of Smolensk; arrival at 7:25 UTC, i.e. as late as 44 minutes after the accident happened. As stated in the Report, these vehicles were alerted and dispatched to the scene of the accident as the first ones.

Indeed, the first to reach the scene of the accident was the PCz-3 unit, which arrived at 6:55 UTC, i.e. as late as 14 minutes after the accident, although the accident took place around 400 m from the threshold of the DS26.

There is also no information about:

- The necessary fire prevention measures and forces provided at the aerodrome during performance of the flight operations;
- Technical and operational characteristics of emergency vehicles for the abovementioned security;
- Specialised professional qualifications of the lifeguards assigned to the abovementioned security;
- Protocols of periodic reviews proving the technical efficiency of fire fighting vehicles and equipment;
- Condition of roads and fire gates, proving their technical reliability when travelling to the accident site.

The Polish side indicates that the command No. 86 of Commander of JW 06755 of 09.04.2010 *on the designation of a flight managing group, a group securing the landing and taking off of aircraft with the delegation of the Republic of Poland at Smolensk “Severny” aerodrome* does not contain a command regarding an instruction for the security services regarding air rescue.

### **Extinguishing agents used and their quantity.**

In the submitted Report, the Russian side did not provide complete information regarding the extinguishing agents used in the course of the rescue operation nor the type of the extinguishing agents used for securing the air operations, especially with regard to extinguishing fire resulting from the aircraft fuel’s ignition. There is also no information on whether the rescue units intended for securing flight operations had the right type and quantity of extinguishing agents necessary to ensure provision of a minimum quantity of these agents for a fire-fighting operation of an aircraft the size of Tu-154M.

### **Management of the rescue operation.**

The Russian side did not provide information about the emergency measures taken, the results of the diagnosis, the decisions taken regarding the forms and methods of conducting the rescue operations.

### **Principles of cooperation of rescue services.**

The Russian side did not provide information about the principles of disposing and cooperation of rescue units in the event of an aircraft incident. In his order No. 86 of 9 April 2010, the Commander of JW 06755 regarding the designation of flight managing group, a group securing the landing and taking off of aircraft with the delegation of the Republic of Poland at Smolensk “Severny” aerodrome, there is no disposition regarding the rules of cooperation between the rescue units in the event of an aircraft incident.

### **Actions of medical rescue teams.**

The medical support at the Smolensk “Severny” aerodrome, as described in the Report, did not guarantee the necessary help to victims in case of an air crash of the Tu-154M aircraft with 96 passengers on board, assuming that there would be victims with major injuries requiring immediate assistance and transport to hospital, with medium to severe injuries, but in need of specialised transportation and with milder injuries requiring medical treatment at the site. For example, according to ICAO aerodrome Services Manual (Doc. 9137) it is assumed that in an aircraft accident with 100 people on board, there may be 75 people injured, including 15 with major injuries requiring immediate assistance and transport to hospital, 23 with medium but not life threatening injuries requiring specialised transportation and 37 with milder injuries.

There is no information about the emergency medical team at the Smolensk “Severny” aerodrome in the group securing the landing and taking off of aircraft with a delegation of the Republic of Poland, there is only a mention of a doctor on duty (*paramedic*).

The Polish side indicates that the first emergency medical team arrived at the scene of the accident at 6:58 UTC, i.e. not until 17 minutes after the accident happened and seven ambulance teams arrived on the scene at 7:10 UTC, i.e. not until 29 minutes after the accident even though the Smolensk “Severny” aerodrome is located within the city of Smolensk.

### **Evacuation of bodies of victims.**

The Report did not include the information from the Russian side regarding the investigative activities conducted at the scene and the relevant documentation of the site from the time before moving the bodies of victims of the accident.

### **The need for documentation**

Emergency action plan of Smolensk “Severny” aerodrome (the requirement of Annex 14 of ICAO).

## **CONCLUSION:**

Based on the report, the Polish side has concluded that in terms of the emergency and fire fighting services, the Smolensk “Severny” aerodrome did not provide the safety of rescue and fire protection in case of performance of an air operation of an aircraft the size of Tu-154M with 96 people on board.

**According to the Polish side, with an established highly unsatisfactory state of preparation and aerodrome security, the Tu-154M aircraft of the status of HEAD (labelled “A”) with the President of the Republic of Poland and 95 people on board, should not receive the consent of the Russian side to perform flight operations at the Smolensk “Severny” aerodrome.**

### **1.16.2. Mathematical simulation**

The only reservation of the Polish side is the absence of an accredited representative or his advisers in the process of flight analysis using mathematical simulation. The right to such participation is provided in point 5.25 of Annex 13.

### **1.16.3. Aerial Assessment of Crew Actions**

The content of subsection **1.16.3** indicates that this is an analysis of the performance of the crew, and therefore it should be included in section “**2 Analysis**” and some information on page 109 should be moved to subsection “**1.1 The Flight History**”.

#### **1) regarding Page 109 of the Report.**

*“at 10:29:40 the crew of the Yak-40 aircraft informed that the Russian IL-76 ‘...made two approaches and left’. (In fact, IL-76 tail number 78817, that was to land after the Yak-40 could not land due to weather conditions and after two approach attempts left for the alternate aerodrome.)”*

According to the statements of witnesses, the crew of IL-76 stopped the first approach just over the lane turning right at a dangerously low height (according to witnesses, the wing tip was at an altitude of approximately 3-4 metres in relation to the surface of the runway). The confirmation of leaving at such a low altitude is found in the record of conversations at SKL, where fear can be heard in the voices of GKL, in connection with the observed situation. The second approach was also unsuccessful and the plane left on the left side of the DS26 at a height of several metres above the embankment located at the apron. It can be concluded that the crew of the IL-76 aircraft made the approaches below the minima of Smolensk “Severny” aerodrome without establishing the visual contact with the runway environment at the right time.

In the analysed case, following the approach to landing of the IL-76 aircraft, according to the rules of FAPPPGosA applicable to Air Force FR operations, takeoffs and landings at the Smolensk “Severny” aerodrome should be suspended.



**2) regarding Page 110 of the Report.**

*Most probably the actions of the PIC could be caused by one thing - that at that very moment he could see the ground or obstacles (trees), estimate the height visually and assess the critical situation. In that situation the PIC's actions were instinctive.*

The proposed conclusion is not sufficiently justified in the conducted analysis.

**3) regarding Page 112 of the Report.**

*Note: The Tu-154M FCOM does not prescribe using the autopilot during a non-precision approach.*

In Section 6, in the position NOTE: it is stated that the FCOM does not prescribe using the autopilot during non-precision approaches. Indeed, such a model of approach is not prescribed, but neither is it forbidden! If this would be too difficult for the crew to perform in reality, or would endanger a safe landing, it should be clearly prohibited by the manufacturer of the aircraft.

**4) regarding Page 114 of the Report.**

*The navigator also did not take a set of safety measures during the descent on the glide path:*

The Report does not quote the document on the basis of which the responsibilities of the navigator were defined. It is stated in the Report that within the 36 splt there was no technology for a four member team work on the Tu-154M aircraft.

**5) regarding Page 115 of the Report.**

*The pressing of the standard pressure selector at the electronic pressure altimeter on final (at about 350 m) was absolutely illogical and was probably caused by mixing with the QFE button (...). As for the navigator, he had insignificant experience on Tu-154 (...), and most probably was the one who could do this action.*

The suggestion that the navigator switched the electronic pressure altimeter for the commander is not confirmed by the facts (the records contained in the CVR and flight data recorder). The report specifies that in the moment of impact with the ground the entire crew occupied their seats and their seat belts and were fastened. It would be impossible for the navigator with his seatbelts fastened to switch the commander's electronic pressure altimeter. The outcome of the analysis conducted by the Polish side is that the hypothesis that the commander switched the altimeter to the value of pressure to 760 mm Hg is highly more probable.

**6) regarding Page 115 of the Report.**

*PROBABLE CAUSES THAT LED TO THE AIRCRAFT DESCENDING LOWER THAN DECISION ALTITUDE AND LACK OF GO AROUND ACTIONS.*

All information contained in this section should be included in Chapter **2. Analysis** or **3. Conclusions**.

**7) regarding Page 117 of the Report.**

*Thus, the accident was caused by severe violation of flight safety principles during approach in weather conditions below minima which included:*

- Failure to go around and descending lower than decision altitude down to an intolerably low height with vertical speed of descent 2 times higher than normal;*
- Lack of important CRM and violations of the SOP.*

Chapter **1. Factual Information** should not discuss the reasons.

**8) regarding Page 117 of the Report.**

*The inadequate decisions taken by the PIC and the crew actions were backed up by high level of psychological stress included by the understanding of importance of landing at the destination aerodrome as well as by the presence of high-ranked officials in the cockpit. During the approach the latter not once discussed with the crew the weather conditions, the decisions to continue the flight and the possible negative reaction of the Main Passenger.*

The record of the on-board voice recorder located in the cabin of the aircraft Tu-154M (CVR) did not reveal any passage confirming the attempt to influence the actions of the crew by third persons, including the Main Passenger.

**1.16.5 Findings of TAWS and FMS Examination**

The analyses conducted at Universal Avionics enabled the reading of the information from the TAWS block and one of the two blocks of FMS (UNS-1D). A number of technical studies were conducted as well as an attempt to read the memory of the second block of FMS UNS-1D (s/n 1577) was undertaken. The attempt did not produce the expected results and it was impossible to read out the content of the memory.

The difference of 160.9 m (573 ft - 45 ft = 528 ft) in the heights adjusted barometrically actually occurred between the signals of FMS1 and FMS2 (based on readings at Universal Avionics). This fact confirms that the PIC's SWS electronic pressure altimeter was set to standard pressure of 760 mmHg /

1013 hPa, and the SWS 2P altimeter was set to the value of 14.6 mmHg / 19.47 hPa less, or approximately 745 mmHg / 993 hPa.

On page 120 the Report includes a statement:

*The coordinates of both outer markers and ARP were obviously taken from the air navigation charts that the crew had (in the SK-42 coordinate system, without conversion to WGS-84 system which is used by GPS).*

Both Russian AIP part GEN 2.1-2 item 3 GEODETIC REFERENCE DATUM and the documentation JEPPESEN - GENERAL - RUSSIA-1 in the subsection WGS IMPLEMENTATION STATUS report that in Russia the PZ-90 cartographic system is used, whose PZ-90.02 version is practically identical to the WGS-84. Until the implementation of the PZ-90 system throughout Russia, the SK-42 system remains in use (despite the standards TOCT P 51794 - 2008 of 28.07.2000 being in force, where the SK-95 system is listed as valid). A warning is also missing in both Russian AIP and JEPPESEN that the data produced in SK-42 system differ substantially from the PZ-90/WGS-84. There is also no algorithm to convert these coordinates.

Lack of the abovementioned information, combined with not including or not informing the Polish side at the handover of valid approach cards for the Smolensk “Severny” aerodrome by the Russian side of the applied SK-42 mapping system in the abovementioned cards can be read as unusual carelessness of the officer preparing the abovementioned data.

#### **1.16.6 Navaid and Lighting Equipment Test Fly-Around**

Remarks of the Polish side to the Protocol of the test flight of 25 March 2010 of the RSP-6M2 device:

The Protocol regarding the test flight of **25 March 2010 of the RSP-6M2 device** passed to the Polish side does not contain:

- Graphical display of the glide path, course and position of BRL and DRL and the line of safe height;
- Photographic material relating to the standard approach to landing;
- Profile with marked radius of the “dead zone” and the dispatcher DRL radar range;
- Information about the direction of landing, from which the flight was performed;
- Scheme of “solid echoes” and reflections from reflective cones;
- Information about the minimum distance from the threshold of the DS and the corresponding height, to which it is possible to control the aircraft’s flight on the glide path;
- An annotation about deletion or a statement of compliance of the glide path and the course line on the PRL radar landing indicators.

The Russian side did not include the “Instructions regarding the operation of the RSP-6M2 system” in the Report.

## Lighting System

According to the Protocol regarding the test flight of 25 March 2010 of the LUCZ-2MU light system, the system was seen at a distance not shorter than 15 km, and the correct settings of the lights and adjustment of the light beam was consistent with the parameters and characteristics of lighting set in the “Instructions for test flight of communication means and radio technical aviation security of the Russian Air Force”.

This is in contradiction with the provisions of the Protocol of the test flight made on 15 April 2010, which stated that the approach lights, depending on the location of aircraft and flight altitude on distances of: 400, 700 and 800 metres from the threshold of DS 26 may be shaded by trees and shrubs growing around them (card 64 of the Report).

Thus, the statement in the conclusions of the Protocol of the test flight of 25 March 2010 of the LUCZ-2MU light system that the lighting equipment meets the requirements of securing aircraft flights without restrictions was contrary to the actual state on the day of the incident and of the test flight.

**In order to be able to provide complete response to the content of this subsection, the Polish side needs access to the following materials (the Polish side repeatedly applied for the provision of those documents to the Russian side - unfortunately without success):**

- Standards of approvals for the operation of the National Aviation aerodromes (FAP NGEA Gos A-2006);
- aerodrome Operations Instructions for the radio-electronic equipment (FAP REA - 2006)
- Instructions for the test flights of means of communication and radio technical Security (RTO) of Flights of Aviation Air Force of Russia.

### **1) regarding page 121 of the Report.**

*On 15 April 2010 upon request of the investigation team the An-26 t/n 147 of Military Unit 21350 aircraft laboratory made a test fly-around of the aerodrome navigation aids and lighting equipment. According to the results of the standard checklist for fly-around the mentioned navigation aids and lighting equipment were operative which was confirmed by the relative task sheets.*

*The minimum landing radar range of 1.5 km in the passive mode (used in the accident flight) (Figure 38) and of 1 km in the active and moving aim selection modes is provided. In the passive mode the blip disappears about 1.2 km from RWY 26 threshold (Figure 39).*

Polish representatives were not allowed to participate in the test flight on board the aircraft or the SKL. The analysis of the abovementioned test flight was not delivered to the Polish side either, despite a request from the Polish side for a copy of this document, pursuant to point 5.25 of Annex 13.

## 2) regarding Page 122 of the Report.

*“One of the purposes was to check the compliance of the aircraft blip on the landing radar with the actual aircraft position. Two cameras were used to record the flight parameters and the indications (one on board and one at the radar). The on-board camera recorded the Garmin 276C GPS and pressure altimeter indications. The radar-based camera recorded the landing radar screen. Before the operations both cameras were synchronised with GPS time.”*

The video recordings registered during the test flight were neither presented nor provided to the Polish side, despite requests for copies of this document issued pursuant to point 5.25 of the Annex.

## 3) regarding Page 123 of the Report.

*1. The landing radar screen mounted for the experiment (and during the accident flight) had lines approximately designating the following angles (shown in black on the chart):*

- *Lower line - 2°42.3’;*
- *Central line - 3°12.3’;*
- *Upper line - 3°42.3’;*

*2. The landing radar underrates the indication of this aircraft distance from the runway threshold by about  $90 \div 150$  m (depending on the distance of the aircraft from the runway threshold).*

In the Report, there is reference to the difference between the test flight of 25 March 2010 (performed with reference to the path of 2°40’ and on 15.04.2010 (path of 3°12.3’). There has been no analysis regarding the path of 2°40’ ( $\pm 30'$ ) valid for the approach cards. The explanation for changes in the path of 2°40’ to 3°12.3’ may be an attempt to explain the lack of response from KSL to the deviation of position of Tu-154M aircraft from the valid glide path outside the permissible tolerance.

## 4) regarding Page 123 of the Report.

*“Thus, in the accident flight the landing zone controller saw the aircraft blip on the radar as being referenced to glide path of ~3°10’. The inaccuracy was about 0.5°, which is equal to the tolerance area range.”*

Analyses of the glide path of 3°10’ do not correspond with the valid and the published path of 2°40’. The information presented by IAC indicates that **the aircraft blip was outside of the permissible error area of the linear deviation, even for the path of 3°10’**, which is not commented by the authors of the Report. The results of calculations carried out by the Polish side, taking into account the position of the aircraft in relation to the glide path of 3°10’, are presented in the table.

Distance from DS26 [[m]	Height relative to the path of 3°10'	Dimensions of tolerance zone [m]	Permissible error: 1/3 of the linear dimensions of the zone of tolerance”).
10000	<b>-60</b>	± 90	± <b>30</b>
9200	<b>-45</b>	± 85	± <b>28</b>
9000	<b>0</b>	± 83	± <b>27</b>
8600	<b>+75</b>	+ 80	± <b>26</b>
8000	<b>+35</b>	± 75	± <b>25</b>
7700	<b>0</b>	± 72	± <b>24</b>
7300	<b>+60</b>	± 68	± <b>23</b>
7000	<b>+50</b>	± 65	± <b>22</b>
6280	<b>+50</b>	± 58	± <b>19</b>
6000	<b>+60</b>	± 55	± <b>18</b>
5250	<b>+30</b>	+ 48	± <b>16</b>
5000	<b>+10</b>	± 45	± <b>15</b>
4000	<b>+10</b>	± 35	± <b>12</b>
3800	<b>0</b>	± 32	± <b>11</b>
3500	<b>0</b>	± 30	± <b>10</b>
3000	<b>-10</b>	± 27	± <b>9</b>
2500	<b>-60</b>	± 22	± <b>7</b>
2000	<b>-60</b>	± 18	± <b>6</b>
1950	<b>-60</b>	± 17	± <b>6</b>
1450	<b>-80</b>	± 14	± <b>5</b>

Location of the blip on the indicator corresponds to the position “on the glide path” when the permissible error of linear deviation does not exceed 1/3 of the linear dimensions of the zone of tolerance”. (in accordance with paragraph 115 of FAPPPGosA)

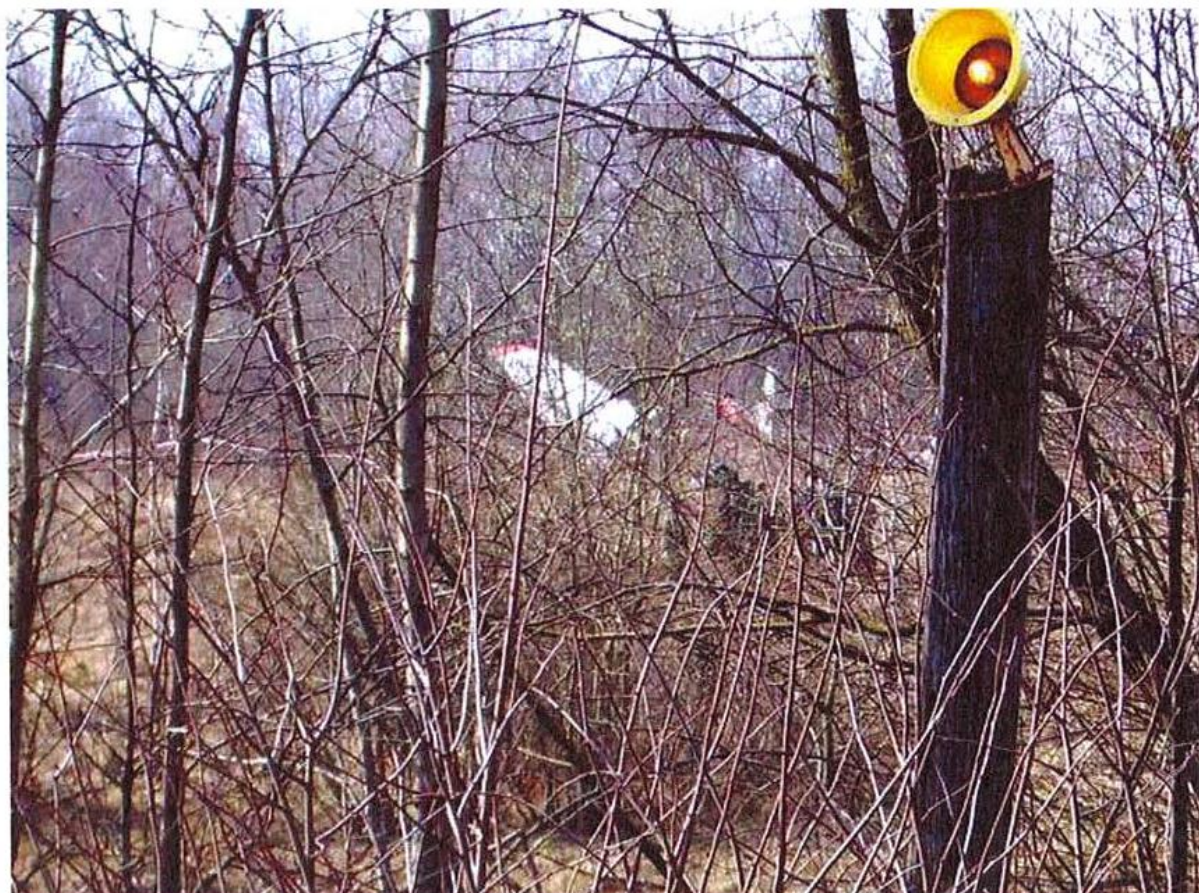
For the path of 3°10' at a distance of 3.3 km to the DS26 the permissible error of linear deviation is ± 28 m, i.e. with a tolerance of 1/3 of the value that is below - 9.33 m, KSL should have informed the crew of its wrong position on the path. The conclusion is that even before reaching 3 km, KSL continued to inform the crew of their correct position “on the course and path”, when in fact the flight of the aircraft was lowering, increasing its vertical distance from the path.

#### 1.16.7 Assessment of the Lighting System Visibility

##### **LUCH-2MU lighting equipment, serial number AK 14152045, released to service inr 1991.**

The photographic documentation made on 10 April 2010 shows that the approach and horizon lights at the Smolensk “Severny” aerodrome did not belong to the LUCH-2MU device as described in the Report in point. 1.8. “Landing navigational equipment and UWD”, item “aerodrome lighting equipment”.

**The appearance of the “LUCH-2MU” lighting equipment at the Smolensk “Severny” aerodrome on 10 April 2010**









**This is what the elements of the LUCH-2MU lighting system should look like – the below pictures**



**Do not come from Smolensk “Severny” aerodrome**



The above photographic documentation shows, that the lighting elements of the lighting system of the Smolensk “Severny” aerodrome originated from an unspecified device, did not have mirrors and focusing lenses, and did not possess a vertical and horizontal plane lighting angle adjustment function.

Moreover, information contained in point 1.16.7 “Assessment of the lighting system visibility” which pertains to the statement, ‘that the crew could not even make visual contact with the first (900 metres from the DS)’ row of approach lights may be true, as the elements of the lighting system laid out at the Smolensk “Severny” aerodrome were not of headlight type, and their photometric characteristics were far from the required standards (pictured below).



**Note the text in figure 42:** is  $\Delta L = 755$  m and should be  $\Delta L = 725$  m.

### **1.16.8. Expert Conclusion on the Possibility of an Unauthorised Person's Presence in the Cockpit by the Time of the Impact**

The Polish party cannot comment on the information contained in the subchapter because of:

- the lack of access to records of forensic medical research (the Polish side is not familiar with the "Expert Conclusion of Coronary Expertise No. 37");
- the lack of access to the crash site inspection report (the Polish side has no knowledge of where inspection area No.1 was located);
- the results of the ethyl alcohol blood concentration tests in the blood sample taken from the Air Force Commander cannot be commented on due to the lack of source documentation (a lack of authorised toxicological test reports and information when and how the specimens subject to testing were obtained). The possibility that alcohol levels detected during the autopsy may be of endogenous origin cannot be ruled out).

An analysis of the properties of the mechanism of the aircraft's collision with the ground and of the causes of injuries to passengers, including to the passenger present in the cockpit is consistent with the available knowledge in the field of aviation medicine and forensic medicine.

### **1.16.9. Expert opinion from the analysis of flight control group (FCG) activities at the Smolensk "Severny" aerodrome on 10 April 2010**

Neither the accredited Polish expert nor his advisers participated in the development of this expert opinion. This was a violation of point 5.25, item h) of Annex 13.

#### **1) regarding Page 129 of the Report**

*At 09:15 the Yak-40 aircraft (Flight PLF 031) landed (...).The Yak-40 landed with visibility 1000 m*

Weather conditions below the aerodrome's visibility minimum existed from 09.09hrs LT. The testimony by the commander of the Yak-40 aircraft crew indicates that he saw the ground from an altitude of 80-90 m. He also stated that he had not seen the strip from an altitude of 80 m and only saw it from an altitude of 50-70 m.

The CATC saw the Yak-40 plane just above the DS 26 threshold. An analysis of the distance between the position of individual objects (see picture below) shows that the actual visibility during Yak-40 aircraft's landing was no greater than 500 metres.



Possible location of the Jak-40 aeroplane

Distance approx. 500 m

Steering position

## 2) regarding Page 129 of the Report.

*“At 09:08 the CATC informed the arriving IL-76 aircraft: «visibility has dropped, mist 1000 m». After making two unsuccessful approaches with visibility 1000 m the IL-76 aircraft (the aircraft visibility minimum is 1000 m) was forwarded to alternate aerodrome of Vnukovo at 09:39”*

The report contains no analysis or evaluation of FCG actions as regards the cited description of the two unsuccessful approaches by the IL-76 aircraft:

- information about the deterioration of visibility to 1000 m was forwarded by the CATC when the IL-76 aircraft was at an altitude of 3000 m. The crew of the IL-76 aircraft confirmed erroneously “1500” and had not been corrected by the CATC. Both approaches to land by the IL-76 aircraft were made below the aerodrome minimum (100/1000), while the actual horizontal visibility was deteriorating to approximately 600 m at the first approach and to approximately 300 m at the second approach, with vertical visibility amounting to less than 50 m;
- there is no assessment of the impact Colonel Krasnukutski had had on the decision making process of the FCG, in particular, of the CATC. During both descents to land the IL-76 aircraft, Col. Krasnukutski actually took control of the aircraft when he saw the final phase of the first approach, and then ordered the plane to perform a second landing circle. In the SLK recording, nearby low flying aircraft could be heard clearly in the background, in addition to the terror in the voice of the CATC in reaction to this approach;

- like the crews of the Yak-40 and Tu-154M aircraft, the IL-76 crew did not report its decision on how they would approach to land on first radio contact, but the CATC told the crew that the approach will be made according to USL with RSL (such information was not given to Polish aircraft crews);
- According to the regulations cited by the Russian side, the exercise of trial approaches by RF state aircraft below aerodrome minimum is prohibited; in light of this it remains incomprehensible why the CATC gave permission for execution of such approaches by the IL-76 aircraft on 10 April 2010;

### **3) regarding Page 130 of the Report.**

*According to the CATC's explanation, at 09:40 he was informed on the Tu-154M aircraft PLF 101 that had departed from Warsaw at 09:27; there was no preliminary request for arrival permission from Warsaw. The estimated flight time enroute was 1 hour and 15 minutes.*

There is no indication of any regulation, requiring the Polish side's aircraft crew to obtain a permission to accept the aircraft immediately before the departure. The Russian AIP contains a provision that, if a forwarded FPL is not rejected within 1 hour of it being sent, it means it has been approved.

### **4) regarding Page 130 of the Report.**

*According to the crew to ATC radio communications record, at 10:23 the crew of Flight PLF 101 contacted the Smolensk "Severny" Aerodrome, CATC informed the crew on the airdrome weather (fog, visibility 400 m, no conditions for landing).*

**The CATC did not give the Tu-154M flight crew all the information and in the correct order as below (Doc. 4444) in accordance with accepted principles of providing information to arriving aircraft:**

a) type of approach and runway in use;

b) meteorological information as below:

- wind direction and ground wind speed, including any significant changes;
- visibility and where applicable – runway visual range (RVR);
- current weather;
- cloud cover below 1500 m (5000 ft) or below the highest minimum absolute sector altitude, depending on whichever is greater; cumulonimbus, where the sky is not visible - vertical visibility when available;
- air temperature;
- dew point temperature - on the basis of regional air navigation agreement;
- setting(s) of the altimeter;
- any available information on significant meteorological phenomena in the approach zone, and a TREND-type forecast for landing, when available.

**5) concerning pages 131-132 of the Report as regards the summary evaluation of FCG's actions and the subsequent impact of these actions on the occurrence of the aviation event.**

*The ATC group actions during the approach did not contribute to the accident.*

The aircraft crew were incorrectly informed about the correct course and path position, when in fact the plane was above path, and from 2.5 km to DS 26 was below path by 2°40' (in relation to the 3°10' path cited by the authors of the Report, the aircraft intersected the path downward 3.3 km from the DS 26 threshold).

*The professional level of the ATC group of Smolensk "Severny" Airdrome complied with the regulations*

The KSL had little experience working as a KSL. He served in this function seven times in the last 12 months prior to the day of the disaster, of which only once with TWA. In his Log Book, there is no proper entry of being authorised to perform KSL duties at the Smolensk "Severny" aerodrome, which fact is inconsistent with FAPPPGoSA.

*The crew was timely informed on the worsened weather conditions below the minima, but despite the warning they decided to approach. In accordance with the Russian AIP the crew was cleared to approach, but all the responsibility for the consequences was to be taken on by the crew because there were no conditions for landing*

It has not been explained how the CATC was able to assess that there were no obstacles (people, vehicles or animals) on the DS and its safety zone when visibility was just 400-200 m.

*The crew was timely informed on the worsened weather conditions below the minima, but despite the warning they decided to approach. In accordance with the Russian AIP the crew was cleared to approach, but all the responsibility for the consequences was to be taken on by the crew because there were no conditions for landing.*

The crew acted in accordance with the provisions of the Flight Rules RL 2006, §19, points 23, 24:

23. Landing shall be permitted when:

- 1) the relevant SRL aerodrome authority has granted permission (does not apply to landing sites and other sites of take-offs and landings where no SRL is available);
- 2) there is no signal prohibiting landing.

24. When flying on the straight-in to land, the PIC must interrupt descent:

- 1) on the command of the SRL aerodrome authority, or
- 2) if landing has not been accurately calculated and cannot be corrected, or
- 3) in the event of an aircraft appearing nearby or if obstacles threatening the safety of landing appear on the DS (runway strip), or

4) in the event of a WM being reached (in accordance with § 23, item 16) and of failure to establish certain visual contact with the ground, which is necessary to continue the approach, or

5) when the flight conditions or weather phenomena do not guarantee a safe landing, and in accordance with the decision of the PIC, perform a second approach to land or divert to an alternate aerodrome.

And § 23, points 16 and 17:

16. During an approach for landing the pilot must abide by those WM, the limiting effect of which occurs at the earliest.

17. The final decision to land is made by the pilot at the latest at the altitude specified in point 16, after an approach to land had been made, regardless of the information about the atmospheric conditions to land obtained previously.

*The ATC group, using the available equipment informed the crew on the aircraft position on approach down to the established decision altitude.*

As previously demonstrated, the Tu-154M crew were erroneously informed about the correct course and path position, when in fact the position of the aircraft was outside the admissible tolerance for the RSL system.

*The crew did not report to the CATC on the selected approach system, nor did they request the landing radar.*

The crew reported no requests to have the KSL secure the chosen approach method but in fact the KSL secured the approach of the aircraft, informing the crew about the aircraft's position. It should be noted, that the relevant provision contained in the Russian AIP indicating who is to determine the type of approach, contradict those in Doc. 4444 and FAPPPGosA.

*The operation of the nav aids and lighting equipment as well as the runway condition atn the Smolensk "Severny" aerodrome did not affect the accident causes.*

The aerodrome lighting equipment did not meet the requirements for the LUCH-2MU system.

*The discrepancies detected in the glide path depiction on the landing zone controller's radar screen did not affect the flight consequences, the flight was performed with a greater obstacle clearance margins and the crew was not to descend lower than the minimum descent altitude established by the ATC*

According to the Polish side, the discrepancies detected on the glide path depiction on the landing zone controller's radar screen, did affect the final outcome of the flight. The crew only possessed information about the 2°40' glide path and the information from the KSL about the aircraft's position relative to the 3°12' path could have misled it.

### 1.16.10. Assessment of the PIC's Psychoemotional Status

1. It has not been explained what basis was used to diagnose a high level of conformism of the PIC.

**Comment:**

The evaluation of the psychological and emotional state of the PIC provided in the IAC report contains the statement: *“the results of the psychological tests reveal the dominating conformity (complaisance, subordinacy) in the PIC's character traits”* (p. 132). The argument justifying this thesis is the level of UGD, 31/6 compromise scale - determining the level of conformity in the NEO-FF1 questionnaire. At the same time, it is concluded that the PIC had a good level of emotional control, a tendency for commutability, cooperation, experimentation, open-mindedness (p. 132). It is further claimed that *“one of the constituents of conformism is anxiety as a personal quality”* (p. 132). It may be concluded from the available results of psychological tests, that the level of anxiety in the crew commander remained low: Questionnaire STAI X-1 (state anxiety) = 21 and X-2 (trait anxiety) = 24.

**Conclusion:**

It cannot be inferred from the available results of psychological tests, that the PIC was a conformist, a submissive man. However, it may be stated, that the results of psychological tests subject to analysis, which had formed the basis for this inference, were completely normal.

2. The premises behind the conclusion that *“Indifference of the Commander-in-Chief of the Polish Air Forces to solving the emerging extremely hazardous situation influenced the PIC's decision to descend below the decision height without establishing contact with ground references”* has not been explained.

**Comment:**

Not all fragments of conversations in the cockpit during the last phase of the flight have been identified. While establishing his role at the critical moment of the flight depends on it, it has not been clearly established why the Commander-in-Chief of the Polish Air Forces was in fact present in the cockpit.

**Conclusion:** The thesis is put forth overly explicitly.

3. One must agree with the thesis, that it had been established practice in 36 splt to alternate the job of the PIC and the co-pilot. However, it should be noted, that this practice did not exclusively apply to the Tu-154M PIC on the flight in question, but was rather a principle applied to all pilots.

4. The statement *“The experts also conducted a psycho-linguistic analysis of the cockpit communications recorded by the CVR”* (p. 131/132) requires a separate comment. In the *“Assessment of the PIC's psycho-emotional status”*, there are no references and conclusions from this analysis, while in other parts of the Report there is only trace information on this subject. Obtaining accurate information about the stated analysis may help determine with greater precision the mental state of the PIC, and more broadly the mental state of the whole crew, during the last phase of the flight.



### **1.16.11. Findings of the Medical Psychological Expertise of the Crew Actions Conducted by the State Research Institute of Military Medicine of the Russian Ministry of Defence**

1. The Russian side has not put forward arguments to form a basis for the formulation of assumptions c) and e) in point 1.16.11 of the Report.

#### **Comment:**

The expert evaluation in this point is based on five assumptions:

- a) decrease in horizontal and vertical visibility due to surface fog which significantly complicated the flight;*
- b) lack of professional skills on the part of the PIC to conduct lettered flights in complicated weather conditions;*
- c) negative psychological climate induced by the presence of a high-ranked aviation official in the cockpit;*
- d) lack of experience in landings in the weather minima and in manual steering mode of Tu-154M;*
- e) fear of punishment on the part of the senior officers in case of failure to land at the destination aerodrome and proceeding to alternate aerodrome*

As to the assumptions contained in point c), there is insufficient evidence to suggest that the presence of a senior commander greatly impaired the psychological climate in the cabin. However it is true that the situation in which the crew found itself during the critical phase of the flight was extremely difficult, and the Commander-in-Chief of the Polish Air Forces did not actively intervene in the piloting process.

As to the assumptions contained in point e), it is well known that pilots should not in any way fear punishment from their senior commanders if they don't land at the indicated aerodrome. The cited incident in Tbilisi in 2008, though heavily publicised by the media, did not result in any disciplinary measures being taken (e.g. the then- PIC was awarded the Silver Medal of Merit in National Defence by the Minister of National Defence for deciding against flying to Tbilisi, and the military prosecutors in Wroclaw refused to initiate a criminal procedure). Of course, this does not mean that the crew did not feel under pressure to perform, a pressure which always accompanies air travel of government VIPs, or was unaware of the weight of the events in which the passengers were to have participated.

#### **Conclusion:**

The assumptions contained in subpoints c) and e) are unsupported by facts.

#### **1.16.14. Estimation of the maximum Landing Weight.**

There is no indication which part of the IUL was used by the Russian commission when determining the aircraft's landing weight. Most probably - according to the Polish side - the remark that the landing weight was exceeded and the maximum, admissible landing weight should be 74 tonnes, was formulated by the Russian aviation subcommittee based on a chart found in the IUL on p. 7.7.9/10. This chart includes the following parameters: runway length, elevation, temperature, runway slope as well as wind direction and strength. It should be noted, however, that both the form and location of the chart at the end of the bulky IUL volume in practice makes it impossible to utilise by the crew, while in the air. It is also the only place in the instructions that allows for the inclusion of all these parameters when calculating the weight for landing.

It should be noted that the method for determining these values, proposed by the manufacturer of the Tu-154M aircraft, is not very crew-friendly and has been developed solely to meet certification requirements.

The only tabular data, adapted for use in all conditions, can be found in table 3.1.42, where the maximum landing weight for an aerodrome of the parameters of the Smolensk "Severny" aerodrome is: 77.2-76.7 tonnes. These tables, however, serve only to help the crew prepare for the flight. They do not account for the impact of tail wind on the length of the landing path, and what's more for the weight limits, and as such cannot be used in the air.

#### **1.16.15 Basis for Establishing Weather Minima for Smolensk "Severny" Aerodrome**

Pursuant to point 1.16.15 of the Report, the calculations of aerodrome landing minima were made in accordance with the applicable Russian Federation documents (set out in the Report). According to the contents of this point, the minimum value for the Smolensk "Severny" aerodrome for course 259° M, for category D aircraft, had been set at 100 m (cloud base) and 1000 m (visibility). This minimum value is contained in a document from a technical review of the aerodrome conducted on 05.04.2010 (*"The act of technical review of Smolensk "Severny" aerodrome for the purpose of accepting special flights"*).

The Polish side points out, that in materials handed over to it by the Russian side in 2009 (landing approach chart, aerodrome diagram and aerodrome minimum values) the aerodrome minimum table contains no data on the minimum conditions for landing with the use of RSP + OSP system for category "D" aircraft. The table contains only the minimum conditions for the OSP - 100x1500 system.

The Polish side requested that current aerodrome data (including the minimum conditions and the current approach chart) be provided to it, but has not received these, despite the fact that the Russians possessed such data.

### **1.17.1. Event Concerning Landing in Azerbaijan in 2008**

Identical remarks as those related to the assumption contained in subpoint e), point 1.16.11.

### **1.17.3. Other Persons of Interest**

The Deputy Chief of the Military Unit 21350 (Aviation base 6955) from the town of Tver was reassigned to Smolensk on the basis of decision by the Chief of the Military Unit 21350, in order to oversee organisational tasks and to assist the CATC in accepting special flights on 7 and 10 April 2010. The findings of the IAC commission show that this individual had performed the functions of coordination and control of the work of all aerodrome services involved in securing incoming flights and did not take direct part in controlling air traffic (p. 145 of the Report), yet an analysis of an audio record from the spool 9 channel 1 reveals audible radio communications by the Deputy Chief with the crew of the Tu-154M t/n 101 aircraft. The IAC commission findings contained in point 1.17.8 of the Report also confirm this fact. It follows, that the Deputy Chief of the Military Unit 21350 had exceeded his powers and did not obey the decision of the Chief of the Military Unit 21350, moreover the IAC commission findings are mutually contradictory.

In the Report, the activities of the Dispatcher of the Flight Dispatch Office of Military Unit 06755 have been completely omitted. Only the scope of his functional duties has been presented, which clearly shows, that when it comes to securing flights on 10 April 2010, he played a very important role. It was his job to pass on information to senior air traffic controllers that the weather at the Smolensk “Severny” aerodrome had deteriorated below the aerodrome minimum and at the same time received a clear decision from the appropriate function as to the next steps needed to ensure the safety of a special status aircraft. The absence in the Report of an analysis of this controller’s action may indicate a desire to conceal shortcomings in the decision-making process at the senior level of air traffic control.

### **1.17.4 Preparation of the Aerodrome to Accept VIP-Flights on April 7 and 10**

Based on a trial flight performed on 16.03.2010, the Russian side stated that the Smolensk “Severny” aerodrome was fit to receive aircraft (Tu-154 and Tu-134) provided a number of recommendations were followed, including those pertaining to the proper condition of lighting equipment and approach stations leading from course 259° M landings. Moreover, on 25.03.2010, an on-flight check of flight navigation, lighting and communications was performed using an An-12 aircraft. According to the documentation drawn up after the flight, all the devices met the specified requirements and were fit for the unrestricted securing of flights. On 05.04.2010, the Chief of the Military Unit 06755 approved “*Technical Assessment of Smolensk “Severny” Aerodrome for VIP flights*” at the set weather minimum.

**A general conclusion from the review protocol – *the aerodrome is I Class, ready to accept VIP flights with the established weather minima for landing course 259° M and Categories B and D of aircraft (Yak-40 and Tu-154) assumes the minima for landing radar+2NDB approach of 100 x 1000 metres***

**The Polish side's remarks regarding the above conclusion are as follows:**

1. Objective control measures at SKL were out of order, as shown by the Russian side as early as during the aerodrome test flight on 25 March, 2010, before it was cleared for operation on 7 and 10 April 2010. According to the document entitled “*Technical Assessment of Smolensk “Severny” Aerodrome for VIP flights*”, the technical condition of the equipment did not meet the requirements set out in normative documents. These irregularities **were not addressed**, as evidenced by lack of records from the PSK workstation and one of the channels of communication on magnetic tape from the P-500 recorders, as indicated by the Russian side.

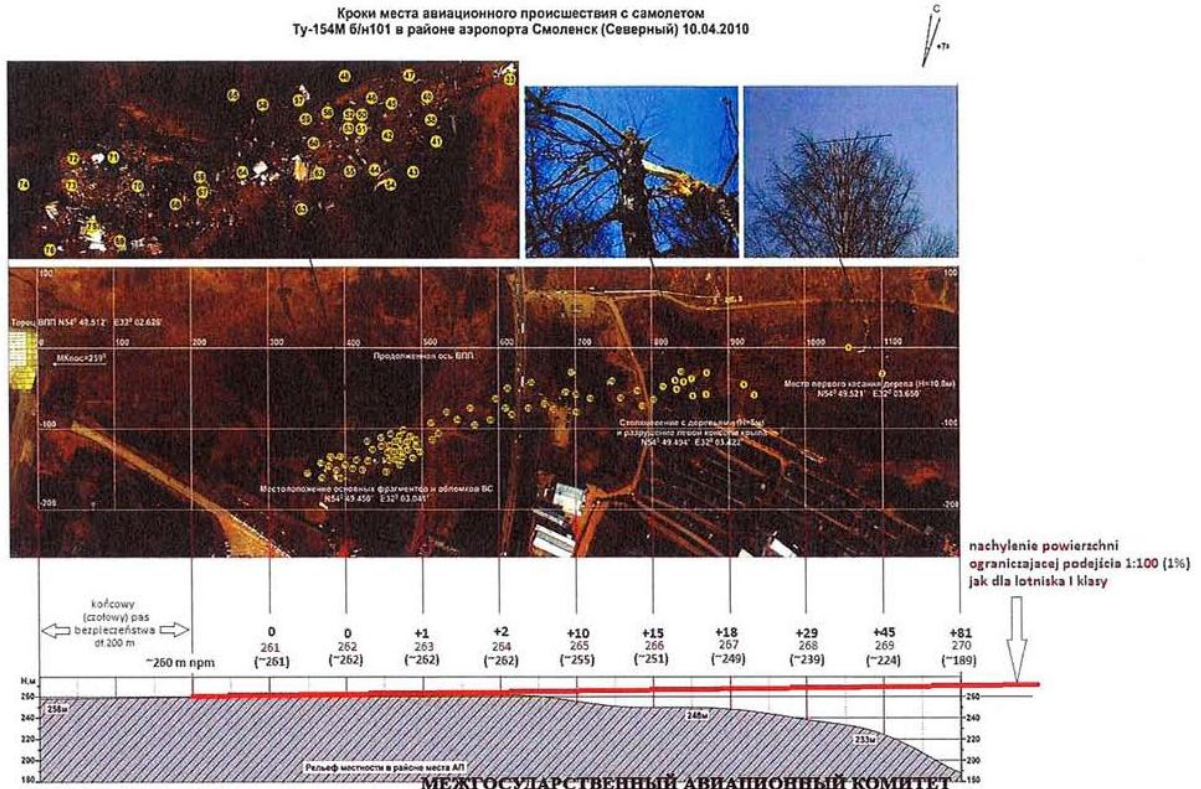
2. Aerodrome's lighting equipment – when evaluating the aerodrome's lighting devices based on the photographic material taken on 10 and 11 April 2010 at the Smolensk “Severny” aerodrome, it must be explicitly stated, that the actual technical condition of the lighting devices differed radically from the condition evidenced in the aerodrome test flight protocol of 25 March 2010. According to the Polish side, the poor technical condition of lighting devices had an adverse effect on the chances of establishing visual contact with lights and on determining the position relative to the ground by the aircraft crew.

3. In the absence of source documentation for the aerodrome and in the absence of applicable laws, the Polish side has assessed Smolensk “Severny” aerodrome's suitability to conduct flight operations on 7 and 10 April 2010 with regard to the limiting surfaces, and particularly with regard to the approach surface, on the basis of material available in two options.

**OPTION I** - approach limiting surface parameters were adopted as for Class I Polish military airfields. According to the classification of military airfields (“Guidelines for the design of military airfields. Part I – Permanent airfields” from 1974 and so from the Warsaw Pact era), in Poland the split of aerodromes into classes (I-V) depending on technical characteristics of the runways and approaches also exists. The aerodrome class is defined by three parameters: the actual length of the main DS, the main DS load capacity (substitute statistic maximum weight per one aircraft wheel), the slope of the approach surface. For Class I aerodromes, these are respectively: 2500 m and over, 17 tonnes. 1:100 (1%). Given the fact, that the then-Polish instructions were drawn up based on Soviet documents, it has been assumed (in the absence of current Russian documents) that identical or very similar parameters also apply to FR military airfields. The initial data of the approach surface:

- surface stretching from the end of the Final (lead) Safety Strip (KPB), i.e. 200 m from the 26 threshold;
- width of the initial (internal) margin 124 m;

- separation of side margins 15°;
- slope 1:100 (1%);
- initial ordinate 260 m above sea level (due to the elevation of the surface of the KPB relative to the 26 threshold).



tilt angle for approach limiting surface 1:100 (1%) as for class I aerodrome;-  
 +26 permissible building height above ground level  
 274 absolute height above sea level of approach surface  
 (~ 248) ground ordinate above sea level



**OPTION II** - limiting approach surface parameters according to the parameters for civil aviation aerodromes and Russian experimental aviation aerodromes were adopted. Under this option, technical conditions and recommendations have been used, otherwise contained in other sources of FR aviation regulations which were obtained:

Нормы годности к эксплуатации в СССР гражданских аэродромов (НГЭА СССР) – (Поправка № 22, утверждена МАК 26.10.98; Поправка № 23, утверждена МАК 02.02.00; Поправка № 24, утверждена МАК 16.07.04; Поправка № 25, утверждена МАК 19.08.05 - дата начала применения поправки № 25 - 01.10.05) - normy dopuszczenia do eksploatacji the standards for clearing civil aerodromes for operation - Section 3.2.2;

Standards for clearing civil aerodromes for operation in the USSR (NGEA USSR) – (Revision No. 22, approved by IAC (Interstate Aviation Committee) on 26.10.98; Revision No. 23 approved by IAC on 02.02.00; Revision no. 24 approved by IAC on 16.07.04; Revision No. 25 approved by IAC on 19.08.05 – revision No 25 effective as of 01.01.05)- Section 3.2.2;

Федеральные Авиационные Правила "Размещение маркиро-вочных знаков и устройств на зданиях, сооружениях, линиях связи, линиях электропередачи, радиотехническом оборудовании и других объектах, устанавливаемых в целях обеспечения безопасности полетов воздушных судов" – przepisy w sprawie the rules on the labelling of objects constituting aviation obstacles to ensure the safety of aircraft - Annexes 6 and 7;

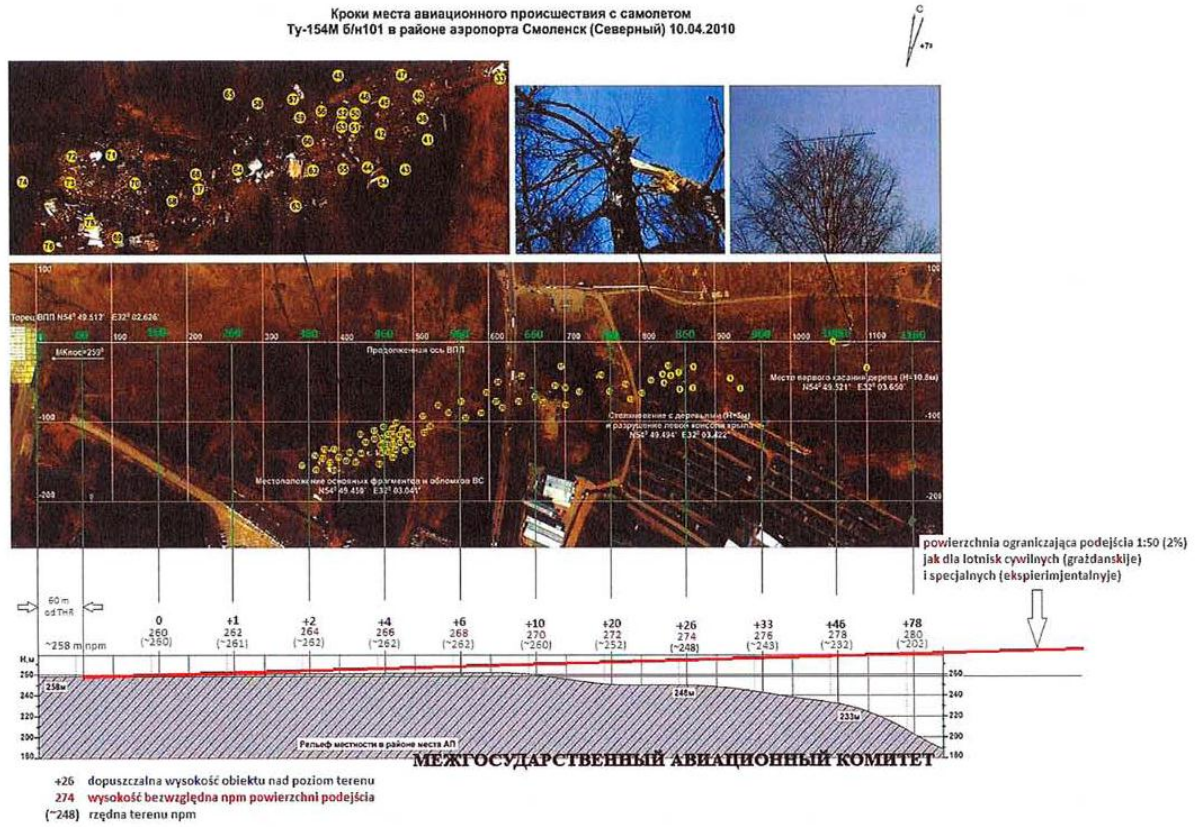
Federal Aviation Regulations “Installation of Marking Signs and Devices on Buildings, Structures, Communication Lines, Power Transmission Lines, Radio-Technical Equipment and other Facilities Installed to Ensure Safety of Aircraft”

Нормы годности к эксплуатации аэродромов экспериментальной авиации (НГЭА ЭА) – normy dopuszczenia do eksploatacji lotnisk lotnictwa the standards for clearing experimental aviation aerodromes for operation - Chapter 4.2.

Initial data of the approach surface:

- surface stretching 60 m from the 26 threshold;
- width of initial (internal) margin 300 m (150 m from the DS axis);
- separation of side margins 15% (app. 8.5°);
- slope 1:50 (2%);
- initial ordinate 258 m above sea level (height of 26 threshold).

## OPTION II



approaches 1:50 (2%) for civil aerodromes

- + 26 permissible building height above ground level
- 274 absolute height above sea level of approach surface
- (~248) ground ordinate above sea level



CLUSTERS OF TREES

An analysis of the approach surface calculated in line with above initial parameters shows that:

- due to the relatively flat terrain, structures and field objects located within the approach surface, about 650 m from the DS 26 threshold may have been the maximum height of:

- app. 2 m above ground level in option **I**
- app. 10 m above ground level in option **II**

- at a distance of 650 m - 900 m, due to the gradual depression of the terrain, the max. object height increases to:

- app. 18 m above ground level in option **I**
- app. 23 m above ground level in option **II**

- there is a dramatic depression from 900 m, which means an increase in the admissible height limit at a 1200 m distance from the DS 26 threshold:

- to app. 81 m above ground level in option **I** (in the BRL area, app. 45 m above ground level)
- app. 98 m above ground level in option **II** (in the BRL area, app. 56 m above ground level)

In both options, it was found that the area situated at a 300 m to 850-900 m distance from the DS 26 threshold, within the approach limiting surface from the 259° direction, was overgrown with plenty of shrubs and featured clusters (groups) of trees of a height of the order of 20 - 25 m above ground level, which exceeded (sometimes significantly, by approximately up to 15 m) the maximum admissible height of objects set by the above stated limiting surface, particularly in the area of the motorway intersecting the approach (400 m -700 m from the DS 26 threshold).



*Trees and shrubs app. 500 m from the DS 26 threshold (view toward 259° approach)*



*Distribution of some clusters of trees in the approach surface area*



This is inconsistent with the Polish, Russian and ICAO (Annex 14) regulations. These clusters of trees in question constituted a real threat to aircraft approaching for landing on the DS 26, especially in the difficult weather conditions that prevailed on 10 April 2010. Moreover, the trees and shrubs growing in the area before the DS 26 threshold obscured lights from the lighting system for the crews and limited SKL personnel's already obstructed visibility (due to fog) from SKL toward the 259° approach. In these circumstances, one cannot claim the aerodrome was fully operational and ready to accept aircraft, particularly those of HEAD status. It should be noted, that *"The act of technical review of the Smolensk "Severny" aerodrome to accept special flights"* dated on 5.04.2010, merely states that, quote: *"... at a distance of 1 to 4 km from the runway threshold, there are no obstacles measuring over 10 m in height relative to the runway threshold and from 4 km to the end of the approach strip, measuring 50 m relative to the runway threshold"*. No information is given about any possible obstacles situated at a distance of up to 1 km from the DS 26 threshold, i.e. in the area where representatives of the Polish side had found clusters of tall trees. The Polish side's assessment of the forest stand having exceeded permissible height levels along the DS 26 approach is confirmed by the mass logging of trees and shrubs in that area, which took place after the accident, as had been established based on the available photo documentation (picture below).



*Logged trees and shrubs – app. 600 m from the DS 26 threshold (view toward the DS).*



*Logged trees and shrubs at the approach axis, at app. 700 m distance from the DS 26 threshold.*



*Logged trees and shrubs at the approach axis, at app. 700 m distance from the DS 26 threshold.*

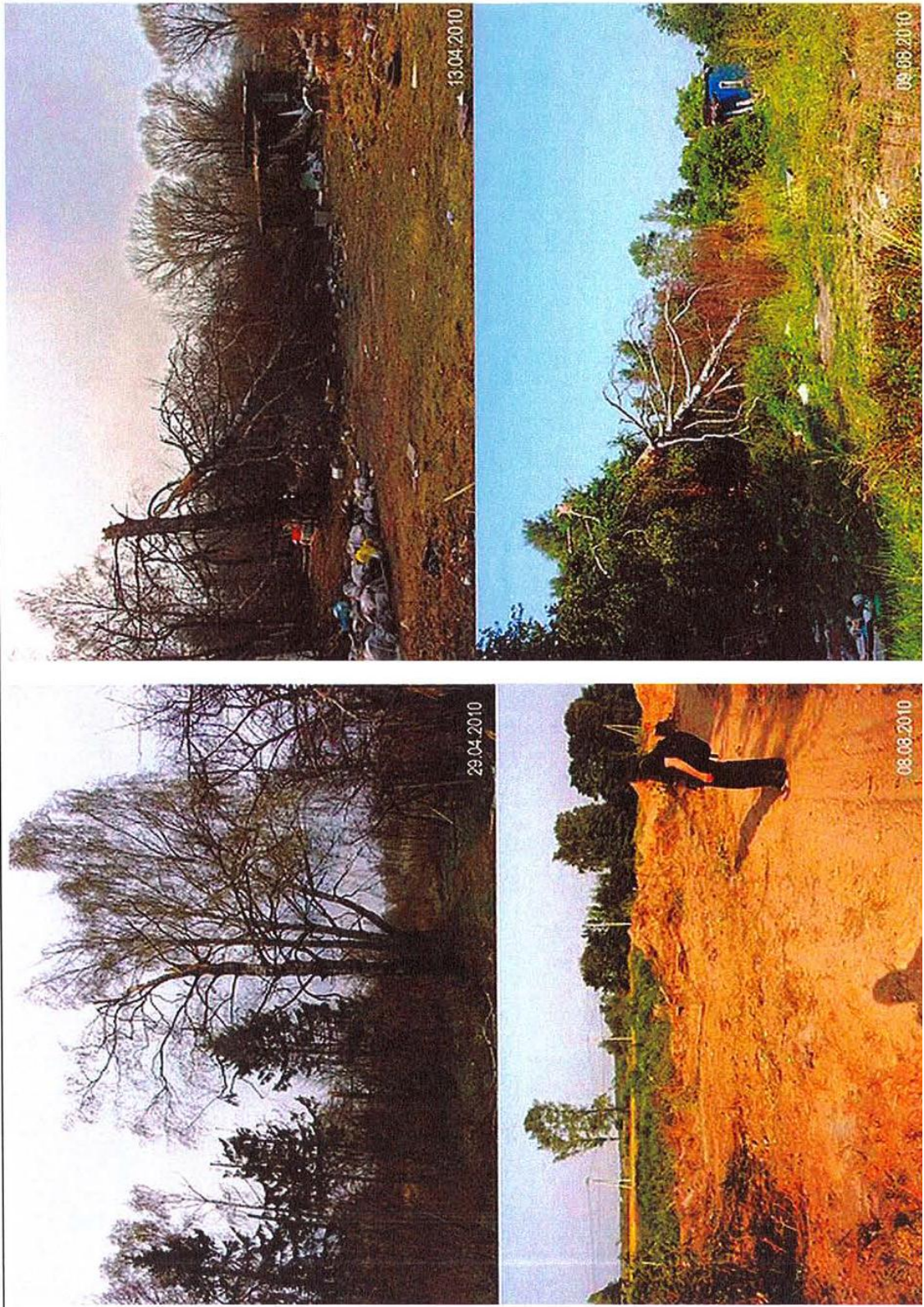


*Logged trees in the BRL area app. 900 m from the DS 26 threshold*

*Differences in condition of the forest stand - area of the approach axis next to the motorway app. 600-650 m from the DS 26 threshold.*



*Differences in the condition of the forest stand – area at an approximately 700-800 m distance from the DS 26 threshold.*



*Differences in the condition of the forest stand – area of the approach axis app. 600 m and 700 m from the DS threshold.*



*Differences in the condition of the forest stand - BRL area app. 1000 m from the DS 26 threshold.*



*Differences in the condition of the forest stand - BRL area app. 1000 m from the DS 26 threshold.*





#### **1.17.5 Findings of the Ballistic and Pyrotechnic Expertise.**

*The investigation team was provided the copies of conclusions of judicial expertise(ballistic and pyrotechnical) for criminal case No. 201/355051-10 in the letter from the Deputy Head of the second administration for investigation of VIP cases on crime against personal and common safety of the Main Investigation Administration of the Inquest Committee at the Main Prosecutor's Office of the Russian Federation No. 201/355051-10 of 14.05.2010.Expert conclusions No. 897 of 13.04.2010 and No. 3451 of 23.04.2010 on the pyrotechnical expertise contain conclusions that no explosives (trotyl, cyclonite or octogen) were found in the wash-offs of the Tu-154M 101 aircraft parts. The findings of the ballistic expertise confirm the presence of weapon (several handguns) and ammunition (cartridges). It was impossible to identify the date of last shots made from those guns*

In the Report, the Russian side did not provide detailed information about investigative activities conducted at the scene of the accident. Data on ballistic and pyrotechnics tests are in fact not verifiable by the Polish side because the Russian side had not provided it with source materials.

### **1.17.6. Possibility of Abnormal Standard Pressure Setting on the Pressure Altimeter**

The subchapter titled “Possibility of Abnormal Standard Pressure Setting on the Pressure Altimeter” should be found in Chapter 2, titled **Analysis** and not in Chapter 1 titled **Factual information**.

The fact that pressure on the PIC’s WBE-SWS NI altimeter had been set at 760 mmHg has been confirmed by the flight recorder records and by the data readings from FMS and TAWS storage blocks.

The Polish side has not received the OAO “Aeroprivor – East” draft for review, which document determined the likelihood of an incorrect standard altimeter pressure setting on the WBE-SWS.

### **1.17.7 Documents used**

*According to Para 1 of the Federal Aviation Rules of Conducting State Aviation Flights: “The Federal Aviation Rules of Conducting State Aviation Flight (hereinafter referred to as the Rules) have been developed in compliance with the current air legislation of the Russian Federation and regulations governing the activities of the federal executive bodies and organisations that have subdivisions of state aviation, and establish the order of flight operations of the state aviation of the Russian Federation (hereinafter referred to as state aviation)”.*

*These Rules and consequently other documents based on the Rules, cannot be applicable to Flight PLF101, as it was not a flight conducted by a subdivision of the state aviation of the Russian Federation or on an aircraft of the state aviation of the Russian Federation.*

In 1993, the Ministry of National Defence of the Republic of Poland and the Ministry of Defence of the Russian Federation concluded an agreement “on the rules of the mutual air traffic of military aircraft of the Republic of Poland and of the Russian Federation within the airspace of both countries.” This Agreement was concluded for a period of five years, subject to automatic renewal for further five-year periods if neither party exercises their right to terminate this Agreement, while maintaining the form of a written notification of that fact to the other Party. By 10 April 2010, none of the Parties to the Agreement exercised their right to terminate the Agreement, therefore, it should be noted that the Agreement continues to be in force.

The Agreement was concluded in order to regulate the rules of mutual air traffic of military aircraft of the two countries. In particular, the following rules were agreed:

Article 1: ... the operation of a military aircraft within the airspace of the Republic of Poland and of the Russian Federation will take place in accordance with international Rules of the Air, with the air law of both countries, and with this Agreement,

Article 8: For the landing of military aircraft of the Republic of Poland on military aerodromes of the Russian Federation (...) The Parties undertake to provide the following services:

(a) free of charge:

- the transfer of the necessary data on military aerodromes;
- the transfer of flight plans;
- the transfer of meteorological data;
- the use of military navigation systems on the route of a flight, and during the take-off and landing.

The analysis of the facts shows that international standards for air navigation were applied during the flight to the ASKIL navigation point only. From the time that point was passed, the flight continued according to the procedures unspecified in the provisions of civil law. If certain deviations from the international regulations and generally accepted recommendations are applied during a flight, as reflected in national legislation, the airspace users should be informed by the authorities of this country about applicable regulations in this respect. No paragraph of the Russian AIP document for aircraft crews contains any guidance on how to plan such a flight outside the classified airspace.

According to the Polish side, the flight of the Tu-154M aircraft, t/n 101, on 10 April 2010 should be treated as a military flight due to the following:

- the aircraft was registered in the “REGISTER OF MILITARY aircraft”;
- the marking of the aircraft (red and white chequerboard), flight (PLF 101) - clearly shows that it was a military aircraft;
- the crew of the aircraft was military;
- the “Claris” document No. 050 clearly indicated that it was a military plane, belonging to the Polish Air Force, and that the Polish President would be on board;
- the complex flight plan detailed the type of flight as military “M” with the “HEAD” status;
- the aircraft obtained authorisation for a military flight from the Republic of Belarus No. 18-32/7750-n and the Russian Federation No. 3677/n/Zjed;
- the landing aerodrome Smolensk “Severny” was a military aerodrome, with the military air traffic service. In correspondence with the Tu-154M crew, the CATC made sure whether the crew performed landings at a military aerodrome;

- after leaving the flight path, the aircraft Tu-154M performed the flight under the control of air traffic services of Smolensk “Severny” aerodrome (Korsazh);
- the approach chart of Smolensk “Severny” aerodrome came from the military collection of aerodrome and navigation information of the Russian Federation, therefore, the approach procedures were the same as in the state aviation of the Russian Federation;
- the landing aerodrome Smolensk “Severny” was not allowed to accept international flights (categorisation according to the ICAO standards was not carried out) - p. 68 of the Project Report;
- the meteorological support for the aerodrome was organised and performed in accordance with the military regulations of the Russian Federation. Information on actual weather conditions and weather forecasts from the aerodrome were not available to the crew of the Tu-154M aircraft before its take-off in Warsaw.

The above facts demonstrate that the flight was performed according to the procedures of state (military) aviation once the control over the flight of the Tu-154M was transferred to the air traffic control services of Smolensk “Severny” aerodrome, and the operations of air traffic services (ATS) should be analysed according to such procedures. Given the above, the content of the Report needs to be complemented in respect of the area indicated.

#### **1.17.8 Provisions of the Russian AIP**

*In compliance with Para 3.10 GEN 1-2.9 of the Russian AIP, foreign aircraft flying to aerodromes not open for international flights should be escorted (led). As was mentioned in Section 1.1. the flight request supplied by the Polish Embassy in the Russian Federation contained a request for a navigator (leaderman). Further the Polish side refused the leaderman services.*

On 18 March 2010, in “Claris” documents No. 50 and 51 sent, 36 SPLT requested, among other things, **access to current aerodrome diagrams and procedures, and sending the leader prior to the departure from Warsaw.** On 09.04.2010, the Ministry of Foreign Affairs of the Russian Federation sent a letter to the Polish Embassy in the Russian Federation permitting the flight. These permits **do not refer to request to make the current aerodrome diagrams and procedures available.** The later part of the Report does not indicate if such data were provided to the Polish side. **Neither does it include information about accepting the decision concerning the absence of the leaderman on board the Polish aircraft.** Flight permission, while required in paragraph 3.9 section GEN 1.2-9 of the Russian AIP, may not be justified by receipt of the refusal of the presence of a leaderman on board the aircraft from 36 SPLT.

## 2 Analysis

The method of the analysis does not comply with the guidelines contained in the **ICAO Doc. 6920 (Manual of Aircraft Accident Investigation, IV edition)**. The analysis should be based on an assessment of **evidence and not hypotheses**. The analysis should examine the evidence already presented in Chapter **1. Factual Information**, and develop circumstances and situations that might occur. This should lead to the formulation of possible hypotheses that should be discussed in the context of the evidence gathered. Hypotheses unsupported with evidence should be rejected. **Hypotheses** may not be treated as **certainties**, and their proof may not rely on **hypothetical evidence**. The listed items are presented as statements in the form of axioms; and conditional expressions, such as likely, possible, etc., were not used even once.

The analysis contains many repetitions as well as references to many facts that were not included in the Chapter **1. Factual Information**. It does not focus on the description of possible variants of the course of action and the assessment of the course of individual flight sequences. The activities of the Flights Management Group were not evaluated and the impact of decisions taken outside the Flights Management Group on these activities. It mainly focused on proving that the activities of the controllers at the traffic control were correct. The influence of pressure from other persons at the CATC-a, who as the only one suggested sending the Tu-154M aircraft to an alternate aerodrome, was not assessed. Full analysis of the situation at the Smolensk “Severny” aerodrome should be carried out after the additions in the recording of the fourth track from BSKP in respect of the accurate indication of the interlocutor and the content of the information passed on.

The analysis presented in this chapter is unclear, also because of the lack of division into properly titled, separate areas.

### 1) regarding page 150 of the Report

*Apart from the four flight crew members there were three flight attendants on board as well as 88 passengers and one security officer, 96 persons overall, all of them citizens of the Republic of Poland*

There were six security officers and one security officer as a cabin crew member (flight attendant), who had completed appropriate training and was authorised to perform this function on board. Therefore, there were 4 crew members on board of the aircraft not 3 as it is presented in the Report.

## 2) regarding page 150 of the Report

*The aircraft was not insured. The crew members did not have insurance policies. In violation of Para 2.2 of Section GEN 1.6 of the Russian AIP the flight was conducted without compulsory insurance or other kinds of securing the responsibility of the owners of the aircraft for damage caused to third parties.*

The cited paragraph of the Russian AIP allows for forms of liability insurance of the owner other than compulsory insurance.

In accordance with Polish law, the aircraft was a state aircraft and, as such, it was not subject to compulsory insurance. In accordance with Polish law, the State Treasury is a guarantor of third party liability in this case.

Until now, the Russian Federation has not made its flight permission for a state aircraft of the Republic of Poland conditional upon the possession of insurance for the aircraft and for its crew members, to which the authors of the Report refer.

## 3) regarding page 151 of the Report

*There were a number of significant shortcomings in the general organisation of the VIP flight. According to the information provided by the Polish side the crew conducted the preflight briefing on their own on 09.04.2010. The top officials did not take any part in the preflight briefing. Records on the briefing, questions under study, applied materials and results of the crew readiness control were not kept*

According to the RL-2006 in § 16:

In paragraph 3, it is written that “the commander of a unit is responsible for the organisation and the logistics of flights of this aviation unit.”

Paragraph 8 states: “The detailed rules of the organisation of flights are set out in the instruction of organisation of flights.”

The Instruction of Organisation of Flights of 2008, § 21, paragraph 11 states: “The organiser is responsible for the organisation of flight preparation of flight attendants he/she is responsible for ...”

**None of these paragraphs warrants direct participation of a unit commander in the preparation of a flight but only its organisation.**

In the Instruction of Organisation of Flights of 2008, § 6 we find the following provision:

Paragraph 4. “Each pilot (crew member) is responsible for the quality of personal preparation and mental and physical ability to fly ...”

Paragraph 5. Those participating in the organisation of flights bear personal responsibility for the quality of their preparation and mental and physical ability to perform their duties ...”

The proper entry and the signature of the commander of the crew in the Flight Log confirms crew preparation for the flight.

#### **4) regarding page 152 of the Report**

*The crew did not have complete air navigation and other data on Smolensk “Severny” Airdrome when preparing for the flight. The investigation team was provided out-of-date information on the approach charts at Smolensk “Severny” Aerodrome. The NOTAM containing information on the exclusion of some navigation aids from operation was not provided to the crew.*

*Note: According to the information given by the Commander of the special air regiment concerning the organisation of that flight, relative requests were submitted so that the Embassy of Poland in Moscow could contact the Russian side to request providing actual aerodrome charts and procedures. Until the departure no information was provided to the regiment by the Embassy.*

*The analysis of the air navigation information that the crew had did not reveal its date of issue (the sheets bear no title, number or date). The cover page of the mentioned fax assumes that air navigation information was issued before April 9, 2009. The aerodrome data for Category Daircraft (Tu-154M) obtained by the crew stipulated only 2NDB landing system (minima 100x1500) or an instrumental landing system (of RMS type) which has been out of operation since October 2009 and could not have been used by the crew anyway due to the absence of relative equipment on board. The crew did not have aerodrome weather minima data for other approach systems (landing radar+2NDB, landing radar) before departure.*

On page 60 of the Report, referring to paragraph 1.8, a copy of the current approach chart for DS 26 of Smolensk “Severny” aerodrome is shown, which is consistent in terms of the aviation content with one the crew. Therefore, this allegation is unfounded.

In addition, footnote number 32 refers to a letter from the Polish Embassy in fact dated 09.04.2009 and not 09.04.2010.

According to the statement of Mrs J. G., made on 05.05.2010, the “Representative of the Department of the Polish Ministry of Foreign Affairs in the Russian Federation, Mr J. M. informed her around 05.04.2010 that the procedures did not change and were the same as those the Ministry of Foreign Affairs of the Russian Federation provided to the establishment in April 2009”

In paragraph 1.1 of the Report, on page 15, there is the following information:

*The letter of the Embassy of the Republic of Poland in the Russian Federation contained a request to provide handling at Smolensk aerodrome as well as “up-to-date aerodrome charts and procedures”. The Polish side requested to provide a navigator on board the aircraft.*

In the remainder of the Report, the Russian side did not comment on whether any Russian institution responded positively to that request.

#### **5) regarding page 154 of the Report**

*Request of the aerodrome readiness at the time of departure and request of the clearance for arrival of the Yak-40 and Tu-154M on 10.04.2010 were not sent, information on the aerodrome readiness and clearance for arrivals were not issued from Smolensk “Severny” Aerodrome*

The Russian side did not indicate the provision containing the requirement that this type of inquiry should be sent to the Russian Federation prior to the departure of Polish aircraft, both on 7 and 10 April 2010

No one on the side of the Russian Federation informed on 7 April 2010, either before the departure or after landing at the Smolensk “Severny” aerodrome, any of the crew members of the Tu-154M, CASA C-295M and Yak-40 aircraft about the performance of flights without mandatory permission for departure before the take-off.

#### **6) regarding page 154 of the Report**

*There was no navigator-leaderman on board the aircraft. According to the available information, after submitting the initial flight permission request the Polish side refused the leaderman services explaining that the crew had sufficient mastery of Russian*

The Russian AIP contains no provision allowing the waiving of the presence of “a navigator - leaderman on board of the aircraft.” The Russian side, according to the cited provision of the Russian AIP, should not permit a flight without the assistance of the navigator, which is equivalent to a violation of the provision in force in the Russian federation by the authority issuing the permit.



### **7) regarding page 155 of the Report**

*The coordinates of both outer markers and ARP were obviously taken from the air navigation charts that the crew had (in the SK-42 coordinate system, without conversion to WGS-84).*

*For the actual geographical position of Smolensk “Severny” Aerodrome the west-to-east inaccuracy does not exceed 150 m, south-to-north inaccuracy is negligible and the elevation inaccuracy is about 10 m. The investigation team believes that considering the actual chain of events these inaccuracies did not contribute to the accident. However, such inaccuracy in the usage of aeronautical information can depict drawbacks in the navigation support of the flight*

The approach cards to Smolensk “Severny” aerodrome provided by the Russian side do not contain information according to which coordinate system the coordinates of navigation points are set. The Russian AIP does not specify either the extent to which the SK-42 system and the PZ-90 system apply in the Russian Federation.

### **8) regarding page 156 of the Report**

Picture illegible – it is impossible to comment by the Polish side

### **9) regarding page 160 of the Report**

*After contacting Moscow Control, the aircraft was cleared for further descent to 3600 m and instructed to contact Smolensk “Severny” Airdrome Control, callsign “Korsazh”.*

This is equivalent to the transfer of control of the aircraft to the flight management group of Smolensk “Severny” aerodrome. No coordination between Moscow - Control and the flight management group of Smolensk “Severny” aerodrome was found in the phone records of SKL.

### **10) regarding page 161 of the Report**

*The air traffic control at Smolensk “Severny” Aerodrome on 10.04.2010 was conducted by three ATC specialists: CATC, deputy CATC and landing zone controller. The CATC and landing zone controller were at the BSKP with landing course 259° M, the assistant CATC was at the DSKP.*

Both the Report and the “Flight control management log” contain no information about the experience and authorisations of the air traffic services specialist - PKL, which according to FAPPPGosA has specific responsibilities.

## 11) regarding page 161 of the Report

*The working stations of the CATC and the landing zone controller are next to each other. According to the boundaries of aircraft handovers when approach is conducted using the aerodrome systems the CATC controls the aircraft from the moment the aircraft enters the approach area and starts turning for the final. The landing zone controller controls air traffic on final until the crew reports: "Runway in sight." The CATC grants clearance after visual contact with the aircraft on final.*

If the crew did not report on the approach type, the CATC (CATC) should, as it did in relation to the crew of the IL-76, inform them about it. According to the provisions of Document 4444:

### 6.5.4 Instrument landing approach

6.5.4.1 Approach control authority should establish a procedure for an instrument approach for the arriving aircraft. The flight crew may request another procedure and, if conditions permit, should be allowed to exercise it.

#### 6.5.4 Заход на посадку по приборам

6.5.4.1 Диспетчерский орган подхода указывает прибывающему воздушному судну подлежащую использованию схему захода на посадку по приборам. Летный экипаж может запросить альтернативную схему, и, если позволяют условия, ему следует разрешать ее использовать.

6.5.4.2. If the pilot reports or an ATC unit clearly establishes that the pilot is not familiar with the procedure for an instrument approach, the pilot should be given a level of initial approach, the point (in minutes of the flight from the appropriate point of reporting) over which the pilot is to start the basic or procedural turn, the level at which the procedural turn should be made and the route line of the final approach. However, when the aircraft received the permission to execute the approach straight from the route, it is necessary to provide only the last information. If it is deemed necessary, the frequency(ies) of navigational aid(s) used should be given, as well as the procedure after a failed approach.

6.5.4.2 Если пилот сообщает или органу УВД становится ясно, что он не знаком с порядком захода на посадку по приборам, указывается высота полета на начальном участке захода на посадку, пункт (в минутах полета от соответствующего контрольного пункта), в котором будет начат стандартный разворот, высота, на которой стандартный разворот будет завершен, или линия пути на конечном участке захода на посадку, за исключением того, что, если воздушному судну выдается разрешение на заход на посадку с прямой, указывается только последнее из перечисленного. В тех случаях, когда это будет сочтено необходимым, указываются подлежащая(ие) использованию частота(ы) навигационного(ых) средства(средств), а также порядок ухода на второй круг.

and FAPPPGosA:

562 In the aviation units where the position of senior assistant RP are nor envisaged, flight control functions in the close zone (RBZ functions) are distributed between the RP at the aerodrome and RZP. In this case: The RP at the aerodrome determines the levels of flights and landing approaches for the crews.

The CATC did not inform the crew about its transfer to communication with the KSL, and the KSL did not inform the crew about taking control over the aircraft's approach. The KSL erroneously informed the crew about their position in relation to the DS26 as well as the position of the aircraft on the glide path and the course.

The crew of the Tu-154M aircraft confirmed the KSL information about their correct position "ON COURSE AND PATH" once, likewise the crew of the IL-76 aircraft who also did not confirm all the commands of the KSL. This means that the crew of the Tu-154M aircraft received the KSL information "ON COURSE AND PATH" that did not reflect the actual position of the aircraft in relation to the glide path.

The remark that the crew "*did not request the radar*" is unclear. In the context of this statement, it can be stated that KSL should not provide the crew with any information about the aircraft's position in relation to the glide path.

None of the crews, including the crew of the IL-76 requested the radar, and all landing approaches were secured by the KSL. The KSL did not correct the aircraft's position in relation to the course and path in any of the four approaches. According to the Russian side, all the crews performed flawless approaches to both the course and the path. This is not consistent with the records of the Tu-154M QAR as well as with the testimonies of witnesses. All aircraft engaged in flight from the left side of the DS 26; from 9 km to 2750 m, from the threshold of DS26, Tu-154M was above the glide path, and then after its passing, it was below its value, i.e.  $2^{\circ}40'$ .

## **12) regarding page 161 of the Report**

*As for the landing zone controller's working station, as was shown in Section 1.16.6, the glide path line was drawn with the actual slope angle of about  $3^{\circ}10'$ , i.e. when the aircraft was at the top of the tolerance area (which is  $30'$ ) for the nominal glide path angle of  $2^{\circ}40'$  the indication of its blip on the radar was corresponding to the "on the glide path" position.*

The graphically plotted actual glide slope angle of  $\sim 3^{\circ}10'$  as adopted by IAC is different from what is shown on the aerodrome chart of  $2^{\circ}40'$ . No sentence explains why the KSL provided such an angle ( $\sim 3^{\circ}10'$ ) and why it failed to notify aircraft crews that on 10.04.2010, the glide path angle was different from the published one.

The KSL command did not reflect the actual position of the aircraft on the indicator according to glide paths  $2^{\circ}40'$  and  $\sim 3^{\circ}10'$  analysed by IAC.

Distance from DS 26 (m)	H-plane in relation to the path 2°40' (m)	Dimensions of the deviation tolerance zone (m)	Permissible error: 1/3 of linear dimensions of the zone of tolerance	Comments
10410	+ 8	± 94	± 31	
10152	+ 13	± 92	± 30	“101, distance 10, entry to the path” (KSL)
9000	+ 59	± 82	± 27	
8300	+ 128	± 76	± 25	“8 on the course, path” (KSL)
8000	+ 106	± 73	± 24	
7700	+ 70	± 70	± 23	“Runway clear” (PKL)
7450	+ 100	+ 68	+ 23	“Conditional landing 120 - 3 m” (CATC)
7000	+ 110	± 64	± 21	
6600	+ 112	± 61	± 20	“continue on the course, distance 6” (KSL)
6260	+ 114	± 58	± 19	DRL
5000	+ 64	± 47	± 16	
4650	+ 58	± 44	± 15	“4 on the course, path” (KSL)
4000	+ 36	± 38	+ 13	
3550	+ 35	+ 34	± 11	“3 on the course, path” (KSL)
3140	+ 20	± 30	± 10	“Turn on lights” (CATC)
2780	0	± 27	± 9	The plane is on the path
2580	-16	± 26	± 9	“2 on the course, path” (KSL) H of aircraft relative to the runway 120 m
2000	-42	+ 20	± 7	
1480	-67	± 16	± 5	“Level 101” (KSL) H of aircraft relative to the runway 17 m
1320	-70	± 15	± 5	“Check altitude, horizon” (CATC) H of aircraft relative to the runway 7 m
1100	-73	± 13	+ 4	BRL
723	-31	± 9	± 3	“Leave for a go-around” (CATC), the moment of disintegration of the aircraft structure
Distance from DS26 (m)	GP in terms of H ~3°10' (m)	Dimensions the derivation tolerance zone (m)	Permissible error: 1/3 of linear dimensions of the zone of	
10000	-60	+ 90	± 30	
9200	-45	+ 85	± 28	
9000	0	± 83	± 27	
8600	+ 75	± 80	± 26	
8000	+ 35	+ 75	± 25	
7700	0	± 72	± 24	
7300	+ 60	± 68	± 23	
7000	+ 50	± 65	± 22	
6280	+ 50	± 58	± 19	
6000	+ 60	+ 55	± 18	
5250	+ 30	± 48	± 16	
5000	+ 10	± 45	± 15	
4000	+ 10	± 35	± 12	
3800	0	± 32	± 11	
3500	0	± 30	± 10	
3000	-10	+ 27	± 9	
2500	-60	± 22	± 7	
2000	-60	± 18	± 6	
1950	-60	± 17	± 6	
1450	-80	± 14	± 5	

It is unclear why the IAC in the report bases its analysis, taking into account three different values of the glide path (2°40'; ~3°10'; 3°12.3').

### 13) regarding page 162 of the Report

*The mentioned inaccuracy in the glide path line disposition on the screen does not affect the aircraft landing distance and does not create ground for runway overrun or early descent. The change in the glide path angle only changes the estimated vertical speed of descent and flare height. When the aircraft is following a steeper glide path (3°10' instead of 2°40') the estimated vertical speed instead of 3.5-4 m/sec increases to 4-4.5 m/sec (in case the reference flight speeds are maintained) whereas the middle marker should be passed 10 m higher than the established altitude of 70 m*

The error indicated in the orientation of the path had an impact on the distance of the entry into the glide path for the DS 26.

### 14) regarding page 162 of the Report

*After establishing radio communications with the Smolensk "Severny" aerodrome, the crew did not report their selected approach system.*

*Note: According to the Russian AIP, ENR 1.5-2 Section 2.3 Entering Terminal Area Para 2.3.2: "when entering the terminal area the crew shall report: ...*

*- the landing system the crew intends to use for approach if there is no ATIS or if it is different from ATIS information"*

In accordance with the principles of good practice if the type of approach is not determined by the crew, the CATC should ask them about it. According to Doc. 4444:

#### 6.5.4. Instrument landing approach

6.5.4.1 Approach control authority should establish a procedure for an instrument approach for the arriving aircraft. The flight crew may request another procedure and, if conditions permit, should be allowed to exercise it.

#### 6.5.4 Заход на посадку по приборам

6.5.4.1 Диспетчерский орган подхода указывает прибывающему воздушному судну подлежащую использованию схему захода на посадку по приборам. Летный экипаж может запросить альтернативную схему, и, если позволяют условия, ему следует разрешать ее использовать.

6.5.4.2. If the pilot reports or an ATC unit clearly establishes that the pilot is not familiar with the procedure for an instrument approach, the pilot should be given a level of initial approach, the point (in minutes of the flight from the appropriate point of reporting) over which the pilot is to start the basic or procedural turn, the level at which the procedural turn should be made and the route line of the final approach. However, when the aircraft received the permission to execute the approach straight from the route, it is necessary to provide only the last information. If it is deemed necessary, the frequency(ies) of navigational aid(s) used should be given, as well as the procedure after a failed approach.

6.5.4.2 Если пилот сообщает или органу УВД становится ясно, что он не знаком с порядком захода на посадку по приборам, указывается высота полета на начальном участке захода на посадку, пункт (в минутах полета от соответствующего контрольного пункта), в котором будет начат стандартный разворот, высота, на которой стандартный разворот будет завершен, или линия пути на конечном участке захода на посадку, за исключением того, что, если воздушному судну выдается разрешение на заход на посадку с прямой, указывается только последнее из перечисленного. В тех случаях, когда это будет сочтено необходимым, указываются подлежащая(не) использованию частота(ы) навигационного(ых) средства (средств), а также порядок ухода на второй круг.

and FAPPPGosA:

562 In the aviation units where the position of senior assistant RP are not envisaged, flight control functions in the close zone (RBZ functions) are distributed between the RP at the aerodrome and RZP.

In this case:

The RP at the aerodrome determines the levels of flights and landing approaches for the crews,

The crew of the IL-76 aircraft also did not report the selected landing approach system. The flight control before the entering of the airspace of Smolensk “Severny” aerodrome informed the crew of the IL-76 aircraft about the type of approach.

#### 15) regarding page 162 of the Report

*The controller clarified the remaining fuel (11 tons), alternate aerodromes (Minsk and Vitebsk) and informed the crew twice that it was foggy at Korsazh, visibility 400 m, no conditions for landing.*

The flight control group of Smolensk “Severny” aerodrome should have had flight plans for arriving aircraft, and know alternative aerodromes and weather conditions at these aerodromes (FAPPPGosA para. 95).

#### 16) The CATC testified that he did not have flight plans of the Polish aircraft, regarding pages 162-163 of the Report.

*Note: According to item c) Para 1 Section AD 1.1-1 of Russian AIP: “pilots-in-command of foreign aircraft operating in Russia, shall make a decision on the possibility of taking-off from an aerodrome, and of landing at destination aerodrome on their own, assuming full responsibility for the decision taken”. On March 13, 2010 Military Units 21350 and 06755 were instructed (by telegram No. 134/3/11/102/2) to adhere to the abovementioned AIP item “for the purposes of high-quality arrangement and support of VIP flights” of aircraft from the Republic of Poland when providing air traffic management services. According to the provided extracts from briefing notes of the ATC group this was included in the list of major objectives and tasks for self-preparation before the flights on April 7 and 10.*

In the telegram No. 134/3/11/102/2, there is reference to **only one provision** in the Russian AIP. The same telegram clearly specifies that the Flight Management Group is to prepare for the securing of flights on 7 and 10 April 2010 in accordance with the principles of FAPPPGosA.

In the content of the Comments, Poland showed that the Flight Management Group (GKL) did not adhere to many points contained in FAPPPGosA, which was not reflected in the analysis contained in the Report.

**17) regarding page 163 of the Report.**

*To check the remaining fuel and the possibility to proceed to the alternate aerodrome after the “trial” approach, the deputy chief of Military Unit 21350, who was present at the BSKP, contacted the crew at 10:25:11: “1-0-1, after the trial approach will you have enough fuel for alternate aerodrome?” The crew replied: “We have enough.” Then as the crew requested at 10:25:22: “Request further descent please” the CATC, considering the provisions of the Russian AIP, Section AD 1.1-1, Para 1 c), replied: “1-0-1, heading 40 degrees, descend 1500”. Thus the controller cleared the crew for the “trial” approach.*

IAC to date has not responded to the question about the role and powers of Col. Krasnokutski. According to extracts of the Report (page 145):

*“During the flights of 10.04.2010, according to the ATC recorder and his own explanations, this person was at the BSKP from time to time (including the time of the accident) providing general coordination of various services, informing (by phone) of different officials on the actual situations concerning the accepted flights and weather conditions as well as coordination of alternate aerodromes. He was not directly involved in the air traffic control.”*

According to the recordings (reel 9 channel 4) he took an active part in conducting radio communications, **despite several suggestions from the CATC to discontinue the approach the Tu-154M aircraft by a clear command “Allowing them till 100 m only, 100 m no questions.” and cuts off any further attempts of CATC to send the aircraft to a reserve aerodrome.**

**18) regarding page 163 of the Report.**

*The expert conclusion drawn by a group of ATC specialists of civil and state aviation (Section 1.16.9) reveals that the fact that the crew did not report the selected approach system although they had been informed on the actual weather conditions far below the minima was interpreted by the ATC group personnel in a way that **the crew intended to make the “trial” approach using the onboard equipment. This is confirmed by the fact that the crew did not request landing radar vectoring***

In accordance with regulations, which require the forcing of aircraft crews to apply relevant regulations and in accordance with the principles of good practice the KSB/CATC should, in the event the crew did not identify the type of approach, ask the crew about it. Discrepancies were found in the standard regulations applied by the Russian Federation: according to Doc. 4444:

#### 6.5.4. Instrument landing approach

6.5.4.1 Approach control authority should establish a procedure for an instrument approach for the arriving aircraft. The flight crew may request another procedure and, if conditions permit, should be allowed to exercise it.

##### 6.5.4 Заход на посадку по приборам

6.5.4.1 Диспетчерский орган подхода указывает прибывающему воздушному судну подлежащую использованию схему захода на посадку по приборам. Летный экипаж может запросить альтернативную схему, и, если позволяют условия, ему следует разрешать ее использовать.

6.5.4.2. If the pilot reports or an ATC unit clearly establishes that the pilot is not familiar with the procedure for an instrument approach, the pilot should be given a level of initial approach, the point (in minutes of the flight from the appropriate point of reporting) over which the pilot is to start the basic or procedural turn, the level at which the procedural turn should be made and the route line of the final approach. However, when the aircraft received the permission to execute the approach straight from the route, it is necessary to provide only the last information. If it is deemed necessary, the frequency(ies) of navigational aid(s) used should be given, as well as the procedure after a failed approach.

6.5.4.2 Если пилот сообщает или органу УВД становится ясно, что он не знаком с порядком захода на посадку по приборам, указывается высота полета на начальном участке захода на посадку, пункт (в минутах полета от соответствующего контрольного пункта), в котором будет начат стандартный разворот, высота, на которой стандартный разворот будет завершен, или линия пути на конечном участке захода на посадку, за исключением того, что, если воздушному судну выдается разрешение на заход на посадку с прямой, указывается только последнее из перечисленного. В тех случаях, когда это будет сочтено необходимым, указываются подлежащая(ие) использованию частота(ы) навигационного(ых) средства (средств), а также порядок ухода на второй круг.

and FAPPPGosA:

562 In the aviation units where the position of senior assistant RP are nor envisaged, flight control functions in the close zone (RBZ functions) are distributed between the RP at the aerodrome and RZP. In this case:

The RP at the aerodrome determines the levels of flights and landing approaches for the crews,

The crew of the IL-76 aircraft also did not report the selected landing approach system. The flight control before the entering of the airspace of Smolensk “Severny” aerodrome informed the crew of the IL-76 aircraft about the type of approach.



The GKL, having no knowledge of by what means the crew will use, wrongly assessed that the crew will perform their approach, “*using their available means*”.

GKL did not inform the crew of the Tu-154M of the navigational aids available.

KSL, despite statements by IAC that the crew did not request radar, gave false information during the approach to landing.

**19. regarding page 164 of the Report.**

*in a telephone conversation with the Chief of military regiment 21350 (Tver) the assistant chief of the regiment who was present at the BSKP reported: “...Well, they approached all right. I guess they have equipment there, on an aircraft like that...”*

This statement, after the landing of the Yak-40 aircraft, shows the poor knowledge of the assistant chief of the 21350 regiment of the landing systems, as well as incorrect information forwarded to superiors, which in turn could affect their processing processing and the further decisions of the CATC.

**20. regarding page 164 of the Report.**

*Having cleared, in compliance with the Russian AIP, the “trial” approach upon the crew’s request in the weather conditions below minima, the ATC group personnel further kept informing the crew on the aircraft position and weather conditions within the capacity of their equipment. In the state aviation of the Russian Federation “trial” approaches in weather conditions below established minima are not allowed.*

The KSL gave incorrect information as to the location of the aircraft’s glide path during approach to landing because the location of the marker on the radar indicator corresponds to the position “on the approach,” when the permissible error of linear deviation does not exceed 1/3 of linear the dimensions of the zone of tolerance” (in accordance with point 115 FAPPPGosA). Information on meteorological conditions was incomplete and inadequate.

Distance from DS 26 [m]	H of the aircraft relative to the path	Dimensions of permissible deviation zone [m]	Permissible error: 1/3 of linear dimensions deviation zone	Comments
10410	+ 8	± 94	± 31	
10152	+ 13	± 92	± 30	“101, distance 10, entry to the path” (KSL)
9000	<b>+ 59</b>	± 82	± 27	
8300	<b>+128</b>	± 76	+ 25	“8 on the course, path” (KSL)
8000	<b>+ 106</b>	± 73	± 24	
7700	<b>+ 70</b>	± 70	± 23	“Runway clear” (PKL)
7450	<b>+ 100</b>	± 68	± 23	“Conditional landing 120 - 3 m” (CATC)
7000	<b>+ 110</b>	± 64	+ 21	
6600	<b>+ 112</b>	± 61	± 20	“continue on the course, distance 6” (KSL)
6260	<b>+ 114</b>	+ 58	± 19	<b>DRL</b>
5000	<b>+ 64</b>	± 47	± 16	
4650	<b>+ 58</b>	± 44	± 15	“4 on the course, path” (KSL)
4000	<b>+ 36</b>	± 38	± 13	
3550	<b>+ 35</b>	± 34	± 11	“3 on the course, path” (KSL)
3140	<b>+ 20</b>	± 30	± 10	“Turn on lights” (CATC)
<b>2780</b>	<b>0</b>	<b>± 27</b>	<b>± 9</b>	<b>The plane is on the path</b>
2580	<b>-16</b>	± 26	± 9	“2 on the course, path” (KSL) H of aircraft relative to the runway 120 m
2000	<b>-42</b>	± 20	+ 7	
1480	<b>-67</b>	± 16	± 5	“Level 101” (KSL) H of aircraft relative to the runway 17 m
1320	<b>-70</b>	± 15	± 5	“Check altitude, horizon” (CATC) H of aircraft relative to the runway 7 m
1100	<b>-73</b>	± 13	± 4	<b>BRL</b>
723	<b>-31</b>	± 9	± 3	<b>“Leave for a go-around” (CATC), the moment of disintegration of the aircraft structure</b>

## 21) regarding page 167 of the Report.

*Analysing the internal communications at the BSKP for that period of time the investigation team comes to the conclusion that the CATC and the chiefs were sure that the aircraft would go to the alternate aerodrome. For example, at 10:26:17 the deputy chief of Military Unit 21350: “Allowing them till 100 m only, 100 m no questions.” This assuredness was based on the fact that the weather was not expected to improve in the nearest time while the remaining fuel on board did not allow staying long in the holding pattern*

CATC once again suggests sending the Tu-154M aircraft to an alternative aerodrome (at this time, visibility was 200 m). Col. Krasnokutski by a clear command “Allowing them till 100 m only, 100 m no questions.” cuts off any further attempts of CATC to send the aircraft to an alternative aerodrome. Information that weather in the near future would not improve was not communicated to the crew of the Tu-154M aircraft.

This is inconsistent with the information contained in the Report that the role of Col. Krasnokutski was only to provide information - coordinating without engaging in directing air traffic:

*This person was not directly involved in directing air traffic. (P. 145)*

This is inconsistent with the provisions, which indicate that the CATC alone takes decisions, and no one can have an influence on this if it could be dangerous to an aircraft.

According to the Polish side a psychological evaluation of the situation in the SKL should be prepared and the impact of Col. Krasnokutski and others on the lack of a decision to send the Tu-154M aircraft to an alternative aerodrome (reel 9 channel 4).

**22) regarding page 167 of the Report.**

*At 10:27 the crew of the Tu-154M aircraft contacted the pilots of the Yak-40 again and was informed that the layer of clouds near the ground is 400-500 m and also that a Russian aircraft after two unsuccessful approaches left to alternate aerodrome (IL-76, 78817)*

*Note: It should be mentioned that the PIC of the IL-76 had earlier passed military service at Smolensk and was perfectly aware of the aerodrome features as well as the radio and lighting facilities. However, based namely on the weather conditions the PIC took the wise decision to proceed to alternate aerodrome*

The Russian side placed in the Report on page 164 information: *"In the state aviation of the Russian Federation "trial" approaches in weather conditions below established minima are not allowed"* the CATC, in allowing an approach by the IL-76 aircraft in conditions below the aerodrome minimum, failed to comply with FR state aviation regulations.

**23) regarding page 171 of the Report.**

*When reaching the base turn, in order to inform the crew about the additional lighting equipment on the aerodrome (projector stations), the controller checked if the crew had landed at a military aerodrome before (which was confirmed by the crew) and informed them that the projectors were on in daytime mode.*

The CATC's question about whether the crew of the Tu-154M had previously performed a landing at a military aerodrome and information about setting the lights to "daytime mode" testifies that flights were secured by military procedures.

**24) regarding page 172 of the Report.**

*At 10:39:10 the controller informed the crew that they were 10 km from the runway threshold and had reached the glide path entrance point. The crew did not give a relative read back.*

Informing the crew that at a distance of 10 km the aircraft had reached the glide path entrance point that KSL guided the aircraft according to the approach glide path angle 2° 40' that was in force on cards.

**25) regarding page 173 of the Report.**

*The crew continued flight at 500 m going through the Before Outer Marker Checklist. The checklist was finished at 10:39:30. Almost at the same time the controller information followed: “8 km on course and glide path”*

Both according to the glide path  $2^{\circ}40'$  and that adopted by the IAC  $-3^{\circ}10'$  the plane was above the descent path.

Distance from DS 26 [m]	H of the aircraft relative to the path $3^{\circ}10'$ [m]	Dimensions of the permissible deviation zone [m]	Permissible error: 1/3 of linear dimensions of the permissible deviation zone
8000	+ 35	$\pm 75$	$\pm 25$

Distance from DS 26 [m]	H of the aircraft relative to the path $2^{\circ}40'$ [m]	Dimensions of the permissible deviation zone [m]	Permissible error: 1/3 of linear dimensions of the permissible deviation zone
8000	+ 106	$\pm 73$	$\pm 24$

**26) regarding page 173 of the Report.**

*As follows from the analysis of the navaid test fly-around (Section 1.16.6), the graphical glide path line on the landing radar screen referred to the glide path angle of  $\sim 3^{\circ}10'$ . It means that the actual aircraft position was higher than that shown on the graphical lines by about 30' ( $0.5^{\circ}$ ), i.e. when the aircraft was on top of the tolerance (for glide path angle of  $2^{\circ}40'$ ) the actual indication of its blip on the radar corresponded to the “on glide path” position on the radar screen*

The record contained in the above text is contradictory, because it was shown “that the actual position of the aircraft was higher than shown by the graphical lines (the graphical line according to the Report corresponded to  $3^{\circ}10'$ ) “by about 30' ( $0.5^{\circ}$ )”, i.e. the position of the aircraft corresponded to a descent angle of  $3^{\circ}40'$ . Therefore, it is erroneous to conclude that the aircraft was at the upper limit of the permissible tolerance for glide path angle of  $2^{\circ}40'$ .

**27) regarding page 174 of the Report.**

*At a distance of 8 km the aircraft was 100 m higher than the glide path (glide path angle  $2^{\circ}40'$ ), at 6 km (outer marker area) – 120 m higher than the glide path (glide path angle  $2^{\circ}40'$ ), at 4 km – 60 m higher than the glide path (glide path angle  $2^{\circ}40'$ ) and at 3 km – 15 m higher than the glide path (glide path angle  $2^{\circ}40'$ )*

The actual location of the tag on the PRL indicator corresponds to the position “on the glide path” as the permissible error of linear deviation does not exceed 1/3 of the linear dimensions of the zone of tolerance” (in accordance with point 115 FAPPPGosA). KSL did not react to significant deviations of the Tu-154M aircraft from the prescribed path  $2^{\circ}40'$  mistakenly informing the crew that they were on the correct glide path.

Distance from DS 26 [m]	H of the aircraft relative to the path 2°40' [m]	Dimensions of the permissible deviation zone [m]	Permissible error: 1/3 of linear dimensions of the permissible deviation zone	Comments
10410	+ 8	± 94	± 31	
10152	+ 13	± 92	± 30	"101, distance 10, entry to the path" (KSL)
9000	+ 59	+ 82	± 27	
8300	+128	± 76	± 25	"8 on route, path" (KSL)
8000	+ 106	± 73	± 24	
7700	+ 70	± 70	± 23	"Runway clear" (PKL)
7450	+ 100	± 68	+ 23	"Conditional landing 120-3 m" (CATC)
7000	+ 110	± 64	± 21	
6600	+ 112	± 61	± 20	"continue further, on course path, distance 6" (KSL)
6260	+ 114	+ 58	± 19	<b>DRL</b>
5000	+ 64	± 47	± 16	
4650	+ 58	+ 44	± 15	"4 on course, path" (KSL)
4000	+ 36	± 38	± 13	
3550	+ 35	± 34	± 11	"3 on course, path" (KSL)
3140	+ 20	± 30	± 10	"Turn on lights" (CATC)
2780	0	± 27	± 9	The aircraft is on the path
2580	- 16	± 26	± 9	"2 on course, path" (KSL) H of aircraft relative to the runway 120 m
2000	-42	± 20	+ 7	
1480	-67	± 16	± 5	"Level 101" (KSL) H of aircraft relative to the runway 17 m
1320	-70	± 15	± 5	"Check level, altitude" (CATC) H of aircraft relative to the runway 7 m
1100	-73	± 13	± 4	<b>BRL</b>
723	-31	± 9	± 3	"Leave for a go-around" (CATC), <b>the moment of disintegration of the aircraft structure</b>

## 28) regarding page 174 of the Report.

*At the distances of 8, 6, 4 km the landing zone controller informed the crew that the aircraft was on glide path although the actual aircraft position was higher than the glide path but within the tolerance range on the radar screen (glide path angle about 3°10'). At a distance of 3km the aircraft was almost at the depicted glide path (glide path angle about 3°10')*

The information given in the Report on p. 172 that the aircraft at a distance of 10 km reached the point of entry into the path of descent clearly shows that KSL guided the aircraft according to the published path 2°40'

KSL, by giving the command "on the course on track" despite the fact that the aircraft was not there, placed the crew in the mistaken belief as to the correct position of the aircraft.

**29) regarding page 177 of the Report.**

*The test fly-around revealed that the established landing zone controller practice was such as to inform the crews that they were on glide path in case the aircraft was anywhere within the glide path tolerance area.*

**Such an “established practice” is a serious threat to flight safety and also a confirmation that this had an impact on the cause of the crash.**

There is no presentation in the IAC analysis of documents on which such large errors in the deviation from the prescribed glide path are permitted.

The actual location of the tag on the PRL indicator corresponds to the position “on glide path” as the permissible error of linear deviation does not exceed 1/3 of the linear dimensions of the zone of tolerance “(in accordance with point 115 FAPPPGosA). KSL did not react to significant deviations of the Tu-154M aircraft from the prescribed path 2°40’, mistakenly informing the crew that they were on the correct glide path.

**30) regarding page 177 of the Report.**

*Depending on the situation (e.g. occupied runway or worsening weather conditions) the CATC informs the crew about that and reports: “Stand by for landing”. This phrase means that the landing is not cleared. In this case if the crew takes and informs on their decision to land upon their own responsibility before passing the decision altitude but in any case not later than passing 1000 m from the runway threshold, the controller can clear them for landing but this clearance will only mean that the airspace ahead and the runway are clear (FAR “Maintaining Radio Communication in the Russian Airspace” and Russian AIP, ENR 1.5-3 Para 2.3.8, 2.3.10).*

*Note: According to the Russian AIP the controller must prohibit landing of an aircraft and instruct the crew to go around if:*

- there are any obstacles along the aircraft descent path or on the runway jeopardizing flight safety;*
- there appeared a threat to flight safe aircraft separation on final*

**Both the CATC on the BSKL and PKL on the DSKL, at a visibility of 200 m, at the moment of the final approach the aircraft Tu-154M, were not able to determine whether there were any people, vehicles, obstacles or animals on the runway and therefore not able to give permission to land.**

**31) regarding page 180 of the Report.**

*Such aircraft control led to the situation that by the time of passing the outer marker which the crew identified by the relative aural warning, the aircraft was about 120 m above the glide path. At the same time as the aural warning was triggered the landing zone controller informed the crew: “Approaching to outer, on course, on glide path, distance 6”. At 6 km the aircraft was actually higher than the glide path (considering the indication inaccuracy the aircraft blip was on the top boundary of the glide path tolerance area for glide path angle of ~3°10’). Meanwhile, judging by the cockpit internal*

*communications (unidentified voice saying “Outer” and navigator replying “400”) the crew realised that they were over the glide path as the outer marker must be passed at 300 m.*

The above text shows that the aircraft was 120 m above the published glide path 2°40'. KSL did not react to the significant deviations from the prescribed flight path. They mistakenly informed the crew that they were on the correct glide path.

Referring to the provisions of FAPPPGosA (paragraph 115) it is clear that the permissible error of linear deviation does not exceed 1/3 of the linear dimensions of the zone of tolerance. Because according to the authors of the Report *“the aircraft blip was on the top boundary of the glide path tolerance area for glidepath angle of ~3°10’*) KSL should react to such a deviation.

**32) regarding page 180 of the Report.**

*The flight path calculations revealed that, after passing the outer marker, the aircraft was to the left of the extended runway centreline (within the course tolerance area) heading directly to the XUBS waypoint. It is possible the FMS could have provided the course adjustment for the aircraft to track directly to XUBS and, therefore, converge on the line between the waypoints*

There is not any material (photos) from the test flight regarding the depiction of the aircraft on the course indicator. These data are very important because all three aircraft on 10.4.2010 performed a flight from the left to the prescribed course of 259°.

**33) regarding page 183 of the Report.**

*At 10:40:13 the landing zone controller informed the crew: “4, on course, on glide path”. Actually at a distance of 4 km the aircraft was at a height of 260 m (for this distance: on glide path with angle 2°40’ – 200 m, glide path tolerance area – 35 m) while the aircraft blip on the radar considering the abovementioned inaccuracies, did not go beyond the top boundary of the glide path tolerance area. The crew gave a relative read back*

The reference from the Russian side to the angle 2°40’ is incomprehensible if in the previous paragraphs they argue that on the PRL indicator the path was marked 3°10’.

At a distance of 4.65 km the aircraft was 58 m above the glide path and “went out” beyond the permissible error of the linear deviation. KSL did not react to significant deviations of the Tu-154M aircraft from the prescribed path 2°40’, mistakenly informing the crew that they were on the correct glide path.

Distance from DS 26 [m]	H of the aircraft relative to the path 2°40' [m]	Dimensions of the permissible deviation zone [m]	Permissible error: 1/3 of linear dimensions of the permissible deviation zone	Comments
4650	+ 58	+ 44	± 15	"4 on course, path" (KSL)
4000	+ 36	± 38	± 13	

#### 34) regarding page 183 of the Report.

*At 10:40:27 the landing zone controller informed the crew: "3, on course, on glide path". The crew did not confirm this. The aircraft was at a distance of about 3500 m from the runway and was on the ~3°10' glide path (on the upper boundary of the glide path tolerance area of the 2°40' glide path). Thus, the landing zone controller was watching the aircraft on the radar as being exactly on glide path.*

Now, again the authors refer to a glide path 3°10'.

At a distance of 3.55 km the aircraft was 35 m above the glide path and "went out" beyond the permissible error of the linear deviation. KSL did not react to significant deviations of the Tu-154M aircraft from the prescribed path 2°40', mistakenly informing the crew that they were on the correct glide path.

Distance from DS 26 [m]	H of the aircraft relative to the path 2°40' [m]	Dimensions of the permissible deviation zone [m]	Permissible error: 1/3 of linear dimensions of the permissible deviation zone	Comments
3550	+ 35	+ 34	± 11	"3 on course, path" (KSL)
3140	+ 20	± 30	± 10	"Turn on lights" (CATC)

#### 35) regarding page 183 of the Report.

*At 10:40:29 the aircraft passed the altitude of 200 m with reference to RWY 26 threshold.*

At a distance of 2.58 km the aircraft was 16 m above the glide path and "went out" beyond the permissible error of the linear deviation, and at a distance of 2 km the aircraft was located 42 m below the glide path. KSL did not react to significant deviations of the Tu-154M aircraft from the prescribed path 2°40', mistakenly informing the crew that they were on the correct glide path.



Distance from DS 26 [M]	H of the aircraft relative to the path 2°40' [m]	Dimensions of the permissible deviation zone [m]	Permissible error: 1/3 of linear dimensions of the permissible deviation zone	Comments
2580	<b>-16</b>	± 26	± 9	"2 on course, path" (KSL) H of aircraft relative to the runway 120 m
2000	<b>-42</b>	± 20	± 7	

### 36) regarding page 187 of the Report.

*The navigator continued calling out heights: 60, 50. At that time, having not obtained the crew report on going around, the landing zone controller instructed: "Level, 101". No crew actions followed to terminate descent, the aircraft continued descent and the navigator continued the height callouts: 40, 30, 20*

The command "Level 101" (10:40:53.4) was given about 14 seconds after informing the crew of the aircraft Tu-154M by KSL "two on course" (10:40:39,9), when in fact the plane was already on the glide path at an altitude of 17 m in relation to the threshold of DS 26.

The command "Level 101" was issued by KSL too late, when the aircraft's marker disappeared from the indicator (according to testimony).

Although the aircraft was for 29 seconds outside the zone when the permissible error of linear deviation does not exceed 1/3 of the linear dimensions of the zone of tolerance" (in accordance with point 115 FAPPPGosA), KSL did not give the crew information about its incorrect position relative to the path, still incorrectly informing it of the correct position "on course and path."

Distance from DS 26 [m]	H of the aircraft relative to the path 2°40' [m]	Dimensions of the permissible deviation zone [m]	Permissible error: 1/3 of linear dimensions of the permissible deviation zone	Comments
<b>2780</b>	<b>0</b>	<b>± 27</b>	<b>± 9</b>	<b>The aircraft is on the path</b>
2580	<b>-16</b>	± 26	± 9	"2 on course, path" (KSL) H of aircraft relative to the runway 120 m
2000	<b>-42</b>	± 20	± 7	
1480	<b>-67</b>	± 16	± 5	"Level 101" (KSL) H of aircraft relative to the runway 17 m
1320	<b>-70</b>	± 15	± 5	"Check altitude, level" (CATC) H of aircraft relative to the runway 7 m
1100	<b>-73</b>	± 13	± 4	<b>BRL</b>
723	<b>-31</b>	± 9	± 3	"leave for a go-around" (CATC), <b>the moment of disintegration of the aircraft structure</b>

This procedure is different from the procedures used in civil aviation and in Polish state aviation, where a break in KSL commands cannot be longer than 5 seconds. This analysis confirms that these assumptions are correct, because they allow in a timely manner for information to be provided about the location of the aircraft on the path and course.

**37) regarding page 190 of the Report.**

*As the information on the landing system was not discussed between the crew and the controller, the landing radar was not requested by the crew, the crew did not read back in most cases the controller's information and the altitude information was not reported to the controller during the descent on final, the investigation team assumes that actually the crew did not conduct the landing radar+2NDB approach*

In accordance with regulations (FAPPPGosA), which require the forcing of aircraft crews to apply relevant regulations and in accordance with the principles of good practice KSB/CATC should, in the event the crew did not identify the type of approach, ask the crew about it.

**FAPPPGosA:**

562. In air units where no permanent positions are envisaged for a senior RP aid, flight control functions in the close zone (RBZ functions) are distributed between the RP at the aerodrome and RZP. In this case: the RP at the aerodrome determines for crews the level of flights and methods of approaching landing.

**38) remark concerning the analysis of air traffic services at Smolensk "Severny" aerodrome**

According to the Polish side, the analysis of air traffic services was made improperly. The effect of GKL's action on the reduction of the level of safety of the performance of air operations at the aerodrome Smolensk "Severny" aerodrome has not been determined. **This is inconsistent with generally accepted methodology of investigation in aviation.**

Air traffic control services at the Smolensk "Severny" aerodrome were not certified by civil legislation, therefore, their action was based on regulations and procedures adopted in state aviation (in this case military). Evaluation of aerodrome air traffic control services should therefore be prepared based on the "Federal Aviation Flight Rules in State Aviation" (Annex to the Order of the Russian Ministry of Defence 24 September 2004 No. 275), according to which (according to the telegram No. 134/3/11/102 of col. N.A. dated March 13, 2010) was scheduled to prepare and secure special flights of Yak-40 and Tu-154M in April 2010 by designated staff of air traffic services at the Smolensk "Severny" aerodrome.

In the text of the Report various angles of the descent path are referred to depending on the need for conducting the analysis, which gives the impression that the choice of path was dictated by the need to prove that on the radar screen the blip of the aircraft was always “on course”. In addition to the doubts about the angle of the path of the radar landing system and the consistency of the analysis regarding the use of this system on page 113 in “Notes” there is a statement saying that in fact the flight crew performed the flight with an angle of 5°. Therefore, the Polish side is forced to ask: what value of the angle of the path should be valid even if the path of 5° did not cause distress and interference with radar guidance controllers.

### **39) remark concerning the analysis of air traffic services at Smolensk “Severny” aerodrome**

In the report, an analysis allowing an assessment of the organisation and implementation of meteorological security and its impact on the occurrence of the accident was made, as evidenced by the findings in section 3.1 of the Report.

## **3 Summary**

### **1) regarding page 193 of the Report.**

*The investigation was conducted by the technical Commission of the Interstate(International) Aviation Committee. The Accredited Representative of the Republic of Poland, his Advisors and a large group of civil and military experts participated in all major aspects of the investigation provided by ICAO Annex 13. The Polish representatives were provided with materials pertinent to the investigation and were given an opportunity to get acquainted with extracts from classified documents of restricted access.*

### **Opinion of the Accredited Representative of Poland:**

The statement above is true only in part because neither the accredited representative nor his advisers were able to participate in many events that were important from the viewpoint of examining the case, such as the testing of radio equipment carried out on 15.04.2010, the accredited representative and his advisers participated in only a few meetings, which are hard to call meetings. The participation of the accredited representative in briefings concerned only checks carried out in Smolensk. Other meetings did not exhaust in any way point 5.25 h of Annex 13, which reads:

*Participation in the investigation shall confer entitlement to participate in all aspects of the investigation, under the control of the investigator-in-change, in particular to:*

h) participate in investigation progress meetings including deliberations related to analysis, findings, causes and safety recommendations

Meetings organised by the IAC Commission was presentations of the results of work performed by Russian specialists. In this work, in most cases specialists from Poland did not attend. The Polish side

was only informed about the results of this work. Dates for meetings were usually made very shortly before their planned start. The accredited representative never, despite the clear conclusions in this regard, received any material relating to a given meeting before its start or after it. This prevented adequate preparation for the discussion or the arrival of additional specialists from Poland who were advisors of the accredited representative. Such action by the Russian side made cooperation connected with explaining the crash difficult and was inconsistent under Annex 13.

**The documents referenced in the draft final Report and not making these available to the Polish side:**

- “Instructions for flights in the region of Smolensk “Severny” aerodrome”- in accordance with The Russian AIP is the basic document regulating the principles of performing flights in the area of the aerodrome;
- documents binding in the Russian Federation concerning the organisation and the security of particularly important flights - in the part concerning the responsibilities of flight management services;
- order of the commander of unit 06755 No. 264 dated 25.11.2009 on the admission of persons to secure flights on 10 April 2010;
- order of the commander of unit 06755 No. 319 dated 31.12.2009 on the individual use of communications and radio engineering to secure flights;
- technical test flight act at Smolensk “Severny” aerodrome dated 15.04.2010;
- logs of apparatus, in which entries are placed of servicing of technical radio equipment of the aerodrome;
- light system log in which entries are made on reviews and irregularities to the system;
- certificate No 86 of 25.05.2006 on the state registration and ability of the aerodrome to operate;
- daily registration of the status and readiness to perform flights;
- tests of meteorological equipment at the aerodrome for measuring and registration of cloud base DWO type-2 and DOC-2M;
- weather log AW-6 from the meteorological station of the aerodrome;
- the results of forensic autopsies and toxicology and identification results.

**Documents, materials or statements that should be attached to the draft final Report:**

- “Instructions for flights in the region of Smolensk “Severny” aerodrome”;
- “aerodrome master plan,” or its equivalent;
- “Standards of approvals for the operation of National Aviation aerodromes (FAP NGEA Gos A-2006).”
- Manual for the operation of aerodromes regarding radio-electronic equipment (FAP REA 2006).

- Instructions for tests to flight communications and radio-technical security of flights (RTO) in the Russian Air Force.
- Documents relating to the procedures and phraseology used by GKL.
- Attachment regarding the conduct of rescue and fire fighting actions together with “Plan for rescue operations”.
- aerodrome inspection report carried out after an accident.
- Transcripts of telephone conversations and the “background” at SKL.

## **2) regarding page 193 of the Report.**

*The possibility to carry out a non scheduled (single) flight on a state aviation aircraft of a foreign State to a Russian aerodrome not open for international flights is explicitly stated in the Russian AIP. Based on the mentioned status of Flight PLF 101, the AIP provisions in parts applicable are to be considered as regulating documents for conduct and organisation of this flight*

The analysis of the facts shows that international standards for air navigation were used during the flight to the ASKIL point. From the moment of going beyond that point the flight took place according to the undefined procedures. If, therefore, during the flight deviations were applied from the international rules and generally accepted international guidelines, reflected in national legislation, the users of air space should be adequately informed by the authorities of such a country about applicable regulations in this regard.

In the order dated 13.3.2010, a reference to the Russian AIP occurs only for subparagraph c) of point 1 of Chapter AD1.1-1:

c) pilots-in-command of foreign aircraft operating in Russia, shall make a decision on the possibility of taking-off from an aerodrome, and of landing at destination aerodrome on their own, assuming full responsibility for the decision taken;

Smolensk “Severny” aerodrome was a military aerodrome which does not satisfy international standards and recommended methods and procedures relating to:

- communications systems and facilities for air navigation, including ground tagging,
- characteristics of aerodromes and flight fields,
- flight rules and air traffic control methods,
- licensing of personnel,
- meteorological services
- maps and flight plans.

Aviation personnel and equipment at Smolensk “Severny” aerodrome did not meet requirements and standards of ICAO for international air navigation in accordance with the Annexes to the Convention on International Civil Aviation signed on 7 December 1944 in Chicago, and other documents such as:

- Attachment 1 - “Licensing of staff”;
- Attachment 2 - “Air traffic rules”;
- Attachment 3 - “metrological service for international air navigation”;
- Attachment 10 - “Air communication”;
- Attachment 11 - “Air Traffic Services”;
- Attachment 14 - “aerodromes” Volume I - “Design and operation of aerodromes”;
- Appendix 15 - “Air information service”;
- Doc. 4444 - “Procedures for Air Navigation Services - Air Traffic Management”;

Therefore, it is considered that the flight safety of the Tu-154M aircraft in the region of Smolensk, “Severny” aerodrome was based on regulations current in Russian state aviation, inter alia, “Federal aviation regulations for the performance of flights of state aviation” order of the Ministry of Defence of the Russian Federation number 275 dated 24 September 2004 (FAPPPGosA).

The facts presented below also testify to this:

- content of telegram 134/3/11/102 of col. N.A. of 13 March 2010, concerning the preparation and protection of special flights of Yak-40 and Tu-154M in April 2010, where he orders the preparations of the staff of the flight management group at Smolensk “Severny” aerodrome according to articles: 216, 255-263, 271, 562 of FAPPPGosA;
- applicable military regulations concerning the control of the aerodrome in terms of compliance with required standards for use;
- application of military regulations in order to conduct a special test flight for communications and radio engineering;
- the question to the Tu-154M crew by CATC in the middle of an approach to land at Smolensk “Severny” aerodrome **“have you ever landed at a military aerodrome?”** which clearly defines the status of the aerodrome and procedures it applies;
- the procedure for obtaining telephone consent from the aerodrome air traffic services at Smolensk “Severny” for the flight of an aircraft despite a submitted flight plan;
- the requirement of confirmation of all KSL commands giving current altitude by the crew of the Tu-154M aircraft;
- approach card for Smolensk “Severny” aerodrome from the military collection of FR navigational information, and not meeting ICAO standards;
- use of reflectors according to the rules of their use on military airfields.

### **3) regarding page 194 of the Report.**

*The provisions of the Federal Aviation Rules for State Aviation of the Russian Federation as well as other documents based on these Rules are only applicable to state aviation organisations of the Russian Federation and state aircraft of the Russian Federation and therefore cannot be applied to Flight PLF 101 as it was not conducted by a state aviation organisation of the Russian Federation or on a state aviation aircraft of the Russian Federation.*

CATC and KSL did not have a licence in accordance with ICAO standards (Attachment 1) and did not apply procedures contained in the documents: ICAO Doc. 4444 “Rules of the air”, Attachment 11 on Air traffic services and other manuals regarding services and procedures for air traffic used in international air navigation. It is therefore considered that GKL personnel applied procedures applicable in the airspace of Smolensk “Severny” military aerodrome i.e. Federal aviation regulations for the exercise of state aviation flights of the Russian Federation (FAPPPGosA) by which they were trained and complied with their obligations on the position of CATC.

#### **3.1 Findings**

The Polish party was not provided with the following materials, which the Authors of the Report adduce:

- ⤴ Photographic documentation of the first hours following the event (including the mentioned aerial photograph);
- ⤴ Data from the decryption of ground sources of objective control;
- ⤴ The protocol from the test flight of radiolocation sources at the Smolensk “Severny” aerodrome performed on April 15<sup>th</sup> 2010; The representatives of the Polish party were not allowed to observe the screens of the radiolocation stations at positions of command throughout the duration of the test flight. After over 5 months from the date of the test flight, the accredited party had still not received its results. The meeting, which took place on June 17<sup>th</sup> along with the presentation of the results of the test flight were not accepted by the Accredited representative and his advisors.
- ⤴ Materials of the mathematical and empirical flight model.

In subsequent sequence, only those conclusion points were made, which the Polish party calls to attention.

***3.1.3 The takeoff and landing weight as well as the centre of gravity were within the limitations established by Section 2 of the AFM. However, the landing weight was about 4.6 tons higher than the limitations for the actual landing conditions at Smolensk “Severny” Aerodrome. The stability and controllability characteristics complied with characteristics of the aircraft type***

There is an absence of indication from the authors of the Report as to what data sources were used for the calculations. Determination of the take-off weight results in assessment of landing weight and constitutes the subject of conclusions made by the Russian committee regarding the exceeding thereof. According to the knowledge possessed by the Polish party, the original weight and balance handbook was not salvaged. Consequently, the data generated by IAC require verification and determination by which method the calculations were performed.

***3.1.4 The aircraft was equipped with the TAWS and FMS UNS-ID. Both systems were on and serviceable***

The flight management system (FMS) of aircraft Tu-154M number 101, was comprised of two identical devices UNS-ID, whose main elements were computers- Navigation Computer Unit (NCU). As a result of the conducted work, data was restored only from one of them - NCU number 281. The second NCU number 1577 was damaged to the extent that data retrieval was not possible. It was not elucidated in what way it was determined that both FMS were on and serviceable.

***3.1.7 Although the Tu-154M tail number 101 did not have a valid Airworthiness Certificate, the accident was not caused by the aircraft technical operation, maintenance or overhaul.***

Significantly, the aircraft Tu-154M number 90A837 /101/ did not receive an “Airworthiness Certificate”. A basic document **establishing** the regulations of aviation technical operations in the Armed Forces of the Republic of Poland is, “The Instruction of Aero-engineering Service of the Aviation Armed Forces of the Republic of Poland, Part I”. DWLiOP, Poznan 1991, sign. **WLOP** 21/90, **which does not mention the aforementioned document, and especially does not require the issue thereof.**

**Further to the above stated the conclusion can be made that aircraft Tu-154M no. 90A837 /101/ was properly prepared by SIL personnel and was navigable on the date of 04/10/2010.**

***3.1.8 By the time of the departure from Warsaw the actual weather at the Smolensk “Severny” aerodrome was lower than the established aircraft and PIC minima for approach using the available approach systems***

Atmospheric conditions below the set minimum not only of the aircraft and its PIC, but equally of the Smolensk “Severny” aerodrome, had occurred already at 05:09 UTC, before the landing of aircraft Yak-



40 at 05:15 UTC, in which the CATC had not informed the air crew. According to the Polish party landing in such atmospheric conditions began the cause and effect process which terminated in the catastrophe involving aircraft Tu-154M.

Upon the landing of the aircraft Yak-40 the CATC approved (in defiance of the Russian regulations of national aviation- *In the state aviation of the Russian Federation “trial” approaches in weather conditions below established minima are not allowed, page 164*) an attempt at landing of the aircraft IL-76 in conditions significantly below the minimum established by the aircraft and the PIC. The occurrence of atmospheric conditions below the norm set by the aerodrome should be the grounds to divert aircraft Yak-40, IL-76 and Tu-154M to an aerodrome, which in the case of aircraft Tu-154M was suggested by the CATC.

***3.1.9 Before the departure the crew received the weather information for the departure aerodrome, the alternate aerodromes as well as for the flight route. The crew did not have the actual and forecast weather for the Smolensk “Severny” destination aerodrome. The weather forecast for the alternate aerodrome of Vitebsk was expired. The meteorological support for the VIP flight at departure from Warsaw was unsatisfactory.***

Before the departure of the Tu-154M f aircraft room Warsaw, the Polish party did not have access to the meteorological data of the Smolensk “Severny” aerodrome, which were only available to the Russian meteorological armed forces and to the controllers at the Smolensk “Severny” aerodrome as well as at the meteorological aviation station in Twerz. Likewise, during later arrivals at that aerodrome (after the catastrophe) meteorological data were still unavailable in Poland. Before departure from Warsaw, the crew of Tu-154M received the information which was fully available in Poland, about the weather conditions on the route of the flight, alternate aerodromes, as well as an erroneous report of the conditions at Smolensk “Severny” aerodrome which incidentally were present at Smolensk “Yuzhny”. This was a result of the occurrence of substantial deficits in the exchange of international meteorological information from Russia, and especially from military aerodromes treating the data about the atmospheric conditions which appeared every 3 hours in the form of surface synoptic observations (SYNOP) as the data from Smolensk “Severny”. The simultaneously existing systems of measurement and meteorological observation at Smolensk “Severny” aerodrome as well as the transfer of their results by means of telephone to another military meteorological centre, without the recording of this data in the form of METAR or SYNOP, incapacitates its international exchange. Additionally, weather prognostics are not performed for this aerodrome in the form of a telegram aerodrome forecast TAF which also makes the *accusation* of lack of possession of this data by the crew before the take-off from Warsaw completely groundless.

The incorporation of transferred data to the crew in the form of TAF about the forecast atmospheric conditions for the Vitebsk aerodrome resulted due to the automatic configuration on the meteorological server of potential aerodromes on the flight route. Meteorologist of the 36<sup>th</sup> Special Regiment of

Aviation Transport prepared the TAF for the crew in accordance with its reported flight plan. He did not have knowledge of the fact that the aerodrome was not operating on holidays. Owing to this fact, the server displayed an expired TAF, which upon printing was issued to the crew with a complete packet of meteorological information. Nonetheless, the telegram TAF did not provide anything relevant, because the crew members were familiarised with the TAF type of telegrams and were able to interpret that it was already expired.

Before departing from Warsaw, the crew received a full meteorological consultation about the weather on the flight route as well a presentation of the weather prognosis for the landing at the Smolensk “Severny” aerodrome. The meteorologist on-call at the aerodrome on the date of 4/10/2010 at 04:10 UTC transmitted the aero-meteorological documentation for take-off to the a navigator of aircraft Tu-154M , and at 04:20 UTC had informed the second pilot of the aircraft about the weather prognosis for the landing at the Smolensk “Severny” aerodrome- cloudy 2-4/8 stratus clouds at a base of 200-300 metres and 5-7/8 altocumulus and cirrus clouds, visibility of 3000-5000 metres in fog. Despite the error made in the weather prognosis for the landing at Smolensk “Severny” aerodrome the occurrence of stratus clouds was forecast which had not been foreseen by the meteorological office in Twerz, which possessed data about the atmospheric conditions for the entire region of Smolensk.

Both the commander of the meteorological station at the Smolensk “Severny” aerodrome, as well as the on call substitute supervising his work at the meteorological office at the air force base in Twerz, had devised a weather prognosis, which had failed. In TWERZ, on the date of April 10<sup>th</sup> 2010 at 01:30 UTC, a prognosis was devised for the Smolensk “Severny” aerodrome, in which the minimal horizontal visibility was 3.0-4.0 km, and the lowest base of the clouds was 600-1000 metres. If the weather prognosis for the Smolensk “Severny” aerodrome (formulated by appropriate Russian meteorological services) reached the crew of the Tu-154M aircraft before its take-off, it would still not be able to provide the crew with proper information about the dangerous weather phenomena that it should prepare for. The prognosis could only console the crew that the weather conditions would be drastically better than forecast by the meteorologists in Warsaw.

After the deterioration in atmospheric conditions at the Smolensk “Severny” aerodrome at 05:09 UTC, below the aerodrome’s set minimum, the prognosis at 05:12 UTC was altered and the most disadvantageous atmospheric conditions were expected to be stratus clouds with a base of 150-200 metres and a horizontal visibility of 1.5-2.0 km, despite the fact that at that time, the conditions at the aerodrome deteriorated significantly, compared to those that were anticipated. At 05:40 UTC (the time recorded on the document), the commander of the meteorological station at the Smolensk “Severny” aerodrome probably issued a STORM prognostic warning that was in effect from 05:40 until 07:00 UTC, which forecast cloudiness 7-8/8 with stratus clouds with a base of 50-100 metres, heavy fog with vertical visibility of 1000-1500 metres and a mist appearing in transient waves with a visibility of 600-1000 metres. In actuality, from the tape recording at the control station of the conversation with the

meteorologist through the loud-speaker, it is evident that at 06:05 UTC, the CATC (KL) had not known of the warning and asked for it be issued. In accordance with the Russian regulations, the CATC was the main addressee of the warning. It can be concluded that the warning was generated later than the query of the CATC. According to the atmospheric conditions occurring at this time in the region of the aerodrome, the warning was already outdated, and the forecast conditions were highly overestimated. This was primarily due to the placement of the meteorological station at the aerodrome in a position which hindered making any representative observations and meteorological measurements. Owing to this location, part of these measurements did not reflect the atmospheric conditions presiding in the DS region and the landing strip. Among those included were measurement of wind direction and velocity, air temperature as well as dew points, along with relative air humidity.

The meteorological precautions for an especially important flight were insufficiently organised not only at the time of departure from Warsaw, however likewise, throughout the course of the flight in the air space of the Russian Federation, and throughout the preparation for landing of aircraft Tu-154M at the Smolensk “Severny” aerodrome. Attesting for this is an absence of complete information about the weather from the CATC at Smolensk “Severny” aerodrome upon establishing contact with him by the crew of Tu-154M; this included data regarding vertical visibility (comments on conclusion 3.1.10). The meteorological preparation measures taken at the Smolensk “Severny” aerodrome were improper not only for the particularly significant flight but likewise for the security of all flights. Only one specialist was present at the aerodrome’s meteorological station, with whom it was impossible to establish connection while he was performing measurements and meteorological observations on the exterior of the headquarter premises - about 40% of the time in such atmospheric conditions. (There was) an insufficient level of weather forecasts being performed at the meteorological office in Twerz in the range of forecast visibility and cloud bases, despite an earlier observation of the occurrence of fog at many meteorological stations in the region of Smolensk (page 52 of the report), which should have been available to the specialists of this office before the take-off of Tu-154 from Warsaw.

↓

***3.1.10 The actual weather at the aerodrome at the time of the accident was: visibility 300 – 500 m, vertical visibility 40-50 m, fog***

The conditions could have factually differed from those occurring at the site of the catastrophe (described in conclusion 3.1.11), but not to that extent. In the conversations that took place at the start ground control station at the time of 06:38.51 until 06:39.40 UTC, the CATC transmitted the following information: visibility 200 metres wind 120°/3m/s. This was most probably the horizontal visibility at the time of the catastrophe at the aerodrome in the (BSKP) region from landing direction 26. With the direction of advection and the tendency for deteriorating weather (with an influx of air mass practically from the site of the catastrophe) the horizontal visibility could not have improved to 300-500 m. It is worthy to delineate the fact that the functional individuals who held the director’s position frequently

described the horizontal visibility, which they were capable of based on an available scheme for assessment of horizontal visibility as well as on the experience they possessed in this domain. The vertical visibility could likewise not be greater than 20-30 metres. The atmospheric conditions cited in this (conclusion/petition) conform more suitably to those measured at the meteorological station of the aerodrome. The quality of the measurements and the observations performed at the meteorological station was assessed and cited below in the comments made on conclusion 3.1.13.

At the time of undertaking security precautions on the date of 4/10/2010 at the Smolensk “Severny” aerodrome, despite the presence of cloud base calculator equipment (in these conditions the device displayed the vertical visibility) at the meteorological station, as well as at the BSKP, DPRM, and the BPRM, the CATC had not once informed the crews of aircraft Yak-40, IL-76 and Tu-154M about the actual vertical visibility. In such weather conditions, this was an especially vital piece of information about the atmospheric conditions present at the aerodrome’s runway.

***3.1.11 The actual visibility at the accident site (near the middle marker) was lower than at the aerodrome due to the terrain peculiarity (lowland). The vertical visibility near the middle marker did not exceed 20 m.***

In accordance with the data contained in the Report on page **188**, the vertical visibility in the BPRM region was estimated at 50-100 metres, however, the vertical visibility was at 10-15 metres. A similar deduction can be made from conclusion **3.1.24**.

***3.1.12 During descent and approach the crew of the Tu-154 M aircraft was not once warned by the ATC and the crew of the Polish Yak-40 aircraft that had landed before at the Smolensk “Severny” Aerodrome on the absence of required meteorological conditions for landing. The decision to proceed to the alternate aerodrome was not taken, which can be considered as the beginning of the chain of events which led to the accident***

The CATC of the Smolensk North aerodrome via radio, transmitted data to the crews of Yak-40 and IL-76 consisting of the vertical visibility which did not correlate to the actually occurring (parameter) which was already at the aerodrome’s set minimum. It was not until the failed attempts at landing of aircraft IL-76 and its deviation towards the alternate aerodrome, that the CATC began to report the actual horizontal visibility. He did not inform the crews of IL-76 and Tu-154M about the stratus cloud base (and basically the vertical visibility) upon landing of Yak-40, when he clearly saw, that it was below 50 metres. This was information relevant to the crew that at the decision altitude, the ground will not be visible. He likewise did not provide the crew of aircraft Tu-154M the weather prognosis for the aerodrome. According to a prognosis relayed to the crew of another aircraft, which upon request from Moscow Control at 06:10 UTC asked the CATC about the atmospheric conditions, he transmitted that the fog will be present for at least another hour. A similar prognosis was released earlier to the crew of IL-76, which

had already diverted its course to an aerodrome (05:42 UTC). This particular prognosis could have additionally aided the crew of Tu-154M to decide to make an alternate landing at the aerodrome.

Both the controller from the Air traffic control centre in Moscow and the CATC of the Smolensk “Severny” aerodrome had not directed the crew of aircraft Tu-154M to one of the alternate aerodromes, which happened to be their responsibility with atmospheric conditions occurring below the set minimum for the aerodrome, the aircraft and its crew, and upon establishing that the aircraft had sufficient fuel and that the atmospheric conditions at the aerodrome were satisfactory.

The CATC of Smolensk “Severny” aerodrome, at a position of control, conversed with the deputy chief of military unit 21350, at 06.24.11, and was decided, that it is necessary to direct Tu-154M to an aerodrome. However, at the time of the CATC’s correspondence with the crew of Tu-154M at 06.25.11, the deputy chief of military unit 21350 took over the correspondence and upon inquiring whether the aircraft would have sufficient fuel after a ground controlled approach to reach the aerodrome, he issued the decision to approve an attempt at landing.

*3.1.13 The weather observation arrangements at the Smolensk “Severny” Aerodrome allowed informing the crew in due time on the worsening weather conditions. The accident was not caused by the deficiencies in meteorological support of the flight.*

The system of meteorological measurement and observation at the Smolensk “Severny” aerodrome did not conform to the standard regulations of the ICAO and WMO due to the location of the meteorological station. In this particular site there was a limited possibility to assess the visibility, cloud age, as well as an impossibility to **observe** any weather phenomena in the DS region and on both runways, and likewise due to the shrouding of the wind meter by the aviation works building and the adjacent cluster of IL-76 aircraft, and improper measurement of wind direction and velocity. A very inappropriate localisation of the Stevenson screen generated errors in the measurement of temperature and air humidity. On 10.4.2010, the parameters of the cloud base and vertical visibility, due to the place they were calculated - the meteorological station, did not reflect the actual values of vertical visibility and the horizontal visibility in the region of the CATC’s position (the vicinity of the eastern DS threshold), as well as those that were present on the route towards the landing strip in the territory surrounding the aerodrome. These measurements, according to the Russian regulations, should be performed equally at the position of the CATC as well as the DPRM and BPRM.

The crews of Yak-40, IL-76, and Tu-154M were not duly informed of the horizontal visibility and were completely devoid of the information regarding vertical visibility, and especially of measurements performed on DPRM and BPRM.

***3.1.14 The Smolensk “Severny” Aerodrome is suitable for various types of aircraft including Tu-154M under the established weather minima for the selected approach system***

According to the Polish party, the Smolensk “Severny” aerodrome was **not prepared to accept** aircraft, especially **in** difficult atmospheric **conditions** bringing to attention to:

- ⤴ the presence of aerial obstacles (a cluster of trees) at a height which exceeded the allowable values as described by the surface which hindered landing from a 259° direction;
- ⤴ A very bad technical state of the elements of the lighting system, not fulfilling the mandatory standards in this domain;
- ⤴ Inadequate meteorological security;
- ⤴ Failure to remove defects, declared at the time of aerodrome receipt on March 25<sup>th</sup> 2010, concerning the function of objective control media, whose technical state did not meet the requirements of standard documents;

***3.1.16 Considering the obstacles in the visual segment of approach, the glide path angle of 2°40’- 3°30’ is acceptable for international flight.***

The Polish party does not set forth any objections towards the range of acceptable angles of the path of descent (2°40’-3°30’). However, analysis of the available documents attests, that limiting the descent in the range of the area, were numerous trees (before their logging), whose height exceeded the acceptable parameters marked by the above mentioned area, incidentally causing an aerial hindrance.

***3.1.17 The Polish side did not conduct technical (check) flights to the Smolensk “Severny” aerodrome to try aerodrome equipment and capabilities to accept VIP flights considering the actual level of training of the crew members. The Polish side refused the leaderman (navigator) services***

None of the regulations specifying the execution of flights by the 36<sup>th</sup> Special Regiment of Aviation formulate that it is obligatory to perform flights testing the accommodations or level of preparedness of the crews.

The issue of authorisation by the Ministry of Foreign Affairs of the Russian Federation to carry out flights without the presence of leaders on board the Polish aircraft was a violation **by the Russian party of its own regulations**, as indicated in the Russian AIP (**chapter GEN 1.2-9 point 3.10 and 3.12**). Without the fulfilment of this condition authorisation should not be issued to execute flights (ew.) and even throughout the course of the flights, upon ascertaining the absence of a leader on board, the aircraft should be diverted to an aerodrome where such restrictions do not apply or should be diverted back to the Polish airspace.

***3.1.18 All the aerodrome nav aids for the approach with the course of 259°, including two NDBs with markers and the landing radar system at the moment of the accident were on and serviceable. There were no breaks in the power supply. The equipment used on April 7 and 10 was the same.***

The stance of the Polish party regarding the functionality of the radio-technical equipment developed at the Smolensk “Severny” aerodrome was noted in point 1.16.6 of *Results of aerodrome test flight TRS and SSO*.

***3.1.19 The graphical glide path line on the landing radar screen of the landing zone controller was depicted with an actual angle of ~3°10' instead of the established 2°40', which means that the actual aircraft position in the accident flight was higher than the depicted one (with reference to the graphical glide path line) by about 0.5°***

and

***3.1.20 The inaccuracy in the glide path line depicting does not affect the landing distance parameters and does not lead to early descent. When following a steeper glidepath of 3°10' instead of 2°40', the estimated vertical speed of 3.5 – 4 m/sec increases to 4 – 4.5 m/sec, and the middle marker should be passed 10 m higher than the established altitude of 70 m***

There exists a reasonable assumption that the landing zone controller incorrectly described the location of the aircraft (Tu-154M) with respect to the one established in the procedure of the descent path. By informing the crew that it is on the glidepath, it introduced error.

This could have resulted from the inability to operate the system or damage to the ranged automatic gain control (WARU), and manual gain control. According to the Russian side, the glidepath (3°10') applied on the radar landing indicator (PRL) was different from the path indicated on the landing card (2°40'). Also, the landing zone controller did not request the crew of Tu-154M to confirm the reported distance in altitude. In addition, the obstacles (clusters of trees) in the zone of approach from the direction of 259° resulted in the APS-6m2 system not meeting the requirements described in the document, “Standards for communications and radio engineering flight security SWD in military aviation,” according to which the plane of the foundation of the APS system would allow the optical visibility of aircraft to an altitude of 5-10 m in the sector of  $\pm 150$  m from the axis of DS.

The Polish party draws attention to the many ambiguities concerning the check of the 6M2 APS system before allowing it to work, in particular:

- ⤴ The acceptance Protocol does not contain information about the direction of landing from which a test flight was performed;
- ⤴ lack of information in the acceptance Protocol on the minimum distance from the threshold of DS 26 and its corresponding altitude, to which it is possible to control the aircraft's glidepath (a

reflection of the aircraft depicted on the course and path of descent indicator of the landing radar PRL should be visible up to an altitude of 60 m);

- ⤴ Lack of annotation about the deletion (or comparison with the pre-existing) of the glidepath and line of course on the PRL landing radar indicators. (Probably the glidepath was not deleted upon the execution of the test flight);
- ⤴ At the time of the system RSP-6m2 test flight, the existing approach chart was not taken into account - differences in the path plotted on the PRL landing radar indicator (according to the Russian party the glidepath plotted was  $3^{\circ}10'$ ), and the path indicated on the approach chart ( $2^{\circ}40'$ ).

*3.1.22 The lighting equipment of the aerodrome before the flights on April 10 was serviceable. There were no complaints about the lighting received by the Safety Investigation Team from the crews of aircraft arriving at the aerodrome on April 10 and at night from April 10 to April 11*

From the photographic documentation made on April 10<sup>th</sup> 2010 at the Smolensk ‘Severny’ aerodrome, it is evident that the components of the lighting system (approach lights) do not come from the LUCH-2MU device, but instead from a nearer **unidentified** device. They did not have mirrors and focusing lenses, or the possibility to adjust the light beam angle in the vertical and horizontal planes, which is essential for their use by the flight crew in difficult weather conditions.

*3.1.27 The special air regiment of the Polish Air Forces had no SOP for the four-member crew of the Tu-154M.*

“Had no SOP” rather than “is no SOP”; in the reports the past tense is used because all arrangements are made on the date the event occurred, and the report is always “after” and is a reference to the past, not the present.

*3.1.29 The crew for the VIP flight was formed without considering the actual level of training of each crew member. The PIC had a break of over 5 months in approaches on Tu-154M in complicated meteorological conditions corresponding to his weather minima 60 x 800. The PIC’s flight log contains records only about 6 NDB approaches within his experience as a PIC of Tu-154M, last conducted in December 2009 (all in simple meteorological conditions). The navigator did not fly Tu-154M for the last 2.5 months permanently conducting flights as a co-pilot of Yak-40.*

Since completing his training on the Tu-154M (NIMC), therefore, since September 2008, the PIC had actually made only six NDB approaches. However, in this place there is inconsistency on its analysis of the crew’s training. This is based on the fact that when stating the flying hours, the value thereof had been assessed after taking into consideration the PIC’s hours flown counting from the beginning of pilot training on this type of aircraft, therefore, the subsequently reported facts must relate



to and be assessed from the same moment in time. One cannot present the facts / arguments selectively, because it is un-objective and unprofessional. If the authors of this report want to preserve the objectivity and logical sequence of the analysis conducted in this document it would be necessary to quote the actual number of these incidents, which should amount to 16. Another statement in this section, which also does not reflect the objective facts are: “The pilot in command had a break of more than 5 months in the implementation of approaches on the Tu-154M in difficult atmospheric conditions.” In fact, the PIC had a break of more than 5 months performing the minimum acceptable amount of approaches for the aircraft crew, which is a major difference when it comes to the pronouncement of this fact. The party conducting the analysis confuses the definitions of “flight in complicated meteorological conditions” with “performance of approach in the minimum acceptable conditions by the PIC / crew. The PIC/crew had performed regular flights under difficult weather conditions.

***3.1.30 The crew members had valid medical licenses. No violations of the work and rest balance were detected. No evidence of alcohol or other prohibited substances was revealed by the coronary examination. The accident was not caused by the health or capacity of the crew members.***

The Polish side did not have access to the records of forensic investigations of the crew and passengers of the aircraft, along with the results of toxicological examinations and identification.

***3.1.31 The chiefs of the air regiment did not monitor the preparation for the VIP flight***

None of the provisions relating to preparation for flights of “VIP” nature impose an obligation on the unit commander to directly control the preparation of the crew to for its implementation. The overall responsibility for preparing the crew for the flight shall be borne by its commander.

In this case, the chief of the regiment assigned to control the preparation of the crew by his deputy, who on the date of 10.4.2010 was present at the aerodrome. In the documents available to the Polish side, there are no exact procedures and requirements that determine how to carry out this supervision. The quality of personal preparation for the flight is the sole personal responsibility of each pilot (according to IOL 2008 § 6 point 4)

***Rationale:***

According to the RL-2006 in § 16:

In Point 3 it is written that, “The responsibility for organisation of flights and flight is the commander of this unit.”

In Point 8 it is written that, “Detailed rules for the organisation of flights are determined by the instruction of flight organisation.”

The IOL 2008 § 21, point. 11 states: The organiser is responsible for organising the flight preparations of the flight personnel under his lead (...)

**In none of these points does it state that the unit commander directly participates in the preparation for flight, but only its organisation.**

The IOL 2008 in § 6 we find the record:

Point 4, “The quality of personal preparedness and psychomotor ability to fly is the responsibility of each PIC (crew member) (...)”

Point 5, Those participating in the organisation of flights bear personal responsibility for the quality of preparation and psychomotor ability to perform their duties (...)”

The confirmation of preparation for the flight crew is an entry and signature of the commander of the crew in the Official Tasks Notebook.

### ***3.1.32 The selection of the alternate aerodromes was not coordinated with the visit managers: The President’s Chancellery and the Security Board***

None of the provisions governing the exercise of flights by the 36<sup>th</sup> Special Aviation Regiment did not formulate an order to consult the selection of alternate aerodromes with the organiser of special flights or by the Security Board. The choice of aerodrome is only an operational decision, dictated by the need to prepare the flight plan ensuring the proper amount of fuel for the inlet to the aerodrome where there is no possibility of landing at the destination aerodrome.

### ***3.1.33 Before the flight the crew did not have the actual aeronautical data for the Smolensk “Severny” destination aerodrome and the Vitebsk alternate aerodrome including the current NOTAMs. The Vitebsk aerodrome could not have been chosen as an alternate aerodrome as according to its working schedule it was closed on weekends***

The crew was in possession of the aerodrome schemes transferred to the DSP by the Polish Embassy before departure to the Smolensk aerodrome on 9.4.2009. They were both on CLARIS sent by the 36<sup>th</sup> Special Regiment of Aviation and the request for permission for air operations on the date of 10.4.2010 transferred to the Third European Department of the Ministry of Foreign Affairs of the Russian Federation by the Polish Embassy in Moscow had concluded a request for transfer of current aerodrome diagrams and procedures. Such information the Russian side had not made available, however by telephone it conveyed the information, that both the schemes and procedures had not changed since last year and they are current.

The absence of NOTAMs regarding the Smolensk aerodrome was due to a lack of access to sources from which they were obtained. “M” series NOTAMs are not disseminated outside Russia. The Russian side should be aware of this and in response to a letter requesting the transfer of existing schemes and procedures that were the most recent upon the issuance of the act from April 5<sup>th</sup> 2010, it should have given them to the Embassy with diplomatic consents on April 9<sup>th</sup> 2010.

**3.1.34 The available aeronautical data for the Smolensk “Severny” aerodrome provided only 2 NDBs approach for the Tu-154M. The crew did not have data on the weather minima for the other landing systems (landing radar+2NDB, landing radar) before the flight.**

The approach scheme presented in the IAC report on page 60 is not part of the documentation held by the flight crew on the date of 10/04/2010. The dossier was referred to the Polish Embassy on 09/04/2009, after which before the flights on the 7<sup>th</sup> and 10<sup>th</sup> of April 2010, the information was relayed that the previously sent documentation is still valid. One of its elements was the following table:

#### МИНИМУМЫ АЭРОДРОМА ДЛЯ ПОСАДКИ

№	Кат. ВС	РМС			РСР ОСП	РСР	ОСП	ОПРС
		Авт.	Дир.	ПСР				
ВПП 08	Верт.		100x1000	100x1000	100x1000	100x1500	100x1500	
	A		100x1000	100x1000	100x1000	100x1500	100x1500	
	B		100x1000	100x1000				
	C		100x1000	100x1000				
	D		100x1000	100x1000			100x1500	
ВПП 26	Верт.		100x1000	100x1000	100x1000	100x1500	100x1500	
	A		100x1000	100x1000	100x1000	100x1500	100x1500	
	B		100x1000	100x1000				
	C		100x1000	100x1000				
	D		100x1000	100x1000			100x1500	

#### AIRFIELD LANDING MINIMA

No	VS Cat.	RMS			RSP OSP	RSP	OSP	OPRS
		Aut.	Dir.	PSP				
Runway 08	Vert		100x1000	100x1000	100x1000	100x1500	100x1500	
	A		100x1000	100x1000	100x1000	100x1500	100x1500	
	B		100x1000	100x1000				
	C		100x1000	100x1000				
	D		100x1000	100x1000			100x1500	
Runway 26	Vert		100x1000	100x1000	100x1000	100x1500	100x1500	
	A		100x1000	100x1000	100x1000	100x1500	100x1500	
	B		100x1000	100x1000				
	C		100x1000	100x1000				
	D		100x1000	100x1000			100x1500	

It shows that the minima for aircraft category D landing for the + OSP RSP, RSP systems are not specified. However, the contents of the report in section 1.16.15. Justification of determination of the minimum weather conditions for Smolensk “North” aerodrome states that: *....., At the Smolensk “North” aerodrome, for an approach at landing with the OSP RSP system with KM 259 ° for the category “D” aircraft, an aerodrome landing minimum can be specified at 80x1000 m. According to the order of Commander of the WTA and the Testimony No. 86 of state registration and the ability to operate the aerodrome, Smolensk “Severny” aerodrome is allowed to receive the aircraft at an aerodrome landing minimum of 100x1000 m.*

If such arrangements have been made this should be communicated to the Polish side. After completion of the act dated the 5<sup>th</sup> of April 2010, they should have been forwarded to the Embassy with diplomatic consents on the 9<sup>th</sup> of April 2010. At that point, the crew surely would have the most current data from Smolensk “Severny” aerodrome that:

*3.1.35 The aircraft departed from Warsaw at 9:27, with a 27-minute delay with regard to the changed departure time (9:00). Initially the flight had been planned for 08:30*

The ATC flight plan for the aircraft Tu-154M flight was filed on 09.04.2010 at 11.47 UTC. The hour of departure was set to be at 05.00 UTC on 10.4.2010. Due to the fact that the flight plan was disseminated to all the required AFTN addresses, it can be stated that the information of the change in departure time comparing to the CLARIS, was **communicated in a proper and timely fashion** to the Russian air traffic control authorities.

The crew of the aircraft Tu-154M requested permission for a flight to the air traffic control authority OKECIE DELIVERY at 05:11 UTC, meaning throughout the period of validity of the flight plan (regulations state that the flight plan expires, at 5 minutes past the ETD, in this case about 05:15 UTC).

*3.1.36 The radio communication with the Minsk Control and the Moscow Control was maintained by the navigator in English. The radio communication with the ATC group of Smolensk “Severny” aerodrome was maintained by the PIC in Russian. The radio communication with the Yak-40 crew was conducted in Polish. The general level of the PIC’s Russian was satisfactory. Most probably the other crew members did not speak sufficient Russian.*

The commander of the Tu-154M aircraft communicated properly and clearly, without any ambiguities. His knowledge of the Russian language can be assessed as good. There is no reason to draw conclusions as to the knowledge of the Russian language by the other crew members.

*3.1.41 When requesting the trial approach the crew did not specify the approach system and they did not request landing radar. Most likely, the crew did not use the LOM and the LMM for navigation and they approached by use of the onboard means*

Given that the, “The destruction of the glower of the ARK-15M control panel lights is typical for de-energised conditions” (point 1.16.13) it can be assumed that the crew performed a landing approach, based on NDB receivers (ARK), and prepared the data entered into FMS. Judging by the records of the CVR and the sequence of actions taken by the crew on the FMS control panel, one can accept the hypothesis that FMS was the primary reference source (HDG values were introduced related to the obtained consent), and markers and NDB - secondary.

***3.1.42. After clearing the crew for the “trial” approach in the weather conditions below the aerodrome minima in accordance with the Russian AIP, the ATC group personnel further informed the crew on the aircraft position and the weather conditions within the capabilities of their equipment.***

In the contents of the comments, the Polish side has repeatedly indicated that the landing zone controller gave incorrect information on the location of aircraft on the path of descent.

***3.1.43 At the transition level the crew set the QFE of 745 mm of mercury on the barometric altimeters which had been transmitted by the controller earlier;***

One can clearly state that the aerodrome pressure 745 mm Hg was set on the altimeters WM-15PB No. II88008 and UWO-15M1B No. 1196652, which have undergone technical surveys (described in point 1.16.13).

The assumption that the crew placed a pressure of 745 mm aerodromes on all mercury barometric altimeters arises only from the radio communications.

The IAC report indicates erroneous analysis, because in actuality the crew changed the altimeters to the landing aerodrome’s pressure above the transition point, at an altitude of about 2100 m.

At. 6:25:25 (UTC according to the stenogram CVR), the commander of an aircraft received permission from the CATC to descend to an altitude of 1500 m, at a measure of 40°. The co-pilot at the same time talked through the other radio with the crew of Yak-40. At. 6:27:05 UTC the co-pilot asked the commander: “*To how many do go down? Six hundred?*” Unidentified cockpit voice answers: “*1500, 4900,*” and the commander added at 6:27:10 UTC, “*to 745*” which is repeated several times. The crew commander switched the encoding altimeter from a value of 760 mmHg to a different value (probably 745), at 6:28:44 UTC (according to the QAR recording), at a barometric altitude of 2176 m.

At 6:29:58 UTC the second pilot reported: “*altimeters 993/745.*” At 6:30:10 UTC the aircraft commander reported to the CATC, “*Korsazh, Polish 101, maintain 1500*”.

***3.1.57 At a distance of 2800 m from RWY 26 threshold the aircraft crossed the nominal glide path (glide path angle 2°40’) and in 3 seconds the landing zone controller informed the crew of aircraft position being on the course and glideslope. The flight altitude was 115 m which almost matched the missed approach altitude.***

The noted values of the slope of the approach are chosen by the authors of the Report as necessary (3°10’ or 2°40’).

***3.1.59 At a distance of 1200-600 m from the point of first impact during the actual descent with the vertical speed of about 8 m/sec, the CVR recorded three reports within 8 seconds about the height of 100 m, equal to the established minimum descent altitude. At that stage of the flight path there exists lowering terrain down to minus 60 m with reference to RWY 26 threshold. The PIC's decision to go around did not follow.***

According to the CVR recording, read by the Polish side, the PIC reported, upon passing an altitude of 100 m, that he is making the go around. The co-pilot confirmed this. There is however an absence of decisive command by the commander (pilot flying the aircraft), consistent with IUL initiating this process. Results of the phonoscopic expertise, carried out by the Polish side, were received in December 2010. The Polish side is ready to transmit them to the IAC commission to utilise the analysis of the crew's activities.

***3.1.61 The landing zone controller not having received the crew report on going around instructed them: "Level, 101". The crew actions to terminate descent did not follow and the aircraft continued descent.***

The command "Level 101", was issued by the KSL too late, when the marker of the aircraft disappeared from the indicator. At the time of its release the aircraft was under the path of descent at an altitude of 17 m in relation to the threshold of DS 26. The crew launched an unsuccessful procedure for go around after the signal turned on warning about a dangerous height (there were registered [elements] on the control column), 1.5 seconds before the release of the command "Level 101", by the KSL.

***3.1.62 The lack of crew actions on passing the established minimum descent altitude of 100 m, no reaction to the TAWS alerts and decision height alert as well as to the landing controller's instruction to terminate descent can evidence the crew's attempt to establish visual flight before passing the middle marker to make a visual landing***

Referring to comments made to proposal 3.1.59 the crew at this time tried - unsuccessfully - to terminate descent. The final statement that "...can evidence the crew's attempt to establish visual flight before passing the middle marker to make a visual landing" is not supported by any facts.

***3.1.64 On final the PIC was experienced psychological clash of motives: on the one hand he understood that the landing in the actual conditions was unsafe and on the other hand there was strong motivation to land exactly at the destination aerodrome. The presence of the Commander-in-Chief of the Polish Air Forces until the collision affected the PIC's decision to continue approach and descend lower than the minimum descent altitude without establishing visual contact with the ground references.***

Since not all fragments of conversations in the cockpit at the last phase of the flight were identified, one can not unequivocally resolve the issue of the reason as to the Commander-in-Chief of the Polish Air Force presence in the crew cabin. According to the Polish side, it is necessary to clarify his actual role in the critical moment of the flight.

***3.1.66 The crew instinctive actions: pulling up the control wheel which led to disengaging the autopilot in the pitch channel by overpowering and setting the throttles to take-off position with disengaging the autothrottle occurred almost at the moment of the first impact with the obstacle which confirms the extremely low visibility and vertical visibility near the middle marker as well as the failure of the crew to take the go-around decision.***

According to the Polish side, the settling of the throttle to take-off position with disengaging of the autothrottle was about 1 second before impact with the first obstacle (tree 35 metres in front and on the left side of the middle marker). According to the Polish side, one can exclude in this case, the instinctive action of the crew, because its activities were not associated with the observable or not observable obstacles - it was a delayed realisation of the procedure for a go around. The actions of the crew commander should not be construed as instinctive but rather as an unsuccessful attempt to resolve a critical situation. The action of the crew is evidence of the poor vertical and horizontal visibility in the area of the middle marker.

***3.1.67 The medical tracing investigation revealed that these actions were taken by the PIC who was at his working seat fastened by seat belts. The other crew members were also at their working seats and fastened.***

The Polish side did not have access to the protocol of surveillance of the location of the occurrence (It does not have knowledge where they were located and how they were marked).

***3.1.68 Results of the medical tracing investigation of the injuries sustained by the Commander-in-Chief of the Polish Air Forces correspond to his presence in the cockpit at the time of the impact with the ground. The coronary examination conducted at the Department for Coronary Expertise of the State Health Enterprise of Moscow "Bureau of Coronary Expertise of the Moscow Health Department" revealed 0.6‰ of ethanol in the blood of the Commander-in-Chief of the Polish Air Forces.***

The results of testing the concentration of alcohol in the blood of the Air Force Commander can not be analysed because of the unavailability of source documentation (no authorised toxicological data and information when and how the material was secured for analysis).

***3.01.69 In 4-5 seconds after the first collision with the obstacle the aircraft collided with the birch with a trunk diameter of 30-40 cm, which led to the left outer wing portion of about 4.7 m ripped off and intensive left bank.***

The detached fragment of the wing (preserved) had a length of 6.1 m, which after taking into account the crushed fragments resulting from a collision with a tree signifies that a fragment of about 6.4 m was detached from the aircraft.

***3.1.69 In 5-6 more seconds, inverted, the aircraft collided with the ground and was destroyed;***

The text of the Report describes the distance using the alternating references to various points (“DS26 threshold” or “first point of collision”) which may be misleading. Providing the height parameter does not specify which height is being described.

***3.1.72 Actions of all rescue services were correct and timely, which allowed preventing the development of ground fire and secure the flight recorders, aircraft structural parts and remains of the persons of board***

In order to state that the actions of the rescue services were correct and timely, it should be compared to a standard point of reference. Such a standard is an aerodrome rescue plan, which for that aerodrome was non-existent, or had not been presented. If the report refers to all the rescue services, then their names should be provided, numbers, and where they were stationed prior to the arrival of the aircraft. The same concerns punctuality. It has not been indicated by which standards it has been established that timely rescue operations were performed.

This statement is untrue, compared to the data given in the text of the Report. This is explained in detail in the text of the remarks to point 1.15. It should be recognised that the aerodrome was not prepared for such a circumstance.

## **3.2 Causes**

The sole purpose of research on the causes and circumstances of the accident, in accordance with the procedures and recommendations contained in Annex 13, is to prevent such incidents in future. In a study conducted by the IAC, whose results were contained in the Report, the Russian side responded in detail to the shortcomings of the Polish side in the preparation of the flight on 10.4.2010 in the **scope** of Tu-154M tail no. 101 flight crew training and the its realisation of the flight.



Information contained in the Report, and documentation submitted to the Polish side analysed by the Polish party indicates, that in the range of preparations made by Smolensk “Severny” aerodrome there were many insufficiencies that contributed to the reduction in the level of safety of the performed flights by both countries on the 7<sup>th</sup> and 10<sup>th</sup> of April 2010. The Russian Party did not disclose these conclusions in the Report and did not refer to these shortcomings.

The report also includes a number of statements, which the Polish side could not accept or which are not supported by sufficient evidence.

One can also get the impression that some of the areas of case studies by the Russian side have been deliberately omitted, or their analysis was conducted too superficially. By analysing the records in the report, regardless of the number of documents submitted by the Accredited and his advisers’ explanations, it can be stated that many of the documents submitted by the Polish side were analysed in brief and were incompletely tested, and the elucidations of Polish specialists helpful in understanding the notations in these documents were not taken into account. As a result, a vast array of information contained in the report is inconsistent with reality. These shortcomings reflect the lack of credibility of the message contained in the Report.

Accordingly, the Polish party concludes that the proposed causes and circumstances of the accident aircraft Tu-154M do not include all the factors affecting its occurrence. In particular:

- The release of permission by the Ministry of Foreign Affairs of the Russian Federation to conduct the flight of Tu-154M and Yak-40 to Smolensk “Severny” aerodrome without a leader on board which is contrary to the provisions contained in the Russian AIP;
- failure by the Russian side to provide actual aero-navigational data of the Smolensk “Severny” aerodrome despite written requests from the Polish side;
- Lack of data from the Russian side of the actual and forecast weather conditions at the Smolensk “Severny” aerodrome before the flight of Tu-154M;
- Failure to transmit the warning to Poland 05.09 UTC of the occurrence of the atmospheric conditions below the set minimum of the Smolensk, “Severny” aerodrome (before the start of Tu-154M from Okecie);
- Lack of decision to send the aircraft to the designated aerodrome or another one having appropriate weather conditions, despite having **information** about the atmospheric **conditions** rendering it impossible to perform any flight operation at the Smolensk “Severny” aerodrome;
- The lack of transmission of information about vertical visibility by the flight controller of the Smolensk “Severny” aerodrome to the aircraft crew:
- The lack of reaction by the landing zone controller at the time of approach at landing by the aircraft Tu-154M when deviating from its mandatory descent path;
- The delayed command by the general CATC to terminate the attempt at landing;
- the lack of assessment of preparedness by the Russian side to accept a VIP flight, especially since such an assessment was made of the Polish side.

According to the Polish side, several statements made in **Chapter 3.2 Causes**, are not backed up by any evidence, and are not adequately justified in the analysis or the analysis has been conducted improperly. Reservations can be made regarding the below statements:

- *There were serious shortcomings in the arranging of the VIP flight concerning the crew training, composition, monitoring of its preparation and selection of alternate aerodromes*
- *The departure was conducted without available actual and forecast weather and the actual aeronautical information for the destination aerodrome. According to available information the Polish side refused the leaderman (navigator) services:*
- *On contacting the ATC group of Smolensk "Severny" aerodrome the crew did not report the selected approach system to them which deviated from the Russian AIP requirements. Further the crew continued approach using the on-board equipment without utilizing ground navigation aids;*
- *The PIC had a break of over 5 months in approaches in complicated meteorological conditions (corresponding to his weather minima 60x800) on Tu-154M. The PIC had not had enough training on approaches in manual steering mode using non precision type of approaches.*
- *The approach was made using the autopilot in pitch and roll channels as well as the autothrottle. This type of approach is not provided by the Tu-154M FCOM and the weather minima and SOP for this type of approach are not described there;*
- *The crew did not terminate descent at the established minimum descent altitude of 100 m ,but continued descent with a vertical speed two times higher than the estimated without establishing visual contact with the ground references;*
- *Despite the numerous TAWS (TERRAIN AHEAD and PULL UP) alerts, the triggering of the radio altimeter decision height alert at 60 m and the ATC instruction, the crew continued descent which can be an evidence of their attempt to establish visual flight before passing the middle marker in order to conduct a visual landing;*
- *The operation of the ground based navigation and lighting equipment did not affect the accident;*
- *The presence of high-ranked persons in the cockpit including the Commander-in-Chief of the Polish Air Forces and the Protocol Director, and negative reaction of the Main Passenger expected by the PIC exposed psychological pressure on the crew members and influenced the decision to continue approach in the conditions of unjustified risk*

On the basis of the above statements, the Polish side requests **the reformulation of causes and circumstances of the Tu-154M aircraft accident as well as the preventive recommendations, upon taking into consideration of all of the factors that had an impact on the occurrence of the incident, including those described in the above document.**