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CHANGES IN THE CONTENT OF NORMATIVE DOCUMENTS AFTER THE AVIATION EVENTS DURING THE TRANSPORT OF THE MOST IMPORTANT PEOPLE IN THE COUNTRY BY MILITARY AIRCRAFT

Assoc. Prof. Ryszard BARTNIK, PhD

Institute of Civil Aviation Management
Faculty of Management and Command
War Studies University, Warsaw

email: r.bartnik@akademia.mil.pl
ORCID: 0000-0003-2167-5878
Researcher ID: B-6566-2019

Dariusz TATAROWSKI, PhD

Security Management System Manager
Polish Medical Air Rescue

e-mail: tatarowski.d@op.pl

Abstract

Ensuring the safety of people that hold the most important state positions is one of the most important tasks that all institutions and those involved in securing the official activities of such people are involved in, including their mobility and movement by air. This requires undertaking actions aimed at eliminating security threats and thus minimising risk. Regulations contained in normative documents concerning the transport of the most important persons in the state by military aircraft are not only concerned with protection against the occurrence of human error, but also regulate the issues of additional requirements for aviation equipment used to carry out such transports and in-depth analysis of environmental factors.

Key words: the most important people in the state, transports by military aircraft, normative documents, security. Research

Introduction

The results of the research included in the article *Solutions ensuring safety during transport of state VIPS by military aircraft* (Parts: 1, 2, 3) provided a foundation for further enquiries that were related to changes in the formal regulations of military air transport for heads of state and government in connection with air accidents.

Despite the specification of a number of requirements in the normative documents intended to guarantee safe transport of the most important persons in the country by military aircraft, the analysis of the literature[1] identified five air accidents and crashes that occurred after World War II, in which Polish military aircraft carrying the most important people in the state were involved. The number of aviation events that occurred during such transport spurred interest in how they happened and in the content of normative documents that regulated the implementation of such transports from the end of World War II. Any irregularities in the content of such documents increase the likelihood of an air accident occurring.

On the basis of the dates of implementation of subsequent normative documents regulating the transport of the most important people in the country by military aircraft, it was found that the introduction of a revised normative document was preceded, in four of the five cases indicated above, by the occurrence of an air event during such a transport. The above dependence indicates that the analysis of a given event provided evidence that the content of normative documents did not specify all the requirements and obligations necessary to ensure security, or contain solutions that had to be regulated differently to ensure the safety of such operations.

The aim of the research, the results of which are presented in this article, was focused on the identification of relationships between air incidents that happened during transportation of heads of state and government and rules contained in formal related documents. The research question was: what changes were implemented into formal documents as a result of air incidents that occurred during flights involving heads of state and government? And the hypothesis verifying the problem indicated in the assumption that the assurance of safety in air transport of the most important people in the state demanded changes in formal regulations related to: level of crew experience, crew selection and coordination, flight pre-planning, crew preparation, minimum aircraft equipment and minimum weather conditions and their analysis.

It was assumed that in order to identify the relationships between changes in formal regulations of military air transport for heads of state and government, air accidents that occurred during these flights would be reviewed along with the findings of the commissions investigating their causes and the indicated changes in the content of normative documents introduced after the occurrence of a given event.

1 Among others: S. Bartosik, M. Mikołajczuk, R. Senkowski, *36th independent special air regiment 1947–1963*, LAF Publishing House, Toruń 2013; M. Mikołajczuk, P. Michalski, *36th special regiment of transport aviation*, Gretza Publishing House, Warsaw 2013; S. Bartosik, M. Bogdanski, R. Senkowski, *Disasters, failures, damage in Polish military aviation 1961–1980*, Aeronautical Photographic Agency, Toruń 2012; D. Tatarowski, *Security of transportation of the most important persons in the state by military aircraft,* Doctoral dissertation, War Studies University, Warsaw 2019.

The Polikarpow Po-2 aircraft failure

No materials were found in the archives from the Polikarpow Po-2 plane crash of the special air regiment on 09.03.1947. According to the report on the training of a special air regiment, "the accident was thoroughly stripped by the commander of the regiment, and the material from the investigation was directed to the flight training department of the Polish Air Force"[2].

The course of the event

The order for the transport of the Minister of Public Administration on the Warsaw–Rzeszów route was handed over to the commander of the special air regiment on 08.03.1947. Because of the heavy snowfall, many airports in the country were unfit for landing on wheels. "At the persistent request of the Minister", two single-engine Po-2 planes equipped with skis were designated to perform the transport. Two pilots from the 2nd squadron were selected for the task[3]. The commander of the special air regiment checked the preparation of the crews and instructed them to safely carry out the flight. On taking off from Warsaw on 09.03.1947 at 8.20 a.m. the "weather and forecast was good". About 40 km before reaching the destination, the crews encountered a snowfall zone in which visibility dropped to 50–100 m. Despite this, the person leading the group decided to continue the flight to Rzeszów. Arriving in Rzeszów, the crews were unable to determine the location of the airport. Because of fuel depletion, the person leading the group decided to land in the contingent area. Visibility was hindered by the observation that the selected landing site was cut by a drainage ditch. In order to avoid collision with an obstacle, the pilot did a sharp turn during the run-out, resulting in damage to the chassis that "folded itself". The propeller of the plane and the bottom wing were damaged. The pilot and the passenger did not suffer any injuries. The damaged plane was repaired at the landing site and then transported to Warsaw on the following day.

2 *Report on combat training of the special air regiment for March 1947*, Military Historical Bureau, reference number IV.115.193.

3 Information on their training and aviation experience has not been preserved. At the end of 1949, the life run of the pilot performing the transport of the Minister of Public Administration on 09.03.1947 amounted to 859 hours and 46 minutes. Taking into account the information found, indicating that pilots of the special air regiment obtained annual air runs of 250 hours in 1947–1948, it is likely that the pilot designated for the task had, at the time of its implementation, a life run not greater than 300 hours. I. Koliński, *Polish People's Aviation 1944–1947*, Ministry of National Defence Publisher, Warsaw 1987, p. 15.

Causes of the event

The commander of the special air regiment considered the ‘’pilot’s haste when landing and making the wrong decision when landing” to be the cause of the incident. The pilot was punished with a five-day house arrest for causing the accident. The commander of the special air regiment, however, did not take into account the fact that the commander of the group, after encountering atmospheric conditions significantly worse than ones that would enable a safe flight, made a decision to continue the flight to the destination airport, trying to carry out the task at all costs without taking into account the security risks that this decision entailed. It can be assumed that the reason for such behaviour was the poor experience of the pilot assigned to carry out the transport, which in connection with his recent experience of performing operational tasks in combat conditions, in which undertaking increased risk for the performance of the task is assumed as a rule, translated into him making a decision without taking into account its possible consequences.

Changes in the content of normative documents

As a result of the air event of 09.03.1947, the problem of the lack of any normative documents regarding the safety of transport of the most important people in the state by military aircraft was noticed[4] and regulated[5]. Subsequent orders: no. 017 of 12.02.1948, no. 0164 of 20.09.1949, and no. 0191 of 26.11.1948, prepared at the level of the Air Force Command determined the list of the most important people in the state, the transport of which in military aircraft necessitates the use of additional procedures aimed at ensuring security. Regulations were introduced that concerned the ban on the use of aircraft with a single power unit and a single crew for such transport. The procedures for ordering flights were standardised, specifying the minimum anticipation with which the order should be placed and the procedure designed to eliminate the possibility of affecting the flight provider. The aspects related to the commissioning of the technical condition of aircraft used for transporting the most important people in the state were also regulated. Although the flight experience of the crew and its personality traits certainly contributed to the occurrence of the aviation incident, no regulations regarding this issue were introduced in the developed normative documents, leaving a decision on appointing crews able to carry out such operations in the hands of the commanding officer of the aircraft.

4 *A report from 11.03.1947 of the Polish Army Commander-in-Chief addressed to the Minister of National Defense*, Military Historical Bureau, reference number IV/507/3/A/203.

5 The analyses of the content of normative documents regulating the security of transport of the most important people in the country by military aircraft carried out in the article titled *Solutions for safety of military air transport of the most important people in the state* (part 1).

The Antonow An-24W plane crash

The great concern of the authorities of the Polish People's Republic with the occurrence of the disaster of 28.02.1973 meant that the establishment of its causes was dealt with by two independent commissions, i.e. the Special Commission for investigating the cause of the plane crash in Szczecin and the Main Commission for Investigation of Aircraft Accidents at the Inspectorate of the Ministry of National Defence for Flight Safety[6].

The course of the event

The order for a flight along the Warsaw–Szczecin route to transport the Ministers of Internal Affairs of Poland and Czechoslovakia was submitted by phone to the commander of the 36th independent special air regiment at about 10.00 am on the day of the flight. The crew commander assigned to carry out the task had current permits to make landings at night in minimum weather conditions. He was a 1st class military pilot with a total run of 3502 hours and 935 hours run on the An-24 plane. The second pilot had the first class of a military pilot, a total of 2125 hours and a run on the An-24 plane of 831 hours. The crew prepared for the flight until 12.00, then made a commission flight of the aircraft designated for the flight. At about 1:00 pm, the squadron commander checked the crew's preparation for the flight, and then the crew went to rest before the night flight[7]. In the evening, the crew got acquainted with the updated weather forecast, according to which, upon arrival at Goleniów, atmospheric conditions allowing landing should prevail. Shortly after the start of the flight at 9.40 pm, the deputy commander of the 36th independent special air regiment for line matters supervising the performance of the task, received information by phone that current weather conditions would make it impossible to land in Szczecin. At the same time, he made a decision not to provide this data to the crew due to a rapid improvement of atmospheric conditions above the minimum ones having been forecast. The crew continued their flight, receiving information from the Choszczno homing node at 10.19 pm on atmospheric conditions allowing the landing in Szczecin (cloud base 100 m, visibility 1000 m). Atmospheric conditions were confirmed after the crew established radio communication at 10.47 pm with the duty manager of the destination airport. Radio contact with the crew broke off when the place was 3 km from the airport (after the flight manager gave the landing distance and confirmed that the plane was on the correct approach path). At 10.52 pm, the plane collided with the ground, undergoing total destruction at a distance of 2 km

6 Military Archive in Nowy Dwór Mazowiecki, reference number 8/1973.

7 The pilot after performing a flight during the day (technical flight) could perform night flights provided that he had rested for not less than 6 hours. *Supplement no. 1 to the Regulations of Performing Flights in Military Aviation* (RPF 66), p. 45, Military Historical Bureau, reference number Avia 855/65.

from the threshold, on the extension of the airstrip. All the crew and passengers died in the crash. The engines and installations of the aircraft were working properly until they hit the ground.

Causes of the event

According to the findings of the commission, the aircraft's sudden loss of longitudinal stability caused the crash which resulted from the icing of the horizontal tail. Icing of the ballast in connection with the probable occurrence of the so-called lower jet stream prevented the crew from taking the aircraft to a horizontal flight after its unexpected transition of descent at a speed of about 10 m/s. It was also determined that LOT Polish Airlines had information that in the event of an An-24 horizontal stabilizer with uplift flaps, an unexpected descent of a plane may take place with a descending speed of 240 km/h (although in this configuration, the stall speed was about 160 km/h) and a falling speed up to 10 m/s. The commission classified the disaster into the "other" causative group, however, without drawing conclusions and recommendations regarding changes to the normative documents.

Changes in the content of normative documents

The analyses of the content of normative documents regulating the security of transport of the most important people in the country with military aircraft made in the article entitled *Solutions ensuring safety during transport of state VIPS by military aircraft* (part 2) allowed it to be established that as a result of the plane crash of 28.02.1973, irregularities in the content of the documents were identified and changes were made. A comprehensive document was developed and implemented for use: *Regulations on the planning, execution and insurance of aircraft flights marked with an Important signal*[8], containing procedures aimed at ensuring the safety of such transport. The list of the most important people in the country entitled to be transported by military ships was limited. It was determined that the weather forecast on the route should be worked out by the Central Hydrometeorological Office. It was pointed out that the representative of the Office of the Council of Ministers or the Government Protection Bureau is responsible for reporting the demand for the transport of the most important people in the state by military aircraft, stating that such a demand should be sent to the unit performing the flight at least 3 days before its implementation. The commander of the airport where the landing was to take place was obliged to make a decision on accepting such a flight, among other things based on an analysis of weather conditions and their forecasts. Before commencing the flight, the crew commander was obliged to familiarise himself with the current

8 Military Historical Bureau, reference number Flight 1566/74.

synoptic situation, including in the area of icing zones. The minimum atmospheric conditions for taking off and landing of military aircraft with the most important people in the state on board have also been raised, compared to the minimum for other flights.

The Mil Mi-2 helicopter failure

The course of the aircraft accident below was described based on the protocol of the commission of the Inspectorate of the Ministry of National Defence for Flight Safety[9].

The course of the event

The contract for the transport of the Prime Minister on the Warsaw Babice–Sypniewo route reached the 103rd Air Regiment of the Vistula Military Units of the Ministry of the Interior (NJW MSW) on 25.09.1976 around 10.00 am. The start was to take place on the same day at 12.30 pm. The crew received information about the appointment to carry out the transport around 10.30 am. The designated crew commander was a first class pilot on the basic training aircraft and was not fully trained to operate in all weather conditions on a Mi-2 helicopter[10]. The second pilot was a 2nd class pilot and was not fully trained to perform flights in all weather conditions[11]. He also did not have permission to fly from the second pilot's seat on the Mi-2 helicopter. The Mi-2 helicopter, produced in 1974, was designated to make the flight, which during the previous operation had a run of 209 hours and made 396 landings. The departure from the Warsaw Babice airport took place in accordance with the order. The flight to Sypniewo was carried out in a hurry (using the nominal not the transit scope of engines). During the flight, the passengers gave the crew information on the exact location of the landing site[12]. The landing on the limited airstrip indicated

9 *Commission investigation report on the 103rd regiment of the NJW MSW*, Military Archives in Nowy Dwór Mazowiecki, reference number 3920/16/77.

10 According to the content of *the Provisions of security and flight regulations for aircraft marked with the "Important" symbol, over the territory of the People's Republic of Poland,* Military Historical Bureau, reference number OPK 658/76, the commander of the crew assigned to transport the most important people in the state by military aircraft should be a first class pilot in a given type of aviation.

11 Pursuant to the content of the *Provisions (...)*, reference number OPK 658/76, the second pilot designated for the transport of the most important people in the state by military aircraft should be authorised to operate in all atmospheric conditions.

12 Pursuant to the *Provisions* (…), reference number OPK 658/76, for casual landings for flights marked with the "important" signal, it had to be preceded by reconnaissance of the landing site from the ground. However, it could be dropped at the request of a person entitled to such transports.

by passengers took place on 2.32 pm. Then, the crew made a flight to the Debrzno airport. On 26.09.1976 at 9.30 pm, the crew moved the helicopter to the airfield chosen previously in Sypniewo. The engines were started at 11.20 am. After a passenger occupied a place in the cabin, the crew commander performed a test of the helicopter in hover, and then began to accelerate. After reaching a speed of 50 km/h and travelling 60 m it started rising with a vertical speed of about 2 m/s. When the helicopter approached the forest wall, its hull shifted to the left while the front part was lifted up, and then it was lost. The second pilot at this time observed the difference in the engine speed indicators of 3%, to which he responded by giving the command: "right engine". The crew commander assessed the above phenomenon as damage to the right engine, to which he reacted by reducing the overall lift of the rotor's pitch and directing the helicopter to a clearing behind the tree line. The helicopter, descending, cut the branches of the pine with the bearing rotor's blades on the left side of the hull. As a result, the direction of the flight was changed by about 15^0 to the left and the flight path to 38^0. The helicopter collided with the ground in a position tilted to the right, destroying the rotor blades, then fell to the right side and turned by 430^0. As a result of the collision, the fuel system was unsealed and a fire was created in the area of the engines. The crew commander left the helicopter through the left window, the main passenger went to the front of the helicopter, where with the help of the second pilot, he was the last one to leave the helicopter through the left window. After a sufficient time had elapsed for the passengers to leave the helicopter at a distance of only 10–15 m, the fire rapidly covered the whole hull of the helicopter and destroyed its entire structure. As a result of the accident, the crew commander suffered second-degree burns of the left hand, while the second pilot a sprain of the right ankle. The commission did not determine the injuries that the passengers suffered.

Causes of the event

According to the findings of the commission, the cause of the accident was exceeding the maximum weight of the helicopter for take-off by 55 kg. This resulted in exceeding the critical angles and dragging of the bearing rotor. The crew commander mistakenly assessed the symptoms of stalling of the rotor as symptoms of failure of the right engine. Despite the low wind speed, it was also probable that the helicopter would enter the turbulence zone on the leeward side of the forest located at the edge of the landing area, which could have influenced the existence of the drag of the rotor. It was pointed out that a shortcoming that could have influenced the cause of the air accident included the crew commander not giving guidelines to the second pilot, the lack of proper division of attention of the crew commander during take-off, the crew disregarding all cargo components when calculating the starting weight and selection of a landing area that did not provide a safe take-off. The commission classified the event into the "malfunction of the crew" causation group consisting in

the aircraft being overloaded before take-off from a limited landing ground, which led to the dragging of the bearing rotor. However, it did not formulate conclusions and recommendations regarding changes to the normative documents.

Changes in the content of normative documents

The analysis of the content of normative documents regulating the security of transport of the most important persons in the country by military aircraft carried out in the article *Solutions ensuring safety during transport of state VIPS by military aircraft* (Part 2) allowed it to be established that as a result of the aviation event of 26.09.1976, no irregularities were identified in the content of indicated normative documents and no changes were introduced. Although the flight experience of the crew and its inadequate personality traits certainly contributed to the occurrence of the aviation incident, the Commission limited itself to pointing out recommendations in this regard to the unit commander, instead of recommending that the irregularities detected be solved in a systemic manner by changing the content of normative documents accordingly.

The Mil Mi-8 helicopter failure

The course of the aircraft accident presented below was described on the basis of the protocol of the commission of the Inspectorate of the Ministry of National Defense for Flight Safety[13].

The course of the event

The commission did not specify with what advance the order for the transport of the Prime Minister on the Katowice–Kleszczów–Lubin–Wrocław route reached the 36th special transport aviation regiment. The start was scheduled for 9.00 am on 04.12.2003. The commander of the regiment appointed a crew commander on 03.12.2003, with current approvals to perform landings of the Mi-8 helicopter during day and night in minimum weather conditions, who had a total of 3111 hours, including 2888 hours on the Mi-8 helicopter and master military pilot class. The second pilot assigned to the crew had the 3rd class of a military pilot[14], a total of 535 hours, including 477 hours on the Mi-8 helicopter. The transport was to be carried out on a Mi-8

13 *The protocol of 20.01.2004 from the investigation of the aviation accident,* Military Archive in Nowy Dwór Mazowiecki, reference number 4128/16/146.

14 Pursuant to the *Provisions* (…), reference number OPK 658/76, the second pilot designated for the transport of the most important people in the state by military aircraft should be authorised to operate in all atmospheric conditions. The committee's protocol lacks information as to whether the other pilot assigned to carry out the transport had the necessary qualifications.

helicopter no. 10632 manufactured in 1977, which had so far flown 3936 hours. The same helicopter was also designated to carry out the transport of the Prime Minister on 03.12.2003 on the Warsaw–Łódź–Warsaw route. Another crew commander was appointed for the implementation of this transport, but the same second pilot was to carry out the transport on 04.12.2003. At the same time, the commander of the crew was given the task of checking the Mi-8 helicopter (no. 10643) on 03.12.2003 for the Military Aviation Works no. 1 in Lodz. At 10.03 pm, the Mi-8 helicopter no. 10632 took off from Lodz, with the Prime Minister on board, and the landing at Warsaw Okęcie airport was scheduled at 11.20 pm. During the transport, there was no crew assigned to perform the task on board except the crew who were assigned the task of carrying out the transport on 04.12.2003 (there was a change of crew commander). After landing at the Warsaw Okęcie airport, the crew commander was instructed to move the helicopter to Katowice. The take-off was at 0.10, the landing in Katowice at 1.18 am. After the Prime Minister arrived at Katowice airport at 9.10 am, he was transported by helicopter to the area of Kleszczów (to the construction site of the A4 motorway). The take-off to Lubin took place at 10.52 am. After about 20 minutes of the flight, the helicopter entered a zone of atmospheric conditions that prevented further flight. The crew commander informed the passengers about this fact and decided to change the flight route and land at the airport in Wroclaw. The landing took place at 11.55 am with atmospheric conditions poorer than the conditions under which the crew commander had the right to land. At 4.00 pm, the crew began preparing the helicopter for a return flight to Warsaw (not included in the order of transport). The meteorological report with the weather forecast for flights to Warsaw did not contain information about the possibility of icing. The take-off of the helicopter from Wroclaw took place at 5.03 pm with poorer atmospheric conditions than the conditions under which the commander had the right to take off. Before take-off, the crew did not turn the anti-icing system for heating the engine inlets to the "manual" working range, which was inconsistent with the Mi-8 helicopter[15] manual. The approach to landing was made according to the indications of the instrument landing system to strip 33 of the Warsaw Okęcie airport. According to the recorders of the flight parameters, during descent from a height of about 750 m, there was a gradual fall of the bearing rotor rotations from 96% to 88%, due to icing of the engine inlet tunnels, without a reaction from the crew. At 6.28 pm, at an altitude of around 570 m, the crew heard a roar from around the engines and then found that the right engine had shut off. The engine shutdown was accompanied by a drop in the rotation of the rotor to 82%. After about 20 seconds, as a result of the pilot reducing the overall pitch of the rotor to 5^0, the rotor's rotations increased to 89% and stabilised in the operating range. After another 30 seconds, at a height of about 350 m, the second engine was shut off. The helicopter's exit below the lower cloud base took place at a height of about 120 m, with a progressive speed of 170

15 *Mi-8 helicopter. Piloting technique*, p. 117, Military Historical Bureau, reference number Flight 1437/71.

km/h and a descending speed of about 4 m/s. The commander of the crew noticed a cluster of houses on the flight path and leaned left towards the darker plane, which turned out to be a forest. At a height of about 60 m and a speed of 140 km/h, the crew commander began increasing the overall pitch, which caused the rotation of the rotor to drop to 77% and continue dropping quickly, and the crew ceased to be able to control the helicopter's behaviour. The contact of the helicopter with the tops of trees occurred at a height of 20 m. The helicopter's hull slid down the tree stack into the cockpit of the pilots after tilting to the right. The fuel tanks became unsealed, but there was no fire. The passenger cabin has been crushed and deformed. The crew members and passengers suffered serious injuries, but they were not life threatening.

Causes of the event

According to the findings of the commission, the cause of the aviation incident was the automatic shutdown of engines due to icing in the engine inlets, caused by the crew not turning on the anti-icing installation to the "manual" working area before entering the clouds when the temperature was 5^0C and lower. The occurrence of the event, in the opinion of the commission, was also influenced by the too short period of rest and improper organisation of the crew's work, as well as the incomplete assessment by the crew of the atmospheric conditions for the implementation of the task. The commission classified the event in the "improper operation, improper technical service" causation group. However, it did not formulate conclusions and recommendations regarding changes to the normative documents.

Changes in the content of normative documents

The analysis of the content of normative documents concerning the security of transport of the most important people in the country by military aircraft that was carried out in the article entitled *Solutions ensuring safety during transport of state VIPS by military aircraft* (Part 3) allowed it to be established that as a result of the air accident of 04.12.2003, irregularities in the content of the indicated normative documents were identified and changes were introduced. The new normative document: *Safety instructions and flight instructions for aircraft marked with an important symbol for the territory of the Republic of Poland. Provisional*[16] determines that the crew commander must not take off or land when there is a landing or take-off area with atmospheric conditions below the minimum specified for the type of aircraft, airport or held privileges. It was pointed out that the senior duty operative of the Air Operations Centre is responsible for supervising the transport of the most important people in the country by military aircraft, whose duties also include providing the commander with information on forecasting dangerous weather

16 Military Historical Bureau, reference number WLOP 341/2004.

events not included in the meteorological communication. It was pointed out that for each transport marked with the "important" signal, two aircraft were specified: the main and spare one. The crew commander was obliged to submit a report to the squadron commander if the forecasted meteorological conditions made it impossible to perform the task. Although the improper personality traits of the crew and the incomplete mastery of emergency procedures certainly contributed to the aviation incident, the normative documents did not introduce any regulations concerning this issue.

The Tupolew Tu-154M airplane crash

The causes of the plane crash of 10.04.2010 were determined independently by two commissions: the Interstate Aviation Committee of the Commonwealth of Independent States[17] and the Flight Safety Committee appointed by the Inspectorate of the Ministry of National Defense. The course of the event presented below was described based on the protocol of the Commission of the State Aviation Investigation[18].

The course of the event

The order for the transport of the President of the Republic of Poland on the Warsaw–Smolensk–Warsaw route came to the 36rd special regiment of transport aviation on 03.03.2010. The start was scheduled for 7.00 am on 10.04.2010. On 09.04.2010, the commander of the regiment appointed the pilot who was a first class military pilot with the right to perform flights as the commander for the implementation of the transport and , as the commander of the Tu-154M plane during the day and at night under the minimum weather conditions and with a total number of 3532 hours, including 492 hours on the Tu-154M plane. As the commission had already determined, the designated pilot did not have valid privileges to perform flights as a crew commander on the Tu-154M plane. The second pilot assigned to the crew had first class military pilot[19] permission to fly as a second pilot on the Tu-154M airplane during the day and night and a total number of 1909 hours, including 193 hours as the second pilot on the Tu-154M plane. According to the findings of the commission,

17 *Final report from the aviation incident investigation Tu-154M side number 101 of the Republic of Poland,* https://doc.rmf.pl/rmf_fm/store/Tlumaczenie-finalne-projektu-raportu-koncowego.pdf (21.10.2018).

18 *Final report of the State Aviation Aircraft Accident Investigation Commission from the aviation incident investigation no. 192/2010/11 of the Tu-154M aircraft no. 101 that took place on 10.04.2010 in the region of Northern Smolensk airport,* https://www.rp.pl/artykul/694379-raport-komisji-Millera-Katastrofa-smolenska.html (22.07.2018).

19 For the Jak-40 airplanes.

the designated pilot did not have valid privileges to perform flights as a second pilot of the crew of the Tu-154M plane. The commission stated that none of the crew members had the authority to conduct radio correspondence in Russian. The transport was to be carried out on a Tu-154M plane no. 101 manufactured in 1990, which so far had flown over 5142 hours and made 3907 landings. On 07.01.2010, the plane was verified for performing flights with the HEAD status. On 06.04.2010, its commission flight was performed stating that the aircraft was prepared to perform a flight with the HEAD status. The Commission found that the crew had prepared for the flight in the individual mode, while the deputy commander of the 36th special air force during a meeting with the crew immediately before departure received assurance of its preparation for the flight. During the preparation, the crew did not have access to the current documentation of the Smolensk airport. The crew also did not get acquainted with the weather forecast for the flight prepared by the senior synoptic of the Centre of Hydrometeorology of the Polish Armed Forces. The plane took off at 7.27 am. When flying in the air space of Belarus at 8.14 am, the crew of the aircraft received information from the controller at Minsk about the current visibility at the Smolensk airport of 400 m. After establishing communication at 8.24 am with the flight manager at the Smolensk airport, the crew received further information about visibility at the airport of 400 m. However, the crew commander asked for permission for a test approach and received it. The plane decreased to an altitude of 500 m and entered the above-airport area. During the approach to the fourth turn, the flight manager provided the crew with information for them to be prepared for the departure to the second circle from an altitude of 100 m. When the aircraft was at a distance of about 10 km from the runway threshold, the landing zone manager told the crew that the aircraft was entering the descent route. The aircraft made a flight with a slight elevation, reaching a height of 130 m above the descent path and being 65 m from the left side from the runway axis. The aircraft began its final descent about 1 km ahead of the next radio beacon. The flight over the radio beacon occurred at an altitude of 426 m above the airport level. 12 seconds after the flight over the radio beacon, the TAWS system[20] generated signalling about the possibility of the plane colliding with the surface of the earth. A moment later, the aircraft commander switched his altimeter to standard pressure (1013 hPa), which caused the TAWS to introduce the wrong altitude of the aircraft flight; therefore, TAWS stopped warning the crew about the possibility of the aircraft colliding with the surface of the ground. At a distance of 3 km from the threshold of the runway, at an altitude of about 180 m above the airport level, the TAWS system again started generating warning signs. The flight of the aircraft on the descent path was performed at a progressive speed of about 310 km/h and a descent speed of about 8 m/s (the forward speed should be 280 km/h and the dropping speed 3.5 m/s). At 8.40.52 am, when the plane was at an

20 Terrain Awareness and Warning System. The task of the system is to warn the crew of the possibility of an unintentional collision with the surface of the earth, in case the pilot is unaware of the danger, until it is too late to avoid collision.

altitude of 91 m above the ground, about 1.7 km from the threshold of the runway, the crew commander issued the command: "we are leaving for the second descent". The second pilot confirmed the command of the crew commander. At 8.40.54 am, at an altitude of 66 m above the ground, there was a signal to confirm reaching the dangerous altitude set at the radio altimeter. A second later, the landing zone manager gave the flight crew a command to move to a horizontal flight, the plane was 70 m below the descent path and 70 m to the left of the runway centre line. At that time, the crew commander began a manoeuvre to depart to the second circle. Due to inertia, the plane continued to decrease its altitude. At 8.41.00 am, at a distance of 1099 m and 5 m below the level of the runway, the plane made its first contact with a terrain obstacle. The plane began to rise slowly and due to the shape of the terrain, its altitude above the ground decreased to 4 m. At 8.41.03 am at an altitude of 1 m above the airport level, at a distance of 855 m from the threshold of the runway, the plane's left wing collided with a birch tree with a trunk diameter of 30–40 cm, resulting in the loss of about 1/3 of the length of the left wing and the entry of the plane into uncontrolled rotation to the left. The collision of the plane with the ground took place in an inverted position. As a result of the collision, the plane was completely destroyed and all people on board were killed.

Causes of the event

According to the findings of the commission, the cause of the catastrophe was the descent below the minimum descent altitude, with excessive falling speed, in atmospheric conditions that prevented visual contact with the ground and the delayed start of the procedure of moving to the other circle. In the commissions opinion, the occurrence of the catastrophe was affected by: the crew's uncontrolled altitude by means of a barometric altimeter during a non-precision approach, no response to warnings about the plane approaching the ground generated by TAWS, an attempt to move to the second circle using the autopilot's working scope "automatic departure" and the crew being provided with incorrect information by the landing zone manager about the correct location of the plane in relation to the threshold of the runway, descent path and the course. The occurrence of the catastrophe was also caused by the incorrect flight training of the crews on the Tu-154M aircraft in the 36th special regiment of transport aviation. Because of the multithreading of causes that contributed to the Tu-154M plane crash, the commission failed to classify the event to one selected causative group. However, it formulated conclusions and recommendations regarding changes in the content of normative documents.

Changes in the content of normative documents

The analyses of the content of normative documents regulating the security of transport of the most important people in the country by military aircraft carried out in the article *Solutions ensuring safety during transport of state VIPS by military aircraft* (part 3) allowed it to be established that as a result of the air accident of 10.04.2010, irregularities in the content of the indicated normative documents were identified and changes were introduced. The new normative document: *Instruction for the organisation of flights marked with the HEAD status in the aviation of the Armed Forces of the Republic of Poland*[21] determines that its provisions apply to all entities taking part in the organisation of flights of aircraft with the HEAD status. It was determined that the flight implementer coordinates the airports/spare airports with the person organising the flight taking into account the safety of the performed flight operations. It was pointed out that regardless of the conditions of the flight (including financial constraints or political needs), the most important thing is always maintaining its safety. It was indicated that the Head of the Hydrometeorological Service of the Polish Armed Forces is responsible for the acquisition of necessary data and the development of the meteorological message for the flight marked with the HEAD status. Requirements for the necessary flight experience of crews entitled to perform operations with the HEAD status were indicated. It was determined that access to the pilots' cabin should be limited only to crew members and deck chief, and its doors should remain closed during the entire flight. The crew commander was obliged to periodically submit reports on the flight to the Air Operations Centre. The possibility of not assigning a space aircraft was sanctioned. A 72-hour validity period of a commission flight was determined allowing an aircraft for a flight with the HEAD status. More than one of the most important people in the state being on board an aircraft at the same time was also forbidden. The rules for the selection of landing areas and other places for take-offs and landings were normalised, if the place of transport indicated by the flight organiser is not an active airport or a landing site described in AIP (of a given country). Although the inadequate personality traits of the crew in the normative documents certainly contributed to the occurrence of the aviation incident, no regulations concerning this issue were introduced.

Summary

The conducted theoretical research allowed the discovery of irregularities in the content of normative documents regulating the transport of the most important people in the country by military aircraft that contributed to the occurrence of aviation events during such transports in Poland after World War II, positive verification of

21 Military Historical Bureau, reference number WLOP 454/2012.

the hypothesis, and thus solving the research problem and achieving the purpose of research.

To generalise, it can be concluded that the occurrence of previous aviation incidents during the transport of the most important people in the country by military aircraft was related to, among other things, irregularities in the content of normative documents regarding: the necessary experience of crew members; proper selection of the crew and its compatibility; planning the flight and the preparation of the crew for the flight; preparation, equipment and technical condition of the aircraft as well as atmospheric conditions and their analysis. The crews involved in all aviation incidents during such transports either had too little overall coverage, or training deficiencies, or failed to properly assess the aircraft performance or had poor knowledge of the operation of the airplane systems, or had no knowledge of the pilot characteristics of the aircraft that were in the possession of other users. Members of the crews assigned to carry out these transports had personality traits that resulted in transport at any cost, or were prone to disregard the provisions and orders of their superiors, or focused too much on one aspect of the task, or presented a passive attitude, not drawing the attention of other crew members to the security rules they breached. The demand for transport was submitted in a way "forcing" its implementation, or the deadlines for submitting such orders were violated, or the crew prepared themselves to conduct the transports in a manner not guaranteeing the safe performance of the task or had outdated and incomplete documents concerning the destination airports during the preparation. The regulations of normative documents in the scope of equipment of the aircraft used for such transport were incorrect. They did not specify all the necessary requirements to be met by an aircraft carrying the most important people in the state. Aircraft used for the transport of the most important people in the state did not have proper construction solutions (e.g. two power units). In the regulations of normative documents in the scope of determining atmospheric conditions and their analysis before the flight, there were changes in the functional level responsible for preparing weather forecasts necessary both to make a decision on carrying out the transport and to carry out the transport of the most important people in the state. The crews did not have the weather forecasts necessary to make a decision to carry out such a transport or information about the actual weather conditions was passed late or it was processed by the functional level authorised to do so, or did not contain warnings about the possibility of dangerous weather phenomena, or the crews did not familiarise themselves with weather forecasts or conducted their analysis too briefly. So, in order to ensure safety, the occurrences of aviation events during the transportation of such important people were followed by changes in the related formal documents.

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