

TRANSLATOR'S NOTE: The Miller Commission's deliberations heard in this recording took place prior to the July 2011 public release of the official **Miller's Report** on the cause of the 2010 crash of Tu-154 M in Smolensk, Russia, by the Donald Tusk government. This 2011 Miller's Report has since been declared invalid.

- **TRANSCRIPT** -

- I'll offer a brief commentary concerning the point about the geometry of the aircraft's collision. What we have here is a situation, whereby there was not a single collision, but there was a chain, a sequence of collisions. We know that after colliding with the first birch tree, the airplane was then colliding with other clumps of bushes, and trees, before it impacted the ground.
- We chose the three most characteristic ... points of contact, because we didn't even call this a collision. Because, it was a contact with this first tree. We know what we are talking about. This is the birch tree located near the closest landing radio beacon. It [the aircraft] cut off the tip of the tree, most likely without sustaining any serious damage. This was the first ... This was the first contact with a ground obstacle. At this moment the aircraft had the following flight parameters:
 - Angle of Attack;
 - Pitch Angle;
 - Roll Angle;
 - And, the Altitude above the ground.
- Then, after flying for approximately 200 meters, at an altitude of several meters over grassy area, the aircraft collided with other trees, breaking their boughs and branches. Then, at the distance of 853 meters from the runway threshold, and 63 meters to the left from its axis, the aircraft's left wing collided with a birch tree that had a diameter of approximately 30 or 40 centimeters. At this moment, the aircraft had the following flight parameters:
 - Angle of Attack ...
- However, these [ground] obstacles will, of course, appear once again on the reconstructed crash site ... In this Annex. That is, in the Sub-Annex.

- Aside from this, I would also like to add, that a landing approach profile is being developed.
- What is present in these characteristic [flight parameter] points, will all be illustrated, and will be a result of this ... and will be shown in this [reconstruction] profile.
- As a result of this collision ... We are talking about a collision with this thick tree ... As a result of this collision, the aircraft lost the tip of the left wing, measuring 6.1 meters, along with an aileron, and two ... two slat sections ...
- This initiated a roll-about longitudinal axis of the fuselage to the left. After flying for approximately 320 meters, the aircraft collided with the ground in the following configuration:
 - Pitch Angle, 6 degrees;
 - Roll Angle, minus 150 degrees;
 - Deviation Angle from the runway threshold, 24 degrees.
- The next point, concerning the technical analysis, states:
- Diagram of the Crash Site
- The place of the aircraft's impact was located around 500 meters from the runway threshold, and 100 meters to the left of its axis. It was a muddy, wet terrain, with tree vegetation, which contributed to the dampening and absorption of the impact energy. The aircraft collided with the ground at a shallow angle, and with the [descent] speed comparable to a normal landing approach speed.
- The main parts of the wreckage were scattered in the area of an approximate length of 140 meters, and approximately 80 meters in width, which for the aircraft measuring 48 meters in length, and having a wingspan of 34 meters, is a small area.
- Taking under consideration an insignificant scattering of debris ... Here we have this very summary ...
- Taking into consideration an insignificant scattering of debris, lack of explosion during the collision, and the fact that the on-board devices - which were not

specifically designed to survive an air crash - survived it, in such a condition, that data reading from these devices was possible - we can state that this was a low-energy event.

- I have a suggestion here ... so, that in this paragraph - mentioning the low-energy event - let us try to add the average acceleration [value(s)] ... That is, in this instance, the deceleration, or a negative acceleration, and to estimate the maximum [deceleration speed], because that shows if there was either an 8 "G", or 15 ["G"] ... because ...
- As far as the maximum [deceleration speed] is concerned, we can ... let us say ... show relatively ...
- No! Easy! Not so fast with this..! There are seats there! There were seats there! These seats were ripped out - it all flew [blew] out uniformly.
- According to the prescribed regulations at a time, the seat fasteners were to withstand ... How much..? 9 "G" ... It is as clear as day here that this was greater than 9 "G". Otherwise, they [the seats] would have remained fastened in place. These days it is more [than 9 "G"], according to new regulations.
- But, these [regulations] were then, and they [the fasteners] did not withstand it ... So, there is some kind of reference point. At some future time we can come back to it, and point it out, when we are describing the very remains of these seats. Well ...
- For this reason we thought it was important, that an average Joe [on board] was not likely to have survived. Had the seats withstood an 8-and-a-half "G", then he would probably have a problem with surviving the 8 "G" ... At least, he would have health problems after something like this ...
- (Jerzy Miller): Let us not exaggerate - when it comes to the 9 "G" or 8 "G" - because, during an [acceleration] impulse, one can survive even 24 ["G"]. However, there is a different problem here. I think that our colleagues from the medical subcommittee, who are not here, can write it for us, because there are manuals for this ...

- These describe what kind of injuries an individual can sustain, based on different acceleration [forces]. If someone wants it ... to see such a manual, I'll let you have it. Depending if there are ... For example, let us say, it shows torn out teeth, or these kinds of things ... These are the described acceleration intervals. Based on this, we can make our calculations.
- Anyway, the subcommittee ... We were under the impression that rather than to make up imprecise, or very imprecise calculations, the issue of these seats gives us good understanding about what was happening ... What was happening onboard ...
- (Jerzy Miller): Yes, but ... Mr. Stanislaw ... let us put this to rest. The 9 "G" versus 100 "G" makes for a "subtle" difference. According to the Russians, there was probably more than 100 "G". Right? The fact that these seats were wrenched at 9 "G" ... So be it ...
- So, we will ... that is, we as a Commission will ... gather information from various subcommittees. Here, the technical subcommittee, as a certainty, can provide information about these seats ... and ... and ... the force estimate ... the force estimate ... at which these fasteners let go.
- Are we sure that it also applies to the flight in an inverted position? Let us leave it here, because this is what the medical subcommittee always does. Since, they always base their findings on that type of analysis, we are going to copy and paste their findings here.
- (Jerzy Miler): I have a question concerning this, because this was a low-energy event. How are we to understand it? These 70,000 plus kilograms multiplied, times V-Square ... That is, the meters per second do not add up to some sort of low-energy event at all! How is it to be understood, so that some "Curious George" is not going to poke through this statement? Is this a definition of a low-energy event here ...
- The air crash investigation manuals, and training courses, teach us that there are various types of impacts. These events are roughly divided into "low angle - low speed", "low angle - high-speed", "high-angle, low speed", "high-angle, high-speed". Then, depending on the angle, the

speed, and then taking into consideration the type of the impact surface, we have either "low-energy" or "high-energy" events. If this aircraft - that can travel 900km per hour - collided with the ground under a 90 degree angle, and the impact surface was hard rather than soft ... let us say, a mountain, we would have a high-energy event. We would have a completely different crash scene, a different debris dispersion, and their different position ...

- The literature deals with this ...
- For an aircraft like this, this is really relatively slow speed - considering what this machine [TU-154M] is capable of. What does a high-energy impact of a large aircraft looks like? It was nicely shown in the photographs from the crashes that took place in Iran. It is a mountainous, hard-surfaced area. A large and well-built aircraft crashes, leaving a crater. The crater was so large that you could hide a building inside of it.
- Half-jokingly, half seriously - in response to this low-energy [conclusion] ... [Tomasz] Hybki, the self-proclaimed crash expert, will tell us immediately that in the course of a low-energy crash, someone could have survived ... and the gun shots that are heard meant that people were being shot dead. To rule out such a situation, like Hybki's theories about people being shot, because this was a "low-energy" event ...
- One of our first discussions, after returning from Smolensk, concerned the lack of fires [at the crash site] - because there should have been fires there ... This precisely is our explanation ... Why did the TAWS and FMS survive ... How could so many navigation instruments have been read ... How did this Commission obtain so much information ... We as a Commission, its Technical Sub-Committee - and this Commission in general - have a particularly great amount of information at our disposal to investigate this event. It is rare for an aircraft to be equipped with so many recorders. It is rare for such devices as TAWS or FMS to survive. It is unusual for such devices as RME, radio-compass, and altimeters, to survive, or to be very precisely set ... to be read ... to show their settings...
- This does not change the fact that large quantities of fuel were pouring from the wing-tanks, when they were being lifted up [at the crash site] ... You could see it ...

- I am saying this so that conspiracy theories do not surface immediately - in the context of this low-energy impact ...
- I don't want to keep on defending this low-energy impact [phrase] at all cost, but to emphasize that everything that we are writing, we are writing, in essence, for the experts, right? However, I think that a summary will be made out of this, and it will be translated into a more digestible language, which will show up in the report.
- Mr. Minister, there was indeed a discussion at the beginning stage of writing this text, whether we are writing it for experts, or for non-experts. This means, in some way, that it is, more or less, a compendium, or an excerpt from a manual, or manuals ... If this text does not go beyond a circle of experts, then the low-energy impact phrase is taken care of. Because, everyone is going to think, "damn it", there was an abundance of recorders on board, that were in no way protected against the impact, that [mysteriously] survived, and now they all sing and spew the data. However, if you anticipate that this text will be read by ordinary people, who are not particularly well prepared to receive it, then indeed, I agree - in particular places, as you gentlemen said - we should sneak in some definitions, or short description(s). We do not have a good sense for this though ...
- (Jerzy Miller): Ladies and gentlemen, the report will be released to the general public. However, the initial [perception] at that moment will be... What will happen in three months? I don't know. In six months? I don't know. In three years? I don't know. In ten years? If Sikorski will be subjected to [an investigation] ... for the third time ... No one knows what kind of IPN¹ will exist then, what they will be looking into in 10 years, and how they will interpret this.
- For this reason, regardless of the circumstances, I do not believe this can be buried forever in some sort of safe, and be kept under lock and key for 50 years ... as it is done in many countries. Because of this, we should assume that this will reach an unprepared reader, and that it will happen sooner than we think.

¹ *Instytut Pamięci Narodowej* - Eng. Institute of National Remembrance - responsible for investigating crimes against the Polish nation]

- Ladies and gentlemen, in Poland the law is clear that it is illegal to reveal information in the possession of the Prosecutors' Office. But, no-one respects this ... and one who knows that the recipient breaks the law, does not have to hold the recipient accountable for breaking this law.
- Now, I feel I have your go-ahead.
- Ok. Let us do it in a way that we will leave the low-energy impact phrase out, and we will describe what this ...
- We will describe what this is all about ...
- An analysis of the actions carried out by the entire crew will be later outlined by Colonel Troszczynski. For the time being, I will concentrate on the injuries sustained by both pilots, which I was able to complete [thus far] ...
- As a result of the inspection ... here, in parenthesis ... of the "Remains 5C, Number 1" ... this is where they were found, and the court-directed medical examination provided by "Expert Number 22," ...
- ... The injuries of the face and of the cranial and cerebral skull [structures] give rise to suggest that they resulted under conditions typical of a collision of an air vessel with the ground, with the following ... an impact against the protruding elements of the cockpit interior.
- While analyzing the character of the head, chest, and spine injuries sustained by the crew members, we can surmise that, for a brief moment, they were subjected to the deceleration impact force above 100 "G". This resulted in the typical types of primary injuries, that allow us to reconstruct the crew position [in the cockpit], and their activities at the time of the aircraft's collision with the ground.
- The extensive bodily injuries discovered as a result of the visual inspection, and forensic autopsies, were a consequence of very similar temporal injuries, or simultaneous injury, which worked with great force in a very short period of time before death.
- The nature of the above injuries allows only to provide group characteristics - and types of objects that caused

the above injuries - as an extensive group of hard and blunt objects.

- Individual characteristics ... this is implied ... of these objects, were not associated with the injuries sustained.
- The means by which these injuries were caused is, in itself, a combination of impact, shock, and friction. That is ... the indicated injuries could be caused by an aviation event ... an air incident on board an aircraft during its collision with the ground, with the following destruction of its structure ...
- The appearance of damaged tissues, the presence, in their light, of extensive blood hemorrhages with a homogeneous morphological character, credibly testifies to the unconditional arising of all injuries while still alive, and that all injuries arose in almost a singular moment, immediately before the death of the victim.
- This excludes the possibility of the victim performing any ... any ... any kind of active, independent activities after sustaining injuries.
- Another question arises here ... about the credibility of these ... these results. Should we address the credibility of these results?
- Do we have any other options?
- We do. We can say that none of this looks credible, and ... and ... that we are of a different opinion. If we have a different opinion, of course ...
- After what these injuries looked like ...
- [A brief unintelligible fragment]
- In response to the MAK [Report], I ... I am sorry that you overlooked it in some way, Mr. Director ... but ... I described in detail, that ... it is consistent with the existing [version] ... existing knowledge of forensic medicine and aviation medicine. I ... simply treat it based on the available documentation. I could, just as well, investigate the accident of Daedalus and Icarus ... and based on the

available documentation, I would write exactly the same thing.

- (Jerzy Miller): Since there are no more questions ... Go ahead please ...
- Doctor, what you presented here is indeed compatible with both readings ... the readings of the flight parameters' recorder, the mechanics of the flight ... that this aircraft indeed, inverted at the last moment ... and ... just as my dear colleagues prepared a description and analysis of the condition of the remains, then indeed, this ... this ... nose of this aircraft, the cockpit, had in fact, ceased to exist. Therefore, when I ... when I listen to this ... then this ... all of this falls into place.
- (Jerzy Miller): I understood the reason for this question. And how will we defend ourselves against questions that are unfavorable to this commission? [For example:] "How do you know all of this?" I understood this as follows: first of all, the mechanics ... not the mechanics, itself ... but the dynamics of what took place, beginning with the collision of the wing with the [birch] trunk, until the deceleration at the place where the fuselage found itself ... suggest that these overload forces caused the kinds of injuries among the crew members, [which are similar to] those revealed by the autopsies. Therefore, this is explainable based on the laws of physics, and understanding of ... I don't know ... the anatomy, or something else.
- Yes. The forensic medicine ... in particular, this is cited in the MAK Report. I didn't want all of these ... I can also present this in tables, showing how many "Gs" will be at work, and what injuries they will cause.
- (Jerzy Miller): I am not going in this direction. I am only saying that this description, which results from Russian documentation, is not a description which would be unlikely from the point of view of the analysis of an aviation event. For this reason, it does not undermine our trust, as it is highly probable that this is what happened. Right? Therefore, anyone who would like to undermine this, would have to make a concerted effort to prove that a person subjected to 100 "G", should have injuries that allow survival.

- (Jerzy Miller continues ...): Otherwise, if we get ourselves into such a polemic - and not a single Pole was present during the autopsies - then we are doomed by default ... that the Committee will find out, that it is on a Russian leash, and for that reason "all that they said isn't worth anything, because it is based on the document sources that are not credible".
- (Jerzy Miller continues ...): As I am listening to this, I'd rather see the following kind of analysis: All that took place during the last phase of the flight exerted such [large] overload forces on the bodies [of the crew], that no one in the cockpit had a chance to survive ... and ... the event ... and the description from the histopathological, and other, studies only confirms that what had happened is ... what results from this description is not only the result of the [event] mechanics, but also a result of the analysis provided by the physicians who carried out this analysis of the bodies. Right?
- Mr. Minister, I think that as far as the court-directed forensic investigation ... carried out by the experts, is concerned ... in essence, enumerating these speeds alone ... here we can also ask for help from the colleagues in the Engineering Commission ... we will be able to prove it ... at what speed it decelerated, what the direction of the impact was ... the angle, et cetera ... that these were large overload forces. Just like Colonel Truszczynski suggested, I suspect that we can expect to get worse questions concerning the credibility of additional types of analysis, like: chemical, biochemical, et cetera.
- (Jerzy Miller): My question is different ...
- We are likely to defend ourselves on this one, as far as the injuries are concerned, I think.
- (Jerzy Miller): From the viewpoint of the medical knowledge ... What happens to the human body when it is subjected to the force of 100 "G"? Well ...? For this reason, I don't expect from you gentlemen to carry out an analysis, or to give us a lecture, whether it was for sure a 100, or 150, or 80 ["G"] ... since this is part of a different Annex. Here, we are dealing with medical conclusions; that in the case of such an event, when we have such and such deceleration [forces], what remains from the body that is

well fastened [by a seatbelt], is what the Russian medical experts suggested.

- Simply put, I don't see any problem with providing - in the Sub-Attachment - a detailed explanation of what such injuries look like, and how it is calculated ... Basically, I have this ready from my everyday practice. After Mr. Chairman [Jerzy Miller] specifies whether this should be 5 or 50 pages, I can ...
- (Jerzy Miller): As long as you don't require us ...
- I won't require you to read it ...
- (Jerzy Miller): ... then the number of pages is unimportant; as long as it is understood by an ordinary reader.
- This I can't guarantee, Mr. Minister. [laughter in the audience]
- (Jerzy Miller): Go ahead please ...
- I have a question. Must we make a reference to the MAK Report? Isn't what was being said, sufficient enough; an analysis of the air-vessel destruction characteristics, and [descriptions of] the injuries found during autopsies which we received via the Prosecutor's Office? Correct?
- It means that the MAK Report will be among 10 different sources cited. Therefore, I could ... I can omit it ... if the distinguished Commission so desires. Because ... because, first of all, these other materials ... while writing my publications I always cite all that I find. If not, I can omit it due to the fact that the available materials allow us to reach the same conclusions.
- (Jerzy Miller): Should I understand that among the available source materials is an autopsy; that the MAK also used this autopsy, and that we are also using this autopsy?
- Yes.
- (Jerzy Miller): For this reason, if I am to make a choice of either referring to the primary, or to the secondary source materials, then I prefer the primary sources.

- Good.
- I have a question concerning this particular value of more than 100 "G". Because, while discussing the Technical Annex, we spoke about the forces at play during this crash. This will be specified in the Medial Annex, because we didn't calculate the forces affecting the airframe. Is this 100 "G" derived from the [types] of injuries, or was it assumed because of the MAK Report? Because, based on the Technical Annex, and our calculations, our findings show that this collision was a low-energy event. The speed at which this plane collided with the ground, was approximately the same as the speed of the plane landing during normal landing. The area was boggy, swampy, and even [the type of] damage and the size of the debris dispersion would indicate, that this collision, as for a plane crash, had a low-energy character. Will we not be accused here, that one description results in a low-energy event, and the other shows 100 "G"?
- It means ... as I said, I will cite [materials] available from the forensic medicine, aviation medicine, and accident medicine sources; research where it is tabularly, and in general terms, described after ... one may say ... after determination of the types of injuries. We can also calculate it, but all indications are that ...
- I am referring to that value of over 100 "G", because I suspect ...
- (Jerzy Miller): May I ask for the speed of the aircraft at the time of the collision with the tree?
- Approximately ...
- It was 270 ... 270 kilometers per hour, and the collision with the ground was at about 260 kilometers per hour.
- (Jerzy Miller): Good. And where did it [the aircraft] come to a halt? 80 meters ... I'll calculate this acceleration momentarily.
- I'll say one thing ... Based on the determined types of injuries, the bodies were subjected to the overload force of - when we are analyzing the bodies of the passengers, and so on - from 100 ["G"] to 350 "G". Because, there was

also complete fragmentation of the bodies ... depending on how the airframe is being destroyed, at which moment, and with which part it collides, it results in the relevant acceleration [forces] ... Depending on ... Let us assume ... If a human body was near the wall ... whether it decelerated in the cockpit, flew, and then decelerated after impacting with the seats, and so on ... This is what the injuries themselves tell us. We will not calculate these forces for everyone [onboard]. It would be the easiest, and quickest, for the cockpit.

- (Jerzy Miller): If I may, Bogus, I have one question... Because, you are describing ... There is this detailed description of the crew, these injuries, and then there is an analogy made to all passengers ... Do you have the analysis results for all the passengers? I did not mean in the Annex. In general. Don't look at that. Have you, in general, seen the results of the autopsies on all the passengers? Can we say, that in the case of the least-affected body, we can also determine that as a result of this collision this person died at the scene instantaneously? Because, I suspect that these questions will, specifically, concern various individuals, and ...
- I reviewed most of the autopsy results, at least their conclusions. Unfortunately, not all of them are yet available, and not all of them are yet translated.
- (Jerzy Miller): Therefore, ladies and gentlemen, if I am not mistaken, if this [plane] was uniformly coming to a stop in a span of 80 meters, this would translate into 1 "G".
- [Unintelligible comments]
- Wait a minute. Wait a minute. If ... ladies and gentlemen ... If it was flying at 260 kilometers per hour, then in meters per second, it is ... 80 ...
- [Unintelligible comments]
- Excuse me ... Yes. Yes. Therefore, it is ...
- One "G" is ... is ...
- (Jerzy Miller): Eight divided by nine is ... 8 "G"

- [Unintelligible comments]
- 80 meters per second, square ... and the "G" is 9.
- [Unintelligible comments]
- Yes. Yes ... So, you have to divide it by 10. Because, 1 "G" is 9.81.
- [Unintelligible comments]
- No! 80 meters per second, square ... I agree with that. But, because 1 "G" equals 9.81, then, unfortunately, it is only 10 "G" - and not 100 ["G"].
- Earlier, it flew ...
- (Jerzy Miller): No, ladies and gentlemen ... Yes, go ahead please ...
- I asked a question about this 100 "G" here, because we could, as a Commission, be asked these kinds of questions. Because ... I once again repeat, that based on our calculations, that is ... from the damage [assessment] it appears, that perhaps these overloads were not so large, and the main factor that led to such injuries, and such destructions of the airframe, was the inverted position of the aircraft.
- And the fact, that the heaviest element, the center-wing with the chassis and fuel, has traveled, as if it were a paver, over this structurally weak part of the hull.
- Is it not the case that these injuries would indicate that they would not be due to overloads, but to the damage resulting from their contact with the airframe?
- No, because while some of the corpses were not dismembered, their brain material was forcefully extruded [through the head orifices: eyes, nose, ears and mouth] and their intestines were extravasated [blown out] in their entirety.
- (Jerzy Miller): Go ahead please ...

- Besides ... This plane, or wreckage, at the final stage ... at least at the beginning of the final phase, did not behave like a stone, because engine number 2 was still finishing its work, and it was still pushing it forward a little bit. Therefore, it seems to me that this is a serious oversimplification, and in fact, it cannot be so easily calculated.
- (Jerzy Miller): Well ... So, briefly speaking, we have to figure out this 100 "G", because it is not impossible. But, at least we have to build ourselves a kinematic model here, which will be close to the 100 "G". Otherwise, we cannot risk making such a statement.
- In this context, I think that this "low-energy" event statement - in the Technical Annex - is still very dangerous. While it basically doesn't add anything, it can lead to questions ...
- Let me make a comment here. While we withdrew this "low-energy" aspect, we have to explain the lack of explosion, the lack of fire, and ... and this small dispersion ...
- (Jerzy Miller): Ok, then I'll brutally ask you: at how many "G's" will it take to make the bodies look like this? Is the 100 "G" really an important demarcation point here?
- It means that ... I worked it out on the basis of ... unfortunately ... I will give you a brief history of the aviation medicine research done by the German aviation physicians at the Dachau Concentration Camp. [They] precisely describe specific injuries and their corresponding overload forces. Using a comparison, as I did not precisely calculate the overload forces at the time [of the crash] ... based on the type of sustained injuries ... However, all manuals and handbooks for air crash investigations are based on this ... Simply ... If this doesn't work, we can write [something else] ... so we don't have to prove anything ... we can write that a majority [of victims were subjected to 100 "G"], but I can assure you that some [of the victims] were subjected to 300 "Gs".
- (Jerzy Miller): So, based on the types of injuries we can deduce that the overload forces were on the order of 300 "G"? Correct?

- Precisely! An impact, and a secondary displacement [of the body/bodies] are two completely different things ...
- (Jerzy Miller): Well, I have a request for a genuine and serious analysis of this 100 "G" hypothesis, because this could be a weak link in our external discussions. Seemingly, this is only a detail, but we can be tripped up over this one.
- I do not insist.
- (Jerzy Miller): I am not expressing my doubts towards you Sir, but rather towards those of us who are part of the technical group. Because, the assumption that it [the plane] evenly decreases its speed over a distance of 80 meters, is certainly not true. It is not a true assumption. Hence, we can look for a different explanation here.
- For example, if the type of ground surface [at the crash site] was different, or a banking turn had, for sure, caused it [the plane] not to have this trajectory. But, this requires us to be prepared for questions. I would not suggest changing this 100 "G" here. Rather, let us think again about this part of the narrative, and come back with either a "yea" or "nay" to have this specific [100 "G"] value included, or removed. Can we adjourn our discussion on this subject for today?

- END OF TRANSCRIPT -

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