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## **NOTE TO THE ATTENTION OF THE MANAGEMENT BOARD MEMBERS**

**Subject: EASA volcanic ash action plan update**

During the June 2010 Management Board meeting was presented the Agency action plan related to volcanic ash. It received the support of the Board.

This action plan is 4 fold:

- 1) Enhance communication with all the actors;
- 2) Organise research institutes, Met offices and other equipped a/c owners coordination in flight testing;
- 3) Continue discussion with the operators to improve the Agency SIB;
- 4) Propose an engine ground test plan to study the effect of ash on engines and identify engine limits.

This note aims to give an update to the Management Board Members on the plan in general but will describe in more details the point 4 which relates to airworthiness of which the Agency is directly responsible.

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### **1) Communications with all stakeholders**

The Agency has organised or taken part in a series of meetings, workshops and teleconferences with various stakeholders.

- a) Meeting with operators on 3<sup>rd</sup> June 2010
- b) Meeting with industry and authorities on 8<sup>th</sup> June 2010
- b) Workshop with organisations having in flight measurement capabilities on 21<sup>st</sup> June 2010

- c) Teleconferences with industry and authorities on 1<sup>st</sup> and 15<sup>th</sup> July 2010
- d) Meetings of the European Aviation Crisis Coordination Cell
- e) Meetings organised by ICAO in Paris

Over the period, the Agency has developed strong communication links with the European Commission, especially in view of the Council of Transport Ministers of 24<sup>th</sup> of June, and with Eurocontrol.

## **2) Improvement of atmospheric ash concentration knowledge and modelling**

On 21<sup>st</sup> of June a workshop was held in Cologne with the aim of bringing all the European expertise in the field of volcanic ash cloud measurement and modelling together. The intention was that the 'EU measurement community' find short, medium and long term solutions to improve the volcanic ash dispersion modelling output.

The Agency and European Commission reiterated the necessity of working together and requested the research community for a structured approach to find the solutions and 'quick wins'.

Airborne, ground and space based existing and future technologies were presented. All stakeholders recognised the need for an improved architecture of data exchange. The need for standardisation of measuring equipment was concluded to be of high importance, as well as the exchange and assimilation of data.

In general it was concluded that atmospheric models were quite accurate under the given conditions at the time of the Icelandic eruption. But it is obvious that the accuracy of the inputs drives the corresponding accuracy of the output. Most significant is the information at the source, the density, intensity and characteristic of the cloud above the volcano. Clearly improvement in this area is possible and necessary. Further development of airborne, ground and space based measurement technology has the potential to further enhance the accuracy of cloud dispersion and forecast models.

The following items were concluded:

- There shall be an immediate response, or even an anticipated response, in case of a volcano eruption, to deploy technology helping to improve the ash prediction model output. In short term it is conceivable to rely on technological infrastructures of research institutes, in long term an ad-hoc dedicated operational infrastructure might be desirable;
- Data exchange between institutions and Volcanic Ash Advisory Centres (VAACs) exists, but should be further developed;
- Satellite observation technology can play an important role in a future observation, measurement, and modelling system but makes optimised data assimilation indispensable;
- Institutional architecture to exchange information and decision making needs to be researched;
- Although governance and institutional questions were not on the agenda of the workshop a structure similar to the oil spill monitoring and vessel detection services of the European Maritime Safety Agency was suggested as an option;
- There was very little expertise and limited knowledge at decision maker level during the recent event as well as very limited capacities in observation, modelling and advisory institutions. Besides technology development, training and availability of resources forms a crucial element.

A follow up will be, amongst other events, a workshop session at the International Air Safety & Climate Change Conference (IASCC) 2010 on 8<sup>th</sup>-9<sup>th</sup> September 2010 in Cologne.

### **3) Follow up of discussions with operators**

Firstly, the implementation of the Agency SIB has not given rise to criticism or request for improvement. It should nevertheless be noted that ashes disappeared rapidly after the SIB publication.

On 3<sup>rd</sup> of June the main European operators (AEA) were invited to discuss with the Agency the proposal they had sent to it for operations in airspace at risk of volcanic ash contamination. They wished to move quickly from "option 1" to "option 2". Their proposal was reviewed by the Agency. It was agreed more work was needed. This would be done over the summer by the AEA and the Agency.

It was also highlighted by the AEA that the CAA-UK was working on a similar approach with NATS and the UK industry. In order to avoid duplication of work, it was agreed that both AEA and EASA would try to obtain more information and participation in this initiative which unfortunately has not been possible so far.

Finally, the Agency has been contacted by other organisations such as IACA. Once the initial work with AEA is finalised, the other organisations will be consulted. This will also apply to the Member States in line with the enhanced communication with stakeholders.

### **4) Improvement of the ash effects knowledge on aircraft and engines, and engine limits**

Amongst the numerous actions which took place during and after the volcanic ash crisis, the Agency led an action which aims at getting a better knowledge of the tolerance of aero engines to the level of ashes concentration likely to be encountered in case of another eruption.

a) During the annual aviation safety conference in New-Orleans, an informal meeting was organised on 8<sup>th</sup> June 2010 by the Agency to discuss the necessity of assessing the tolerance of engines to the level of ashes likely to be encountered if there is another eruption. It was well attended by representatives of the engine manufacturers, airframe manufacturers, authorities and associative bodies present during the conference.

The meeting concentrated on the airworthiness aspects for which the Agency is the only responsible body in Europe. The following points were agreed:

- 1- In accordance with its role in airworthiness, the Agency will take the lead in all domains related to the consequences on aircraft/engines of an encounter with volcanic ashes.
- 2- Whereas all parties agree that effects on airframe and systems also need to be assessed, the parties agree that the work should focus in a first phase on turbine engines.
- 3- All parties agree that a coordinated approach is necessary. On the long term, this can only take place through ICAO.
- 4- The parties also agree that a short term contingency plan (setting up of a crisis cell, better information of all parties on the real-time situation) and a mid-term solution are necessary to allow for an improved handling of the situation in case the Icelandic volcanoes would erupt again in the near future.

5- This mid term approach:

- 5.a - would not preclude on any choice concerning the decision mechanisms (decision by member States as in the present "European" model or decisions by operators as in the "US" model),
- 5.b - would take into account that, in case of a future eruption, a more accurate validated model must be created, i.e., the uncertainty on the level of ashes in the atmosphere would have significantly decreased. Zones would be more precisely delineated and the levels would be more accurate.
- 5.c - would provide the decision makers, whomever they are (member States or operators), with information related to the tolerance of the engines to ashes in order for them to take the most appropriate decisions. This information would be derived from experience, analysis and existing test data. The industry nevertheless warns that multiple engine parameters need to be taken into account.

6- Results from the ICAO working groups, when available, could substitute for the mid-term solution.

7- Airbus and Boeing, invited to participate as observers in the meeting, provided the following statement:

*Airbus and Boeing agree to submit, as part of the ICCAIA mid-term plan, a proposed outline of a clear decision making process, including confirmation of the appropriate associated aircraft operating procedures and limitations for flight around volcanic ash events to assure continued safe flight and landing capability.*

b) The two teleconferences of 1<sup>st</sup> and 15<sup>th</sup> July 2010 were attended by representatives of GE, SNECMA, RR-UK, RR-US, PW-USA, PW-Canada, Honeywell, MTU, Airbus, Boeing, Dassault Aviation, GAMA, ATA, ASD, FAA, UK CAA, LBA and EASA. In both cases, the industry sent to the group important contributions prior to the teleconferences. These contributions addressed the two following subjects which were then presented, reviewed and discussed during the teleconferences.

#### Data related to the encounter with ashes:

A table of all volcanic ashes encounters registered so far with the engine manufacturers was provided to the group. The following comments were made:

- 1- More data will be collected and compiled in the coming weeks.
- 2- Overall, there is little data related to long exposures to low concentrations of ashes.
- 3- At the present point, although some analyses are on-going, there is no confirmation of any damages directly related to the recent Icelandic volcanic event. This was confirmed by reports from Airbus, Boeing and Dassault Aviation.
- 4- Effects of sand are generally different. However, some types of sand could have similar properties to volcanic ashes.
- 5- Some military data could prove relevant and supplement the present data, subject to declassification and sanitization.

### Assessment of engine tolerances to defined ashes concentration levels:

Concerning, ground testing and the determination of quantitative tolerances for engines, there is a general agreement that the purpose is not to define certification limits but to assess the effects of the ash concentration levels which would be published by the VAAC in the event of another eruption. Taking into account the numerous activities which are currently taking place (enhancement to the computer model, indication of "average" rather than "peak" values, backwards calibration, setting up of measurement equipment, both on-ground and airborne, etc.) the group believes that the VAAC will be able to provide much more accurate figures for the concentration of ashes in the atmosphere. As a consequence, it is important that the potential effects of flying into those concentrations are known to the decision makers, even if the basic principle that "no flight should take place into visible ash" remains as the most important rule.

The industry reached the following main conclusions:

- C.1- Any ground test would require careful definition of its precise conditions.
- C.2- A "strawman" test plan was presented based on scenarios.
- C.3- The industry focal point insisted that single ash concentration values were not sufficient to define safety limits because the issue is multidimensional (concentration, exposure time, engine technology, engine age...).
- C.4- Testing of a single engine model is not expected to provide a certification basis for all engines.

In the discussion that followed the presentation, the following points were made:

- P.1- The economical aspects for operators will need to be taken into account. In particular, if some levels of exposure can be mitigated by additional maintenance, this needs to be defined in order for the operators to take an appropriate risk based decision,
- P.2- The results of any test will be difficult to use in practice if the accuracy of the ash concentration as predicted or measured in the air does not match that of the tests. There is now a commonly agreed understanding that there is a ratio of about 50 between average and peak ash levels and that the VAAC model rather gave the peak values.
- P.3- The scenario approach is very useful. At the present time, 2 are defined: unplanned encounter with significant ash concentration and continued encounter with low levels. More scenarios could be introduced. When the scenarios are more precisely defined, the aircraft manufacturing community needs to be involved because of the effects on the aircraft,
- P.4- The respective merits of probabilistic and deterministic approaches were discussed, taking birds encounter as an example. The two approaches (probabilistic and deterministic) may also be combined,
- P.5- There is a need to assess to what quantitative level corresponds the qualitative assessment of "visible ash" in order to ensure the compatibility between the two approaches (US approach based on the avoidance of visible ash and EU approach based on predicted levels).
- P.6- Other concerns linked with chemical contamination (e.g. corrosion, potential impact on health) also need to be considered.

Way forward:

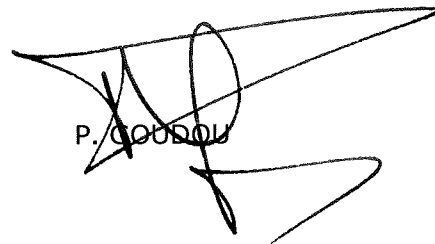
The engine and aircraft manufacturers insist that flying into visible ash shall be avoided at any time.

The engine community supports further assessment of the tolerance of engines to volcanic ash, taking into account the points listed above.

The group also agreed that more time will be needed to further refine ground test plans and conditions. Further contacts are necessary with volcanologists and modelling people, in order to agree on truly representative level and type of ashes.

The next significant event is the meeting of the ICAO task force, taking place in Montreal at the end of July. EASA and other authorities will be represented and will present the status of their activities. Engine industry will also attend via ICCAIA. This meeting will be a chance for the continuation of globally coordinated activities related to the volcanic ash threat.

The group shared the opinion that the present group should be kept and debriefed of the outcome of the ICAO task force meeting. Continuation or new orientation of the activities could follow. This will be done during a teleconference organised by the Agency on 19<sup>th</sup> August 2010.



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