



International Civil Aviation Organization

WORKING PAPER

A37-WP/226

TE/131

24/07/10

(Information paper)

English only

ASSEMBLY — 37TH SESSION

TECHNICAL COMMISSION

Agenda Item 46: Other Issues to be Considered by the Technical Committee

UNITED STATES PERSPECTIVE ON VOLCANIC ASH PRACTICES AND POSSIBLE WAYS TO IMPROVE SERVICE

(Presented by the United States)

EXECUTIVE SUMMARY

This paper presents a summary of past events from the Eyjafjallajökull volcano and its impact on aviation and highlights challenges that are being considered collectively for global harmonization of services in support of volcanic ash.

<i>Strategic Objectives:</i>	This information paper relates to Strategic Objectives A, D and E
<i>Financial implications:</i>	Not applicable
<i>References:</i>	Annex 3 — <i>Meteorological Service for International Air Navigation</i> Doc 9766, <i>Handbook on the International Airways Volcano Watch (IAVW)</i> — <i>Operational Procedures and Contact List</i> Doc 9691, <i>Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds</i>

1. INTRODUCTION

1.1 Following the eruption of the Eyjafjallajokull volcano (the volcano) in Iceland on 14 April 2010, European countries began withdrawing air traffic service and closing airspace as the ash cloud spread eastward. The resulting restrictions on civil flights in 23 countries across most of northern and central Europe stranded passengers across the globe and severely disrupted air transport operations for several days. Over 300 airports, representing 75 per cent of European air traffic, closed. EUROCONTROL estimated that more than 100 000 flights were cancelled affecting the travel plans of around 10 million passengers. The airlines estimated their losses in the order of \$1.7 billion, the airports at \$400 million, and air navigation service providers at \$200 million with wider impacts to the general economy.

2. DISCUSSION

2.1 The presence of volcanic ash is a recognized hazard in aviation. Several severe incidents occurred in the 1980s and 1990s at various locations throughout the world involving commercial jetliners. The common denominator in these incidents was the lack of awareness by aircraft pilots that they were flying through areas contaminated by volcanic ash. The United States has considerable experience with volcanic eruptions, and the United States' objective during volcanic ash episodes is to ensure that the aviation community receives timely and consistent information on the location of ash clouds including their current position, flight level, and projected trajectory. Generally, the Federal Aviation Administration (FAA) will establish a temporary flight restriction (TFR) only in areas where immediate danger exists: that is, typically extending no more than a 10 nautical mile radius of an erupting volcano. The United States procedures are consistent with the ICAO *Handbook on the International Airways Volcano Watch (IAVW) — Operational Procedures and Contact List* (Doc 9766). The FAA utilizes TFR's as a means of regulating air traffic in and around significant events. This differs from the traditional restricted area, danger area, and prohibited area categories

2.2 The United States supports the operation of two volcanic ash advisory centres and three meteorological watch offices. These facilities provide advisories and in-flight warnings in accordance with ICAO Doc 9766 and disseminate them globally via the world area forecast system satellite broadcast.

2.3 The United States worked cooperatively with our European counterparts during the Eyjafjallajokull volcano eruption. Direct support included the sharing of information on established procedures such as the National Volcanic Ash Operations Plan for Aviation and the Alaska Interagency Operating Plan for Volcanic Ash Episodes. The FAA's Air Traffic Control System Command Centre (ATCSCC) is the focal point for the U.S. National Airspace System in providing guidance and direction on managing traffic volumes impacted by constraints such as a volcanic ash cloud. After the eruption, the FAA participated in discussions with industry focused on developing plans to reopen European airspace while ensuring safe operations. Subsequently, the FAA continues to participate with industry and European authorities in discussions relating to the operational effects the Iceland volcanic eruption had on aviation and on how best to manage airspace in and around volcanic ash concentrations. While there have been numerous meetings, ad hoc conferences/seminars/task forces since the eruption and the disruption to air traffic, the FAA believes efforts would now best be focused by working these issues through the ICAO Volcano Ash Task Force (IVATF). The goal of the IVATF is to reduce the number of flight disruptions while ensuring the highest levels of safety.

2.4 Since the eruption there has been an outpouring of international interest in understanding how volcanic ash disrupts the aviation community and how best to deal with this hazard in the future. This paper does not detail or outline all the issues or lessons learned, but rather supports that there is a need for ICAO to continue to support the International Airways Volcanic Watch Operational Procedures Study Group (IAVWOPSG) in an expanded role. This group could ensure, through a collaborative framework of air navigation service provider (ANSP), volcanologist and meteorologist, there exists a means to improve existing services. Accurate and timely communication of hazard information and its incorporation into decision support tools is critical for effective flight planning. This same principal applies to the engineering community as it relates to airplane and engine certification and tolerance to volcanic ash.

2.5 The United States sees great value in having current practices and standards as described in Annex 3 and also in ICAO Doc 9766 reviewed based on the findings from the IVATF and by the IAVWOPSG and Air Traffic Management Requirements and Performance Panel (ATMRPP). The current standard, promulgated over the years, is ash avoidance. Most efforts to date have been focused on mitigating ash encounters. While the United States has not achieved 100 per cent mitigation, we can state that we have an excellent track record mitigating aircraft encounters with ash. Credits go to the IAVWOPSG for operating very efficiently and no doubt decreasing the number of encounters with ash we could have had otherwise. As the science advances in ground-based and space-based detection with enhancements in model performance through collaborative decision making and ensemble modelling, ANSPs will come closer to achieving a 100 per cent goal of ash avoidance. In working with airplane and engine manufacturers, aircraft operators will have a better understanding of airplane and engine tolerance to ash and, at what levels of ash an aircraft can safely operate in, without undue concern to the safety of flight including airplane occupant protection. This does not preclude the need to have oversight on airplane and engine performance and maintenance when ash is encountered.

2.6 The following challenges are seen as a basic list of work that can be done in the IVATF and IAVWOPSG and regionally for global harmonization of services in support of volcanic ash:

- improve collaborative decision making among the VAACs;
- improve model performance and harmonize global models and use of ensemble modelling;
- better define source parameters for models by working with the International Union of Geophysics and Geodesy who support the world wide Volcano Observatories;
- review of existing contingency plans in ICAO Regions to ensure there is harmonization between Regions and services provided;
- further evaluation of airplane systems, occupant safety and engine tolerance to ash to better define (i) total risk to the airplane (i.e., systems, engine, and occupants) and (ii) areas of ash concentration that has to be supported with associated improvement in model output;
- understanding of uncertainty or probabilistic forecasting of ash concentration and how it affects decisions on fly or no fly zones; and

- review of existing procedures and practices on the provision of information to flight crews and airline operations centres to support their operational decisions for time critical messages.

3. **CONCLUSION**

3.1 The Assembly is invited to note the information in this paper.

3.2 This paper has attempted to talk to the events following the eruption of the Eyjafjallajökull volcano and summarize some of the work ongoing in the IAVWOPSG and new work of the IVATF.

3.3 This paper has highlighted a list of challenges for ICAO with support of member States that are to be considered collectively for global harmonization of services in support of volcanic ash.

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