



International Civil Aviation Organization

**FIFTEENTH MEETING OF THE
COMMUNICATIONS/NAVIGATION/SURVEILLANCE AND
METEOROLOGY SUB-GROUP (CNS/MET SG/15) OF APANPIRG**

Bangkok, Thailand, 25 – 29 July 2011

Agenda Item 11: Implementation of SIGMET and warnings

CURRENT SITUATION ON RADIOACTIVE CLOUD AND TSUNAMI

(Presented by Japan)

SUMMARY

This paper introduces actions taken by the Japan Meteorological Agency regarding tsunami warnings and radioactive clouds, after the 3.11 earthquake and consequential accident at the Fukushima Dai-ichi nuclear power plant.

This paper relates to –

Strategic Objectives:

A: **Safety** – Enhance global civil aviation safety

C: **Environmental Protection and Sustainable Development of Air Transport**

Global Plan Initiatives:

GPI-12 Functional integration of ground systems with airborne systems

GPI-19 Meteorological Systems

1. Introduction

1.1 At 2:46 P.M., March 11, 2011, series of big earthquakes occurred near northeast and east part of Japan. The magnitude of the biggest quake recorded 9.0.

1.2 Soon consequentially, within about 30 minutes, there were horrible gigantic Tsunami which rushed deep into the shore, swallowing buildings, cars, and almost all kinds of things. Though precise research has not been done yet, some pictures showed that the maximum height of the Tsunami was sometimes over 10m.

1.3 The Sendai Airport was hit by the tsunami which rushed into its terminal and also over the Runway. Equipments near the surface were broken or swept away, and electric facilities of airport building were broken. There were almost 1400 staff and passengers left inside of the building, but 2 days later, all people were rescued.

1.4 After these quakes and Tsunami, the Fukushima Dai-ichi and Dai-ni nuclear power plants had troubles at their ECCS (Emergency Core Cooling System), and radioactive materials were accidentally released into the atmosphere from some reactors of the Dai-ichi plant.

1.5 After a lot of efforts, currently, Japanese Government says that rate of release of radioactive materials have been getting much lower than just after the accident. However, there are still many steps to take before the problems might end.

2. Tsunami warning issue

2.1 In Japan, because there are many experiences of quakes which cause tsunami, it is the most important thing to issue tsunami warnings without no delay, and as soon as possible. So, the Japan Meteorological Agency (JMA) has established highly sophisticated tsunami warning system which can issue tsunami warning within about 3 minutes after the quake, at the latest. Actually in this case, the first tsunami warning was issued at 2:49 P.M., 3 minutes after the quake.

2.2 Considering the short lead-time of tsunami warnings, ATS providers and/or airport authorities in Japan directly use and inform users of tsunami warnings which JMA issues for all disaster related organizations. In this regard, JMA does not reproduce such warnings into the form of aerodrome warning.

2.3 Detailed investigation of damages caused by the quake and tsunami has not been completed yet, though, this Sendai Airport's case shall be examined in detail later.

3. Radioactive clouds issue

3.1 The Japan Meteorological Agency (JMA), according to the discussion with the Japan Civil Aviation Bureau, had decided not to issue radioactive cloud SIGMET, and filed a difference to the ICAO Annex3. One of the main reasons is that there haven't been any specific (or reliable) criteria and guidelines concerning issuance of such SIGMET.

3.2 However, considering its critical influences on aircraft operations and importance of notifying occurrence of such a danger, and answering requirement from ICAO, JMA had started to issue SIGMET on radioactive cloud, since 1610UTC, March 17

3.3 Earlier than the SIGMET issuance, WAFcs put the symbol of release of radioactive materials into atmosphere on their SIGWX charts, since 21UTC, March 15.

3.4 Though there are no specific criteria concerning radioactive clouds SIGMET, JMA decided the area of the SIGMET in consistent with the no-fly zone issued by JCAB via NOTAM according to the indoor evacuation area declared by Japanese Government, because it's the only credible source of danger.

3.5 Since 31 May, at the same time as JCAB reduced no-fly zone from 30km radius to 20km radius based on consultation with the Nuclear Safety Institute, JMA changed area depicted in radioactive cloud SIGMET from 30km to 20km.

4. Discussion

4.1 Tsunami warnings

4.1.1 While it is still unclear how much the damages at the Sendai Airport could be mitigated by the tsunami warning, this case enough shows that tsunami had destructive effects on the airport.

4.1.2 So, it is necessary for such States that have airports near sea shore and/or at nearly sea-level, to review current working arrangements between ATS providers, Airport authorities, and other users on when / who / how / where to issue the tsunami warnings, as well as to maintain the skill to provide appropriate tsunami warnings.

4.1.3 As mentioned in Section 2, in order to mitigate the damage caused by tsunami, it is especially important to disseminate tsunami warnings to people around the airport as quickly as possible. As an example, it may be useful to transfer the public tsunami warning to the relevant organizations, not reproducing as the aerodrome tsunami warning.

4.2 Radioactive clouds

Definition of the role and working arrangement between relevant organizations

4.2.1 According to Annex3 and Doc 9691, after receiving the EER products issued by RSMC;

- MWO
 - Provides the ATS units with information on location and time of the accident, and forecast of its trajectory of radioactive materials
 - Issue radioactive clouds SIGMET
- WAFCs
 - Put the symbol of the accident on their SIGWX charts.

4.2.2 Under current regulations and guidelines, these three types of information would be issued independently with respective criteria. This may cause a trouble with users, since WAFS SIGWX chart is considered as useful information to notify users the accidental release of radioactive materials and to encourage them to look after regarding information (SIGMET or NOTAM).

Lack of global technical standards or guidelines

4.2.3 As mentioned in the Section 2, there have not been any technical standards on how to issue radioactive cloud SIGMET. What kind of information should be used as a source? Or, by what criteria a MWO should define the dispersion?

4.2.4 ICAO Doc 9691 “Manual on Volcanic Ash, Radioactive Materials, and Toxic Chemicals “ describes the role of each organization (IAEA, WMO, RSMC, MWO, WAFCs, AIS, ACC, NOF) and the route of information dissemination. However, there is no description in that document on how to issue radioactive cloud SIGMET.

4.2.5 Also, it seems that there aren't any criteria to put the symbol of radioactive accident in the WAFS SIGWX Chart, in ICAO Annex3

4.2.6 In both Annex3 and Doc 9691, the RSMC product (EER products) is written as the most likely source of information on radioactive materials. However, it still unclear what kind of information should be derived from the EER products and disseminated to the users, and what the users should use the information after receiving it.

Uncertainty of EER products

4.2.7 EER products have not been verified enough, especially regarding its parameters and criteria to calculate and depict dispersion or trajectory of radioactive materials. So the products have certain amount of uncertainty.

4.2.8 Moreover, sometimes it is difficult to obtain appropriate parameters, such as rate of blowout.

4.2.9 Harmonization between the models of RSMC also should not be enough verified.

4.2.10 Therefore, at this time, EER products haven't been enough verified to be considered as the single source of deterministic information like SIGMET, or NOTAM

5. Conclusions

5.1 The task force members are invited to note the current actions taken by JMA.
