IAVWOPSG-Memo/64
29/7/14

MEMORANDUM

Ref: AN 10/18.2

To: Members, International Airways Volcano Watch Operations Group (IAVWOPSG)

From: IAVWOPSG Secretary

Subject: **Proposed initial guidance to support the issuance of SIGMET for the release of radioactive material into the atmosphere**

Action:
a) note the information; and
b) provide comments, if any, not later than 30 September 2014.

Further to earlier discussions within the International Airways Volcano Watch Operations Group (IAVWOPSG), in particular at the sixth meeting of the IAVWOPSG held in September 2011 in Dakar, the Secretariat has undertaken internal coordination as well as external coordination with other international organizations (principally expert groups of the World Meteorological Organization (WMO) and the International Atomic Energy Agency (IAEA)) in order to develop some proposed initial guidance to support the issuance of SIGMET by meteorological watch offices for the release of radioactive material into the atmosphere.

The attachment to this memo provides an outline of the problem, the background of the ICAO provisions, the recent progress including coordination activities, a proposal with a rationale and suggested areas for further work.

Please send your comments, if any, on the attached proposed initial guidance by e-mail (rromero@icao.int with a copy to vloch@icao.int) not later than 30 September 2014.

Best regards,

(signed by)
R. Romero

ATTACHMENT

Proposed initial guidance to support the preparation of SIGMET information for a radioactive cloud

Problem Statement:

It has been identified that guidance to support meteorological watch offices (MWOs) in the preparation of SIGMET information for the release of radioactive materials into the atmosphere (i.e. for a radioactive cloud, RDOACT CLD) is lacking and that in many cases MWOs have little or no experience or expertise in dealing with radioactive clouds. There is little or no guidance available concerning the qualitative and/or quantitative trigger points for the issuance of a SIGMET message for a RDOACT CLD nor concerning the areal extent of the phenomena to be referenced in the messages. These impediments may negatively impact the implementation (preparation and issuance) of SIGMET information which may, in turn, pose a risk to flight safety due to a lack of situational awareness.

Background:

In 2001, the International Civil Aviation Organization (ICAO) introduced requirements concerning the transmission to aircraft in flight of information on the accidental release of radioactive materials into the atmosphere. These requirements, in the form of International Standards and Recommended Practices (SARPs), are contained principally in ICAO Annex 3 to the Convention on International Civil Aviation – *Meteorological Service for International Air Navigation*.

In 2007, Annex 3 was enhanced to include an update to the SIGMET template in respect of a RDOACT CLD. SIGMET information, in the form of a plain text message and/or graphical product, is issued by a meteorological watch office (MWO) concerning the occurrence or expected occurrence of specific en-route weather phenomena and other phenomena in the atmosphere which may affect the safety of aircraft operations. SIGMET information is therefore to be issued by a MWO when a RDOACT CLD is occurring or is expected to occur in a flight information region/upper flight information or control area for which the MWO has designated responsibility and for which it maintains a continuous watch.

In 2013, ICAO eliminated the reference to the 'accidental' nature of a release, such that SIGMET information for RDOACT CLD is to be issued (whenever it is occurring or expected to occur) irrespective of the cause.

Notwithstanding these developments, guidance to support MWOs in the preparation of SIGMET information for a RDOACT CLD remains an improvement area.

Recent progress:

September 2011 — At the 6th Meeting of the International Airways Volcano Watch Operations Group (IAVWOPSG) of ICAO, which is tasked to address issues concerning the release of radioactive materials into the atmosphere, the group noted a lack of guidance to support the preparation and issuance of SIGMET information for a RDOACT CLD and a lack of available expertise within MWOs in this context. The group discussed potential quantitative criteria and concepts to provide guidance.

October 2011 — The World Meteorological Organization (WMO) Coordination Group on Nuclear Emergency Response Activities (CG-NERA), when discussing the IAVWOPSG concerns, expressed further concern as to what quantitative criteria should be used to trigger the issuance by a MWO of a SIGMET message for a RDOACT CLD – for example, should it be the dose criteria for the passengers' health or the contamination of the airframe itself?

December 2011 — At the 22nd Regular Meeting of the Inter-Agency Committee on Radiological and Nuclear Emergencies (IACRNE), of which ICAO and WMO are members, the Committee was presented with a synopsis of the recent ICAO and WMO considerations concerning guidance for SIGMET information for a RDOACT CLD. Taking into account the lessons learned and experiences gained from the response to the Fukushima Daiichi nuclear power plant accident earlier in 2011, the Committee agreed to establish an ad-hoc working group, comprising experts from relevant international organizations, that would be tasked to progress this and other issues identified.

April 2013 — An IACRNE ad-hoc working group on air and maritime transportation (WG-AMT) became effective on 1 April 2013. Through correspondence and teleconference, Secretariat from ICAO, WMO and IAEA have been working to progress the identified issues concerning SIGMET information for a RDOACT CLD.

August 2013 — It was identified that the IAEA had safety standards and supporting guidance concerning protective actions and other response actions in an event of a nuclear or radiological emergency including suggested emergency zones and distances around nuclear facilities in which protective actions and other response actions need to be planned. In case of General Emergency[1] at a nuclear power plant (NPP), the radius of the so-named urgent protective actions planning zone (UPZ) around the NPP is in the range of 15 to 30 km depending on specific analysis of the nuclear power plant and local conditions.

October 2013 — At a meeting of the WMO Expert Team on Emergency Response Activities (ET-ERA), the successor group to the CG-NERA referenced above, experts from WMO Regional Specialized Meteorological Centres (RSMCs) in Vienna and Montreal and the IAEA agreed to undertake more extensive quantitative examination of the horizontal and vertical extent of a RDOACT CLD based on realistic source terms for a few cases (i.e. based for different emergency scenarios and with different prevailing meteorological conditions). The outcome of this work may be realized before the end of 2014, subject to available resources.

April and May 2014 — The IACRNE ad-hoc WG-AMT reviewed and subsequently endorsed, through correspondence, a methodology for proposed initial guidance to support the issuance of SIGMET information for a RDOACT CLD. Subsequent to this endorsement, the members of the parent IACRNE Committee were invited to review the proposal through correspondence, since IACRNE has had a vested interest in this issue since the IACRNE/22 meeting in December 2011, as indicated above. Upon the completion of this review, no changes or objections were expressed by the members of the IACRNE, and it was intended to socialize the proposal next with the concerned ICAO/WMO expert groups.

[1] General Emergency (the highest emergency class): Events resulting in an actual or substantial risk of an atmospheric release of radioactive material requiring immediate implementation of urgent protective actions and other response action off the site.

Proposal:

Appreciating the need for prompt actions when a release of radioactive materials into the atmosphere occurs, including the preparation and issuance of SIGMET information, and noting that especially during the early stages of a release there may be little or no qualitative or quantitative information available upon which to base decisions, a zone centered on the location of the release with the following attributes[2] are proposed to be used only (see Note) in the initial SIGMET message for a RDOACT CLD:

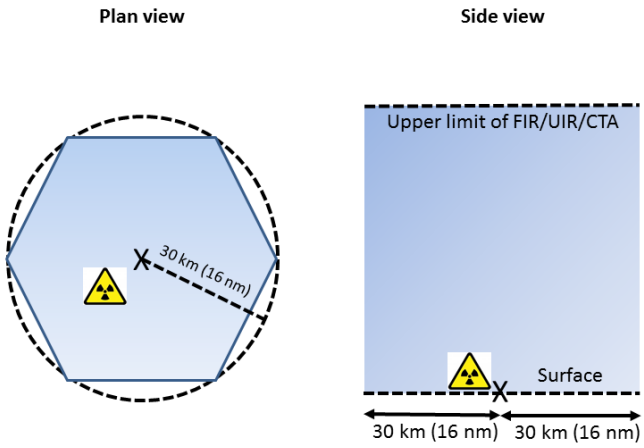
- horizontal radius of 30 km (16 nm); and
- vertical extent from the surface (SFC) to the upper limit of the flight information region/upper flight information region (FIR/UIR) or control area (CTA) as applicable.

Note. — ICAO Annex 3 – Meteorological Service for International Air Navigation *requires that, during a radiological environmental emergency, at the request of the delegated authority of the State in which the radioactive material was released into the atmosphere or at the request of the IAEA, information in the form of atmospheric transport model products is produced by WMO Regional Specialized Meteorological Centres (RSMCs). This information is supplied to operational contacts points at National Meteorological Centres who in turn distribute in their respective States to, inter alia, the concerned MWO(s). This information would be expected to assist the MWO(s) in the determination of the observed or forecast extent of the contamination, which may differ (potentially substantially) from the proposed attributes above, and hence assist in the preparation of SIGMET. Since such supplementary information would be expected to be available during an ongoing radiological environmental emergency, the attributes above are proposed to be used only in the initial SIGMET message for a RDOACT CLD. However, in the event that such supplementary information is not available, the concerned MWO(s) may decide to use the above attributes for subsequent SIGMET messages on an on-going basis until such time as the supplementary information does become available or the emergency is declared to have ended, whichever comes first.*

Owing to a limitation of the template for SIGMET messages contained in Annex 3 (such that an area described by a circle of defined radius cannot presently be used to describe the horizontal extent of a radioactive cloud), the boundary of the zone established should comprise normally of not more than seven (7) coordinates and should be roughly circular, centred on or proximal to the location of the release. Where the zone established by the MWO overlaps the area of responsibility of an adjacent MWO (of the same State or an adjacent State), the MWOs concerned should undertake all necessary coordination to ensure consistency of the information included in the SIGMET message(s).

[2] Variation of the approximate default distances used by a factor of two or more during application is reasonable. A State may elect to use different distances when there is substantiated justification.

Example schematic:



Example SIGMET message (fictitious location):

YUCC SIGMET 2 VALID 201200/201600 YUDO –
YUCC AMSWELL FIR RDOACT CLD OBS AT 1155Z WI S0030 W13950 – S0030 W13940 – S0045 W13930 – S0100 W13940 – S0100 W13950 – S0045 W14000 – S0030 W13950 SFC/FL500 STNR NC

Rationale:

Limited ICAO guidance currently exists to assist MWOs in the preparation of SIGMET information for a RDOACT CLD. Work to establish qualitative and/or quantitative criteria that would prompt the issuance of a SIGMET message for a radioactive cloud is subject to available resources and unlikely to yield results in the near term.

The proposed guidance is:

- consistent with IAEA safety guidelines concerning the establishment of an urgent protective action planning zone of up to 30 km radius during a General Emergency at a nuclear facility;
- considered sufficiently flexible to address the near term needs of States with MWO responsibilities; and
- expected to be included in a suitable ICAO publication.

Appreciating the need for timely information to be communicated to aircraft in flight and others concerned when radioactive material has been released into the atmosphere, and recognizing that existing national and international arrangements intended to ensure that MWOs, area control centres and others are notified of a release, the guidance proposed above is intended to serve as a near term, interim solution prior to the instituting of a longer term, more all-encompassing solution.

Further work:

Qualitative and/or quantitative criteria that would prompt the issuance of a SIGMET message for a radioactive cloud is an area that continues to require attention, subject to available resources.

References:

- ICAO Annex 3 – *Meteorological Service for International Air Navigation*
- IAEA Requirements GS-R-2 – *Preparedness and Response for a Nuclear or Radiological Emergency*
- IAEA Safety Guide GS-G-2.1 – *Arrangements for Preparedness for a Nuclear or Radiological Emergency*
- ICAO IAVWOPSG meeting reports
- WMO ET-ERA meeting reports
- IAEA IACRNE meeting reports

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