



International Civil Aviation Organization

**FIRST MEETING OF THE ASIA/PACIFIC METEOROLOGICAL
ADVISORIES AND WARNINGS IMPLEMENTATION TASK FORCE
(METWARN/1 TF/1)**

Bangkok, Thailand, 23 – 25 March 2011

Agenda Item 2: Review educational material

- a) Monitor the developments of IAVWOPSG and METWSG with reference to guidance on radioactive cloud and Tsunami**

DISSEMINATION OF INFORMATION ON RADIOACTIVE CLOUD

(Prepared by the Secretariat)

SUMMARY

This paper presents a summary on the current provisions on radioactive cloud and an account of information on radioactive cloud provided during the Fukushima nuclear power plant event.

This paper relates to:

Strategic Objectives:

A. Safety

Global Plan Initiatives:

GPI – 18 Aeronautical information

GPI – 19 Meteorological Systems

1. INTRODUCTION

1.1 With reference to the release of radioactive activity from the Fukushima nuclear power plant as a result of the earthquake and Tsunami on 11 March 2011, a discussion on current provisions and guidance is provided as well as an account on the dissemination of information on radioactive cloud provided for international flight.

2. DISCUSSION

Requirements

2.1 ICAO produced a draft table of relevant provisions and guidance related to information on radioactive cloud (WAFS SIGWX, SIGMET, notification of release of radioactive material by VAAC London to ACCs, NOTAM) and is provided in the **Attachment 1**. This draft table may be updated in the future to include Annex 14 provisions that account for transportation of dangerous goods.

2.2 With reference Amendment 75 to Annex 3, Volcanic Ash Advisory Centre (VAAC) London provides direct notification to Area Control Centres (ACCs) regarding the release of radioactive material. A global database on the 8-character AFTN address of the ACCs has been developed in 2009 and 2010 to meet these new requirements and may be considered in a future FASID Table. Results of tests on disseminating information on radioactive material will be reported to the Sixth Meeting of the International Airways Volcano Watch Study Group (IAVWOPSG/6) in September 2011.

2.3 The Joint Radiation Emergency Management Plan includes many international agencies such as the International Atomic Energy Agency (IAEA) and ICAO (<http://www-pub.iaea.org/MTCD/publications/PDF/jplan2002.pdf>). Each party's role is detailed and ICAO continues to fulfill its role in the Fukushima event. The IAEA provides information on radioactive material to the Regional Specialized Meteorological Centres (RSMCs) which are relayed to Meteorological Watch Offices (MWOs) where SIGMET on radioactive cloud in a simplified manner (location, duration and date and time of the release and forecast trajectories). The SIGMET is issued to warn aviation of this hazard for the corresponding Flight Information Region (FIR) (Annex 3, 3.4 g) and Appendix 6, 1.1.4). Further guidance related to SIGMET on radioactive cloud is being developed by the International Airways Volcano Watch Study Group (IAVWOPSG) as a result of APANPIRG Conclusion 20/69. This guidance is expected to be included in Part II of the Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds (Doc 9691). This guidance material will be considered at the IAVWOPSG/6 meeting in September 2011.

Information for aviation

2.4 Information on radioactive cloud related to the Fukushima nuclear power plant is provided below as well as issues or questions that arose.

- VAAC London notification to ACCs of radioactive release (**Attachment 2**)
 - ACC addresses in Japan for VAAC London to disseminate information on radioactive cloud were not provided to Regional Office for global collation – need to verify if this information is still needed
- NOTAM/SIGMET used 30 km radius around power plant and did not account for transport by the wind (**Attachment 3**)
- NOTAM used a prohibited area instead of restricted area, the latter being most accurate in that a restricted area allows for authorized operations such as emergency flight operations as defined by Annex 15
- NOTAM used UNL (unlimited) for the upper boundary of the no-fly zone
 - questions arose as to how high the contamination is most likely to be (3000 m is the upper measurement of radioactive material as provided by the RSMC)
- World Area Forecast Centres (WAFCs) London and Washington included radioactive cloud symbol over the Fukushima nuclear power plant (**Attachment 4**)

- SIGMET issued late (17 March 2011 at 0610Z) *noting that Japan filed a difference not to issue SIGMET on radioactive cloud (Annex 3, 3.4 g and Appendix 6, 1.1.4)*
- SIGMET on radioactive cloud embedded in other SIGMET (**Attachment 5**) *ting that Japan filed a difference not to issue separate SIGMET for separate phenomenon (Annex 3, Appendix 6, 1.1.4)*

Airlines could not retrieve this information automatically

- SIGMET on radioactive cloud defined only for area defined by government to stay indoors (30 km)
- SIGMET on radioactive cloud defined as stationary

Previous two bullets did not take into account wind and should utilize information provided by RSMCs

Note that IATA inquired on these two bullets on 17 March 2011 and expressed concern with Pacific Organized Tracks (PACOTS) that are optimized routes across the Pacific to take advantage of the wind for that day and agreed upon by Japan and the United States.

Short term recommendations

2.5 Realizing that this is not a common emergency and that some issues may arise, the group may use the below steps to provide the most accurate information on radioactive cloud necessary for flight safety:

- Compliance with Annex 3 on the issuance and format of SIGMET (e.g. separate SIGMET)
- Compliance with Annex 15 on the nomenclature used in NOTAM
- Utilizing RSMC products which accounts for trajectory/dispersion of radioactive cloud
- Providing a sensible height of contamination in SIGMET and NOTAM based on present day knowledge of contamination
- Providing VAAC London with 8-character AFTN addresses and assuring they are current

2.6 Longer term issues include providing proper guidance to States on the use of RSMC products, which is being developed by the International Airways Volcano Watch Operations Group (IAVWOPSG). In addition, realizing the health risks to passengers and airline operators would be most useful to the stakeholders in making the most informed decisions based on safety risk management principles. The duration and type of exposure should translate to risk. Note that health risks to aviation associated with radioactive cloud are being investigated by the World Health Organization (WHO) in conjunction with ICAO.

3. ACTION BY THE MEETING

3.1 The meeting is invited to

- a) Review the contents in Attachment 1 for State preparedness on radioactive cloud;
and
- b) Review the contents in paragraph 2.5 to assure the safety of international flight.

ICAO provisions relating to radioactive material released accidentally into the atmosphere
(as at 14 March 2011)

1. ANNEXES

Annex 3 – *Meteorological Service for International Air Navigation*

Annex 11 – *Air Traffic Services*

Annex 15 – *Aeronautical Information Services*

Annex	Edition (Year)	Chapter or Appendix	Paragraph or sub-paragraph	Context
3	17th (2010)	Chapter 3	3.2.1 d)	World area forecast centres. To receive information concerning the accidental release of radioactive materials into the atmosphere from its associated WMO regional specialized meteorological centre (RSMC) for the provision of transport model products for radiological environmental emergency response, in order to include the information in SIGWX forecasts
3	17th (2010)	Chapter 3	3.4.2 g) and Note	Meteorological watch offices. Supply information received concerning the accidental release of radioactive materials into the atmosphere, in the area for which it maintains watch or adjacent areas, to its associated ACC/FIC, as agreed between the meteorological and ATS authorities concerned, and to aeronautical information service units, as agreed between the meteorological and appropriate civil aviation authorities concerned. The information shall comprise location, date and time of the accident, and forecast trajectories of the radioactive materials. <i>Note.— The information is provided by WMO regional specialized meteorological centres (RSMC) for the provision of transport model products for radiological environmental emergency response, at the request of the delegated authority of the State in which the radioactive material was released into the atmosphere, or the International Atomic Energy Agency (IAEA). The information is sent by the RSMC to a single contact point of the national meteorological service in each State. This contact point has the responsibility of redistributing the RSMC products within the State concerned. Furthermore, the information is provided by IAEA to RSMC co-located with VAAC London (designated as the focal point) which in turn notifies the ACCs concerned about the release.</i>
3	17th	Appendix 2	1.3.3 j)	World area forecast system.

Annex	Edition (Year)	Chapter or Appendix	Paragraph or sub-paragraph	Context
	(2010)			Items included in WAFS SIGWX forecasts. [...] information on the location of an accidental release of radioactive materials into the atmosphere of significance to aircraft operations, comprising: the radioactivity symbol at the site of the accident and, at the side of the chart, the radioactivity symbol, latitude/longitude of the site of the accident, date and time of the accident and a reminder to users to check NOTAM for the area concerned.
3	17th (2010)	Appendix 2	1.3.4 d)	World area forecast system. Criteria for including items in SIGWX forecasts. [...] where a volcanic eruption or an accidental release of radioactive materials into the atmosphere warrants the inclusion of the volcanic activity symbol or the radioactivity symbol in SIGWX forecasts, the symbols shall be included on SIGWX forecasts irrespective of the height to which the ash column or radioactive material is reported or expected to reach; [...]
3	17th (2010)	Appendix 2	2.2 b)	Notification of WAFC concerning significant discrepancies. Meteorological offices using WAFS BUFR data shall notify the WAFC concerned immediately if significant discrepancies are detected or reported in respect of WAFS SIGWX forecasts concerning [...] volcanic eruptions or an accidental release of radioactive materials into the atmosphere, of significance to aircraft Operations.
3	17th (2010)	Appendix 6	1.1.4 and Table A6-1	Format of SIGMET messages
3	17th (2010)	Appendix 9	1.3 e)	List of information for the area control centre and flight information centre. The following meteorological information shall be supplied, as necessary, to an area control centre or a flight information centre by its associated meteorological watch office: [...] information received concerning the accidental release of radioactive materials into the atmosphere, as agreed between the meteorological and ATS authorities concerned [...]
3	17th (2010)	Appendix 9	3.1 b) 3)	Information to be provided for aeronautical information services units. The following information shall be supplied, as necessary, to an aeronautical information services unit: [...] accidental release of radioactive materials into the atmosphere, as agreed between the meteorological and appropriate civil aviation authorities concerned; [...]
11	13th (2001)	Chapter 4	4.2.1 c)	Scope of flight information service Flight information service shall include the provision of pertinent: [...] information concerning the

Annex	Edition (Year)	Chapter or Appendix	Paragraph or sub-paragraph	Context
				release into the atmosphere of radioactive materials or toxic chemicals
11	13th (2001)	Chapter 7	7.6	Air Traffic Services requirements for information. Information concerning radioactive materials and toxic chemical “clouds”. ATS units shall be informed, in accordance with local agreement, of the release into the atmosphere of radioactive materials or toxic chemicals which could affect airspace used by flights within their area of responsibility.
15	13th (2010)	Chapter 5	5.1.1.1 r) and v)	NOTAM origination. A NOTAM shall be originated and issued concerning the following information: [...] presence or removal of, or significant changes in, hazardous conditions due to snow, slush, ice, radioactive material, toxic chemicals, volcanic ash deposition or water on the movement area; [...] release into the atmosphere of radioactive materials or toxic chemicals following a nuclear or chemical incident, the location, date and time of the incident, the flight levels and routes or portions thereof which could be affected and the direction of movement; [...]

2. MANUALS

Doc 4444 – PANS-ATM

Doc 8126 – Aeronautical Information Services Manual

Doc 8896 – Manual of Aeronautical Meteorological Practice

Doc 9377 – Manual on Coordination between Air Traffic Services, Aeronautical Information Services and Aeronautical Meteorological Services

Doc 9691 – Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds

Manual	Edition (Year)	Chapter or Appendix	Paragraph or sub-paragraph	Context
4444	15th (2007)	Chapter 9	9.1.3.4	Supply of information to aircraft
8126	6th Edition (2003)	Chapter 6	6.1.5 v) and Appendix B	NOTAM
8896	9th (2010)	Chapter 1	1.3.2	MWO
8896	9th (2010)	Chapter 3	3.7.2.2 j)	WAFS
8896	9th (2010)	Chapter 3	3.7.2.3 d)	WAFS
8896	9th (2010)	Chapter 4	4.2.1	SIGMET
8896	9th (2010)	Appendix 5	Attachment	WAFS
9377	5th (2010)	Chapter 1	1.1.3, 2.2.2 b)	Supply of information
9377	5th (2010)	Chapter 3	3.4.1 g), 3.4.4 a)	SIGMET
9377	5th (2010)	Chapter 5	5.1.5 e), 5.1.7 k), 5.4.6	Letters of agreement
9377	5th (2010)	Chapter 6	6.1, 6.8 b) and Note	Coordination between AIS and MET
9377	5th (2010)	Appendix 1	Table A1-3	SIGMET
9377	5th (2010)	Appendix 2	Table A2-3	Supply of information
9691	2nd Edition, Amendment No. 2 (2010)	Part II Chapter 7	7.1	Radioactive materials
9691	2nd Edition, Amendment No. 2 (2010)	Part II Chapter 8	8.1	Effects of radioactive materials
9691	2nd Edition, Amendment No. 2 (2010)	Part II Chapter 9	9.1	Accidental release of radioactive materials into the atmosphere
9691	2nd Edition, Amendment No. 2 (2010)	Appendix H		Example of notification from IAEA regarding the release of radioactive material into the atmosphere

END

Attachment 2 - Nuclear Emergency Message from VAAC London to ACCs

0000055300

635

NNXX01 EGRR 171712

NUCLEAR EMERGENCY

DTG: 20110317/1710UTC

ORIGIN: VAAC LONDON

INFO SOURCE: IAEA

STATUS: EMERGENCY

SITE: FUKUSHIMA

LOCATION: N3742 E1410

START OF RELEASE: 20110314/2200UTC

END OF RELEASE: 20110316/0430UTC

FIR NAME(S): FUKUOKA, MANILA, TAIBEI, SHANGHAI, INCHEON,
PYONGYANG, VLADIVOSTOK, KHABAROVSK, YUZHNO-SAKHALINSK,
ANCHORAGE

WP14 - attachment 2 - vaac london

FIR CODE(S): RJJJ, RPHI, RKRR, RCTB, ZKKP, ZSHA, KZOA,
UHHH, PZAN

ADDITIONAL INFO: NEXT UPDATE DEPENDENT ON IAEA
NOTIFICATION

Attachment 3 – NOTAM on radioactive cloud

J1265/11 - RADIOACTIVE CLOUD

FCST WI N3714 E14047 - N3709 E14102 -

N3714 E14116 - N3725 E14122 - N3737 E14116 - N3742 E14102 -

N3737 E14047 - N3725 E14041 - N3714 E14047

DRIFT DIRECTION : STNR INTST UNKNOWN. SFC - UNL, 17 MAR 15:57 2011 UNTIL 17 MAR
19:50 2011. CREATED: 17 MAR 15:57 2011

NOTAM on Prohibited Area

150302 RJAAYNYX

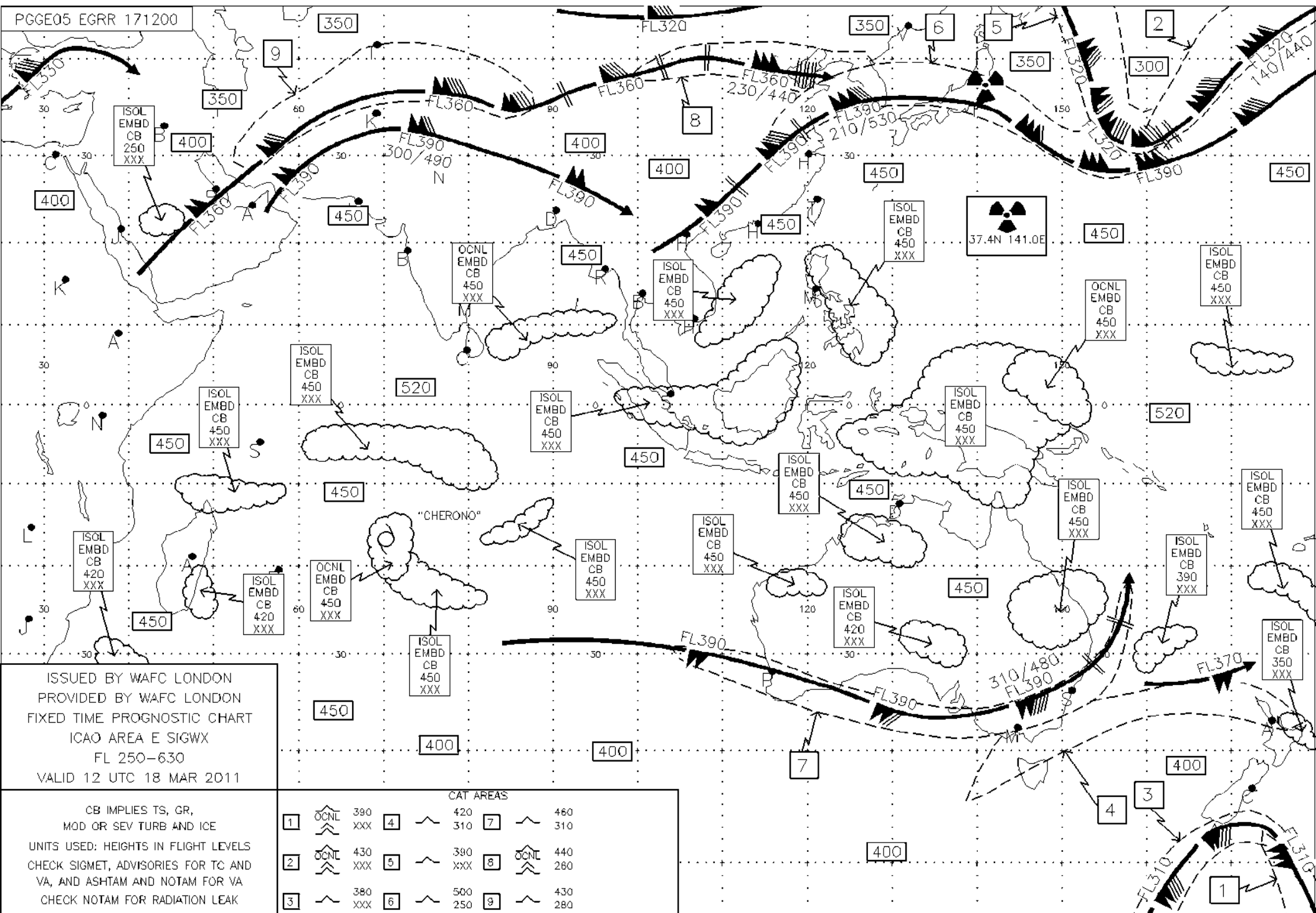
(0419/11 NOTAMR 0394/11

Q)RJJJ/QXXXX/IV/M/EW/000/999/3725N14102E017

A)RJSS B)1103150259 C)PERM

E)IN ACCORDANCE WITH THE ARTICLE 80 OF CIVIL AERONAUTICS LAW, FLT PROHIBITED AREA
IS ESTABLISHED AS FLW, IDENTIFICATION : RJP1 AREA : WI A RADIUS OF 30KM FM
372529N1410158E

(THE TOKYO ELECTRIC POWER CO.INC. FUKUSHIMA NO.1,
OKUMA-FUTABA-CHO FUTABA-GUN IN FUKUSHIMA) RMK/SEE AIP ENR 5.3-29 F)SFC G)UNL)



PGGE05 EGRR 171200

ISSUED BY W AFC LONDON
 PROVIDED BY W AFC LONDON
 FIXED TIME PROGNOSTIC CHART
 ICAO AREA E SIGWX
 FL 250-630
 VALID 12 UTC 18 MAR 2011

CB IMPLIES TS, GR,
 MOD OR SEV TURB AND ICE
 UNITS USED: HEIGHTS IN FLIGHT LEVELS
 CHECK SIGMET, ADVISORIES FOR TC AND
 VA, AND ASHTAM AND NOTAM FOR VA
 CHECK NOTAM FOR RADIATION LEAK

CAT AREAS			
1	OCNL 390 XXX	4	420 310
2	OCNL 430 XXX	5	390 XXX
3	380 XXX	6	500 250
		7	460 310
		8	OCNL 440 280
		9	430 280

Attachment 5 SIGMET on radioactive cloud

WSJP31 RJTD 170610

RJJ SIGMET 4 VALID 170610/171010 RJTD-

RJJ FUKUOKA FIR MOD TO SEV TURB FCST WI N3620 E13350 - N3630 E13140

- N3440 E12910 - N3340 E13150 - N3440 E13410 - N3620 E13350

FL270/330 MOV E 20KT NC.

RDOACT CLD FCST WI N3714 E14047 - N3709 E14102 - N3714 E14116 -

N3725 E14122 - N3737 E14116 - N3742 E14102 - N3737 E14047 - N3725

E14041 - N3714 E14047 STNR INTST UNKNOWN=