

WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR BASIC SYSTEMS

CBS TASK TEAM ON THE DEVELOPMENT OF OPERATIONAL PROCEDURES FOR NON-NUCLEAR ERA (TT-DOP-nNERA)

MELBOURNE, AUSTRALIA, 5 – 8 NOVEMBER 2012



FINAL REPORT



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EXECUTIVE SUMMARY

The Meeting of the CBS Task Team on the Development of Operational Procedures for non-Nuclear Emergency Response Activities (TT-DOP-nNERA) was held at the Bureau of Meteorology, in Melbourne, Australia, from 5 to 8 November 2012.

The Team was presented with background information related to the OPAG on DPFS, in particular recalled the relevant decisions of the sixteenth session of the World Meteorological Congress (Cg-16, Geneva, Switzerland, May 2011) and statements adopted by the fifteenth session of the Commission for Basic Systems (CBS-15, Jakarta, Indonesia, September 2012), including the DPFS structure and the Task Team Terms of Reference, and agreed on a number of follow up actions, which were included in the Task Team work plan for the period 2012-2014, focused on aspects related to operational procedures and capacity building.

The Team reviewed the first draft set of operational procedures for non-nuclear ERA, which followed the structure (template) for the new *Manual on the GDPFS* (WMO-No. 485). A second draft was prepared during the meeting, which should be further refined and tested in an exercise, planned to be held by mid-2013.

The Team discussed mechanisms for capacity building and made proposals for improving the content and structure of the WMO web site for ERA. The Team recommended demonstrating transfer of the dispersion modeling capability to NMHSs, and identified the NMHSs of Argentina and South Africa as possible candidates.

GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING

1.1 The Meeting of the CBS Task Team on the Development of Operational Procedures for non-Nuclear Emergency Response Activities (TT-DOP-nNERA) was opened by its chairperson, Mr Chris Ryan (Australia), at 09.30 hours on Monday, 5 November 2012, at the Headquarters of the Bureau of Meteorology (BoM), in Melbourne, Australia. Mr Ryan welcomed participants to the meeting. He introduced Dr Sue Barrell, Assistant Director for Observations and Engineering of the Australian BoM and Vice-President of the Commission for Basic Systems (CBS), to address the meeting.

1.2 Dr Sue Barrell, on behalf of the Director of the Australian Bureau of Meteorology Dr Rob Vertessy, and on her own behalf also as Vice-President of CBS, welcomed all participants to the meeting of the CBS/TT-DOP-nNERA and to Australian BoM headquarters, in Melbourne, Australia. Dr Barrell recalled that the Technical Conferences at the last sessions of CBS have been focused on end-to-end Basic Systems (from observations to service delivery), which are the core business of NMHSs. She highlighted the role of the Global Data-processing and Forecasting System (GDPFS), including the Emergency Response Activities (ERA), as a critical integrating component of these end-to-end systems across multi-scale (space and time), which consists of a global forecasting operational infrastructure operated by Members that greatly contributes to their national programmes, including user requirements. Dr Barrell also recalled that the Technical Conference at the fifteenth session of CBS, had a dedicated session on *Understanding and Communicating the Return on Investment through the Basic Systems and Services*, which highlighted the importance of liaising and establishing good relations with various stakeholders (e.g. World Bank). Establishing operational procedures for non-Nuclear ERA, which will be incorporated into the Manual on the GDPFS (WMO-No. 485), is an example of the application and provision of the benefits of the such systems to customers and also contribute to the WMO's Rolling Review of Requirements (RRR). Dr Barrell stressed the importance of Capacity Building activities that this meeting is considering, in order to make sure that the procedures are used and understood by all concerned. She noted that the Severe Weather Forecasting Demonstration Project (SWFDP) is a possible mechanism for leveraging such systems. Dr Barrell noted that the work of this Task Team greatly contributes to CBS. She concluded by wishing everyone a successful meeting and a pleasant stay in Melbourne.

1.3 Mr Peter Chen, on behalf of the Secretary-General of the WMO, Mr Michel Jarraud, welcomed participants to the meeting and expressed appreciation of WMO to the Australian BoM for hosting this meeting in Melbourne, and for providing the excellent meeting facilities and local arrangements. Mr Chen also thanked Mr Chris Ryan of the Australia BoM for guiding the work of the TT-DOP-nNERA. Mr Chen recalled that the recent CBS-15 has approved significant changes to its working structure, including to the OPAG on DPFS, which is task-oriented for responding even more efficiently to evolving requirements, key objectives, and WMO priorities. These changes will have an impact to the work plan for the WMO Emergency Response Activities (ERA) programme. He recalled that the "Regional and Global Arrangements" of the ERA, as stated in the *Manual on the GDPFS* (WMO-No. 485), describe the operational procedures for the provision of atmospheric transport model (ATM) products by the designated WMO Regional Specialized Meteorological Centres (RSMCs) in support of nuclear environmental emergency response, which are mature, and its response systems well practiced. Similar arrangements have not been developed in the case of an emergency posed by an airborne non-nuclear non-radiological hazard. In addition, CBS-15 has been considering looking at response to emergencies in a broader context, associated with weather, climate, water and environmental hazards, and Members expect that any possible operational procedures for responding to emergencies be built upon the lessons learnt from the experience of development of the system for nuclear ERA. He concluded by wishing everyone a successful meeting.

2. ORGANIZATION OF THE MEETING

2.1 Adoption of the agenda

2.1.1 The Team adopted the provisional agenda without changes, as provided in Annex I to this report.

2.2 Working arrangements

2.2.1 All documents submitted for the meeting are referenced and hyperlinked in the Documentation Plan (INF. 1), which had been posted on the WMO website at:

http://www.wmo.int/pages/prog/www/DPFSERA/Meetings/TT-DOP-nNERA_Melbourne2012/DocPlan.html

2.2.2 The Team agreed its hours of work and other practical arrangements for the meeting. The list of participants in the meeting is provided in Annex II to this report.

3. OUTCOMES OF CG-16 (2011), AND CBS-15 (2012) INCLUDING DPFS STRUCTURE AND TASK TEAM TERMS OF REFERENCE

3.1 The Team was presented with background information related to the OPAG on DPFS, including recalling statements adopted by the fifteenth session of the Commission for Basic Systems (CBS-15, Jakarta, Indonesia, September 2012), and relevant decisions of the sixteenth World Meteorological Congress (Cg-16, Geneva, Switzerland, May 2011).

3.2 The Team noted that Cg-16 encouraged the continued collaboration with other relevant international organizations on meteorological aspects of mitigating the major impacts of environmental emergencies related to airborne hazards. In particular, Cg-16 noted the well-coordinated supply of useful radioactive atmospheric transport and dispersion prediction products by the RSMCs for Environmental Emergency Response (EER), arising from the Fukushima nuclear incident, and the successful collaboration with the IAEA and CTBTO. The Team agreed to address the working relations with other relevant international organizations under agenda item 10.

3.3 The Team noted that Cg-16 requested the WMO Secretary-General and CBS, in collaboration with other relevant technical commissions (e.g. CAeM), to take appropriate actions to review the existing procedures, taking advantage of similar activities carried out by relevant international organizations. In addition, in the context of national disaster management practices, there are issues associated with the provision of specialized meteorological information to the general public, including proper representation of this information. Cg-16 therefore requested CBS to review the EER procedures to strengthen these aspects in the *Manual on the GDPFS* (WMO-No. 485). While recognizing that the provision of information for the general public is a very sensitive issue and is not part of the ERA procedures, the Team stressed the need to address this issue in order to respond to Members. It noted that CBS-15 provided a direction on the way forward, primarily focused on further assisting NMHSs in the interpretation of ERA-related products and their application for national purposes, and agreed to further address these aspects in the WMO-TD. 778. In addition, the Team noted that CBS-15 requested Members who host RSMCs to consider the provision of appropriate training courses in the use and interpretation of their guidance and products. The Team stressed the need for training of trainers in all WMO Regions, while recommending that the WMO Secretariat send out a circular letter to WMO Members and an e-mail to the ERA contact points informing/publicizing the aspects covered by the WMO-TD. 778, which provides documentation for Meteorologists at NMHSs on the RSMC support for Environmental Emergency Response, and agreed to include reference (web link) to the WMO-TD. 778 in the dissemination of ERA products issued by RSMCs. The Team agreed to further discuss capacity building activities under agenda item 8.

3.4 The Team noted the significant progress that has been made with the comprehensive revision of the *Manual on the GDPFS* (WMO-No. 485), following the adoption by Cg-16 of the revised Manual's outline. The Team noted that the revised Manual is organized in such a way that it should allow the future incorporation of, and accommodate, technical aspects that may arise from emerging initiatives. It also noted that the revised Manual introduces a number of changes to the current procedures, and that some GDPFS centres may report temporary non-compliance with regard to some of the requirements, mainly because of resource constraints during system development or adaptation. In this context, and noting that the new Manual would most likely be in force by 2015, CBS-15 requested the Secretariat to clearly indicate the comprehensive summary of changes of functions and procedures well in advance to ensure the smooth transition, and also recommended that a transition plan for the implementation of the new Manual (which will replace the current version) be developed to manage the technical changes and the initial designation of the GDPFS centres as defined in the new Manual, including WMCs and RSMCs, for consideration by the next session of CBS. The Team agreed to address the development of operational procedures for non-Nuclear ERA under agenda item 6 and the related aspects in the new Manual on the GDPFS in agenda item 7.

3.5 The Team noted that CBS-15 agreed that there is a need to incorporate the mandatory functions and criteria for the designation of RSMC with activity specialization in Atmospheric Sand and Dust storm Forecasts (RSMC-ASDF) in the current version of the Manual on the GDPFS, and therefore proposed an amendment to the Manual on the GDPFS, as found in Annex 1 to Recommendation 4.4/2 (CBS-15). However, CBS-15 expressed its concerns regarding the uncertainty of the sand and dust storm model outputs and the consistency between these products and the observations; and therefore requested the OPAG on DPFS to work with the CAS Committee on SDS-WAS in the assessment of the reliability/maturity of such products for operational purposes, as well as in further developing and utilizing widespread dust forecasting models. Until these matters are resolved, CBS-15 decided to include a statement concerning their reliability with these products. The Team agreed to address these issues under agenda item 4.1. The Team noted that CBS-15 was presented with and endorsed the nomination of the centre in Barcelona (Spain) to act as an RSMC-ADSF for the Northern Africa (north of Equator), Middle East and Europe.

3.6 The Team noted that CBS-15 tasked the OPAG on DPFS with development of operational procedures for significant non-nuclear incidents, where a NMHS could request and receive ATM support from an RSMC, for consideration by the next session of CBS. It agreed that this will be the main purpose of the current meeting and therefore will be addressed under agenda item 6.

3.7 The Team was informed of the new working structure for DPFS adopted at CBS-15, including the Expert Team on Operational Forecasting Process and Support (ET-OFPS), the Expert Team on Operational Predictions from Sub-seasonal to Longer-time Scales (ET-OPSLS), and the Expert Team on Emergency Response Activities (ET-ERA). It noted the possible impacts of this new structure to ERA, including the fact that atmospheric sand and dust storm forecast aspects may be addressed by the ET-OFPS. It also noted that CBS-15 stressed the need for designation criteria and functions for Centres that could specialize in the development and provision of products and services to assist humanitarian agencies in mitigating the impacts of meteorological-related hazards, which could be based on the lessons learnt from the ERA. The Team noted that the working structure and programme will be discussed at the Interim-ICT meeting, planned to be held in Geneva, Switzerland, in January 2013. In preparation for this meeting, the meeting decided to review the Terms of Reference (ToR) of the previous CBS Expert Team on Applications of Atmospheric Transport Modelling (ATM) for Non-nuclear ERA (ET-nNERA), aligning with the new DPFS structure, under agenda item 11.

4. UPDATES

4.1 WMO Sand and Dust Storm Warning Advisory and Assessment System

4.1.1 The Team recalled that the 2009 meeting of the CBS Expert Team on Applications of Atmospheric Transport Modelling (ATM) for Non-nuclear ERA (ET-nNERA) endorsed the CBS review document (October 2009) on the draft Implementation Plan of the Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS), and provided a number of additional comments for consideration by the proposed ad-hoc joint CAS-CBS Task Team, which was established with representatives from the CBS OPAG on DPFS and CAS in order to prepare an amendment to the *Manual on the GDPFS* (WMO-No. 485) on mandatory functions and designation criteria for a RSMC(s) with activity specialization in Atmospheric Sand and Dust storm Forecasts (RSMC-ASDF), which was presented at and endorsed by CBS-15, as found in Annex 1 to Recommendation 4.4/2 (CBS-15).

4.1.2 The Team recalled that CBS-15 expressed its concerns regarding the uncertainty of the sand and dust storm model outputs and the consistency between these products and the observations; and therefore requested the OPAG on DPFS to work with the CAS Committee on SDS-WAS in the assessment of the reliability/maturity of such products for operational purposes, as well as in further developing and utilizing widespread dust forecasting models. In addition, the Team noted that there were a number of unresolved issues within the Regional Association (RA) II, which would need to be addressed before any proposed nominations to CBS. In this context, the Team noted the draft text for the upcoming session of RA II (December 2012) which requests the SDS-WAS Regional Steering Group for Asia to consider establishing an SDS-WAS node for the western part of RA II, and proposes an assessment(s) of the capabilities to produce and deliver atmospheric sand and dust storm forecasts, and a demonstration(s) of possible operational arrangement(s) to serve Members of the eastern and western parts of RA II. The Team noted that these issues will be followed up by the co-chairperson of the OPAG on DPFS, Mr Yuki Honda (Japan) together with another expert (to be identified; most likely from the RSMC-ASDF Barcelona), within the framework of the ET-OFPS.

4.2 ICAO requirements related to non-nuclear ERA

4.2.1 The Team noted that the needs of international civil aviation for meteorological information are defined in ICAO Annex 3 — *Meteorological Service for International Air Navigation* / WMO Technical Regulations [C.3.1], which includes, *inter alia*, requirements for meteorological information on the occurrence or expected occurrence of atmospheric sand and dust storms, volcanic ash, and toxic chemicals, which are threats to aviation.

Sand and Dust Storms

4.2.2 The Team also noted that Amendment 76 to Annex 3/Technical Regulations [C3.1] proposes the introduction of criteria defining moderate and heavy sand and dust storms (under Appendix 6, 4.2.9), as follows:

- 4.2.9 Recommendation — *Sand storm / dust storm should be considered:*
- a) *heavy whenever the visibility is below 200 m and the sky is obscured; and*
 - b) *moderate whenever the visibility is:*
 - 1) *below 200 m and the sky is not obscured; or*
 - 2) *between 200 m and 600 m.*

4.2.3 The Team noted that the proposed criteria, developed in consultation with WMO, will assist Meteorological Watch Offices in the preparation of SIGMET (and AIRMET) information for flight information regions. Amendment 76 to Annex 3 is subject to adoption by the ICAO Council in early 2013 prior to applicability on 14 November 2013.

4.2.4 The Team noted that, in principle, developments such as SDS-WAS and the designation of RSMC(s)-ASDF are of interest to ICAO, since they can be expected to advance the (meteorological) capabilities of States where sand and dust storms occur, and could in the future be used to improve Meteorological Watch Offices' capability to prepare SIGMET (and AIRMET) information. However, such support is not currently required by international civil aviation and therefore the costs associated with their development and operation cannot be recovered through air navigation service charges.

Volcanic Ash

4.2.5 The Team noted that ICAO established, in consultation with WMO, an International Volcanic Ash Task Force (IVATF) during the Eyjafjallajökull eruption to urgently address the issues that had caused significant disruption to civil aviation in Europe, the North Atlantic and beyond. Over a period of 2 years, and complementary to an existing ICAO International Airways Volcano Watch Operations Group (IAVWOPSG), the IVATF worked on approximately 40 tasks to advance the scientific understanding and operational response to volcanic eruptions and volcanic ash in the atmosphere. The Team also noted that Amendment 76 to Annex 3/Technical Regulations [C3.1] proposes the introduction of a requirement for States with active or potentially active volcanoes to ensure that the volcano observatory monitors these volcanoes – the existing provision only requires the monitoring of *active* volcanoes. A revision of ICAO's air traffic control procedures when volcanic ash is reported or forecast is expected to become applicable in November 2014 through an amendment to PANS-ATM (Doc 4444). The Team noted that ICAO greatly appreciates the continued support of WMO and its Technical Commissions, in particular CAeM and CBS, in the continued advancement of the scientific understanding and operational (emergency) response to volcanic eruptions and volcanic ash in the atmosphere.

4.2.6 The Team noted that, in respect of updated guidance, the ICAO *Handbook on the International Airways Volcano Watch – Operations Procedures and Contact List* (Doc 9766) and *Manual on Volcanic Ash, Radioactive Material and Toxic Chemicals* (Doc 9691) have undergone comprehensive review and, where necessary, revision. In addition, new guidance in the form of a *Manual on Flight Safety and Volcanic Ash – Risk Management of Flight Operations with Known or Forecast Volcanic Ash Contamination* (Doc 9974) has been published to provide guidance which States may recommend to operators and regulatory authorities where volcanic ash contamination may be a hazard for flight operations.

Toxic chemicals

4.2.7 The Team noted that during the consultation of draft Amendment 75 to Annex 3 in 2009, Contracting States identified a need for guidance on the issuance of aerodrome warnings relating to toxic chemicals. It had been indicated, by States, that it was unclear what toxic chemicals exactly meant. Since there was limited expertise in the field of toxic chemicals within the ICAO Secretariat, the ICAO Air Navigation Commission agreed that WMO, as the expert body in this area, should be invited to prepare additional guidance on toxic chemicals which would assist States in the issuance of aerodrome warnings accordingly. The Team noted that following consultation with and assistance from WMO, appropriate guidance has been included in the ICAO *Manual on Volcanic Ash, Radioactive Material and Toxic Chemicals* (Doc 9691). The guidance highlights that airborne toxic chemicals are highly localized events and the associated hazardous effects are usually sudden and short-lived in nature. For this reason, they are dealt with typically at a local level to ensure adequate, immediate emergency response. Since the main potential impact at an aerodrome would be if the source of the chemical release was nearby, local arrangements within a State are considered to be the most efficient means to deal with the hazard. The new guidance in Doc 9691 cross-references to appropriate WMO guidance on emergency response activities contained within WMO-TD. 778, in particular Annexes 8 (Guidance on response to chemical incidents - definition of requirements concerning chemical incidents), 9 (Role of national meteorological services (NMSs) in response to chemical incidents) and 10 (Guidance for development of the interface between a national meteorological service and other emergency response agencies in case of chemical incidents). The Team noted that ICAO greatly appreciates

the assistance by WMO and its Technical Commissions, in particular CAeM and CBS, in the development of this new guidance, and agreed to highlight the potential impacts of chemical incidents on aviation into the planned exercise. The Team agreed to further address this issue under agenda item 6.

5. REVIEW OF WORK PLAN, AND RECOMMENDATION OF NON-NUCLEAR ERA TASK TEAMS AREAS OF WORK

5.1 The Team reviewed the work plan established in 2005, and revised in 2007 and 2009, to the CBS Expert Team on Applications of Atmospheric Transport Modelling (ATM) for Non-nuclear ERA (ET-nNERA). It reported on the progress of the items, and decided which items are to be retained, and added new actions that arose out this meeting's conclusions. The Team defined priority areas for the future work programme, taking into consideration the directions for the DPFS and its new structure. The Team agreed that the priority areas in its work plan will be:

1. Operational Arrangements
2. Capacity Building
3. Work with International Organisations

5.2 Within the Operational Arrangements, the Team agreed that the first activity will be to complete the drafting of operational procedures for significant non-nuclear incidents, followed by the proposed experiment which will exercise the procedures (see agenda item 6). The full work plan for the Task Team for 2012-2014 is given in Annex III to this report.

6 DEVELOPMENT OF OPERATIONAL PROCEDURES AND EXERCISE

6.1 The Team recalled that the 2009 meeting of the ET-nNERA agreed on guidelines for the development of operational procedures for non-nuclear incidents as follows:

- The current PR to PR (Permanent Representative with WMO) arrangement is purely administrative and not "operational" and could not support operational needs.
- Operational procedures would be developed for "significant incidents" meeting defined criteria, excluding short-fused, short-lived local incidents
- The established nuclear ERA arrangement should be used as a guide when developing the new procedures.
- A regional ATM centre does not have to be an existing RSMC, nor would all RSMCs be required to agree to provide support, nor would the regional ATM centre necessarily have to support all NMHSs in a WMO Regional Association. A regional ATM centre could provide support to a limited number of NMHSs in its neighbouring region (e.g. within 1500 km).
- The procedure should include a NMHS designated "delegated authority" for requesting regional ATM support, and a NMHS operational contact point for receiving the defined ATM products.

6.2 The Team noted that a first draft set of operational procedures for non-nuclear ERA was developed using the agreed guidelines. This draft has been prepared in the format required for the new *Manual on the GDPFS* (WMO-No. 485). Noting that the new *Manual* includes separate procedures for Atmospheric Sand and Dust storm Forecasts and Volcanic Ash, the Team focused the revision of the draft set of operational procedures for other non-nuclear hazards, such as smoke from large fires and large chemical releases. The revised set of operational procedures is given in Annex IV (second draft) to this report. The Team requested the Secretariat to circulate this second draft text to the relevant experts for feedback. It stressed the need for capacity building activities to ensure the effective use and interpretation (uptake) of the products that would be made available by the RSMCs, through these operational procedures, to NMHSs, and that a number of aspects should be further expanded / addressed in WMO-TD. 778. These issues will be further addressed in agenda items 8 and 9, respectively.

6.3 While revising the draft set of operational procedures, the Team enquired about whether WHO has developed standards and/or guidelines that could help defining contouring values for the graphical products. It noted that WHO has produced Air Quality Guidelines for Europe (<http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality/publications/pre2009/air-quality-guidelines-for-europe>), which are based on long-term exposure. It also noted that the US EPA has developed the Acute Exposure Guideline Levels (AEGs, <http://www.epa.gov/oppt/aegl/>), which give concentrations of concern for different periods of exposure up to 8 hours. The Team also noted that the American Industrial Hygiene Association has prepared the Emergency Response Planning Guidelines (<http://www.aiha.org/insideaiha/GuidelineDevelopment/ERPG/Pages/default.aspx>), and that the US National Institute of Occupational Safety and Health has developed the Immediately Dangerous To Life or Health Concentrations (IDLHs, <http://www.cdc.gov/niosh/idlh/intridl4.html>). It should be noted that the Team agreed to limit the RSMC support to releases that have the potential for long range impacts (defined as distances greater than 50 km). Therefore these guidelines may not be relevant for long range impacts.

6.4 The Team stressed that the second draft set of operational procedures should be tested in an exercise, and therefore discussed the objectives of this exercise and defined a suitable chemical incident scenario. It agreed that the main objective of this exercise is to test operational procedures for request/reply for RSMC support for a significant chemical incident, rather than evaluate the accuracy of the models. This exercise will also demonstrate and illustrate to the NMHSs involved the use of ATM in a significant incident for supporting decision-making, and will demonstrate to CBS the practicability of the developed procedures.

6.5 A suitable smoke from industrial fire scenario will be developed, led by the ET-ERA Chairperson, and the exercise would be carried out preferably in June or July 2013. An appropriate location for the simulated fire has been selected (i.e. the Campana-Zarate petrochemical plant in Argentina, which is located close to the Uruguay border). In the event of a major fire, transboundary impacts and effects on large population centres, such as Buenos Aires and Rosario City, could be expected. The incident scenario could include the following features:

- Use a real scenario, and run with real weather data on the decided date (one run for a few days);
- Involve NMHSs of Argentina, Uruguay and Brazil; inform other NMHSs in RA III and ICAO (to highlight the potential impacts to aviation);
- NMHS in Argentina will make one request, and one RSMC only (Washington or Montreal – to be decided) will provide its products for one model run, while all RSMCs will be informed and produce their products to demonstrate the procedures, but will not share the information.

7. MANUAL ON THE GDPFS (RELEVANT SECTIONS ON ERA)

7.1 The Team reviewed and revised the draft text for the new *Manual on the GDPFS* (WMO-No. 485) while working on the second draft set of operational procedures, under agenda item 6. The draft text for the new *Manual* is given in Annex IV to this report. The Team noted the new *Manual* should be completed by February 2014.

7.2 The Team noted that the new *Manual on the GDPFS* includes a section describing the minimum information on the characteristics of the atmospheric transport modelling system to be provided by the RSMCs. Noting that there are a number of questionnaires addressing this issue, the Team recommended that this information be used for the development of this section in the new *Manual*, and tasked the ET-ERA chairperson to prepare a draft of this section and circulate it among the Task Team members and other relevant experts, especially those responsible for the existing RSMCs with activity specialization in the provision of atmospheric transport modelling for environmental emergency response and/or backtracking. The Team requested the Secretariat to add the RSMCs' email addresses on the ERA web page (http://www.wmo.int/pages/prog/www/DPFSERA/transport_model_products.htm).

8. MECHANISMS FOR CAPACITY BUILDING

8.1 The Team recalled that “Identify and promote technical resources which can assist NMHSs in developing their atmospheric transport modelling capabilities, particularly for limited area non-nuclear emergencies such as chemical releases to the atmosphere” was part of the Terms of Reference for the ET-nNERA, adopted at CBS-14 (2009). It also recalled that in relation to capability building, CBS-Ext.(06) had endorsed the ET-nNERA’s conclusions that, because of the predominately “localized” nature of environmental emergencies related to chemical incidents, that the strategy and plan should be concentrated on developing the necessary capabilities at the NMHSs. In the case of smoke from large fires, a regionalized approach would be appropriate, where designated RSMCs would provide emergency support to NMHSs and at the same time build capacity at the national level.

8.2 The Team recalled that a WMO survey was carried out among NMHS in 2004 to develop an understanding of their requirements and capabilities in emergency response, including non-nuclear airborne hazard events. The highlights of the survey conclusions were:

- Many want support, training and guidance in all hazard areas;
- Some, even if they already run modelling systems, want guidance and training because of the limitations of their own models or modelling systems;
- The first priority need for assistance is the case of atmospheric dispersion from chemical accidents and the second priority is for smoke from wild-land fires, with the third priority being in biological emergencies;
- The modelling capabilities in the case of chemical accidents are presently quite unequally distributed among the Regions, with the majority concentrated in Europe. Those NMHSs that are planning to develop atmospheric dispersion capabilities for environmental emergencies noted their priority was in this area;
- Although chemical dispersion and transport in water are seen as a similar level of threat as smoke from forest and grass fires, the existing modelling capabilities for the transport in water are less developed than for the atmospheric pathway, and assistance in the case of an accidental release to water is less requested than releases into the atmosphere.

8.3 While noting that these conclusions may still be relevant, the Team recommended reviewing the user requirements by including ATM aspects from the ERA survey into *Annual WWW Technical Progress Report on the GDPFS and the Annual Numerical Weather Prediction (NWP) Progress Report* and including the results on ERA web pages.

8.4 The Team noted the existing modelling capabilities and available tools at RSMC Washington and RSMC Beijing, including for smoke from forest and grass fires and toxic chemical releases, and agreed that these would greatly contribute to capacity building activities for non-nuclear ERA. While acknowledging the extensive amount of very useful technical information presently available on the WMO web site for ERA programme, at <http://www.wmo.int/pages/prog/www/DPFSERA/EmergencyResp.html>, the Team agreed to advise the Secretariat on available n-NERA dispersion modeling capabilities from institutions in their RA area that can be ported to NMHSs, emphasizing the modeling capabilities that provide source information for toxic chemical release, so that the Secretariat can include these references into the WMO web site for ERA.

8.5 At the same time, the Team noted that there are a number of web-based training modules on operational dispersion for non-nuclear, e.g.:

NOAA/ARL: <http://www.meteozone.com/tutorial/html/index.html>
<https://ready.arl.noaa.gov/hysplitcameo/training/index.html> (password protected)

UCAR/COMET Training: https://www.meted.ucar.edu/training_module.php?id=33

U.S. EPA: <http://www.epa.gov/scram001/dispersionindex.htm>

CAMEO/ALOHA: <http://www.epa.gov/osweroe1/content/cameo/index.htm>

DTRA/HPAC:

[http://www.dtra.mil/documents/business/DNWS/2011DNWSCatalogFINAL\(09September2010\).pdf](http://www.dtra.mil/documents/business/DNWS/2011DNWSCatalogFINAL(09September2010).pdf)

that could be made available to NMHSs to ensure proper use of ATM for non-nuclear ERA. In this context, and noting that many of these web sites are password protected, the Team requested the Secretariat to work with those that have been developing these modules in order to allow access to these web sites by NMHSs. At the same time, it recommended that these materials be publicized among the NMHSs and the inclusion of these links on the WMO-TD. 778.

8.6 The Team realized that the WMO web site for ERA, including WMO-TD. 778, is under-utilized by NMHSs, and stressed the need for promoting it, including its resources. At the same time, feedback should be sought from those who access and further pursue suggested links to other resources. The Team suggested that a user feedback form be further developed on the WMO web site for ERA, which should be guided by a few focused questions on usefulness of information and links provided. It requested the Secretariat to distribute the web page usage statistics to Team members. The Team recommended that the web site be updated to highlight distinction between nuclear and non-nuclear materials, and ensure that meteorological model resources list is up-to-date, including links on fire-monitoring sites. The Team also recommended that the WMO Bulletin article on ERA (January 2006) be updated when the operational procedures for non-nuclear ERA are in place, to further promote the programme. It requested the Secretariat to post on the web site the compiled glossary of terms relating to ATM.

8.7 The Team stressed that most atmospheric transport and diffusion models require some form of driving meteorological current conditions and/or predictions (NWP) to produce a forecast of the dispersion plume. Non-Nuclear dispersion emergencies are often localized in nature (less than 50 km), therefore, the NWP should resolve important local-scale flow features that could impact the dispersion forecast. Background on properly representing local-scale weather for dispersion calculations are described in WMO-TD. 778. Such flows such as land-sea breezes, mountain valley flows or other orographically induced flows often require high resolution meteorological analyses or predictions (under 10 km grid spacing), which have been made to a number of NMHSs within the framework of the Global Data-processing and Forecasting System (GDPFS) programme, including through the implementation of the Severe Weather Forecasting Demonstration Project (SWFDP). The Team noted that even when such grids are available, they may not be coupled with available dispersion models for easy use. Therefore, and noting the list of meteorological models available through the GDPFS (see individual *Annual WWW Technical Progress Reports on the GDPFS and the Annual Numerical Weather Prediction (NWP) Progress Reports* at http://www.wmo.int/pages/prog/www/DPFS/ProgressReports/2012/2011_GDPFS-NWP.html and the summary of the *Status the WMO Forecasting Centres relative to Numerical Models* at ftp://ftp.wmo.int/Documents/PublicWeb/www/gdpfs/GDPFS-NWP_Annualreports10/STATUSTA2010.doc), the Team recommended that those models that could be readily used for operational dispersion modeling be identified from that list and reference be provided on the WMO web site for ERA. The Team suggested demonstrating transfer of the dispersion modeling capability to NMHSs, and identified the NMHSs of Argentina and South Africa as possible candidates.

9. ERA WEBSITE CONTENT AND STRUCTURE

9.1 With respect to the structure of the ERA website and based on the long experience with the nuclear side of ERA, the Team noted that:

- The nuclear ERA information is mature and does not require significant changes, except for regular updates.

- The non-nuclear ERA aspects, procedures, etc need to be added. The website structure must be flexible enough to easily accommodate new information and procedures with a minimum of restructuring.
- Developing, maintaining and updating the website require regular work. The more specific and detailed web pages are, the more work is needed to maintain them.
- The basic structure of the website and its main sections is sound and can be easily adapted to include the non-nuclear ERA aspects such as procedures, capacity building, case studies, etc.

9.2 The Team agreed that the following approach would be taken with respect to the development of non-nuclear ERA web pages and documentation in WMO-TD 778:

- Keep the main sections as they are now:
 - [Emergency Response Activities \(ERA\) Overview](#) (main page)
 - 1- [Procedures](#)
 - 2- [Resources and Tools](#)
 - 3- [Background and reference material](#)
 - 4- [Case Studies & examples of ERA events and products](#)
 - 5- [Purpose, objectives and organization of the ERA programme](#)
 - 6- [Contacts](#)
- Where possible, keep / adapt the existing text to include nuclear and non-nuclear ERA. For example, pages that describe in general terms the ERA programme, such as the main page.
- Where not possible or desirable, keep / create separate links for nuclear and non-nuclear (or other) activities. For example, in the main section [Procedures](#), move things dealing with nuclear ERA in a “nuclear” web link; create a non-nuclear (or other) web link. That will permit the population of the corresponding new web pages with information, procedures, etc. as they become available.

9.3 Some of the modifications identified under agenda items 6 to 8 include:

- Add new relevant sections from the Manual on the GDPFS for non-nuclear ERA. For example, Appendix A.II.2.2.9d (Characteristics of atmospheric transport modelling system) and Appendix A.II.2.2.9f (Users interpretation guide for non-nuclear atmospheric transport model products provided by RSMCs).
- Add documentation on capacity building and training for non-nuclear ERA (agenda item 8).
- Include examples of modelling for non-nuclear events: forest fire smoke and corresponding satellite imagery; chemical fires, etc.
- Document what the parameters in the request for support form mean (base and top of release, etc.).
- Document NMHSs’ responsibility for information flow to users within their State.

9.4 The ET-ERA Chairperson and Co-chairperson will prepare a list of changes needed, identify TT members of the team that can contribute to specific sections and establish timelines.

10. WORKING WITH RELEVANT INTERNATIONAL ORGANIZATIONS

10.1 The Team noted that ICAO and WHO have been invited to the current meeting, but none of them were able to attend. It also noted that ICAO has submitted a document on its requirements for consideration by the Team (see agenda item 4.2).

10.2 The Team was informed of the actions carried out as a follow up to the three strategies identified by the ET-nNERA in its 2009 meeting, and noted that progress on developing linkages with relevant international organizations has been a challenge. The Team discussed the way forward as regards to further engagement of relevant international organizations on the work of the Team and recommended:

- Make relevant international organizations aware of the operational procedures for non-nuclear ERA, once they have been established;
- Share the information of the outcomes / report of the exercise, which should include an item on potential implications to other relevant international organizations.

11. ANY OTHER BUSINESS

11.1 The Team reviewed the Terms of Reference of the ET-nNERA, adopted by CBS-14, in 2009) with the view of contributing to the discussions at the upcoming extraordinary meeting of the ICT-DPFS, planned to be held in Geneva, Switzerland, in January 2013, on which the ET-ERA Chairperson and the Co-chairperson will attend. The Team identified the following expected outcomes for this Task Team:

- Development of resources on the WMO web pages for ERA to assist NMHSs and strengthen their capabilities (this expected outcome includes capacity building, training and documentation activities);
- Development and refinement of the operational procedures for non-nuclear ERA;
- Test the operational procedures by conducting an exercise, and share the outcomes / report with all NMHSs and relevant international organizations.

11.2 In order to improve the working methods and effectiveness, the Team agreed to convene teleconferences for frequent updates and follow up actions, involving all RSMCs with activity specialization in the provision of atmospheric transport modelling for environmental emergency response and/or backtracking. The Team requested the TT Chairperson to organize a first teleconference immediately after the planned extraordinary meeting of the ICT-DPFS (January 2013). It recommended the organization of two teleconferences in the first half of 2013 and one towards the end of 2013.

12. CLOSING

12.1 The Meeting of the CBS Task Team on the Development of Operational Procedures for non-Nuclear Emergency Response Activities (TT-DOP-nNERA) closed at 15:00 on Thursday, 8 November 2012.

AGENDA

1. **OPENING**
2. **ORGANIZATION OF MEETING**
 - 2.1 adopting the meeting agenda
 - 2.2 working arrangements
3. **OUTCOMES OF CG-16 (2011), AND CBS-15 (2012) INCLUDING DPFS STRUCTURE AND TASK TEAM TERMS OF REFERENCE**
4. **UPDATES**
 - 4.1 WMO Sand and Dust Storm Warning Advisory and Assessment System
 - 4.2 ICAO Requirements related to non-Nuclear ERA
5. **REVIEW OF WORK PLAN, AND RECOMMENDATION OF NON-NUCLEAR ERA TASK TEAMS AREAS OF WORK**
6. **DEVELOPMENT OF OPERATIONAL PROCEDURES AND EXERCISE**
7. **MANUAL ON THE GDPFS (RELEVANT SECTIONS ON ERA)**
8. **MECHANISMS FOR CAPACITY BUILDING**
9. **ERA WEBSITE CONTENT AND STRUCTURE**
10. **WORKING WITH RELEVANT INTERNATIONAL ORGANIZATIONS**
11. **ANY OTHER BUSINESS**
12. **CLOSING**

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**WORK PLAN FOR THE NON-NUCLEAR ERA PROGRAMME
(November 2012)**

Area of Requirement	Component Action	Responsibility	Timing / Milestone	Priority (as per paragraph 5.1)
Development of operational procedures	<p>Complete the drafting of operational procedures for significant non-nuclear incidents, including the minimum information on the characteristics of the ATM, and circulate it among TT members and other relevant experts, especially those responsible for the existing RSMCs</p> <p>Conduct experiment comprising a simulated request from NMHS to RSMC for assistance during a large chemical fire</p>	<p>ET-ERA Chairperson and Co-chairperson to complete the set of operational procedures</p> <p>Secretariat to circulate the draft for comments</p> <p>RSMCs to provide feedback</p> <p>Secretariat to add the RSMC email addresses on the ERA web page</p> <p>ET-ERA Chairperson to lead development of experiment scenario.</p> <p>RSMCs, Argentina, Uruguay and Brazil</p>	<p>Second draft by January 2013), final version by February 2014</p> <p>January 2013</p> <p>March 2013</p> <p>ASAP</p> <p>Scenario and plans by February 2013</p> <p>Conduct experiment by June/July 2013</p>	1
Capacity building and ERA web-page	Send out a circular letter to WMO Members and an e-mail to the ERA contact points informing/publicizing the aspects covered by the WMO-TD. 778	Secretariat	January 2013	2

Area of Requirement	Component Action	Responsibility	Timing / Milestone	Priority (as per paragraph 5.1)
	<p>Include reference (web link) to the WMO-TD. 778 in the dissemination of ERA products issued by RSMCs.</p>	<p>RSMCs with activity specialization in the provision of atmospheric transport modelling for environmental emergency response and/or backtracking</p>	<p>Ongoing</p>	
	<p>Advise the Secretariat on available n-NERA dispersion modeling capabilities from institutions in their RA area that can be ported to NMHSs</p>	<p>TT members, RSMCs to advise; Secretariat to post it on the WMO web site for ERA</p>	<p>January 2013</p>	
	<p>Work with those that have been developing web-based training modules in order to allow access to those web sites which are password protected by NMHSs, and publicize this materials on the website</p>	<p>Secretariat</p>	<p>ASAP</p>	
	<p>Review and update the WMO web site for ERA, including updating the glossary</p>	<p>ET-ERA Chairperson and co-chairperson to coordinate and identify TT members that could contribute and establish timelines; TT members to contribute (Mr Anton Muscat, Ms Gwenaëlle Hello, and Mr Jeff McQueen)</p>	<p>Coordination by January 2013, contributions prior to the exercise (June/July 2013)</p>	
	<p>Update the WMO Bulletin article on ERA (January 2006) to further promote the programme</p>	<p>Secretariat, with contributions by TT members</p>	<p>When the operational procedures for non-nuclear ERA are in place</p>	

Area of Requirement	Component Action	Responsibility	Timing / Milestone	Priority (as per paragraph 5.1)
	<p>Identify those NWP models that could be readily used for operational dispersion modelling</p> <p>Demonstrate transfer of the dispersion modelling capability to candidate NMHSs</p>	<p>Mr Jeff McQueen and Secretariat</p> <p>Secretariat to assist</p>	<p>March 2013</p> <p>Ongoing</p>	
Work with International Organizations	<p>Engage with relevant international organizations to promote the usefulness of ERA products and determine requirements</p> <p>Make relevant international organizations aware of the operational procedures for non-nuclear ERA</p> <p>Share the information of the outcomes / report of the exercise, which should include an item on potential implications to other relevant international organizations.</p>	<p>Secretariat</p> <p>Secretariat</p> <p>Secretariat</p>	<p>Ongoing</p> <p>Once the operational procedures have been established</p> <p>After the exercise</p>	3

**DRAFT SET OF OPERATIONAL PROCEDURES FOR NON-NUCLEAR ERA
(Second Draft)**

2.2.9 Response to non-Nuclear Environmental Emergencies

This activity includes a network of Regional Centre(s) and associated National Meteorological Centres within a geographical region.

RSMCs with activity specialization in response to non-nuclear environmental emergencies, shall:

- Prepare on request atmospheric transport forecast or hindcast products relating to events in which hazardous (*to be defined in the glossary*) non-nuclear contaminants have been released into the atmosphere. The criteria for activation of the Regional support procedures are defined in Appendix A.II.2.2.9.a.
- As soon as possible but within 2 hours of a request from an authorized person¹ make available to the NMHS operational contact point² or to the relevant international organization(s) on the WIS³ a range of these products. The minimum list to be made available, including parameters, forecast range, time steps and frequency, is given in Appendix A.II.2.2.9b.
- Inform the requesting NMHS or international organization, as well as other NMHSs in the same Regional Association, of the availability of products by email.
- Use agreed default emission source parameters for atmospheric transport modelling for essential parameters that are not provided. Default source parameters for a range of release scenarios are given in Appendix A.II.2.2.9c.
- Document in WMO TD No. 778 up-to-date information on the characteristics of its atmospheric transport modelling system. The minimum information to be provided is given in Appendix A.II.2.2.9d.

NMHSs or relevant international organizations requesting RSMC support in activity 2.2.9 shall:

- Request via the authorized person that an RSMC in the Regional Association concerned provides products relating to events in which hazardous non-nuclear contaminants have been released into the atmosphere. Requests should be made by e-mailing (faxing as backup) the completed form in Appendix A.II.2.2.9e to the appropriate Regional Centre(s) and confirming reception by phone.
- Provide the RSMCs with the essential information specified on the request form.
- NMHSs only will distribute the products within their State based on their national arrangements.

RESPONSIBILITY <i>(Changes to Activity Specification)</i>			
To be proposed by:	CBS/ET-ERA	CBS/ICT-DPFS	
To be approved by:	CBS		
To be decided by:	EC / Congress		
DESIGNATION			
To be approved by:	CBS		
To be decided by:	EC / Congress		
COMPLIANCE			
To be monitored by:	CBS/ET-ERA		
To be reported to:	CBS/ICT-DPFS	CBS	

¹ The person authorized by the Permanent Representative of the WMO Member to request RSMC Support or from a relevant international organization

² Designated by the Permanent Representative

³ RSMCs password protected dedicated website

APPENDICES

Appendix A.II.2.2.9a – CRITERIA FOR ACTIVATION OF REGIONAL SUPPORT PROCEDURES FOR NON-NUCLEAR EMERGENCY RESPONSE

Scope of the activity and criteria for activation

Environmental emergencies can be caused by a broad range of events with various temporal and spatial scales involving the release of hazardous substances into the environment. The scope of non-nuclear ERA includes: smoke from large fires, emissions from volcanic eruptions, and large chemical releases. Volcanic ash activities are covered under activity 2.2.6. Atmospheric Sand and Dust storms forecasts are covered under activity 2.2.10. Document WMO TD No. 778 provides detailed documentation on environmental emergency response activities.

NMHSs may request RSMC support for releases that have the potential for long-range impacts. Long range is defined as distances greater than 50 km.

Appendix A.II.2.2.9b – MINIMUM LIST OF PRODUCTS

Smoke from forest or grass fires (default values for parameters not provided)

- Arbitrary 1 unit mass release per fire
- Continuous release over 36 hours
- Release distributed from surface to 500 m
- Forecast duration 36 hours
- Hourly images and Shapefile
- Contouring at 4 values (1.0E-17 to 1.0E-14 for a 1 unit release)

Smoke / chemical from industrial fire (default values for parameters not provided)

- Arbitrary 1 unit mass release per fire
- Release duration 6 hours
- Release distributed from surface to 500 m
- Forecast duration 12 hours
- Relative or absolute concentrations from surface to 200 m
- Hourly images and Shapefile
- Contouring to be determined based on specifics of the event

Chemical releases not involving fire (default values for parameters not provided)

- Arbitrary 1 unit mass release
- Release duration 6 hours
- Release distributed from surface to 20 m
- Forecast duration 12 hours
- Relative or absolute concentrations from surface to 20 m
- Hourly images and Shapefile
- Contouring to be determined based on specifics of the event or the request

Backtracking

- Produce backtrajectories from point of interest for low levels based on specifics of the event or the request
- Hindcast to 36 hour
- Image and Shapefile

All products shall include a list of parameters that were used for the dispersion modelling as listed in Appendix A.II.2.2.9f.

The RSMC will perform a quick assessment of the products before they are issued, and may provide a short explanatory message if any issues of concern are noted.

Appendix A.II.2.2.9c – DEFAULT EMISSION SOURCE PARAMETERS

Scenario	Type of Event	Material released	Rate of Emission	Vertical Distribution
Forest or grass fires	Smoke	Tracer	One unit over 36 hours	Constant from surface to 500 m
Major industrial fire	Smoke / chemical	Tracer	One unit over 6 hours	Constant from surface to 500 m
Chemical release not involving fire	Chemical	Tracer	One unit over 6 hours	Constant from surface to 20 m
Other events	Variable	Tracer	One unit over duration of release	Variable

Appendix A.II.2.2.9d – CHARACTERISTICS OF ATMOSPHERIC TRANSPORT MODELLING SYSTEM

(To be developed)

Appendix A.II.2.2.9e – REQUEST FORM TO ACTIVATE RSMC SUPPORT

ENVIRONMENTAL EMERGENCY RESPONSE ALERT REQUEST FOR WMO RSMC SUPPORT BY AUTHORIZED PERSON¹

1. This form should be sent by e-mail to the RSMC operational contact in the Regional Association when support is needed for releases that have the potential for long-range impacts (distances greater than 50 km). The RSMC operational contact information is available on http://www.wmo.int/pages/prog/www/DPFSERA/transport_model_products.htm
2. The requester shall confirm reception of email at RSMC by phone.
3. The RSMC shall make available its products as soon as possible but within 2 hours.

DATE AND TIME OF REQUEST:

1) MANDATORY INFORMATION:

- Name, title, organization, Country and phone number of requester:
- Brief description of event:
- Date and Start time of release (specify local time or UTC):
- Location of release (as accurately as possible) in order of preference:
 - Latitude and longitude coordinates (as precise as possible; specify units as decimal degrees or degrees, minutes and seconds)
 - Address, city, Country

2) OTHER INFORMATION: If known, the following would be useful for the modelling and should be provided as well:

- Name of location (name of chemical plant, factory, etc.)

¹ The person authorized by the Permanent Representative of the WMO Member to request RSMC Support or from a relevant international organization

- Meteorological conditions at location (wind speed and direction / weather / cloudiness):
- Name of pollutant(s) to be modelled if known. *If unknown, a tracer will be used.*
- Quantity (mass) or release rate (mass per unit time) of pollutant. *If unknown, one unit mass will be used.*
- Expected release duration. *If unknown, modeller will use default parameters or make a reasonable assumption.*
- Duration of simulation for the dispersion model run. *If not provided, modeller will use default parameters or make a reasonable assumption.*
- Size of area of interest (for example, within 300 km of source). *If not provided, modeller will use default parameters or make a reasonable assumption.*
- Base above the surface, dimension of release area and maximum height in meters reached by the pollutant (top of smoke plume for example). *If not provided, modeller will make a reasonable assumption.*
- If quantity (mass) and name of pollutant(s) are provided, what concentrations should be displayed on modelling outputs? Please specify.
- Any other information that may be useful:

Appendix A.II.2.2.9f – USERS INTERPRETATION GUIDE FOR NON-NUCLEAR ATMOSPHERIC TRANSPORT MODEL PRODUCTS PROVIDED BY RSMCs
(adapt information from Appendix II-7)