W O R L D M E T E O R O L O G I C A L O R G A N I Z A T I O N
WEATHER, CLIMATE AND WATER

COMMISSION FOR HYDROLOGY

First meeting of the Management Committee (MC) for the CHy Project on the Assessment of the Performance of Flow Measurements and Techniques

(Geneva, 18 and 19 November 2009)

FINAL REPORT

1. Opening remarks

1.1 In his opening statement, Mr A. Tyagi, Director of the Climate and Water Department in the WMO Secretariat, welcomed the participants to the WMO headquarters and made a brief introduction on the activities of the WMO Commission for Hydrology (CHy), particularly in relation to flow measurements.

1.2 Mr P. Pilon, who chaired the meeting in his capacity of designated representative of CHy, thanked the different organizations represented at the meeting for having accepted to be part of the membership of the Management Committee (MC), and the invited experts for attending and assisting the group in undertaking the CHy project on the Assessment of the Performance of Flow Measurements and Techniques (hereafter referred to as "the Project"). After making a brief recount of the history leading to the formation of the MC and the adoption of the Project as part of the Work Programme of CHy, he asked the participants to consider the provisional agenda and suggest additions, if needed. The agenda was adopted without changes. It is attached as Annex 1 of this report.

2. Self- introduction by participants

2.1 All participants introduced themselves explaining the interest of their organization in the Project. In particular, Ms J. Pellaux explained that the ISO representative, Mr T. Yorke had been unable to attend on this occasion, but had prepared comments on the various items of the agenda, copies of which she distributed and were duly taken into account in the ensuing discussions. Mr G. Young informed the group that he was attending in his capacity of President of IAHS, but that the IAHS representative in the MC was Mr J. Le Coz. Finally, Mr B. Sumner introduced Mr J. Skripalle as the representatives of HMEI in the MC and Mr R. Hamelin as an observer also on behalf of HMEI. The list of participants is included in Annex 2.

3. Brief review of activities completed in 2007-2009

3.1 Mr Pilon reviewed the various outputs of the project during its first three years of existence, and reminded participants that all related information could be found in the Project website: http://www.wmo.int/pages/prog/hwrp/FlowMeasurement.html

4. Ongoing activities

4.1 Mr Pilon explained that the current meeting was mostly focused on taking decisions about future activities. The MC examined first those activities currently under implementation. Its decisions are reported below under the corresponding Project Output of the Work Plan (the draft version of which for 2010-2011 is contained in Annex 3 of this report).

Project output 1 - Summary of field discharge measurement instrumentation and techniques

4.2 The MC reviewed the draft synthesis report analyzing the responses to the survey, which had been prepared by J.Fulford and Z. Buzás. Participants were given an opportunity to send their final comments up to the end of 2009, based on which the authors would finalize the report by mid-January 2010. It was agreed that the report would be published on the project website as background material and that its Appendix B would be either removed or included with an explanatory note that its contents did not represent an inclusive list of manufacturers of hydrological equipment.

4.3 It was also decided that it would be beneficial to consider undertaking a new survey in approximately 5 years for comparison purposes and that the survey form would be withdrawn from the website. It was recommended that the current survey form be modified according to the comments received, as this would be helpful for the future exercise.

Project output 2 - Collection of international and national standards and guidelines regarding field discharge measurement instrumentation and techniques

4.4 The MC reviewed the Beta version of the website containing the online repository of standard and guidelines used by NHSs, suggested several modifications and agreed that the website should be launched by 1 February 2010. J. Fulford and P. McCurry were provided with a printed version of the database, which they were going to review to correct possible incorrect categorizations of entries.

Project output 3 - Framework for the assessment of uncertainty in discharge measurement and guidelines for its implementation

4.5 The MC considered the issue of the publication of documents already developed under this project output (PO), namely:

Guidelines for the assessment of uncertainty of hydrometric measurements – by M.Muste
Literature review of existing uncertainty analysis publications – by J.Fulford
Discharge uncertainty example: weighing and timing measurements of discharge – by J.Fulford

4.6 It was decided to recommend to the AWG of CHy to publish them as Guidance Material, after one or two additional examples of uncertainty analysis would be developed to complement the existing one (tentative date of completion of this new task to be agreed at the next teleconference). J. Fulford agreed to provide one additional example for typical open channel measurement conditions by early 2010. M. Muste volunteered to approach a colleague who is an expert in uncertainty analysis to develop a pertinent example possibly dealing with closed conduit flows.

4.7 Further discussion under this PO concentrated principally on Tasks 3 (d) and 3 (e) of the Work Plan. M. Muste made a presentation on his proposal on how to develop an uncertainty analysis decision aid tool (UDAT). An interesting debate ensued, and it was agreed that further elaboration was needed to proceed on these challenging tasks, including examining the possibilities of the WMO Secretariat funding a dedicated post doctoral student to assist M. Muste in the development of the UDAT and J. Fulford reviewing software already developed by the USGS. Further discussion leading to a decision on the way forward would occur during the next teleconference of the project.

Project output 4 - Guidelines for conducting and reporting results of instrument calibration and performance test on instruments and techniques

4.8 P. McCurry made a presentation on the progress made in the preparation of the "Guidelines for Conducting and Reporting on Calibration, Testing and Verification of Performance of Flow Measurement Instruments", and a new timetable for this PO was agreed upon, as shown in the Work Plan. Discussion highlighted the need to: develop standard test procedures; explain differences between calibration and verification; seek opinion from experts at laboratories; and achieve uniformity in specifying accuracy (e.g., 2σ). Members of the MC were requested to provide in writing their comments on the Guidelines. P.McCurry agreed to have a revised draft to the MC by February 28, 2010.

Project output 5 - Collection of test reports on the performance of instruments and techniques

4.9 As reflected in the Work Plan, the MC agreed that once the guidelines for reporting developed under PO 4 would be finalized, a specific call for tests reports, both using national formats and developed using the guidelines, would be made.

5. New Activities

5.1 The MC decided to add two Project Outputs to the five originally identified and modified the Work Plan accordingly.

Project output 6 – Uncertainty Analysis of Discharge Determination via Various Techniques

5.2 The MC agreed on the pertinence of extending the project efforts on uncertainty analysis to go beyond measurements and include discharge determination techniques. An initial work plan was developed but, in view of the time constraints, it was decided to further refine it at the project's next teleconference.

Project output 7 – Guidance and recommendations

5.3 In discussing the Guidelines being developed under PO 4, the MC debated on the importance of the Project developing recommendations for the various sectors involved in flow measurements. Examples mentioned were: a recommendation to the industry on being consistent on how the accuracy statements of their equipments are made, and another on NHSs accepting verification results made by certified laboratories for instruments thereby foregoing the need to duplicate the test at their national facilities, unless the test is part of a quality assurance program for laboratory certification. It was agreed to add a Project Output on the development of guidance and recommendations, the Work Plan for which would be developed on an *ad hoc* basis.

6. Requests from the Commission of Hydrology and its Advisory Working Group

6.1 The MC reviewed the following requests of CHy-XIII, which the AWG had considered at its first meeting in February 2009, but on which had not taken any decision pending the formation of the MC:

6.2 *The Commission, at its Thirteenth session, "requested its AWG to consider extending the scope of the project to include assessments of: (a) the effects of different morphological and climatological conditions on instrument performance and (b) the stability and reliability of data resulting from instrumentation over long time periods. "*

6.3 *The Commission also "requested the AWG to consider, at some stage in the future and subject to successful implementation of the first stages of the project, the possibility of extending the scope of the project to cover other hydrological measurements beyond those related to discharge".*

6.4 The MC was of the opinion that the three requests above were interesting, but suggested to the AWG that these aspects be dealt with later in the development of the project, as there was consensus that the first concern of the group should be that of accomplishing the original objectives of the project.

6.5 As regards the AWG request for "*the Management Committee of the project to continue supporting the president of CHy in following up to its proposal to adopt common and consistent methods of estimating and expressing uncertainty for the whole WMO community"*, the MC discussed at length the best way forward in this effort, with the presence of observers from CCl, CIMO, CAgM. This discussion proved very useful for the success of the Informal Meeting of the PTC representatives on the subject of Uncertainty Analysis, which was held the following day, with the participation of P. Pilon, M. Muste and J. Fulford as representatives of CHy.

7. Adoption of Work Plan 2010-2011

7.1 Based on the discussions reported above, the MC prepared an initial draft version of the project Work Plan for 2010-2011, which is included in Annex 2. The Plan would be further refined

in successive teleconferences. The most updated version would always be available on the project website: http://www.wmo.int/pages/prog/hwrp/Flow/flow_tech/workplan.php

8. Closure of the meeting

8.1 The Chairman thanked all present for their enthusiastic participation and useful contributions. The meeting was closed at 17h30 on 19 November 2010.

ANNEX 1

W O R L D M E T E O R O L O G I C A L O R G A N I Z A T I O N
Weather, Climate and Water

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Provisional Agenda

Wednesday 18 November

9:00 Opening remarks - A. Tyagi
9:15 Self-introduction by participants
9:30 Brief review of activities completed in 2007-2009 - P.Pilon
10:00 Ongoing activities and their eventual follow-up: Survey Analysis – J.Fullford/Z. Buzás

10:30 Coffee break

11:00 Ongoing activities and their eventual follow-up: Collection of international and national standards and guidelines – C.Caponi/N.Ravalitera

11:30 Ongoing activities and their eventual follow-up: Development of decision-aid tool prototypes and associate uncertainty analysis – M.Muste

12:00 Ongoing activities and their eventual follow-up: Guidelines for conducting and reporting results of instrument calibration and performance test on instruments and techniques – P.Mc Curry

12:30 Lunch

14:00 Review of requests from CHy-XIII
14:15 Point of view of partner organizations: statements by IAHS, IAHR, ISO and HMEI

15:30 Coffee Break

16:00 Preparation of Work Plan 2010-2011 – General discussion
17:30 Adjourn

Thursday 19 November

9:00 Support to CHy's proposal to adopt common and consistent methods of estimating and expressing uncertainty for the whole WMO community – Progress report

9:30 Review of the proposed Guidelines for Uncertainty Analysis for Hydrologic Modelling

10:30 Coffee break

11:00 Adoption of the Work Plan 2010-2011

12:30 Lunch

14:00 Adoption of the Work Plan 2010-2011 (continued)

15:30 Coffee break

16:00 Adoption of the final report

17:30 Closure of the meeting

ANNEX 2

W O R L D M E T E O R O L O G I C A L O R G A N I Z A T I O N
Weather, Climate and Water

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Geneva, 18 and 19 November 2009

List of participants

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ANNEX 3

Work plan 2010 – 2011

Project output 1 - Summary of field discharge measurement instrumentation and techniques

Task	Expert(s)	Estimated Start date	Tentative Completion Date
(a) Prepare structure of summary form and populate it	J. Fulford		Completed
(b) Upload form on web and request contributions to fill gaps	WMO Secretariat		Completed
(c) Notify NHSs by circular letter	WMO Secretariat		Completed
(d) Synthesis of results	J.Fulford, Zs. Buzás	ongoing	14/01/2010*

*comments to be received by 18/12/2009

Project output 2 - Collection of international and national standards and guidelines regarding field discharge measurement instrumentation and techniques

Task	Expert(s)	Estimated Start date	Tentative Completion Date
(a) In circular letter under output 1) b, include a request for standards and guidelines.	WMO Secretariat		Completed
(b) Upload collection on the web site *	WMO Secretariat	ongoing	1/2/2010 (upload)

* periodic requests for additional contributions

Project output 3 - Framework for the assessment of uncertainty in discharge measurement and guidelines for its implementation

Task	Expert(s)	Estimated Start Date	Tentative Completion Date
(a) Literature review of existing uncertainty analysis framework approaches	M. Muste & J. Fulford		Completed
(b) Synthesis of recommended standardized approach to uncertainty analysis for discharge measurements (draft for review on web)	M. Muste & J. Fulford		Completed
(c) Developing 3 implementation examples of the uncertainty analysis (draft for review on web)	M. Muste, J.-L. Krajevski & J. Fulford	28/2/10	TBD

(d) Development of decision-aid tool prototype and associate uncertainty analysis database for proof of concept and demonstration purposes of point and profiling velocity instruments and multiple techniques (draft for review on the web)	M. Muste, J. Fulford & J. Le Coz	TBD	TBD
(e) Development of examples of the utility of prototype for improvement of measurement approaches and processes (draft for review on the web)	M. Muste & J. Fulford	TBD	TBD

Project output 4 - Guidelines for conducting and reporting results of instrument calibration and performance test on instruments and techniques

Task	Expert(s)	Estimated Start Date	Tentative Completion Date
(a) Establishment of protocols/specifications for instrument calibration and testing and verification of performance characteristics of instruments and techniques (draft for review on the web)*	P. McCurry, J. Fulford & J. Le Coz	ongoing	1/6/2010
(b) Develop sample format for reporting testing and verification results (draft for review on the web)	P. McCurry & J. Fulford		4 months after completion of 4a.

* Comments on initial draft due 18/12/09, revised draft to be available 28/2/10

Project output 5 - Collection of test reports on the performance of instruments and techniques

Task	Expert(s)	Estimated Start Date	Tentative Completion Date
(a) Request reports on test, evaluation and comparison of instruments and techniques	WMO Secretariat		2 months after completion of PO 4
(b) Request reports and specifications from manufacturers	HMEI		"
(c) Request reports of laboratory tests of instruments	WMO Secretariat & IAHR		"
(d) Request new reports developed using guidelines under 4)	WMO Secretariat		"
(e) Create and populate a website with the collected information			

Project output 6 – Uncertainty Analysis of Discharge Determination via various techniques

Task	Expert(s)	Estimated Start Date	Tentative Completion Date
(a) Literature review of estimating the uncertainty of most frequently used techniques*	J.Fulford, J. Le Coz		
(b) Recommended terminology and methodology to be used in the estimation of uncertainty	M.Muste		
(c) Develop examples of applying numerical methods for estimating the uncertainty			

* based on the results of the project's survey

Project output 7 – Guidance and recommendations

Task	Expert(s)	Estimated Start Date	Tentative Completion Date