

4th Tidal and Water Level Working Group Meeting

8 - 10 May 2012, Calders Hotel & Conference Centre, Fish Hoek, Cape Town, South Africa

Report to the 3rd meeting of the Hydrographic Services and Standards Committee

(Paragraph numbering is the same as the Agenda Item numbering and does not necessarily reflect the order in which matters were discussed.)

1 **Opening**

- 1.1 Mr Stephen Gill, Chairman (USA-NOAA) opened the meeting at 0900 and thanked all participants for coming. He also thanked South Africa for hosting the meeting and providing excellent support and facilities.
- 1.2 All participants introduced themselves and, on behalf of the Hydrographer of South Africa, Captain Theo Stokes, Commanding Officer SAS PROTEA, welcomed all participants and wished them a successful meeting.
- 1.3 Stephen Shipman (IHB), on behalf of the Directing Committee thanked South Africa for hosting the meeting and providing a high level of support and excellent facilities. He reported that apologies for non-attendance had been received from Denmark, Estonia, Germany, Japan, New Zealand, Portugal, and Mr Dan Pillich (Expert Contributor).

2 **Administrative Arrangements**

- 2.1 The Chairman introduced the Agenda which was adopted. See Annex B.
- 2.2 The draft timetable was introduced, it was explained that this was intended for guidance only and was not intended to be a rigid structure. Where necessary time spent on individual topics would be amended to allow an appropriate discussion.
- 2.3 The Chairman reported on the 3rd meeting of the Hydrographic Services and Standards Committee (HSSC). Although he had been unable to attend he had been able to introduce the TWLWG report by telephone conference, he briefed on the presentation provided.
- 2.4 The IHB briefed on the TWLWG report provided to the XVIIIth IHC as part of the HSSC report.
- 2.5 IHB reported on the action items from TWLWG3. Actions were either complete or were being considered further within the Agenda. A new list of Action Items would be prepared for this meeting. See Annex E. All encouraged to provide tide gauge sampling rates and web links for inclusion in the Inventory of tide gauges on the IHO website. **Action for IHB** to update as information received.

3 **National Presentations**

National presentations were made by Australia, United Kingdom, Norway and United States. Titles of the presentations made are at Annex D and pdf versions of the presentations can be downloaded from the TWLWG4 web page on the IHO web site. Finland gave a verbal brief on national activities whilst United States also provided a brief on the NOAA Tides and Currents website (www.tidesandcurrents.noaa.gov).

4 Programme matters

4.1 Standard Constituent List

.1 UK reported that there had been no additions or changes since the last meeting. The UK reported on a message that he had received regarding the Standard Constituent List and his draft reply - document TWLWG3/4-1A.

.2 Korea gave a presentation on Examining classical tidal harmonic prediction algorithms, which examined the query posed by Bill Yau. The Chairman requested the presentation be e-mailed to members in pdf format, **Action IHB**, and for UK to respond to Bill Yau in light of the information presented by Korea. **Action UK**.

4.2 Standard for Digital Tide Tables

.1 UK briefed on the draft document, particularly the feature attributes to be included in digital tide tables. The document is available on the TWLWG2 website. All were encouraged to study the document, providing comments and input to UK for passing to TSMAD as appropriate. **Action All**

4.3 Dynamic Application of Tides in ECDIS

.1 US briefed all on the present status of progress and up-dated on the work which has been conducted in the US. IHB suggested a descriptive document highlighting the challenges and problems needed to be overcome and therefore to create an IHO wide document. The TWLWG is encouraged to articulate the issues and boundaries required to be identified and passed to HSSC for further comment and direction.

.2 South Africa highlighted work which had been conducted by Jeppesen, which included attributes required by clients. Australia reported on research work being conducted by OMC.

4.4 Standard for the Transmission of Real Time Tidal Data

.1 US briefed on a draft document generated by NOAA detailing the current situation, comments received from various organisations were discussed. UK expanded on their comments. The Chairman encouraged all to remain engaged in the discussion of this issue with the object of working towards the creation of a more definitive document.

4.5 Report on the English translation of the French Manual of Tides

.1 The IHB informed the meeting that the translation and proof reading of the Manual had been completed and that he was awaiting news of its printing. Item now can be considered complete.

4.6 Definitions of MSL and relevance of IHO Technical Resolutions

.1 Finland provided a presentation from BSHC CDWG on Non-tidal Waters Activities 2011-12, in which the background and discussions were highlighted, particularly INSPIRE issues and MonaLisa WP 3.3, the harmonisation of CD in the Baltic Sea area. INSPIRE specification outcomes for measuring datums and definitions were highlighted.

4.7 Inventory of tide gauges used by IHO Member States

.1 IHB highlighted that few up-dates to the inventory had been received; the Chairman encouraged all to check their data listings and to pass any amendments or changes to IHB. TWLWG members were encouraged to approach cooperating and non-IHO member states to provide information to increase the geographical spread of the information held. As had been noted earlier, the Chairman encouraged all to provide tide gauge sampling rates and web links for inclusion in the Inventory on the IHO website (See Paragraph 2.5).

4.8 The study of long term data sets for the determination of global sea level rise

.1 UK briefed on activities involved with the Permanent Service for Mean Sea Level and information available on the website (www.psmsl.org/products/anomalies). US detailed activities and highlighted data available. US explained how Climate Change research on sea level used the data and the importance of a common datum to this research. It was highlighted the records were of particular value in Tsunami research, including older analogue traces, and for flooding studies.

.2 Norway reported on studies into the impact of sea level rise on amphidromic points, the increase in the M2 amplitude on the south coast of Norway over the period 1930 to 2010 was highlighted, whilst analysis of M2 phase did not display the same increases. The Chairman requested Member States to take long term records of their best quality data to conduct a series of one year analysis of constituents (M2, S2, N2, K1, O1 and P1) and to exchange the results to generate a data set for further research.
Action All.

4.9 Compare Tidal Predictions generated as a result of analysis of a common data set by different analysis software

.1 US introduced the results received from the analysis of the common data set for the US tide station at Boston for the year 2010. US used 120 constituents, UKHO used 86 and SANHO used 51; in addition data was analysed by SANHO, UK and US for the SANHO tide station at Port Nolloth for the year 2010. The US highlighted the comparison of the results obtained.

.2 UK presented the results of their analysis of Port Nolloth data and the comparison with SANHO results. The Chairman indicated this should be an on-going project with other Member States data sets being analysed for comparison. The Chairman highlighted each Member States standard program should be utilised for the analysis. **Action All.** The Chairman requested the Boston and Port Nolloth data should be available on the website and all Member States should conduct an analysis and present their comparisons. **Action IHB.** The Chairman urged TWLWG members to provide similar data from their own records for comparable analysis.
Action All.

4.10 Review of relevant IHO resolutions

.1 The IHB introduced document TWLWG4/4/10A listing those IHO resolutions which fell within the area of competence of TWLWG.

.2 Finland reported on work conducted on technical resolution 3/1919 as amended in relation to non-tidal areas. IHB indicated this subject required the input of other WGs reporting to HSSC, in particular CSPCWG. Finland questioned which areas should be included; IHB highlighted the WP requirement to focus on non-tidal

areas such as the Baltic Sea rather than inland waters. US highlighted the work conducted between US and Canada in the Great Lakes. IHB suggested the text should separate tidal and non-tidal waters and appropriate wording should be submitted to HSSC for approval.

.3 IHB presented a draft text of resolution 3/1919 as amended for consideration by TWLWG. After discussion it was agreed the draft text should be available on the website and fully discussed before being submitted to HSSC for approval. The Chairman stressed Inland Waterways should be addressed within this resolution and TWLWG should strive to find appropriate wording. The Chairman requested the new wording of Technical Resolution 3/1919 as amended be reviewed and comments provided by 29 June 2012. **Action All.**

4.11 Review of relevant IHO Charting Specifications (S-4)

.1 The IHB introduced documents TWLWG3/4/11A and TWLWG4/4/11B reporting on the outcome of correspondence with CSPCWG (11A) and outlining the sections of publication S-4 which relate to tidal issues (11B). No further action required at present.

4.12 Exchange of harmonic constants / predictions

.1 UK gave a presentation on Exchange Format for Harmonic Constituents and Predictions, which is available on the TWLWG website. UK highlighted the work being conducted with SHOM to take this forward and proposed to continue this collaboration. The Chairman indicated the TWLWG should continue to support and encourage the development of data formats and further exchange between TWLWG Members. **Action All**

.2 UK demonstrated the website and data available (www.ukho.gov.uk/AdmiraltyPartners/FGHO/Documents/Schema/HC_Schema_V1.xsd). The IT challenge of using XML data format were highlighted, however the Chairman noted TWLWG Members should be encouraged to develop the capability to use this data format for future ease of data exchange. It was highlighted there was a need to review the Technical Resolution on Times Zones due to the differences between ISO standard (ISO 8601) format and that used by mariners in respect of S-100 and nautical publications. **Action IHB.**

.3 Norway highlighted the availability of the paper on Unified Tidal Analysis and Prediction Using the UTide Matlab Functions from the University of Rhode Island.

4.13 Update on IOC GLOSS programme

.1 No further input. The Chairman requested IHB continue to represent the TWLWG at the GLOSS meetings. **Action IHB.**

4.14 Vertical Reference Framework update on IAG ICP 1.2

.1 The IHB introduced document TWLWG4/4/14A providing the latest report from IAG ICP 1.2. The Chairman indicated the report should be noted by TWLWG and considered complete; in view of the fact IAG consider their actions are completed and ICP was to be dissolved, the item should be removed from the WP.

.2 France presented details of work undertaken on Geoid Observations from Space.

4.15 Tides and datums in rivers and estuaries.

.1 The IHB introduced document TWLWG4/4/15A reporting on his discussions with the Inland ECDIS. US highlighted the additional uses to which AIS is currently being put by some countries, including the transmission of real time environmental data. The Chairman requested IMO SN_1/Circ. 289 be downloaded from the IMO website and made available for all to study. **Action IHB.**

.2 Brazil gave a presentation on Chart Datum for Rivers in Brazil, available on the website. US noted many other countries use a low level water reference frame obtained from observations, with similar method used in Argentina and Peru.

4.16 Tsunami warnings

.1 IHB introduced the item, providing some background. The Chairman highlighted the value of long term tidal observations and sea level data to Tsunami warning centres, all TWLWG Members were requested to note this item. The DART System, managed in the US, was highlighted and the website content was explained.

4.17 TWLWG work plan

.1 The IHB displayed the draft work plan which had been prepared in advance of the meeting. It was indicated the areas where amendments were required as a result of decisions taken during the meeting. There were no comments on the draft work plan and it was noted that the updated version would be included in the meeting report and that all delegates would therefore have the opportunity to comment before it was submitted to HSSC4 for approval.

5 Any other business

.1 Determining the ellipsoidal height of MSL at the coast. UK highlighted correspondence with NOC and up-dated TWLWG on activities undertaken by UKHO. It was felt this should be progressed and expanded to cover the entire globe. The metadata, which should accompany gGPS data obtained at a tide gauge site, was highlighted and discussed. The connection with the GLOSS programme was emphasised and the Chairman encouraged TWLWG Members to consider involvement in and support of this programme. It was agreed this should be considered for inclusion in the TWLWG WP by HSSC and for IHB to reply to the request. **Action IHB.**

.2 The draft document Actual Tides On-line Link, ATOL, created by Chris Andraesen was introduced by IHB. All agreed it would be a useful resource to be added to the TWLWG website. US noted there would be an on-going requirement to maintain the listing once published. The Chairman suggested it would be an appropriate addition to the TWLWG website, the Chairman requested IHB to e-mail the list to all TWLWG Members for checking for additions and amendments and for any errors to be e-mailed to IHB by 1 August 2012. **Action All.**

.3 Members presented details of their national websites.

6 Election/Re-election of Chairman and Vice-Chairman

.1 The IHB introduced document TWLWG4/6A explaining the requirement to elect / re-elect the Chairman and Vice Chairman of TWLWG4. Stephen Gill was re-elected as Chairman and Zarina Jayaswal was re-elected as vice-Chairman.

7 Venue and dates of the 5th TWLWG Meeting

.1 The IHB reported that in recent years IHOTC/TWLWG meetings had been held as follows: Asia-Pacific - 2, Europe – 2, North America – 1 and South America – 2, Africa -1. Chairman resolved to e-mail TWLWG to gain a volunteer to host the next meeting.

8 Review of Action Items

.1 A draft list of Action Items from the meeting were reviewed and agreed. All Action Items are marked in this report and are collected together at Annex D. It should be noted that the list of action items does **NOT** include tasks that are in the TWLWG Work Programme. An updated list of the Action Items will be maintained on the TWLWG5 web page and all those who have actions to complete should keep the IHB informed of any progress. **Action ALL.**

9 Draft Report to the HSSC / Draft Agenda for TWLWG5

.1 It was agreed that the IHB would circulate a draft meeting report to all attendees by 18 May. Attendees were requested to provide any comments by 15 June. **Action ALL.**

.2 The IHB and Chairman would prepare the final report to HSSC4 using the format required by HSSC. The Chairman expected, subject to budgetary approval to represent TWLWG at the HSSC4 meeting. **Action IHB and USA.**

.3 A draft Agenda was presented to the meeting and is included at Annex G to this report. The draft Agenda may require further amendment following the outcome of HSSC4.

10 Closing remarks

.1 The Chairman thanked everyone for coming to the meeting, wished them a safe journey home.

.2 Stephen Shipman (IHB) on behalf of the Directing Committee thanked South Africa for their excellent support and facilities for the meeting which had undoubtedly contributed to a successful meeting. He noted that this would be his last meeting as he was due to retire from the IHB in the near future. He said that it had been both a pleasure and a privilege to work with the TWLWG and wished his successor David Wyatt similar good fortune.

.3 The Chairman thanked South Africa for their support and all delegates for coming and contributing to the meeting. The meeting closed at 1530.

The following Annexes are attached:

- A. List of participants.
- B. Agenda of TWLWG4
- C. List of Documents
- D. List of presentations made by nations
- E. TWLWG4 – List of Actions
- F. TWLWG Draft Work Programme
- G. Draft agenda for TWLWG5
- H. Revised draft Technical Resolution 3/1919 as amended

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LIST OF PARTICIPANTS

COUNTRY	NAME AND ADDRESS	TELEPHONE AND FAX NUMBERS

Tidal and Water Level Working Group
Cape Town, South Africa, 8-10 May 2012
Agenda – (TWLWG4)

1 Opening

- .1 Opening address by the Chairman
- .2 Address by host nation
- .3 Welcome by the IHB

2 Administrative Arrangements

- .1 Adoption of the Agenda
- .2 Conduct of the Sessions
- .3 Report on Intercessional Activities including HSSC3
- .4 Matters arising from TWLWG3 / Review of Action Items

3 National Presentations

- .1 Presentations by delegates on “National Tidal Issues”

4 Programme Matters

Note: {xx} indicates TWLWG Work Plan reference

- .1 Standard Constituent List {A.1} (Chris Jones)
- .2 Standard for Digital Tide Tables {B.2} (Steve Gill)
- .3 Dynamic Application of Tides in ECDIS {C.1} (Ian Halls)
- .4 Standard for the transmission of real time tidal data {C.2} (Stephen Gill)
- .5 Report on the English translation of the French Manual of tides {D.2} (IHB)
- .6 Definitions of MSL and relevance of IHO TRs to non-tidal waters {E.1} (Jukka Varonen +IHB)
- .7 Inventory of Tide gauges used by IHO Member States {F.1} (IHB)
- .8 The study of long term data sets for the determination of global sea level rise. {H.1} (Chris Jones, Tør Torresen, Stephen Gill & Salvador Moreno)
- .9 Compare Tidal Predictions generated as a result of analysis of a common data set by different analysis software (Stephen Gill)
- .10 Review of relevant IHO Technical Resolutions (IHB)
- .11 Review of relevant IHO Charting Specifications (IHB)
- .12 Exchange of Harmonic Constants / Predictions (Chris Jones)
- .13 Update on IOC/GLOSS Program (GLOSS / IHB)
- .14 Vertical Reference Framework Update on IAG 1.2 (IHB)
- .15 Tides and datums in rivers and estuaries (ALL)
- .16 Tsunami Warnings (ALL)
- .17 TWLWG Work Plan (IHB)

5 Any Other Business

- .1 Determining the ellipsoidal height of MSL at the coast
- .2 Links to real time tidal data

6 Election/Re-election of Chair and Vice-Chair

7 Venue and dates of the 5th TWLWG Meeting (TWLWG5)

8 Review of Action Items from TWLWG4

9 Draft Report to HSSC4 / Draft Agenda for TWLWG5

10 Closing remarks

TWLWG4 - List of Documents

Document No	Document Title
TWLWG4/2/1A	Agenda Rev2
TWLWG4/2/1B	Draft Timetable
TWLWG4/2/4A	Status of Actions from TWLWG3 (updated to 8 May 2012)
TWLWG4/4/2A	Standard for Digital Tide Tables
TWLWG4/4/5A	English text of French publication "Coastal Tides"
TWLWG4-4-9A	Compare predictions from a common set of tidal observations
TWLWG4-4-9A-Add1	Compare predictions from a common set of tidal observations - Excel File
TWLWG4-4-9A-Add2	Compare predictions from a common set of tidal observations - Constituents
TWLWG4/4/10A	Review of relevant IHO resolutions
TWLWG4/4/11A	Review of relevant IHO Charting Specifications (S-4)
TWLWG4/4/11B	Review of relevant IHO Charting Specifications (S-4)
TWLWG4/4/14A	Vertical Reference Framework
TWLWG4/4/15A	Tides and Datums in rivers and estuaries.
TWLWG4-5A	Determining the ellipsoidal height of MSL at the coast
TWLWG4/6A	Election of the Chair and Vice Chair of the TWLWG
TWLWG4-Australia	Presentation by Australia
TWLWG4-Brazil	Presentation by Brazil
TWLWG4-Korea	Presentation by Rep of Korea
TWLWG4-Norway	Presentation by Norway
TWLWG4-Peru	Presentation by Peru
TWLWG4-Spain	Presentation by Spain
TWLWG4-UK	Presentation by UK
TWLWG4-UK	Presentation by UK
TWLWG4-USA	Presentation by USA

Tidal and Water Level Working Group

National Presentations

Australia: Australian Hydrographic Service - Tide and Geodetic Control

Brazil: Chart Datum for Rivers in Brazil

Korea: Examining Classical Tidal Harmonic Prediction Algorithms

Norway: Tidal Activities - Extreme Value Analysis

Peru: National Tidal Issues – Peruvian Sea Level Network

Spain: Spanish Tidal Resources

United Kingdom: South Coast Tsunami, 27-29 June 2011
Exchange Format for Harmonic Constituents and Predictions

United States: NOAA - Approach to Testing New Water Level Sensors

Tidal and Water Level Working Group

Actions from TWLWG4

The numbering of action items relates to the final report paragraph numbers:

- 2.5 All encouraged to provide tide gauge sampling rates and web links for inclusion in the Inventory of tide gauges on the IHO website. TWLWG Members were encouraged to approach cooperating and non-IHO member states to provide information to increase the geographical spread of the information held. **Action All. Action IHB** to update as information received.

- 4.1.2 The Chairman requested the presentation be e-mailed to members in pdf format, **Action IHB**, and for UK to respond to Bill Yau in light of the information presented by Korea. **Action UK.**

- 4.2.1 All are encouraged to study the draft Standards for Digital Tide Tables document, providing comments and input to UK for passing to TSMAD as appropriate. **Action All**

- 4.8.2 The Chairman requested TWLWG Members to take long term records of their best quality data to conduct a series of one year analysis of constituents (M2, S2, N2, K1, O1 and P1) and to exchange the results to generate a data set for further research. **Action All.**

- 4.9.2 The Chairman indicated this should be an on-going project with other TWLWG Members data sets being analysed for comparison. The Chairman highlighted each TWLWG Members standard program should be utilised for the analysis. **Action All.** The Chairman requested the Boston and Port Nolloth data should be available on the website and all TWLWG Members should conduct an analysis and present their comparisons. **Action IHB.** The Chairman urged TWLWG Members to provide similar data from their own records for comparable analysis. **Action All.**

- 4.10.3 Review TR 3/1919 as amended and provide comment by 29 June 2012. **Action All.**

- 4.12.1 The Chairman indicated the TWLWG should continue to support and encourage the development of data formats and further exchange of harmonic constituents and predictions between TWLWG Members. **Action All**

- 4.12.2 It was highlighted there was a need to review the Technical Resolution on Times Zones due to the differences between ISO standard (ISO 8601) format and that used by mariners in respect of S-100 and nautical publications. IHB was tasked to bring this to the attention of HSSC for further discussion. **Action IHB**

- 4.13.1 The Chairman requested IHB continue to represent the TWLWG at the GLOSS meetings. **Action IHB.**

- 4.15.1 The Chairman requested IMO SN_1/Circ. 289 be downloaded from the IMO website and be made available for all to study. **Action IHB.**

- 5.2 The Chairman requested IHB to e-mail the Actual Tides On-line Link, ATOL, list to all TWLWG Members for checking for additions and amendments and for any errors to be e-mailed to IHB by 1 August 2012 and forward. **Action All.**

1 TWLWG Work Plan

1.1 TWLWG Tasks

- A Maintain Standard Tidal Constituent List (IHO Work Programme 3.2.4 refers)
- B Prepare a Standard for Digital Tide Tables (IHOTC Report to the XVIIth IHC as adopted)
- C Liaise with TSMAD on tidal matters relevant to the Dynamic Application of Tides in ECDIS and develop a Standard of the transmission of real-time tidal data (Action HSSC1/18)
- E Review the various definitions of MSL and their relevance to Hydrographic Offices and review the IHO tidal resolutions to ensure that they are compatible with the requirements of non-tidal areas such as the Baltic Sea.
- F Prepare and maintain an inventory of tide gauges used by Member States and to publish it on the IHO/TWLWG web site.
- H Compare the tidal predictions generated as a result of analysis of a common data set using different analysis software.
- ‡ Review and provide feedback of On-line real time water level observation document

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard
A.1	Maintain Standard Tidal Constituent List	H	No updates required in 2012	Continuous		O	Chris Jones*	
A.2	Compare the tidal predictions generated as a result of analysis of a common data set using different analysis software.	H	Select Common data set Analyse using different software Predict common set of tides Compare results	Continuous		O	Stephen Gill*	
B.2	Prepare a Standard for Digital Tide Tables	H	Prepare draft Standard	2009	2013	O	Stephen Gill* Chris Jones Zarina Jayaswal	

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard
C.1	Liaise with TSMAD and DIPWG on tidal matters relevant to the Dynamic Application of Tides in ECDIS	H	<p>Review Objects and Attributes required for water levels and streams (Passed to TSMAD April 2010)</p> <p>Prepare draft pages for Objects and Attributes.</p> <p>Prepare draft Product Specifications (S1**) for tidal data in S-100.</p>	2009 2010 2012	2011 2012 2013	C O O	ZarinaJayaswa* Stephen Gill Chris Jones Juan Fierro Ruth Farre Dan Pillich	
C.2	Develop a Standard for the transmission of real-time tidal data	H		2009	2013	O	Stephen Gill* Chris Jones Zarina Jayaswal Juan Fierro	
E.1	Review the various definitions of MSL and their relevance to Hydrographic Offices and review the IHO tidal resolutions to ensure that they are compatible with the requirements of non-tidal areas such as the Baltic Sea.	H	Reviewed at TWLWG2- Further work undertaken at TWLWG3 and TWLWG4. Definition of MSL approved for submission to HDWG. Work on the IHO resolutions ongoing.	2009	2013	O	Jukka Varonen* Tor Tørresen Phil MacAulay Stephen Shipman Chris Jones Stephen Gill	
F.1	Prepare and maintain an inventory of tide gauges used by Member States and to publish it on the IHO/TWLWG web site.	H	Initial inventory from TWLWG members available on IHO web site. CL36/2010 sent to Member States seeking wider input.	Continuous		O	David Wyatt* Stephen Gill	

Task	Work item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-completed	Contact Person(s) * indicates leader	Related Pubs/Standard
H1	The study of long term data sets for the determination of global sea level rise.	H		2011	2014	O	Chris Jones Salvador Moreno Stephen Gill Tor Tørresen Gwenaële Jan Do-Seong Byun	
I1	On-line real time water level observation document	H	Review and feedback by 1 August 2012	2012	2013	O	David Wyatt	

1.2 TWLWG Meetings (IHO Task 3.1.11 refers)

Date	Location	Activity
8 – 10 May 2012	Fish Hoek, South Africa	4 th Meeting
April/May 2013	To be decided	5 th Meeting

Chair: Stephen Gill
Vice-Chair: Zarina Jayaswal
Secretary: David Wyatt

Email: Stephen.Gill@noaa.gov
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Tidal and Water Level Working Group
April/May 2013
Draft Agenda – (TWLWG5)

1 Opening

- .1 Opening address by the Chairman
- .2 Address by host nation
- .3 Welcome by the IHB

2 Administrative Arrangements

- .1 Adoption of the Agenda
- .2 Conduct of the Sessions
- .3 Report on Intercessional Activities including HSSC4
- .4 Matters arising from TWLWG4 / Review of Action Items

3 National Presentations

- .1 Presentations by delegates on “National Tidal Issues”

4 Programme Matters

Note:{xx} indicates TWLWG Work Plan reference

- .1 Standard Constituent List {A.1} (Chris Jones)
- .2 Standard for Digital Tide Tables {B.2} (Steve Gill)
- .3 Dynamic Application of Tides in ECDIS {C.1} (Ian Halls)
- .4 Standard for the transmission of real time tidal data {C.2} (Stephen Gill)
- .5 Definitions of MSL and relevance of IHO TRs to non-tidal waters {E.1} (Jukka Varonen +IHB)
- .6 Inventory of Tide gauges used by IHO Member States {F.1} (IHB)
- .7 The study of long term data sets for the determination of global sea level rise. {H.1}(Chris Jones, TørTorresen, Stephen Gill &Salvador Moreno)
- .8 Compare Tidal Predictions generated as a result of analysis of a common data set by different analysis software (Stephen Gill)
- .9 Review of relevant IHO Technical Resolutions (IHB)
- .10 Review of relevant IHO Charting Specifications (IHB)
- .11 Exchange of Harmonic Constants / Predictions (Chris Jones)
- .12 Update on IOC/GLOSS Program (GLOSS / IHB)
- .13 Tides and datums in rivers and estuaries (ALL)
- .14 Determining ellipsoidal height of MSL at the coast (ALL)
- .15 Actual Tides On-line Link status (All)
- .16 TWLWG Work Plan (IHB)

5 Any Other Business**6 Venue and dates of the 6th TWLWG Meeting (TWLWG6)****7 Review of Action Items from TWLWG5****8 Draft Report to HSSC5 / Draft Agenda for TWLWG6****9 Closing remarks**

TITLE	Reference	Last amendment (CL or IHC)	1 st Edition Reference
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DATUMS AND BENCH MARKS	3/1919 as amended	19/2008	A2.5
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1 It is resolved that chart datums (datums for sounding reduction), the datums of tide prediction and other tidal datums shall always be connected with the general land survey datum, and, in addition, with a prominent and permanent fixed mark in the neighbourhood of the tide gauge, station, observatory etc.

2 It is resolved that ellipsoidal height determinations of the vertical reference marks used for tidal observations should be made, in order to support the production of seamless data sets; i.e. to allow the translation between data sets with differing vertical datums. It is further resolved that such observations should relate to a geocentric reference system, preferably the International Terrestrial Reference System (ITRS) or one of its realizations e.g. the World Geodetic System 1984 (WGS84).

Where the tidal range is appreciable (>30cm)

3 It is resolved that heights on shore, including elevations of lights, should be referred to a HW datum. The datum used should be clearly stated on charts.

4 It is resolved that the datum for tide predictions shall be the same as chart datum (datum for sounding reduction). It is further resolved that the Lowest Astronomical Tide (LAT), or as closely equivalent to this level as is practically acceptable to Hydrographic Offices, be adopted as chart datum. Alternatively the differences between LAT and national chart datums may be specified in nautical documents. If low water levels in a specific area frequently deviate from LAT, chart datum may be adapted accordingly.

5 It is resolved that Highest Astronomical Tide (HAT) be adopted as the datum for vertical clearances. Alternatively the differences between HAT and national datums for vertical clearances may be specified in nautical documents. If high water levels in a specific area frequently deviate from HAT, the datum for vertical clearances may be adapted accordingly.

Note: LAT (HAT) is defined as the lowest (highest) tide level which can be predicted to occur under average meteorological conditions and under any combination of astronomical conditions. It is recommended that LAT and HAT be calculated either over a minimum period of 19 years using harmonic constants derived from a minimum of one year's observations or by other proven methods known to give reliable results. Tide levels should, if possible, reflect the estimated error values obtained during the determination of these levels.

Where the tidal range is negligible (<30cm)

6 It is resolved that heights on shore, including elevations of lights, should be referred to Mean Sea Level (MSL) or other level as closely equivalent to this as is practically acceptable to Hydrographic Offices. The datum used should be clearly stated on charts.

Note: The adopted level may be a well-defined geodetic datum as used for heights in land survey applications or an observed local Mean Water Level (MWL) based on long series of water level observations.

7 It is further resolved that a HW datum be used for vertical clearances. In order to allow the development of regional solutions, it is recommended that an appropriate long term range of low/high water definitions of the lower/upper 94-100 percentile be adopted.

Inland Waters

8 It is resolved that data shown on charts and publications should be referred to an appropriate low water datum. The selection of the datum to be used is a difficult issue which can only be determined locally and which will be largely dependent on seasonal hydrological conditions.