Tides and Datums in Rivers and Estuaries

1. Following TWLWG3 the IHB contacted the Inland ECDIS Group in accordance with Action
    TWLWG3-4.16.1 and received the responses given below:

To: bernd.birklhuber@bmvit.gv.at; Denise.R.LaDue@usace.army.mil; lee.alexander@unh.edu;

Dear Denise, Bernd and Lee,

One of my tasks at the IHO is to act as secretary to the Tidal and Water Level Working Group
(TWLWG).

Two of TWLWG's tasks are to: "Liaise with TSMAD and DIPWG on tidal matters relating to the
dynamic application of tides in ECDIS"; and "to develop a standard for the transmission of real-time
tidal data".

The TWLWG3 meeting tasked me to make contact with the Inland ECDIS group to see if you had
done, or were planning to do, any work related to water levels in order that any experiences might
be shared and duplication of effort avoided.

I would appreciate any information you might have on this matter?

From Lee Alexander:

It is good to hear from you. Also, it is good to know that you are the best POC in the TWLWG re: the
dynamic application of tides/water levels to electronic charts (ECDIS, ECS, and PPUs.)

Please be advised of two research, development, test and evaluation (RDT&E) initiatives that I am
currently involved in:

1. For the past three years, have been working within IMO and IALA on refining various types of AIS
Application-Specific Messages (AIS ASMs). In June 2010, IMO published SN.1/Circ.289 which is the
new/improved "Guidance on the Use of AIS Application Specific Messages(see attached). AIS ASMs
are increasingly used to provide met/hydro and other types of real-time information such as
tides/water levels. Attached is a copy of a paper on this topic presented at the recent US Hydro
Conference. In particular, there are three different AIS ASM messages that can be used to provide
water level information:
    Met/Hydro (FI 11)
    Tidal Window (FI 14)
    Environmental (FI 26)
As mentioned in the US Hydro paper in the section titled "Relationship to IHO Standards",
For IHO S-57 and S-100 related standards dealing with dynamic met/hydro information,
consideration should be given to using the same data content fields and parameters that are defined
in IMO SN.1/Circ.289.

2. I have a small research project with US Army Corps of Engineers on the use of detailed bathymetry
that is used either as a River Information Overlay (RIO) with existing ENCs or would be incorporated
into the "next generation" of Inland ENCs. The goal is contours and depth areas at decimeter (10
cm) intervals. Using this type of data coupled with accurate water level information (also at 10

cm intervals), precise under-keel clearance and/or air draft (under bridges) is possible. Again, the water level information would be provided via AIS ASMs based on the parameters defined in IMO SN.1/Circ.289.

Another person actively involved in AIS ASM development/implementation is Brian Tetreault. Brian was previously with US Coast Guard, but after retiring, now works for US Army Corps. Brian is also actively involved on the international level (e.g., IALA), and keeps up with current River Information System (RIS) developments in Europe. Brian is top notch. You may wish to contact him as well.

During the next few weeks, I will get back to you with more specifics and some examples on all this.

From Bernd Birklhuber:

Within the Inland ENC Harmonization Group (IEHG) we were not concentrating on tides. But the depth information in Inland ENCs is normally referred to a reference low water level of the respective inland waterway, which is normally a sloped plane. The actual water level is higher most of the time, but because of the variations in the cross sections and the inclination of the river beds different water level planes are not parallel to one another. Many countries are already using water level models to calculate the real water level between gauges. We have defined a standardized data exchange format in XML for the transmission of the correction values that have to be applied to the depth information in the Inland ENC.

At the moment this data exchange format is tested within the European project IRIS II (Implementation of River Information Services) in three Inland ECDIS applications. We hope that we can present the results of the tests in autumn.

A precondition for the applicability of the XML file: the depth information in the Inland ENC has to be encoded in a specific way, which is described on page I.1.2 of the Encoding Guide for Inland ENCs. The Encoding Guide, the XSD for the standardized water level files and a description of the water level file can be downloaded from http://ienc.openecdis.org.

But I have some doubts that this model is of much use for maritime applications, because it has been developed for rivers and canals. The water level file can only be applied to a linear waterway with a waterway axis and waterway-km values and it is not possible to encode corections in two dimensions (e.g. if the water level on the left bank of a river is lower that the water level on the right bank).

If you need more information or have any questions, please do not hestitate to contact me.

2. TWLWG4 is invited to note the information provided and take any action it considers appropriate.