



IHB File No. S3/7198

**CIRCULAR LETTER 13/2005**  
**1 February 2005**

**WORKING GROUP ON S-44**  
**STANDARDS FOR HYDROGRAPHIC SURVEYS**

References: A. CL 37/2004 dated 21 June  
B. CL 67/2004 dated 11 October

Dear Hydrographer,

The IHB thanks the following 24 Member States who responded to Reference B: Australia, Brazil, Canada, Chile, Colombia, Croatia, Ecuador, Finland, France, Germany, India, Japan, Rep of Korea, Mexico, Morocco, Netherlands, Norway, Russian Federation, Spain, Sweden, Tunisia, Turkey, United Kingdom and United States of America.

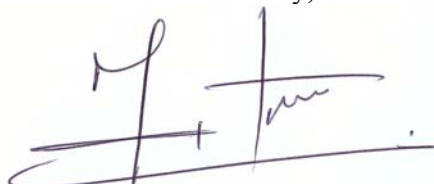
Member States were asked to comment on / propose changes to the draft TOR that were attached at Annex C to Reference B and to suggest specific items that the WG should consider. These comments are shown at Annex A and the IHB has assimilated them into the revised draft TOR attached at Annex C.

An updated list of the members of the S-44 Working Group is at Annex B.

Two nominations were made for the posts of Chairman / Vice Chairman of the WG: Chris Howlett of the United Kingdom and Rob Hare of Canada. Following discussions between the nominees it was agreed that Chris Howlett (UK) be Chairman and Rob Hare (Canada) be Vice Chairman.

Email contact with the WG members will be initiated shortly in order to commence the task of preparing the 5<sup>th</sup> Edition.

On behalf of the Directing Committee  
Yours sincerely,



Vice Admiral Alexandros MARATOS  
President

Annex A: Member States comments  
Annex B: Membership of the WG  
Annex C: Draft Terms of Reference



**Member States' comments on the TOR for the S-44 WG and specific items which the WG should address.**

**AUSTRALIA**

**1) Draft WG Terms of Reference (TOR)**

The TOR should be amended to incorporate all issues identified in response to CL67/2004.

**2) Items to be considered**

Changes in the 5<sup>th</sup> edition of S-44 should be minimal and restricted to those areas that warrant amendment, i.e. the document should not be completely re-written.

The relationship between S-44 Orders and S-57 ZOC should be explained.

The WG should consider what the mariner and other users of the data actually want in 2004?; this may require the WG to look beyond bathymetry towards other navigational requirements, e.g. seafloor characterisation.

The WG should consider realistic access to technology. Whilst MBES and other swath systems are increasingly employed by developed nations they are unlikely to become the standard means of surveying for some time, in other words S-44 needs to cater for all technologies.

The WG should assess the capability of swath systems to achieve least depth over a feature rather than by mechanical sweep.

The WG should decide what feature/target detection is actually required for navigation safety. Is the two metre cubic feature acceptable, or should we be detecting (e.g.) the masts of wreck, wellheads and other potential hazards. This is significant because MBES may not detect this type of feature. On the other hand, if a survey correctly determines the least depth over a feature, is it necessary to identify it as a feature rather than the general seafloor topography?

The WG should consider in what circumstances (if any) 100% bathymetric coverage is required.

**3) Proposed Chair/ Vice Chair**

Australia does not wish to nominate its representative (Lt Cdr Peter Johnson) as the WG Chairman or Vice Chairman.

**4) Possible observers from Academia and Industry**

It is suggested that the following organisations be invited as Observers:

University of New Hampshire – Centre for Coastal and Ocean Mapping (general)

University of New Brunswick – Ocean Mapping Group (swath technology)

University of Southern Mississippi (general)

Tenix LADS Corporation (Australia) (LIDAR technology)

Joint ALB Technical Centre of Expertise (USA) (LIDAR technology)

Fugro Survey Pty Ltd (Australia) (hydro survey, inc. swath and LIDAR Technology)

UK Maritime & Coastguard Agency (hydro survey, inc. swath and LIDAR Technology)

Flagship Training (UK) (general)

**BRAZIL**

1) No comments nor changes to the draft TOR

2) We believe that there are no items to add

3) No name to indicate

4) No names to indicate

## **CANADA**

- 1) The TORs are fine, no suggestions for changes
- 2) Please circulate the following links and the attached article by MacPhee and Hare, published in Lighthouse Edition 64, Winter 2003. For WG Reference

<http://www.hydrographicsociety.org/Articles/journal/2002/104-2.htm>

<http://www.hydrographicsociety.org/Articles/journal/2002/105-2.htm>

<http://www.omb.unb.ca/omg/papers/MONAGHAN.pdf>

<http://www.chc2004.com/chc2004/papers/johnson.pdf>

- 3) We would like to propose Rob Hare as the Chairman/Vice Chairman of the WG

- 4) Possible names to propose

Dr. David Wells (UNB, UNH, USM)

Steve MacPhee

Dave Monahan (UNH)

Dr John Hughes Clarke (UNB)

Dr Brian Calder (UNH)

Erik Hammerstad (Simrad)

Keith Vickery (Geo Acoustics)

Gary Gunther (NOAA Lidar expert)

Xavier Lurton (IFREMER)

## **CHILE**

In relation to the referenced documents this Directorate has nominated the following members to the WG on S-44 (Standards for Hydrographic Surveys): Teniente 2° Felipe A. Barrios and Srta Pilar Ortiz.

## **COLOMBIA**

The Hydrographic Office of Colombia fully agrees that the Working Group on the S-44 Publication meets again to review it, taking into account that its fifth edition dates back to 1998. Likewise, we support the Terms of Reference (ToRs) for the group, proposed in such circular letter, especially because Colombia is using, since 2004, the Multibeam Echo Sounders technology (echo sounders by swaths exploring).

## **ECUADOR**

Ecuador agrees with the re-convening of the S-44 WG. About the TOR we think it would be suitable to have a more detailed explanation on the calculation of error limit exactitude. It is necessary that the specific criterion that support to determine the values of parameters that conform the formula. If it were possible Ecuador would be pleased to appoint a member to the S-44 WG for Geodesy Field, Mr. Julio Rosero.

## **FINLAND**

Finland approves the TORs of the S-44. They seem quite comprehensive. Finland proposes Mr. Jukka Varonen as a member of the Working Group.

## **FRANCE**

Concerning the TOR, it is suggested to add in para 2, three specific items concerning the means of satisfying the requirements for a complete seabed survey coverage, the limits to note in order to study the seabed surveys and the archiving of digital data. Detailed comments on these 3 new items as well as those already noted will be sent to the WG Members by email.

It would also be a good idea to add in the PROCEDURES part of the TOR, the period of the year in 2006 when the WG results should be submitted to the IHO Member States for approval.

## **GERMANY**

Germany agrees with all objectives as listed in the draft suggesting that the following item should be added:

Objectives:

2.f to harmonize as far as possible the standards of S-44 and the “Zones of confidence” as described in S-57.

## **INDIA**

India supports the reconvening of the S-44 WG.

## **JAPAN**

- 1) We have no comment nor proposal to change the TORs
- 2) We have no suggestion except what we have mentioned
- 3) We have no candidate for the Chairman/ Vice Chairman
- 4) I'll send Dr Shigeaki Kubo from Sanyo Techno Marine, INC as an observer.

## **KOREA, Rep of**

- 1) No comment
- 2) The current status of hydrographic surveying in developed developing and under developed countries would be checked to consider, and then it will be necessary to prepare a plan to promote the capability of hydrographic surveying in developing and underdeveloped countries.
- 3) No comment
- 4) Prof. Chul-uong CHOI, Pukyong National Univ  
Dr. Joseph PARK, UST21 Corp

## **MEXICO**

Mexico supports the reconvening of the S-44 WG.

## **MOROCCO**

Morocco agrees to the S-44 WG reconvening. Particularly when this review is compatible with the main aims of the IHO, i.e. a better and safer navigation.

However, SHOMAR, in view of its limited number of staff, will not be able to participate directly in the WG tasks, but would be honoured if they could participate in the activities by email if possible.

## **NETHERLANDS**

- 1) The Netherlands agrees with the draft TORs.
- 2) The WG should pay attention to amongst others:  
Multibeam technology / swath echosounders (already mentioned)  
Lidar (already mentioned), but also in more general terms other “remote sensing” such as synthetic aperture radar etc..  
Bring S-44 in line with ZOCs, if possible (already mentioned)  
Alternatives (acoustical) to mechanical sweeping. (already mentioned)  
A better definition of “targets” (already mentioned). Consider parallel with NATO-AML small/large bottom objects  
Balance between required positional and depth measurement accuracy w.r.t category.  
Guidelines w.r.t accuracy, seabed variability and resurvey policy.
- 3) The NL-HO representatives Mr Leendert Dorst is not available for the post of (vice) chairman.
- 4) No suggestions.

## **NORWAY**

- 1) No comments TORs is OK seen from Norwegian view.
- 2) The items listed in CL37/2004 are a good starting point; more can be added during the process.
- 3) Norway is not prepared to hold the position as Chairman/Vice Chairman of the WG.
- 4) Norway proposes Kongsberg – Simrad AS

PO Box 111  
N-3191 Horten  
Norway

Point of contact Erik Oscar Hammerstad [erik.oscar.hammerstad@kongsberg.com](mailto:erik.oscar.hammerstad@kongsberg.com)

## **RUSSIA**

The Russian Federation HO supports the re-convening of the WG on S-44. We have no proposals on changes to the draft TOR of the Group. When considering proposals on the new edition of S-44, particular attention should be paid to the possibility of wide use of the modern technical aids of high accuracy, multibeam echo sounders including, to carry out hydrographic surveys of “special” and “1” category (categories of IHO Standards, table 1). Provision of nautical charts and publications produced on the basis of the requirements of the previous standards (introduction to S-44, 4<sup>th</sup> Edition), should be retained in the new edition of S-44.

We would like to nominate the Captain 1<sup>st</sup> rank Smirnov Valentin Georgiyevich as a member of the Working Group from the Russian HO (email: [gunio@homepage.ru](mailto:gunio@homepage.ru) attention of the Chief of SOKOI Bureau).

## **SPAIN**

- 1) It would be interesting to use airborne “LIDAR” echo sounders in hydrographic surveying, to define the type of surveying in which they can be used and whether the control lines must

be made using the same method or it is desirable to make them with a craft at sea. This point can be assessed by the countries with experience in this type of surveying.

It is convenient to specify the links with the metadata requirements, for the S-57 CATZOCs.

2) The most important subject to handle would be the use of multibeam echo sounders, MBES, in levels of confidence and accuracy depending on the area to be surveyed and on the own parameters or on those introduced by the sounder operator. The MBES equipments use different frequencies determining a maximum scope in depth, but the minimum scope is not specified so that the errors in the sounding do not exceed those admitted by the S-44, depending on the type of surveying.

3) For the moment and due to the lack of staff in this Hydrographic Institute, we have nominated no representative for the Working Group.

4) We do not know of any potential observers, but it could be interesting to submit this Circular Letter to the University of Cádiz and to the SIMRAD Company, in the case they would be willing to participate, as well as to all the multibeam sounders' producers.

## **SWEDEN**

1) In the 1<sup>st</sup> paragraph just before the word "technical" ADD the following text: "the development of appropriate requirements and"

2) Suggested objectives to be added to the list (following under 2e)

Split the S-44 document in two; one (short compliance) standard and one (more technical) guideline.

Develop a more distinct standard not dependent upon the survey technique

Pay attention to requirements in other IHO documents such as ZOC in S-57

Specify the requirements of resolution (maximum size of survey footprint) and density

Change the traditional confidence level for hydrographic surveying (95%) aiming to eliminate false statistical confidence.

Take into consideration the general interpretations of the 4<sup>th</sup> Edition of S-44

Update the demands of bottom search.

## **TUNISIA**

1) THOS agree with the proposed draft TORs

2) THOS has no suggestions concerning this matter

3) THOS has no nominations for the WG

4) THOS has no nominations concerning this matter.

## **TURKEY**

The TN-DNHO agrees with the TOR of the WG on S-44.

## **UNITED KINGDOM**

1) The UK proposes the following changes to the draft TOR

**Introduction;** first line, insert 'for nautical charting and other associated uses' after 'hydrographic surveys' to reflect the spirit of the final paragraph of the preface to S-44 Edition 4.

**Membership:** The UK recommends that, to keep the WG at an efficient size, members should obtain views from the academic and industrial sectors at a national level and reflect

them in the WG's ongoing correspondence, and therefore considers that the invitation to observers should be removed from the TORs.

**Objectives:**

- i. Merge existing objectives 2a and 2b to make the revised S-44 standard more generic and therefore applicable to all future trends of data collection. UK proposes new objective 2a: 'the applicability of the S-44 standard to all existing, emergent and future technologies'.
  - ii. Insert new objective 2b to cover the use of mathematically derived surfaces as the output from hydrographic surveys: 'the possible use of statistically generated surfaces as an output of hydrographic surveys.
  - iii. Objective 2e, line 1, amend to read: ' the update of Annex A to the 4<sup>th</sup> Edition ....' As UK considers that there is still a valid need to classify deep sea soundings gathered on passage.
  - iv. Insert new objective 2f. 'Consider the relationship between S-44 Edition 5 and the guidelines promulgated by the IHB CL27/2002 Guidelines for the Processing of High Volume Bathymetric Data'.
- 2) The UK suggests no additional specific items for the WG to consider, other than those incorporated in the amended objectives in 1) above.
  - 3) The UK proposes Mr. Christopher Howlett, Head of Bathymetric Data Centre, at the United Kingdom Hydrographic Office, as the Chairman or Vice Chairman of the WG.

**UNITED STATES of AMERICA**

- 1) The US has no additional comments on the draft TORs. They are satisfactory as written.
  - 2) It is suggested that the WG consider possible compatibility between S-44 and S-57's Zones of Confidence.
  - 3) The US does not wish to propose a Chairman or Vice Chairman.
4. The US proposes:  
Captain Andy Armstrong, University of New Hampshire/Joint Hydrographic Centre.  
[Andy.Armstrong@noaa.gov](mailto:Andy.Armstrong@noaa.gov) Tel. 1-603-862-4559; Fax. 1-603-862-0839 and  
David Dodd, University of Southern Mississippi, [david.dodd@usm.edu](mailto:david.dodd@usm.edu) Tel. 1-228-688-7127. Fax. 1-228-688-1121

In addition the Naval Oceanographic Office would also like to nominate a person to the S-44 Working Group if it is not too late. His name is Doug Cronin, email [cronind@navo.navy.mil](mailto:cronind@navo.navy.mil), telephone 1-228-688-5603



Membership of the Working Group on Standards for Hydrographic Surveys (S-44)

Australia:	Lt Cdr Peter Johnson
Canada:	Rob Hare
Chile:	Teniente 2° Felipe A. Barrios and Srta Pilar Ortiz
Croatia:	Dr J Kasum, Dr Z Gržetiæ
Ecuador:	Mr Julio Rosero
Finland:	Mr Jukka Varonen
France:	Ingénieur Patrick Michaux
Germany:	Bernd Vahrenkamp
Italy:	Lt Marco Grassi
Japan:	Shin Tani
Netherlands:	Leendert Dorst
Norway:	Kjell Olsen
Portugal:	Lt Cdr Fernando Freitas Artilheiro
Republic of Korea:	Seong-kyo Kong
Russian Federation:	Captain 1 <sup>st</sup> Rank Smirnov Valentin Georgiyevich
Sweden:	Lars Jakobsson
United Kingdom:	Chris Howlett and Lt Cdr Richard Dobson
USA:	Jerry Mills and Doug Cronin

**IHO WG on Standards for Hydrographic Surveys (S-44) - Terms of Reference**  
**(December 2004)**

**Introduction:**

S-44 provides minimum standards for hydrographic surveys for nautical charting and other associated uses. It therefore needs to be reviewed on a periodical basis in order to take account of the developments in requirements and in surveying equipment and procedures.

The following note is taken from the Preface to the 4<sup>th</sup> Edition (1998) of S-44:

<p>It should be noted that the issue of a new standard does not invalidate charts and nautical publications based on previous standards, but rather sets the standards for future data collection to better respond to user needs</p>
---

**Membership:**

Membership of the IHO Working Group on Standards for Hydrographic Surveys is open to all Member States wishing to participate. The IHB will also be represented. The Working Group may invite observers from academia and industry to participate in its work both during and between meetings. Observers are not entitled to vote.

**Organization:**

The Chairperson will conduct the business of the Working Group. Business will be conducted mainly by correspondence. Meetings of the Working Group will only be held when it is considered necessary to progress the tasks of the Working Group

**Objectives:**

1. To review the text of the 4<sup>th</sup> Edition and identify where improvements can be made.
2. To prepare a draft 5<sup>th</sup> Edition of IHO publication Standards for Hydrographic Surveys (S-44) for approval by Member States. When undertaking this task the WG should consider, as a minimum, the following matters:
  - a. The applicability of the S-44 standard to all existing, emergent and future technologies. A standard that is independent of survey technique?
  - b. What does the mariner and other users of the data actually want in 2005? This may require the WG to look beyond bathymetry towards other navigational requirements such as seafloor characterisation and the possible use of statistically generated surfaces as an output of hydrographic surveys.
  - c. Under what circumstances, if any, is 100% bathymetric coverage required.
  - d. The need for clearer guidance on the description of seabed features (“targets”) that need to be detected during a survey. Assess the capability of swath systems to measure the least depth over such a feature in lieu of a mechanical sweep. What feature/target detection is actually required for safety of navigation? Is the two metre cubic feature acceptable, or should systems detect for example the

masts of wrecks, wellheads and other potential hazards? MBES may not detect this type of feature, however if a survey correctly determines the least depth over such a feature, is it necessary to identify it as a particular feature rather than as part of the general seafloor topography? The possible alignment with NATO-AML small/large bottom objects. Should shoal examination thresholds be set i.e. for a particular gradient change in the seafloor?

- e. The archiving of digital data.
- f. The inclusion of the Guidelines for the Processing of High Volume Bathymetric Data as promulgated by CL27/2002.
- g. The need for metadata for hydrographic surveys and the harmonisation of S-44 with other IHO Publication for instance metadata and ZOC in S-57.
- h. The need for the retention, and if necessary the update, of Annex A, “Classification Criteria for Deep Sea Soundings”. *[NB This formed Chapter 2 in the 3<sup>rd</sup> Edition and was retained, for historical reasons, without amendment as Annex A in the 4<sup>th</sup> edition.]*
- i. The possible split of S-44 into two sections, a short compliance standard plus more technical guidelines.
- j. Specifying the requirements of resolution (maximum size of survey footprint) and density.
- k. Changing the traditional confidence level for hydrographic surveying (95%) aiming to eliminate false statistical confidence.
- l. The provision of a more detailed explanation of the calculation of error limits and the specific criteria for determining parameters to use in the formula.
- m. The balance between required positional and depth measurement accuracy with respect to category.
- n. The provision of guidelines with respect to accuracy, seabed variability and resurvey policy.

**Procedure:**

1. The Chairperson is to submit a report for inclusion in the IHO Annual Report.
2. Should the Chairperson be unable to exercise his/her function the Vice-Chairperson will take over.
3. The Working Group should aim to submit a draft 5<sup>th</sup> Edition to Member States for approval by the end of 2006.
4. The IHB will provide secretarial support to the Working Group.