

Report of the Nautical Cartography Working group (NCWG)

Submitted by:	Chairman, NCWG
Related Documents:	NCWG5 Minutes
Related Projects:	Future of Nautical Paper Chart

Chair:	Mikko Hovi (Finland)
Vice-Chair:	Jacqueline Barone (USA)
Secretary:	James Timmins (UK)
Member States:	Argentina, Australia, Brazil, Canada, Denmark, Estonia, Finland, France, Germany, Greece, India, Indonesia, Iran, Italy, Japan, Korea (Rep of), Latvia, Netherlands, New Zealand, Norway, Pakistan, Russia, South Africa, Spain, Sweden, Turkey, Ukraine, UK, USA (=29)
Expert Contributor Organisations:	IHO Secretariat, ICA, Navico Norway, Esri, Teledyne Caris
<i>see Annex A for full details</i>	

1. Meetings Held During Reporting Period

- 1.1 NCWG5 – 5-8 November 2019, Stockholm, Sweden. The full record of this meeting can be found on the NCWG page of the IHO website.
- 1.2 NCWG6 is planned to be held 3-6th November in Cadiz, Spain, and/or by VTC.

2. Work Program

2.1 S-4 Chart Specifications of the IHO and Regulations for International (INT) Charts

- 2.1.1 The working group has discussed and approved several clarifications to S-4 which include amendments to the use of term 'Existence Doubtful', guidance on fishing nets attached to wrecks, submarine cables and limits of charting regions D and E. Further details of these clarifications are listed in **ANNEX C**.
- 2.1.2 A revision to S-4 regarding offshore solar farms has been discussed and agreed by the working group. Approval is sought by the HSSC to include this revision in S-4, details of the proposed changes are included at **ANNEX D**.
- 2.1.3 US NOAA has led the NCWG work on the FOPNC survey and final report. Survey results have been received and analysed with findings included in the final report. At NCWG5 members discussed the survey findings and made recommendations that are also included in the final report awaiting HSSC approval. This work is one of the key priorities of the IHO 2019-2020 work program.

2.2 S-4 supplementary publications INT1, INT 2 & INT 3

- 2.2.1 INT1 Symbols, Abbreviations and Terms used on Charts. There are three official language versions of INT1. Their current status is:
 - Spanish language version published by ES/IHM: Edition 6, April 2018

- French language version published by FR/SHOM: Edition 7, 2019.
- English language version published by DE/BSH: Edition 9, August 2018

The efforts of IHM, SHOM and BSH and their collaboration through the NCWG INT1 Sub-Working Group are acknowledged in developing these revisions.

- 2.2.2 The UK has volunteered to take over responsibility for publishing the English language version of INT1 in the absence of any other offers. A new edition of the English language INT 1 will be published by UK in November 2020 and will only include limited changes to the existing NP5011 product published by the UKHO, further content changes will be made in subsequent editions. NP5011 will include INT 1 in the title and additional references to supplementary national content will be added at Section V Data Quality Indicators which hasn't been approved by NCWG yet. This new edition of INT 1 will be Edition 8 as that is the next edition number of NP5011 however the existing INT 1 published by Germany is currently on edition 9. To avoid confusion for customers and IHO members, the UKHO and IHO will provide guidance to distributors and members regarding this change.
- 2.2.3 The working group continues to discuss the future options for INT1. It is acknowledged that the mariner will continue to require access to a hard copy version of INT1, additionally the working group believes that improvements could be made for access and use of INT1 by Hydrographic Offices.
- 2.2.4 INT2 Borders, Graduations, Grids and Linear Scales. There are no current plans for a revision of Edition 4, 2007, published by NL.
- 2.2.5 INT3 Use of Symbols and Abbreviations. There are no current plans for a revision of Edition 5, 2011, published by UK. Discussions at NCWG2 indicated that UKHO can no longer print INT3 on two sides and would no longer be providing printed versions of INT3 on request. However, UK has indicated that they will continue to maintain INT3 as PDF on the IHO web site for Hydrographic Offices to print themselves as required.

2.3 S-11 Part A Guidance for the Preparation and Maintenance of International Chart Schemes

- 2.3.1 Current status is Edition 3.1.0, published February 2018. There are no current plans for a revision.

2.4 Liaison with other IHO working groups and S-100 implementation support

- 2.4.1 The working group has provided input to ENCWG regarding the issue of equivalent T&Ps for ENCs.
- 2.4.2 The working group has been working with S101PT to create new symbols for new or significantly changed features in S-101, that cannot be carried over directly from S-52.

3. Progress on HSSC Action Items

- 3.1 Action HSSC11/44: *India to submit a proposal to NCWG on a way to address some of the requirements of the IHO Resolution 1/2005 (Response to Disasters) aiming to incorporate emergency contact numbers on charts.* This was discussed at NCWG5 and it was recommended that NIPWG consider this topic
- 3.2 Action HSSC11/45: *NCWG to investigate the possible options and consequences for the future of the three INT-1 versions (English, French, Spanish).* This was discussed

at NCWG5 and is an ongoing task for the INT1SubWG as referred earlier at paragraph 2.2.3.

- 3.3 Action HSSC11/46: *NCWG/IHO Sec / Member states to undertake the actions as proposed by the NCWG on the Future of The Nautical Paper Chart, including the survey.* As referred to earlier at paragraph 2.1.3 the survey has been completed and the final report is being submitted to HSSC12.
- 3.4 Action HSSC11/47: *NCWG to anticipate the need to consider the proposals made at HSSC-11 on the Automated production of paper charts from ENC's at its next meeting.* This was discussed at NCWG5 following presentations on the subject by Esri and Teledyne Caris. One of the conclusions from the discussion was the need for a common IHO baseline for symbology. This baseline symbology should be rule-based and such that it can be implemented in the production software by default, that fulfils the minimum requirements for automated paper chart production, and can be extended and/or modified if the HO so wishes. The Working group recommends that HSSC consider tasking NCWG to develop a baseline symbology to support more automated paper chart production.
- 3.5 Action HSSC11/48: *S-100WG, ENCWG, NCWG and NIPWG to develop a harmonised portrayal process for S-98.* This action is ongoing and NCWG chair will liaise with other working groups.

4. Problems Encountered

- 4.1 Ongoing resource stretch at participating HO's.
- 4.2 Member states are all at different levels of progression regarding paper chart and ENC production, this presents some challenges when discussing the future of the paper chart, INT1 and S-4.

5. Any Other Items of Note

- 5.1 The Terms of Reference were updated by members at NCWG5 and are included at **ANNEX E** for approval by HSSC.
- 5.2 At NCWG5 Rep of Korea delivered an update (see NCWG5-06.10) regarding the development of Wing-In-Ground Effect craft (WIG) which are vehicles that are designed to sustain flight over a level surface but do not maintain constant contact with the surface. They are faster than ships and have a maximum altitude of up to 150 metres. The WIG craft are classified as ships not aircraft. The trials have shown that a separate nautical chart product may be needed by the WIG craft. The NCWG concluded that further guidance is needed from HSSC regarding IHO position on WIG craft and related navigational products.

6. Conclusions and Recommended Actions

- 6.1 NCWG concludes that the future of S-4 should now be reviewed and a baseline symbology developed for paper charts.
- 6.2 NCWG recommends that HSSC adds the baseline symbology as new work item to the NCWG work plan, as recommended at revised work plan at **ANNEX B**

7. Justification and Impacts

- 7.1 The future of S-4 is closely linked with the existing work item on the future of the nautical paper chart, it is also related to HSSC action 11/45 on the future of the 3 INT1 versions. These three work items would benefit from being considered together as a combined solution may be possible, this would reduce duplicated effort and allow freedom to explore wider solutions. S-4 is currently 452 pages long therefore this is likely to be a large amount of work and will require considerable effort by the NCWG.
- 7.2 The baseline symbology work is also closely related to the future of S-4 and INT1 as well as supporting the future of the paper nautical chart. This work is required to help progress paper chart automation and also support symbol creation and harmonisation for S-101 and S-100 products in general. Support from the S-100WG and ENCWG may be required as this is also a large task.

8. Action Required of HSSC

The HSSC is invited to:

- a. **Note** this report
- b. **Endorse** the continued activity of the working group
- c. **Endorse** the proposed changes to S-4 listed at **ANNEX D** and submission of Edition 4.9.0 to IHO Member States for approval to publish
- d. **Approve** the Terms of Reference of the NCWG at **ANNEX E**
- e. **Approve** the new work item on common IHO baseline symbology and changes to revised NCWG workplan at **ANNEX B**.
- f. **Discuss** the IHO position regarding WIG craft and possible separate navigational product type.

ANNEX A

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(Updated 1 September 2020)

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¹ INT1subWG; ² NCWG Portrayal subWG; ³ Future of the Paper Chart subWG (FOPCsubWG)

Work plan 2019-20 - Summary of progress

(updated to 24 FEB 2020 following NCWG5 and subsequent activity, changes in red)

Tasks

A	Maintain and extend Publication S-4 'Chart Specifications of the IHO & Regulations of the IHO for INT Charts' (IHO Task 2.2.1)
B	Maintain and extend Publication S-11 Part A 'Guidance for the Preparation and Maintenance of INT Chart schemes' (IHO Task 2.2.2)
D	Development of new (and revised) symbology (IHO Task 2.2.1)
E	Maintenance of S-4 supplementary publications INT1, 2 & 3 (IHO Task 2.2.1)
G	Conduct meetings of NCWG (IHO Task 2.1)
H	Provide technical assistance to other IHO working groups and support regarding the implementation of S-100 (IHO Task 2.3)

Work items

* Allowing for approval via HSSC (in accordance with Resolution 2/2007) before MS and publication.

No	Work item	Priority H-high M-medium L-low	Next Milestone	Start Date	End Date	Status P-Planned O-Ongoing C-Completed	Contact Person(s)	Affected Pubs/Standard	Remarks
A16	Consideration of the 'future of the paper chart'	H	Final report to HSSC12.	2014	2020	Completed	Colby Harmon		CSPCWG10 Action 36 NCWG1 Action 54 Meeting following NCWG2 NCWG3 Action 12 Report at HSSC9 Report at HSSC10 Report at HSSC11 NCWG4 Action 4/2 Discussed at NCWG5 Report submitted to HSSC12
A26	Portrayal subWG	H	Agree protocol for seeking advice from NCWG	2016		O	Chair NCWG		HSSC7 Action 18 NCWG2 Actions 5, 22, 30-32 Attendance at NIPWG Visualization workshop May 2017. NCWG3 Action 15
A28	Future of S-4	H	NCWG6 – discuss future of S-4 and agree work tasks	2020	2022	O	Chair NCWG	S-4	NCWG3 Agenda 7.4: waiting on progress with A16

A29	Consider ICPC submission on charting submarine cables taking into account deep sea mining	L	Amend S-4 B-443 and C-408. (S-4 4.9.0)			Completed	Chair NCWG	S-4	HSSC8/68 (pending submission from ICPC). ICPC unavailable for discussion at NCWG3. NCWG3 Action 19 completed: S-4 contains nothing contradictory to Res.4/1967 (as amended IHO-A1) NCWG4 – Action 4/17 completed. S-4 clarifications to be published
E1	Maintain official INT1s		UK to take over English INT1 from DE and publish new edition			O	DE: S Spohn FR: S Guillou ES: F. Yanguas	INT1	DE INT1 edition 9 published August 2018 ES INT1 edition 6 published April 2018 FR INT1 edition 7 published in 2019 UKHO plan to publish new edition of English version before end of 2020.
E9	Develop new section V for INT1 for 'data quality'	M	Draft under consideration by INT1 subWG	2014	2021	O	Chair NCWG INT1 subWG	INT1	CSPCWG10 Action 35 NCWG3 Agenda 11.2: Transferred to UK NCWG4 – Action 4/18 ongoing
E10	Symbol library	L	UK to confirm freedom to use UK's symbol set	2016		O	UK (N Rodwell) US (C Harmon)	S-4, INT1	NCWG Actions 45, 46 NCWG3 Agenda 3: Not required to progress at this time.
E11	Develop baseline symbology to support automated chart production	H	NCWG6 – discuss and agree work tasks	2020		P		INT1, S-4	New proposal by NCWG at HSSC12
H2	Prepare a single educative IHO authoritative document addressing the issue of "equivalent" T&Ps for ENCs, in view of its distribution to HOs, Port State Control authorities and mariners after approval.	M	Chair to circulate revised draft to WG members for comment	2016		Completed	NCWG Chair and ENCWG Chair	S-66 Stage 2?	HSSC8/28 NCWG3 Action 15 Guidance published as part of existing IHO document "Information on IHO Standards Related to ENC and ECDIS".

Meetings (Task G)

Date	Location	Activity
6-9 November 2018	The Hague, Netherlands	NCWG4
5-8 November 2019	Stockholm, Sweden	NCWG5
3-6 November 2020	Cadiz, Spain	NCWG6

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ANNEX C

S-4 Clarifications discussed and approved by NCWG

Actions in blue

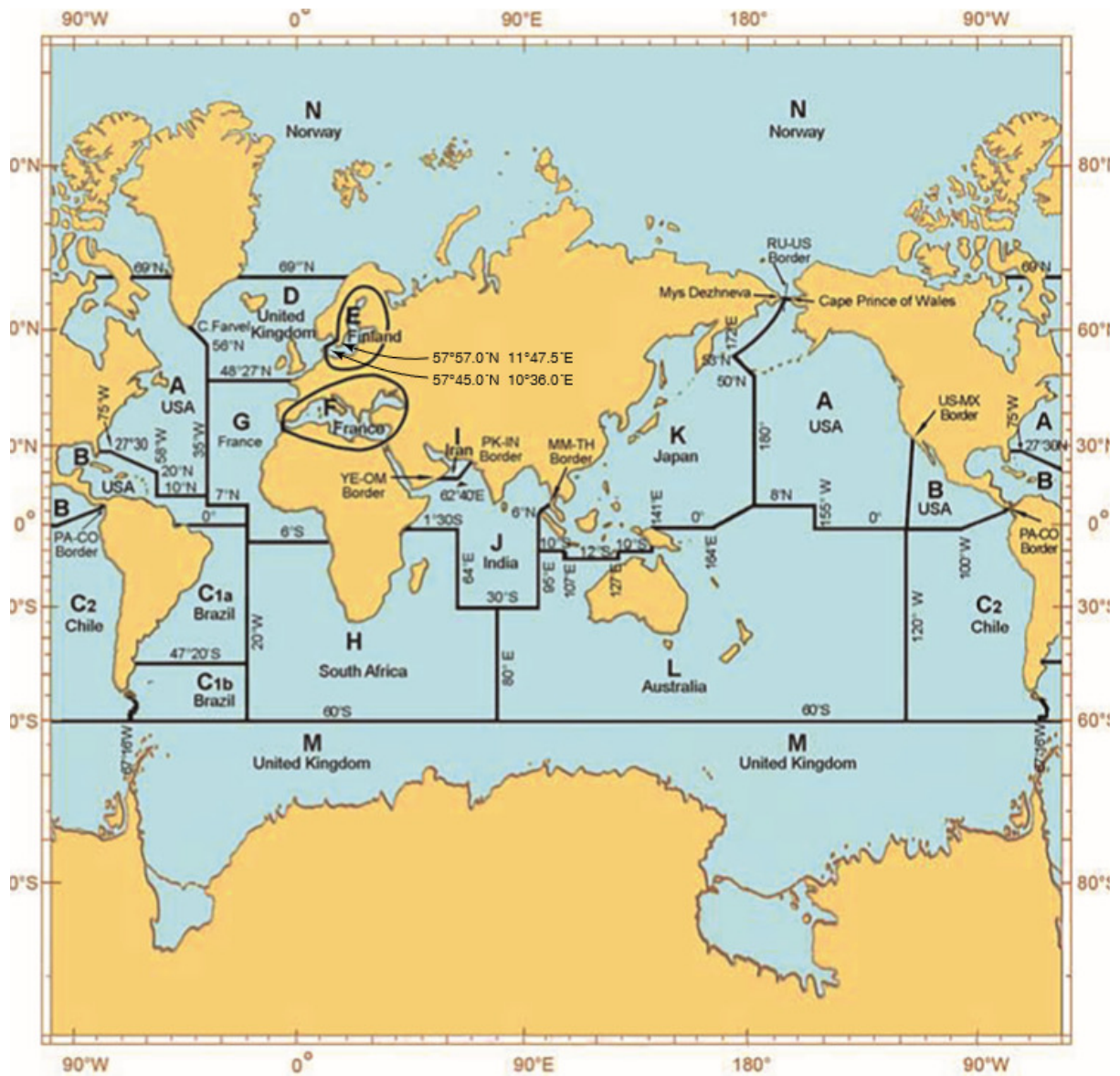
Comments and explanations in green

Extracts from S-4 in black with:

- Proposed additional words in red
- Proposed deletions ~~crossed through~~.

ACTION NCWG5/04

The limit between Charting Regions D and E is clarified by including limit coordinates in the diagram at A-204.8.



ACTION NCWG4/11

6.15 Existence Doubtful (US)

Docs: NCWG4-06.15 A Existence Doubtful

The Netherlands endorsed the proposal by the US. The chair asked the members to consider what changes may be required for S-100WG. The term 'vigia' was discussed and it was agreed that it is an outdated term that may be confusing.

Action 4/11 - Draft S-4 amendment regarding 'Existence Doubtful' and circulate to members. (Secretary and Chair)

Revised text agreed by NCWG:

B-424.1 PA, meaning **Position approximate**, must be used to indicate that the position of a shoal, wreck, ~~or other object etc~~, either has not been accurately determined or does not remain fixed.

B-424.2 PD, meaning **Position doubtful**, must be used to indicate ~~a shoal, wreck, or other object wreck, shoal, etc~~, has been reported in various positions and not confirmed in any of them.

B-424.3 ED, meaning **Existence doubtful**, must be used to indicate an object, dangerous to navigation, which is shown on a chart, the existence of which has come into question, but which has not been adequately disproven. ~~the possible, but unconfirmed, existence of a rock, shoal, etc (sometimes called a 'vigia')~~.

ACTION 4\15

12.2 INF2 Fishing nets attached to wrecks (UK)

Docs: NCWG4-12.2 INF2 Fishing nets attached to wrecks

The chair encouraged members to share their practices and policy's regarding nets attached to wrecks. The US, DE and ZA all informed members that they would show the least depth of nets attached to wrecks whereas UK, ES and SE advised that they show the depth of the wreck only and do not show the shoaler depth of any nets that were attached. The IHO Secretariat recommended that the least depth of nets should be shown and Director Kampfer shared an account of a small fishing vessel in Namibian waters that snagged a fishing net that was attached to a wreck and sadly sank with several lives lost.

Action 4/15 Draft wording for S-4 regarding recommendation to issue chart correcting notice to mariners when shoaler wreck depths from snagged fishing nets are discovered. Also include need for temporary notice until nets cleared. (UK)

Revised text agreed by NCWG:

B-422.6 A wreck of unknown depth for which a safe clearance cannot be estimated.

For a wreck over which the least depth is unknown and a safe clearance **cannot** be estimated, the underwater wreck symbol must be used:

K29

The symbol should also be used for all wrecks in waters over 200 metres deep.

For a wreck **considered to be potentially dangerous** to some surface vessels capable of navigating in the vicinity, a surrounding danger line and solid blue tint must be added:

K28

The use of symbols K28 and K29 should be reviewed whenever the size of vessels capable of navigating in the vicinity changes (for example if an access channel is dredged).

B-422.7 A wreck for which a survey has shown a reduced depth of water over it, representing an increased hazard compared with the charted depiction. This includes both wrecks of unknown depth and those over which the least depth has been established.

It should be determined, from examining the survey data, what is causing the surveyed height of the wreck from the seabed to be less than that charted. It may be the case that the wreck is disintegrating, resting at a different angle, or debris has become attached to it.

If the original data is not available, for example if a vessel's report is received, it should be established what exactly has been measured and from what datum point. For example, the quality of the previous survey (shown on the chart) may not match that of a more recent survey, affecting the surveyed seabed depth. This is important if a depth of water above the wreck is given, but nothing else, which may suggest the wreck itself is now taller, but more likely the distance to the seabed has been surveyed as different to what is already known.

If debris has become attached to the wreck, consider consulting the appropriate maritime authority to determine if there are plans to remove the attached debris and if an updated least depth should be charted at the wreck.

B-422.8 Changing criteria for wrecks. B-422.1-6 provides guidance on charting new wrecks. However, historically the criteria used for differentiating between symbols K28 and K29 for wrecks were often based on a threshold value for the estimated depth over the wreck (for example: 20m; 28m). Criteria have varied between nations and over time (due to the increasing draught of large vessels). The term 'non-dangerous wreck' was formerly used for K29 symbols, even though they may be dangerous to some vessels capable of navigating in the vicinity. Unfortunately, the chart user is not necessarily aware of that fact or that, due to the changing criteria, the same symbol on a chart may have different meanings. Ideally, therefore, all charted K28 and K29 symbols should be re-assessed to conform to the guidance above.

If resources and knowledge do not allow for an immediate re-assessment of all charted K28 and K29 symbols, the following actions should be taken to reduce possible confusion, starting with priority areas:

- An explanation (or reference to an explanation in a nautical publication) of the possible inconsistency between the meaning of K28 and K29 symbols on a chart must be given in the national equivalent of INT1, and a cautionary note may be added to charts.
- Existing K29 symbols may be updated according to the following formula:

- i. Retain K29 in water deeper than 100m.
- ii. In water shallower than 100m, amend K29 to K30, with the safe clearance depth being that formerly applied to differentiate between K28 and K29. (Take care where the criteria used has changed over time).
- iii. If this action results in over-crowding, a selection should be made to show the extent of the area, or symbols merged into extended danger lines.
- iv. Take care to ensure no anomalies result, such as wrecks with a safe clearance greater than the surrounding depths; in such cases, the original data must be reassessed or, if not possible, the symbol should not be changed, see B-416.3.

- A database, maintained for wreck information, would assist any reassessment and demonstrate why a particular symbol was chosen.

B-422.9 A Foul Area is an area of numerous uncharted dangers to navigation.....

B-422.10 Submerged obstructions too small to be shown to scale must be charted similarly to wrecks (see B-422.3, 422.4, 422.7)

ACTION 4\17

6.4 Submarine cables [Work item A29] (ICPC)

Docs: NCWG4-06.4A,B,C Paper and presentation by ICPC

A late paper and presentation was received during the meeting from the ICPC that briefed upon the dangers caused by cables as well as the serious problems caused when they were broken. The delegates heard about some of the challenges in managing cables information and it was acknowledged that a comprehensive cables database is required. It was noted that some existing databases contain duplications. It was stated that the engineers who lay the cables will hold the exact as laid positions but that it was possible that the cable owners who have a responsibility to publish details of the positions may sometimes use planned positions instead. When asked about disused cables, the ICPC commented that they believed that they should still be shown on charts.

Discussion also focused on buried cables, the ICPC informed that buried cables would often be buried to about 2 metres under the seafloor and the cable would be buried out as far as the 1000m contour whereupon it may then be exposed again. The members heard the ICPC concerns regarding deep sea mining in areas that have cables and the risk of cable damage if the cables were not shown on the chart. Whilst it was acknowledged by the members that this was a risk it was generally felt that it was unlikely that information on mining activities would be submitted to the hydrographic offices. The hydrographic offices would require support from the cables and mining industry to ensure that information on cables in seabed mining areas is appropriately received.

The NCWG members felt that their offices would always consider showing any cables information received and informed the ICPC that they may sometimes not receive information from the cables company. The NCWG believed that the first priority was to ensure that the quality of information and the mechanism of information supply is improved by the cables industry. The IHO Secretariat inquired about the ICPC progress regarding establishing a data exchange mechanism and the ICPC did not have an update on the current status.

The ICPC provided suggested amendments to sections B-443 and C-408.1 but it was pointed out by the Chairman that the wording in this proposal formed the basis of the text previously used in the assembly Circular letter (ACL) 10 bis.3. This was a proposal to amend Res 4/1967 that was discussed at IHO A1. The IHO assembly had approved the proposal in an amended format and S-4 has been updated to agree with that approved version. Therefore the NCWG should remain consistent with the approved version. It was agreed that some minor changes to the wording of S-4 could be considered.

IHO Secretariat provided the following wording suggestion:
"B-443.8 Even buried cables may be damaged by anchoring and marine activities. In shallow waters for instance, they should be charted in magenta with a note stating, if known, the nominal...."

ACTION 4/17 - Chair and secretary to draft amendments to B-443 and C-408.1, regarding submarine cables. To include reference to IHO resolution 4/1967 as well as minor changes to wording. Circulate wording to members for review. (Chair and Secretary)

Revised text agreed by NCWG:

B-443 SUBMARINE CABLES

Submarine cables are used to carry power or telecommunications. All power cables and most telecommunication cables carry dangerous voltages. Submarine cables are potential hazards to both vessels and life, particularly to fishing vessels engaged in trawling the seabed. Where possible, submarine cables are now buried beneath the sea floor in water depths of less than 1000 metres; however there remains a large percentage unburied. Submarine cables, **both buried and unburied**, are vulnerable to damage from anchoring, trawling, mining or other seabed operations; even small craft

anchors can penetrate a soft seabed sufficiently to foul a cable. Damage to telecommunication cables can lead to extensive disruption of national and international communications, whilst damage to power cables can disrupt electricity supply. See IHO resolution 4/1967 as amended for further information.

Submarine cables, including disused cables, should be charted to indicate their presence to vessels engaged in anchoring, trawling, mining or other seabed operations in order to:

- Warn mariners of the potential hazard to their vessel, including electric shock to any vessel fouling or breaking the cable, possible capsizing of a small vessel if its fishing gear or anchor is trapped under the cable, or loss of gear (trawls or anchor cables).
- Prevent damage to the cable and avoid disrupting the service the cable may be providing.

Active cables should be charted to a depth of 2000 metres (which is the deepest depth of water to which vessels may be endangered by fouling the cable). The origin and destination names and/or name of a submarine cable may be inserted adjacent to the cable, in sloping magenta text, where these are not obvious or in order to associate a note, for example: *Valencia to Ibiza; F.O.G. cable (see Note)*.

For disused cables, see B-443.7. For buried cables, see B-443.8. For cables related to degaussing areas see B-448.

* * *

B-443.8 Cables, buried under the seabed ~~so deep that they are not remain~~ vulnerable to damage from anchoring, trawling, mining or other seabed operations. ~~should not be charted (so that mariners are not unnecessarily inhibited from anchoring or fishing). In marginal cases they may~~ They should be charted in magenta with a note stating the nominal depth to which they are buried, as L42.1, but with a cable symbol.



If they are partly laid in a tunnel, the entrance, if required to be shown, must be charted as L42.2, but with a cable symbol. For details, see B-444.5.

* * *

C-408 SUBMARINE CABLES

C-408.1 Submarine cables are vulnerable to damage from anchoring, trawling, mining or other seabed operations. Their inclusion on charts assists in protecting the cables (and the service they provide) from damage, in addition to warning mariners of the potential hazard presented to their vessel by the existence of submarine cables. See IHO resolution 4/1967 as amended for further information.

Active cables should be charted to a depth of 2000 metres (which is the deepest depth of water to which vessels may be endangered by fouling the cable), using symbol L30.1 or L31.1 as appropriate. They are not normally shown on the 1:10 000 000 series. Guidance is provided in B-443. Where the chart is the largest scale, or in areas where it is likely to be used for navigation, submarine cables should be shown if at all possible. However, depiction of the cables may be terminated before they reach the coast, or inshore water, to avoid obscuring other important detail. In these cases, a suitable legend should be inserted on the chart in the vicinity and a note included, in magenta, preferably under the main title block, along the following lines:

NOTE. Submarine cables have been omitted from part of this chart. For details of these, the larger-scale charts should be consulted.

This note may be combined with the note concerning the omission of submarine pipelines (see C-409.2).

Revisions to S-4 recommended by NCWG and requiring approval by HSSC

Actions in blue

Comments and explanations in green

Extracts from S-4 in black with:

- Proposed additional words in red
- Proposed deletions ~~crossed through~~.

ACTION 4/6

6.8 Offshore Solar Parks (NL)

Docs: NCWG4-06.8A ,B Offshore Solar Parks

Netherlands presented the subject of offshore solar parks and their proposal was approved by the group, Australia endorsed paper 6.8 via correspondence.

(NL) ACTION 4/6 - Formulate S-4 wording regarding solar farms and circulate to NCWG members. (Secretary)

Revised text agreed by NCWG:

B-445.12 Wave ~~energy devices~~; and offshore solar energy devices; Wave farms and offshore solar farms. A wide variety of devices for harnessing wave **and offshore solar** energy are being developed. These devices need protection and are also potentially dangerous to navigation.

At the present stage of the industry, wave **and offshore solar** farms should usually be treated as Development Areas (limit N1.2, N2.1 or N2.2 as appropriate, see B445.7); (that is: charted in magenta), as the actual obstructions will come and go or be moved as experiments progress. A legend such as '*Renewable Energy Devices - Development Area (see Note)*' should be inserted in the area. Small areas may be simply labelled '*Development Area (see Note)*', '*Wave Farm (see Note)*' or '*Solar Farm (see Note)*'. 'All cables, buoys, lights and permanent structures should be charted as normal.

A magenta note should be inserted warning of the potentially hazardous nature of the area, for example:

DEVELOPMENT AREA

Extensive testing of renewable energy devices, both above and below the surface, takes place in this area. Mariners should exercise caution if navigating in this area. For further information, see [eg associated publication].

Later, if such an area becomes established as a wave **or solar farm**, the symbol for a renewable energy device should be used. Usually, the renewable energy device symbol will be used in combination with an area symbol, although if necessary (for example because of scale or for a single device) it may be used as a point symbol, with the centre of the circle representing the position:



Symbol N1.1 (black maritime limit implying permanent physical obstructions) should normally be used for the limit of a wave or solar farm. However, if navigation is prohibited, N2.2 must be used:



If there are other restrictions, N2.1 may be used, noting the principles for portraying coincident limits at B-439.6.

NAUTICAL CARTOGRAPHY WORKING GROUP (NCWG)
(Formerly the Chart Standardization and Paper Chart Working Group - CSPCWG)

Terms of Reference and Rules of Procedure

- Ref:*
- 1) 1st HSSC Meeting (Singapore, October 2009)
 - 2) 4th HSSC Meeting (Taunton, United Kingdom, September 2012)
 - 3) 6th HSSC Meeting (Viña del Mar, Chile, November 2014) (name change only)
 - 4) 7th HSSC Meeting (Busan, Republic of Korea, November 2015)
 - 5) 8th HSSC Meeting (Monaco, November 2016) (clarification in section 4.c only)
 - 6) 9th HSSC Meeting (Ottawa, Canada, November 2017) (editorial changes, and 4.a) (iii)
 - 7) 12th HSSC Meeting (Bristol, United Kingdom, May 2020) (....)

1. Objectives

- a) To provide expert and authoritative advice and guidance to **IHO Member States**, relevant IHO bodies and non-IHO entities on the concepts of nautical cartography, including
 - (i) The definition and the construction of digital chart content for the optimal and efficient production and maintenance of nautical chart products (S-57 ENC, S-101 ENC, paper charts meeting IHO standards if needed)
 - ~~(i) Its application to nautical charts existing in any physical or digital form;~~
 - (ii) The development of specifications for symbolization of any data required to be displayed ~~on nautical charts~~ from ENC on ECDIS (S-57 based, S-100 based, dual-fuel) and on paper charts meeting IHO standards if needed
 - (iii) The **interoperable** integration of the nautical chart and other ~~cartographic~~ nautical products for e-Navigation in support of the S-100 implementation roadmap. This includes resolving portrayal issues related to the ~~simultaneous~~ display of a nautical chart ~~in combination with navigational information and non-navigational information~~ within an integrated navigation system.
- b) To provide expertise to the International Board on Standards of Competence for Hydrographic Surveyors and Nautical Cartographers (IBSC) on the standards of competence for cartographers when deemed necessary.
- c) To monitor the development of other relevant international standards.
- d) **The primary support compiling the rules to be used by nautical cartographers in their decision-making process for creating chart content is S-4.**

2. Authority

This WG is a subsidiary of the Hydrographic Services and Standards Committee (HSSC). Its work is subject to HSSC approval.

3. Composition and Chairmanship

- a) The WG shall comprise representatives of IHO Member States (MS), Expert Contributors (EC), observers from accredited Non-Governmental International Organizations (NGIO), and a representative of the IHO Secretariat. A membership list shall be maintained and posted on the IHO website.
- b) The Chair will monitor membership to ensure that each Regional Hydrographic Commission is invited to be represented on the WG.

- c) EC membership is open to entities and organizations that can provide a relevant and constructive contribution to the work of the WG.
- d) The Chair and Vice-Chair shall each be a representative of a MS. The election of the Chair and Vice-Chair shall be decided at the first meeting after each ordinary session of the Assembly and shall be determined by vote of the MS present and voting.
- e) A Secretary should be appointed to ensure the smooth running of WG business; to administer consultation and collation of members' views; and may act as Editor of the WG's publications. The position is normally filled by a member of the WG.
- f) If the Chair is unable to carry out the duties of the office, the Vice-Chair shall act as the Chair with the same powers and duties. If the position of Chair or Vice-Chair becomes vacant during the period between two ordinary sessions of the Assembly an election should be conducted at the next meeting of the Working Group or by correspondence.
- g) ECs shall seek approval of membership from the Chair.
- h) EC membership may be withdrawn in the event that a majority of the MS represented in the WG agrees that an EC's continued participation is irrelevant or unconstructive to the work of the WG.
- i) All members shall inform the Chair in advance of their intention to attend meetings of the WG.
- j) In the event that a large number of EC members seek to attend a meeting, the Chair may restrict attendance by inviting ECs to act through one or more collective representatives.

4. Procedures

- a) ~~The WG's main tasks are listed at (1) above and are amplified here:~~
 - (i) ~~Keep under continuous review the IHO publication S-4 'Regulations of the IHO for International (INT) Charts and Chart Specifications of the IHO', in order to advise the HSSC on their updating, design and format and the portrayal of symbols. Note: S-4 is supplemented by: INT-1 'Symbols, Abbreviations and Terms used on Charts' INT-2 'Borders, Graduation, Grids and Linear Scales' INT-3 'Use of Symbols and Abbreviations' These supplementary documents are maintained by individual MS, under the supervision of NCWG.~~
 - (ii) ~~Advise the HSSC on suggestions put forward by MS to update S-4, in accordance with IHO Specification B-160, with the goal of achieving the maximum possible adherence by MS to the Regulations and Specifications.~~
 - (iii) ~~Keep under continuous review S-11 Part A 'Guidance for the Preparation and Maintenance of International (INT) Chart and ENC Schemes' in order to advise the HSSC on its updating.~~
 - (iv) ~~Advise the IHO Secretariat and Regional Hydrographic Commissions, as appropriate, on the work of International Charting Coordination Working Groups (ICCWG) or Regional Charting Groups (RCG) in order to promote the production of international (INT) charts.~~

~~(v) Offer advice based on the WG experience to ICCWG/RCG and individual MS, on chart schemes and cartographic work, in order to strongly encourage adherence to IHO charting specifications.~~

- b) The WG should work by correspondence, teleconferences, group meetings, workshops or symposia. The WG should meet about once a year. When meetings are scheduled, and in order to allow any WG submissions and reports to be submitted to HSSC on time, WG meetings should not normally occur later than nine weeks before a meeting of the HSSC.
- c) Decisions should generally be made by consensus. If votes are required on issues or to endorse proposals presented to the WG, only MS may cast a vote. Votes at meetings shall be on the basis of one vote per MS represented at the meeting. Votes by correspondence shall be on the basis of one vote per responding MS represented in the WG.
- d) The date and venue of group meetings shall normally be announced by the Chair at least six months in advance.
- e) The draft record of meetings shall be distributed by the Chair (or the secretary) within six weeks of the end of meetings and participants' comments should be returned within three weeks of the date of despatch. Final minutes of meetings should be posted on the IHO website within three months after a meeting.
- f) Sub-working groups and project teams may be created by the WG or proposed to HSSC to undertake detailed work on specific topics. The terms of reference and rules of procedure of the sub-working groups and project teams are determined or proposed by the WG as appropriate.
- g) The WG will maintain close liaison with other HSSC WGs, particularly the ENCWG, NIPWG and S-100WG, and other groups developing and maintaining S-100 based products. The WG should liaise also with other IHO bodies, international organizations and industry, as appropriate and as instructed by HSSC.
- h) The WG should prepare annually a report on its activities and a rolling two-year work plan, including expected time frame.