

**INTERNATIONAL HYDROGRAPHIC  
ORGANIZATION**



**ORGANISATION HYDROGRAPHIQUE  
INTERNATIONALE**

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**CIRCULAR LETTER 32/2009  
12 May 2009**

**IHO S-57 SUPPLEMENT 2  
- ANNOUNCEMENT OF DOCUMENT RELEASE**

Reference: Circular Letter 106/2008 of 15 December – *Minutes of 20<sup>th</sup> CHRIS Meeting.*

Dear Hydrographer,

**Minor Amendment to Temporal Attribution Rules for S-57 Objects**

1 As reported in the Reference, the 20<sup>th</sup> meeting of the Committee on Hydrographic Requirements for Information Systems (CHRIS/20) considered an urgent item tabled by the Chairman of the Transfer Standards Maintenance and Applications Development Working Group (TSMAD) concerning the need for minor amendments to S-57 to address shortcomings in the temporal attribution of S-57 objects and certain “master/slave” relationships. (see CHRIS/20 agenda item 6.1 and CHRIS paper 20-WP1). A copy of CHRIS 20-WP1 is attached for information.

2 This urgent item resulted from recent changes to the IEC 61174 testing standard for ECDIS which introduced tests to type-approve the correct handling of temporal attribution of S-57 ENC objects in ECDIS equipment. These attributes enable time variable changes to be shown on an ECDIS display whereby features are either displayed or hidden according to the date of effectiveness attributed to them. The most common features affected are buoys and beacons whose slave features (topmark, fog signal, et cetera) do not currently permit temporal attribution. This results in spurious objects remaining on display if, or when, the display of the master buoy or beacon is suppressed.

3 As a result, and noting the potential safety of navigation implications, CHRIS/20 tasked TSMAD to urgently consider suitable minor revisions to S-57 to clarify temporal attribution and “master/slave” relationships and, subject to there being no adverse impacts on stakeholders, to develop a Supplement to S-57. This would follow a similar process to the development and implementation of S-57 edition 3.1 Supplement 1 that provided urgent guidance on the inclusion of Archipelagic Sea lanes and Environmentally Sensitive Sea Areas in ENCs that was announced in IHO Circular Letter 5/2007 dated 12 January 2007.

4 The TSMAD Chairman has now reported to the Chairman of HSSC (formerly CHRIS) that the work on Supplement 2 is complete. The Chairman also reported that a range of ECDIS manufacturers and independent testing has confirmed that the changes detailed in Supplement 2 will cause no significant adverse impacts to them or to ECDIS users. Furthermore, the most prominent ENC production software manufacturers have indicated that there will be minimal impact on their existing software and hence on HO's. A copy of the completed S-57 Supplement 2 is attached for information.

## Minor Amendment to S-57 Definitions for CATZOC

5 At its meeting CHRIS/20 also agreed on minor amendments to the S-57 definitions for CATZOC tabled by the Data Quality Working Group (DQWG) (see CHRIS/20 agenda item 6.6 and CHRIS paper 20-06.6A). A copy of CHRIS20-06.6A is attached for information. The principal reason for introducing these minor changes to the CATZOC definitions was to address the apparent reluctance of some ENC producer nations to attribute ENC data because of the perceived stringent conditions inferred by the current definitions of CATZOC categories A1 and A2 in relation to “seafloor coverage” and the use of the phrase “All significant seafloor features detected and depths measured”. CHRIS/20 agreed that these minor amendments to the definitions would be promulgated as part of Supplement 2 to S-57, when it was completed.

## Introduction of Supplement 2 to S-57 Edition 3.1 (S57 e3.1.2)

6 Supplement 2 to S57 e3.1 containing the agreed changes to CATZOC definitions and the addition of temporal attribution on certain feature objects is entitled: “*Supplementary Information for the Encoding of S-57 Edition 3.1 ENC Data*”. The supplement has been developed and agreed by the TSMAD in accordance with the instructions of CHRIS/20, and is issued herewith with immediate effect. For the convenience of readers, the contents of Supplement 1 have been included in Supplement 2. Supplement 2 is available for download from the IHO web site <http://www.iho.int> > Publications > Downloads.

On behalf of the Directing Committee  
Yours sincerely,



Captain Robert WARD  
Director

Attachments (in English only):

1. CHRIS paper 20-WP1 – *S-57 Temporal Attribution*
2. S-57 e3.1 Supplement 2 - *Supplementary Information for the Encoding of S-57 Edition 3.1 ENC Data*
3. CHRIS paper 20-06.6A – *Chairman’s Report of the DQWG*

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Copied for information to: **ECDIS Stakeholders** (as listed on IHO website)

## Paper for Consideration by CHRIS

## S-57 Temporal attribution

<b>Submitted by:</b>	TSMAD
<b>Executive Summary:</b>	Proposal for a minor revision to S-57.
<b>Related Documents:</b>	S-57, S-52, S-58.
<b>Related Projects:</b>	

**Introduction / Background**

Recent changes to the IEC 61174 standard introduced tests to type approve the correct implementation of temporal attributes. These attributes enable time variable changes to be made to the ECDIS display whereby features are either displayed or hidden according to the date attributed. Currently some equipment objects do not carry temporal attributes and therefore will not react to these changes and will remain displayed when the master feature is hidden. The temporal attributes are DATSTA (date start) DATEND (date end), PERSTA (period start) and PEREND (period end).

**Analysis/Discussion**

S-57 includes the concept of master/slave relationships between structure feature objects and equipment feature objects as described in the following extract from the S-57 ENC Use of the Objects Catalogue

**12.1 Lighthouses, navigational marks - relationships****12.1.1 Geo objects forming parts of navigational aids**

*Aids to navigation are composed of fixed or floating structures carrying equipment objects.*

*The most common structure objects are: BCNCAR, BCNISD, BCNLAT, BCNSAW, BCNSPP, BOYCAR, BOYINB, BOYISD, BOYLAT, BOYSAW, BOYSPP, BRIDGE, BUISGL, DAYMAR, LITFLT, LITVES, LNDMRK, MORFAC, OFSPLF, PILPNT, SLCONS.*

*Equipment objects consist of: DAYMAR, FOGSIG, LIGHTS, RADSTA, RDOSTA, RETRFL, RTPBCN, SISTAT, SISTAW, TOPMAR.*

*Radar reflectors must not be encoded as separate objects when attached to navigational aids. If it is required to encode their existence, it must be done using the attribute CONRAD = 3 (radar conspicuous (has radar reflector)) on the structure object.*

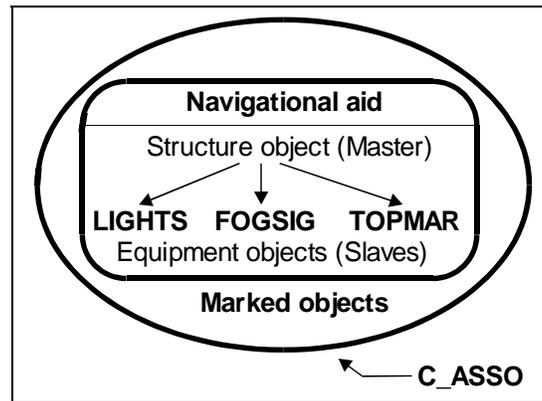
*Rescue stations and coastguard stations are not related directly to navigation, and they must not, therefore, be part of the equipment objects of navigational aids. If it is required to encode a rescue or coastguard station at the same location as a navigational mark, it must be encoded as a separate object, and share the same spatial object as the navigational aid.*

**12.1.2 Relationships**

*A master to slave relationship must be created in order to relate the different objects comprising a navigational aid.*

When the navigational aid contains a structure object (from the above list), this object must be the master object, and the equipment objects must be the slaves.

When the nature of the base structure is unknown or there is no structure object, one of the equipment objects must be chosen as the master object, giving priority to a **LIGHTS** object, if one exists.



**Figure 20 – Navigational aids**

If it is required to encode the name of the navigational aid, it must be done using the attribute *OBJNAM* (and possibly the attribute *NOBJNM*) on the master object. The name should not be repeated for the slave objects. If the name is painted on the structure, it must be encoded with the same spelling in *OBJNAM* if it is based on the Latin alphabet. If the name is not based on the Latin alphabet, it must be encoded on *NOBJNM*, and transliterated for encoding on *OBJNAM*.

All point objects comprising a navigational aid must point to the same point spatial object.

The navigational aid may be associated with the objects which it marks (e.g. **RESARE** or **OBSTRN** objects) using the collection object **C\_ASSO** (see clause 15). Several navigational aids and several marked objects may be associated in the same relationship.

The original, undocumented, intention of the master slave relationship was that ECDIS systems would use the master slave relationship to implement time variable scenarios. When the master object is subject to a time variable change the slave object will react in parallel. This is the reason why the temporal attributes were never include for the equipment objects listed above.

### Conclusions

This creates at a minimum a confusing, if not dangerous, display for the ECDIS user. Spurious equipment feature objects would remain visible while the master feature objects are hidden.

### Recommendations

TSMAD recommends a minor revision of S-57 (Supplement No. 2) to add temporal attributes to the following feature objects:

**FOGSIG, RADSTA, RETRFL, RTPBCN, TOPMAR**

The intention is to publish this new supplement following a full and final review at TSMAD 18 at May 2009. In the interim a TSMAD Encoding Bulletin will be issued advising encoders of the issue and proposing a temporary solution.

### **Justification and Impacts**

If this situation continues, there is a high likelihood that an ECDIS user could be confused and lose confidence in the quality and/or validity of the data.

Early indications are that there will be no impact on ECDIS systems, but a thorough investigation will be instigated when test data is available.

Production systems will require minor changes to dictionaries to add the new temporal attributes.

Validation software will not be affected as changes to S-58 are not required.

### **Action Required of CHRIS**

The CHRIS is invited to:

Endorse the recommendations to develop and publish Supplement No 2 of S-57 and prepare an interim S-57 ENC Encoding Bulletin.

# INTERNATIONAL HYDROGRAPHIC ORGANIZATION



## IHO TRANSFER STANDARD For DIGITAL HYDROGRAPHIC DATA

Supplementary Information for the Encoding of S-57 Edition 3.1  
ENC Data

(S-57 Supplement No. 2)

June 2009

S-57 Supplement 2 incorporates the contents of S-57 Supplement 1.  
Supplement 2 therefore supersedes Supplement 1.

The use of S-57 edition 3.1 in conjunction with Supplement 2 results in S-57 Edition 3.1.2.

Published by the  
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MONACO

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## 1. Introduction to S-57 Edition 3.1 Supplement No. 2

Supplement 2 promulgates several minor additions and changes to S-57 Edition 3.1.

Supplement 2 incorporates the contents of Supplement 1. Supplement 2 therefore supersedes Supplement 1.

This supplementary addition to S-57 comprises:

- from Supplement 1 - Three new feature object classes;
- from Supplement 1 - Three new attributes;
- from Supplement 1 - Two new attribute values for Category of Restricted Area;
- new in Supplement 2 - Addition of temporal attributes to navigation aid equipment object classes - FOGSIG, RADSTA, RETRFL, RTPBCN and TOPMAR;
- new in Supplement 2 - Changes to the definitions for the enumerates of the attribute CATZOC.

This document is structured so that its contents may be easily used in conjunction with the existing S-57 Edition 3.1. It contains pages describing the various changes to S-57 Edition 3.1 as well as numbered sections corresponding to the relevant sections of the ENC Product Specification (Edition 2.0) and the Use of the Object Catalogue for ENCs (Edition 2.1). For ease of use, red text is used in the document to highlight the new changes introduced since S-57 Edition 3.1 Supplement 1.

The use of S-57 Edition 3.1 in conjunction with Supplement 2 results in S-57 Edition 3.1.2.

Enhancements implemented in the superseded Supplement 1 remain optional for ENC producers.

New changes introduced in Supplement 2 define changes to the standard with regards to the encoding of temporal attributes for some navigation aid equipment objects and the definitions of CATZOC values A1 and A2.

The need for these enhancements is explained in IHO Circular Letters 94 of 2005 and 32 of 2009.

## 2. S-57 (EDITION 3.1.2) Appendix A Chapter 1 (IHO Object Catalogue)

### 2.1 Correction to Object Class – Fog Signal

The attributes PEREND and PERSTA have been added to object class fog signal.

#### GEO OBJECT CLASSES

Object Class: <b>Fog Signal</b>
---------------------------------

Acronym: **FOGSIG**

Code: **58**

Set Attribute\_A: CATFOG; DATEND; DATSTA; NOBJNM; OBJNAM; **PEREND; PERSTA;**  
SIGFRQ; SIGGEN; SIGGRP; SIGPER; SIGSEQ; STATUS; VALMXR;

Set Attribute\_B: INFORM; NINFOM; NTXTDS; SCAMAX; SCAMIN; TXTDSC;

Set Attribute\_C: RECDAT; RECIND; SORDAT; SORIND;

#### Definition:

A warning signal transmitted by a vessel, or aid to navigation, during periods of low visibility. Also, the device producing such a signal. (IHO Dictionary, S-32, 5th Edition, 1890)

#### References:

INT 1: IR 1, 10-16, 20-22;

M-4: 452-452.8;

#### Remarks:

Distinction: signal station, warning;

## 2.2 Correction to Object Class – Radar Station

The attributes PEREND and PERSTA have been added to object class Radar Station.

### GEO OBJECT CLASSES

Object Class: **Radar Station**

Acronym: **RADSTA**

Code: **102**

Set Attribute\_A: CATRAS; COMCHA; DATEND; DATSTA; HEIGHT; NOBJNM; OBJNAM;  
**PEREND; PERSTA**; STATUS; VALMXR; VERACC; VERDAT;

Set Attribute\_B: INFORM; NINFOM; NTXTDS; SCAMAX; SCAMIN; TXTDSC;

Set Attribute\_C: RECDAT; RECIND; SORDAT; SORIND;

#### Definition:

A station with a transmitter emitting pulses of ultra-high frequency radio waves which are reflected by solid objects and are detected upon their return to the sending station. (International Maritime Dictionary, 2nd Ed.)

#### References:

INT 1: IM 30; IS 1;

M-4: 485.1; 487.3;

#### Remarks:

The object □radar station□ is used to encode the technical equipment itself independent of the building or structure where it is installed. This building or structure, e.g. mast, tower, building, radar dome is a different object.

Distinction: radar line; radar range; radar transponder beacon;

### 2.3 Correction to Object Class – Radar Transponder Beacon

The attributes DATEND, DATSTA, PEREND and PERSTA have been added to object class Radar transponder beacon.

#### GEO OBJECT CLASSES

Object Class: <b>Radar transponder beacon</b>
---

Acronym: **RTPBCN**

Code: **103**

Set Attribute\_A: CATRTB; DATEND; DATSTA; NOBJNM; OBJNAM; **PEREND; PERSTA;**  
RADWAL; SECTR1; SECTR2; SIGGRP; SIGSEQ; STATUS; VALMXR;

Set Attribute\_B: INFORM; NINFOM; NTXTDS; SCAMAX; SCAMIN; TXTDSC;

Set Attribute\_C: RECDAT; RECIND; SORDAT; SORIND;

Definition:

A transponder beacon transmitting a coded signal on radar frequency, permitting an interrogating craft to determine the bearing and range of the transponder. Also called racon. (IHO Dictionary, S-32, 5th Edition, 4137)

References:

INT 1: IS 2-3;

M-4: 486.1-3;

Remarks:

The object class radar transponder beacon is only used to encode the technical equipment independent of the structure on which it is located (e.g. a beacon, light-vessel or tower).

Distinction: radar line; radar range; radar station;

## 2.4 Correction to Object Class – Retro-reflector

The attributes DATEND, DATSTA, PEREND and PERSTA have been added to object class Retro-reflector.

### GEO OBJECT CLASSES

Object Class: **Retro-reflector**

Acronym: **RETRFL**

Code: **113**

Set Attribute\_A: COLOUR; COLPAT; **DATEND; DATSTA**; HEIGHT; MARSYS; **PEREND; PERSTA**; STATUS; VERACC; VERDAT;

Set Attribute\_B: INFORM; NINFOM; NTXTDS; SCAMAX; SCAMIN; TXTDSC;

Set Attribute\_C: RECDAT; RECIND; SORDAT; SORIND;

#### Definition:

A means of distinguishing unlighted marks at night. Retro-reflective material is secured to the mark in a particular pattern to reflect back light. (Adapted from the UKHO NP735, 5th Edition).

#### References:

INT 1: not specified;

M-4: not specified;

#### Remarks:

The body carrying the retro-reflector is a separate object.

Distinction: beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon special purpose/general; buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; radar reflector;

## 2.5 Correction to Object Class – Topmark

The attributes PEREND and PERSTA have been added to object class Topmark.

### GEO OBJECT CLASSES

Object Class: <b>Topmark</b>
------------------------------

Acronym: **TOPMAR**

Code: **144**

Set Attribute\_A: COLOUR; COLPAT; **DATEND; DATSTA**; HEIGHT; MARSYS; **PEREND; PERSTA**; STATUS; TOPSHP; VERACC; VERDAT; VERLEN;

Set Attribute\_B: INFORM; NINFOM; NTXTDS; PICREP; SCAMAX; SCAMIN; TXTDSC;

Set Attribute\_C: RECDAT; RECIND; SORDAT; SORIND;

#### Definition:

A characteristic shape secured at the top of a buoy or beacon to aid in its identification. (IHO Dictionary, S-32, 5th Edition, 5548)

#### References:

INT 1: IQ 9;

M-4: 463.1;

#### Remarks:

The body carrying the topmark is a separate object.

Distinction: beacon, cardinal; beacon, isolated danger; beacon, lateral; beacon, safe water; beacon special purpose/general; buoy, cardinal; buoy, installation; buoy, isolated danger; buoy, lateral; buoy, safe water; buoy, special purpose/general; daymark;

The following new object classes have been included in order to encode Archipelagic Sea Lanes.

## 2.6 New Object Classes - Archipelagic Sea Lane

### GEO OBJECT CLASSES

Object Class: <b>Archipelagic Sea Lane</b>
--

Acronym: **ARCSLN**

Code: **161**

Set Attribute\_A: DATEND; DATSTA; NATION; NOBJNM; OBJNAM;

Set Attribute\_B: INFORM; NINFOM; NTXTDS; PICREP; SCAMAX; SCAMIN; TXTDSC;

Set Attribute\_C: RECDAT; RECIND; SORDAT; SORIND;

#### Definition:

Article 53 of the United Nations Convention on the Law of the Sea (UNCLOS) states that:

‘an archipelagic State may designate sea lanes ..., suitable for the continuous and expeditious passage of foreign ships ... through ... its archipelagic waters and the adjacent territorial sea. ... All ships ... enjoy the right of archipelagic sea lanes passage in such sea lanes ... [which] include all normal passage routes used as routes for international navigation ... through archipelagic waters’.

(Note: references to aircraft and air routes in UNCLOS have been omitted in these extracts from Article 53). (IHO M-4 B-435.10, S-51 Appendix 2 Part II)

#### References:

INT 1: M 17;

M-4: B-435.10;

#### Remarks:

The object class Archipelagic Sea Lane encodes the area of an Archipelagic Sea Lane.

Distinctions: administrative area; archipelagic sea lane axis; caution area; fairway; inshore traffic zone; recommended traffic lane part; restricted area; submarine transit lane; traffic separation scheme lane part; traffic separation zone; two-way route part.

## 2.7 New Object Classes - Archipelagic Sea Lane Axis

### GEO OBJECT CLASSES

Object Class: <b>Archipelagic Sea Lane Axis</b>
---

Acronym: **ASLXIS**

Code: **162**

Set Attribute\_A: DATEND; DATSTA; NATION; NOBJNM; OBJNAM;

Set Attribute\_B: INFORM; NINFOM; NTXTDS; PICREP; SCAMAX; SCAMIN;  
TXTDSC;

Set Attribute\_C: RECDAT; RECIND; SORDAT; SORIND;

Definition:

The reference line used to determine the maximum extents of an Archipelagic Sea Lane. It may not indicate the deepest water nor any recommended route or track.

Article 53 of the United Nations Convention on the Law of the Sea (UNCLOS) states that:

'an archipelagic State may designate sea lanes ..., suitable for the continuous and expeditious passage of foreign ships ... through ... its archipelagic waters and the adjacent territorial sea. ... All ships ... enjoy the right of archipelagic sea lanes passage in such sea lanes ... [which] include all normal passage routes used as routes for international navigation ... through archipelagic waters'.

References:

INT 1: M 17;

M-4: B-435.10;

Remarks:

In the definition, references to aircraft and air routes in UNCLOS have been omitted in these extracts from Article 53. (IHO M-4 B-435.10, S-51 Appendix 2 Part II)

Distinctions: administrative area; archipelagic sea lane; caution area; deep water route centreline; fairway; inshore traffic zone; navigation line; recommended route centreline; recommended track; recommended traffic lane part; restricted area; submarine transit lane; traffic separation scheme lane part; traffic separation line; traffic separation zone; two-way route part.

## 2.8 'New Object' Feature Object Class

The following 'New Object' feature object class has been included in order to cater for possible future requirements specified by the IMO and that affect safety of navigation which cannot adequately be encoded by any existing object class. It must not be used unless approved by the Transfer Standard Maintenance and Application Development Working Group (TSMAD) and the Colours and Symbols Maintenance Working Group (CSMWG) and issued as an ENC Encoding Bulletin.

### GEO OBJECT CLASSES

Object Class: <b>New Object</b>
---------------------------------

Acronym: **NEWOBJ**

Code: **163**

Set Attribute\_A: CLSDEF; CLSNAM; COLOUR; COLPAT; CONDTN; CONRAD;  
CONVIS; DATEND; DATSTA; NATION; NOBJNM; OBJNAM;  
PEREND; PERSTA; RESTRN; STATUS; WATLEV;

Set Attribute\_B: INFORM; NINFOM; NTXTDS; PICREP; SCAMAX; SCAMIN;  
SYMINS; TXTDSC;

Set Attribute\_C: RECDAT; RECIND; SORDAT; SORIND;

#### Definition:

A new feature specified by the IMO and that affects safety of navigation which cannot adequately be encoded by any existing object class for use in an S-57 data set.

#### References:

INT 1: not specified;

M-4: not specified;

#### Remarks:

The 'New Object' feature object class has been included in order to cater for possible future requirements of the IMO that affects safety of navigation which cannot adequately be encoded by any existing object class. It must not be used unless approved by the Transfer Standard Maintenance and Application Development Working Group (TSMAD) and the Colours and Symbols Maintenance Working Group (CSMWG) and issued as an ENC Encoding Bulletin.

Distinction: caution area;

### 3. S-57 (EDITION 3.1.2) Appendix A Chapter 2 (Attributes)

The following new attribute values for Environmentally Sensitive Sea Area (ESSA) and Particularly Sensitive Sea Area (PSSA) have been included for CATREA. The additions are in bold font.

#### 3.1 New Attribute values for Category of Restricted Area

Attribute: <b>Category of restricted area</b>
---

#### FEATURE OBJECT ATTRIBUTES

Acronym: **CATREA**

Code: **56**

Attribute type: L

Expected input:

ID	Meaning	INT 1	M-4
1	: offshore safety zone		
2	: <del>anchoring prohibition area</del>	L 3;	
3	: <del>fishing prohibition area</del>		
4	: nature reserve	N 22;	
5	: bird sanctuary	N 22;	
6	: game reserve	N 22;	
7	: seal sanctuary	N 22;	
8	: degaussing range	N 25;	B-448.1-3;
9	: military area	N 31;	
10	: historic wreck area	N 26;	B-449.5;
11	: <del>inshore traffic zone</del>		
12	: navigational aid safety zone	M 29.1;	B-435.7;
13	: <del>danger of stranding area</del>		
14	: minefield	N 34;	B-441.8;
15	: <del>diving prohibition area</del>		
16	: <del>area to be avoided</del>		
17	: <del>Prohibited area</del>		
18	: swimming area		
19	: waiting area		
20	: research area		
21	: dredging area	N 63;	B-446.4;
22	: fish sanctuary		
23	: ecological reserve		
24	: no wake area		
25	: swinging area		
26	: water skiing area		
27	: <b>Environmentally Sensitive Sea Area (ESSA)</b>	<b>N 22;</b>	<b>B-437.1;</b>
28	: <b>Particularly Sensitive Sea Area (PSSA)</b>	<b>N 22;</b>	<b>B-437.6;</b>

Definitions:

offshore safety zone: the area around an offshore installation within which vessels are prohibited from entering without permission; special regulations protect installations within a safety zone and vessels of all nationalities are required to respect the zone. (IHO Dictionary, S-32, 5th Edition, 4471)

nature reserve:	a tract of land managed so as to preserve its flora, fauna, physical features, etc.
bird sanctuary:	a place where birds are bred and protected.
game reserve:	a place where wild animals or birds hunted for sport or food are kept undisturbed for private use.
seal sanctuary:	a place where seals are protected.
degaussing range:	an area, usually about two cables diameter, within which ships' magnetic fields may be measured; sensing instruments and cables are installed on the sea bed in the range and there are cables leading from the range to a control position ashore. (IHO Chart Specifications, M-4)
military area:	an area controlled by the military in which restrictions may apply. (Hydrographic Service, Royal Australian Navy)
historic wreck area:	an area around certain wrecks of historical importance to protect the wrecks from unauthorized interference by diving, salvage or deposition (including anchoring). (IHO Chart Specifications, M-4)
navigational aid safety zone:	an area around a navigational aid which vessels are prohibited from entering.
minefield:	an area laid and maintained with explosive mines for defence or practice purposes.
swimming area:	an area in which people may swim and therefore vessel movement may be restricted.
waiting area:	an area reserved for vessels waiting to enter a harbour.
research area:	an area where marine research takes place.
dredging area:	an area where dredging is taking place.
fish sanctuary:	a place where fish are protected
ecological reserve:	a tract of land managed so as to preserve the relation of plants and living creatures to each other and to their surroundings.
no wake area:	an area in which a vessels' speed must be reduced in order to reduce the size of the wake it produces.
swinging area:	an area where vessels turn. (Service Hydrographique et Océanographique de la Marine, France).
water skiing area:	an area within which people may water ski and therefore vessel movement may be restricted.

**Environmentally Sensitive Sea Area (ESSA):**

**a generic term which may be used to describe a wide range of areas, considered sensitive for a variety of environmental reasons. (IHO Chart Specifications, M-4)**

**Particularly Sensitive Sea Area (PSSA):**

**an area that needs special protection through action by IMO because of its significance for regional ecological, socio-economic or scientific reasons and because it may be vulnerable to damage by international shipping activities. (IHO Chart Specifications, M-4)**

Remarks:

The official legal status of each kind of restricted area defines the kind of restriction(s), e.g. the restriction for a 'game reserve' may be 'entering prohibited'.

### 3.2 Correction to Attribute – Category of Zone of Confidence in Data

Changes made to the definitions of the attribute CATZOC

#### FEATURE OBJECT ATTRIBUTES

Attribute: <b>Category of zone of confidence in data</b>
--

Acronym: **CATZOC**

Code: **72**

Attribute type: E

Expected input:

ID	Meaning
1	: zone of confidence A1
2	: zone of confidence A2
3	: zone of confidence B
4	: zone of confidence C
5	: zone of confidence D
6	: zone of confidence U (data not assessed)

Definitions:

See ZOC Table on following page.

ZOC Table:

1	2	3		4	5
ZOC <sup>1</sup>	Position Accuracy <sup>2</sup>	Depth Accuracy <sup>3</sup>		Seafloor Coverage	Typical Survey Characteristics <sup>5</sup>
A1	± 5 m + 5% depth	= 0.50 + 1%d		Full area search undertaken. Significant seafloor features detected <sup>4</sup> and depths measured.	Controlled, systematic survey <sup>6</sup> high position and depth accuracy achieved using DGPS or a minimum three high quality lines of position (LOP) and a multibeam, channel or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10	± 0.6		
		30	± 0.8		
		100	± 1.5		
		1000	± 10.5		
A2	± 20 m	= 1.00 + 2%d		Full area search undertaken. Significant seafloor features detected <sup>4</sup> and depths measured.	Controlled, systematic survey <sup>6</sup> achieving position and depth accuracy less than ZOC A1 and using a modern survey echosounder <sup>7</sup> and a sonar or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10	± 1.2		
		30	± 1.6		
		100	± 3.0		
		1000	± 21.0		
B	± 50 m	= 1.00 + 2%d		Full area search not achieved; uncharted features, hazardous to surface navigation are not expected but may exist.	Controlled, systematic survey achieving similar depth but lesser position accuracies than ZOCA2, using a modern survey echosounder <sup>5</sup> , but no sonar or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10	± 1.2		
		30	± 1.6		
		100	± 3.0		
		1000	± 21.0		
C	± 500 m	= 2.00 + 5%d		Full area search not achieved, depth anomalies may be expected.	Low accuracy survey or data collected on an opportunity basis such as soundings on passage.
		Depth (m)	Accuracy (m)		
		10	± 2.5		
		30	± 3.5		
		100	± 7.0		
		1000	± 52.0		
D	worse than ZOC C	Worse Than ZOC C		Full area search not achieved, large depth anomalies may be expected.	Poor quality data or data that cannot be quality assessed due to lack of information.
U	Unassessed - The quality of the bathymetric data has yet to be assessed				

Remarks:

**To decide on a ZOC Category, all conditions outlined in columns 2 to 4 of the table must be met.**

Explanatory notes quoted in the table:

<sup>1</sup> The allocation of a ZOC indicates that particular data meets minimum criteria for position and depth accuracy and seafloor coverage defined in this Table. **ZOC categories reflect a charting standard and not just a hydrographic survey standard. Depth and position accuracies specified for each ZOC category refer to the errors of the final depicted soundings and include not only survey errors but also other errors introduced in the chart production process.** Data may be further qualified by Object Class 'Quality of Data' (M\_QUAL) sub-attributes as follows:

- a) Positional Accuracy (POSACC) and Sounding Accuracy (SOUACC) may be used to indicate that a higher position or depth accuracy has been achieved than defined in this Table (e.g. a survey where full seafloor coverage was not achieved could not be classified higher than ZOC B; however, if the position accuracy was, for instance, ± 15 metres, the sub-attribute POSACC could be used to indicate this).
- b) Swept areas where the clearance depth is accurately known but the actual seabed depth is not accurately known may be accorded a 'higher' ZOC (i.e. A1 or A2) providing positional and depth accuracies of the swept depth meets the criteria in this Table. In this instance, Depth Range Value 1 (DRVAL1) may be used to specify the swept depth. The position accuracy criteria apply to the boundaries of swept areas.
- c) SURSTA, SUREND and TECSOU may be used to indicate the start and end dates of the survey and the technique of sounding measurement.

<sup>2</sup> Position Accuracy of depicted soundings at 95% CI (2.45 sigma) with respect to the given datum. It is the cumulative error and includes survey, transformation and digitizing errors etc. Position accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

<sup>3</sup> Depth accuracy of depicted soundings =  $a + (b \cdot d) / 100$  at 95% CI (2.00 sigma), where d = depth in metres at the critical depth. Depth accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

<sup>4</sup> Significant seafloor features are defined as those rising above depicted depths by more than:

	Depth	Significant Feature
a.	<40 m	2 m
b.	>40 m	10% depth

**A full seafloor search indicates that a systematic survey was conducted using detection systems, depth measurement systems, procedures, and trained personnel designed to detect and measure depths on significant seafloor features. Significant features are included on the chart as scale allows. It is impossible to guarantee that no significant feature could remain undetected, and significant features may have become present in the area since the time of the survey.**

<sup>5</sup> **Typical Survey Characteristics - These descriptions should be seen as indicative examples only.**

- <sup>6</sup> Controlled, systematic surveys (ZOC A1, A2 and B) - surveys comprising planned survey lines, on a geodetic datum that can be transformed to WGS 84.
- <sup>7</sup> Modern survey echosounder - a high precision single beam depth measuring equipment, generally including all survey echosounders designed post 1970." (See also 1.CI.42).

### 3.3 New Attribute – Object Class Definition

The following new attributes have been included to describe the characteristics for the “New Object” object class.

#### FEATURE OBJECT ATTRIBUTES

Attribute: <b>Object Class Definition</b>
---

Acronym: **CLSDEF**  
Attribute type: S

Code: **190**

Definition:

Specifies the defining characteristics of a ‘new object’.

Remarks:

Identical definitions must be used for other instances of identical features being encoded.

The wording for the attribute CLSDEF must be approved by TSMAD before use.

**3.4 New Attribute – Object Class Name****FEATURE OBJECT ATTRIBUTES**

Attribute: <b>Object Class Name</b>
-------------------------------------

Acronym: **CLSNAM**  
Attribute type: S

Code: **191**

Definition:

Specifies the descriptive name of a 'new object' feature object class.

Remarks:

All 'new objects' of the same class must share the same CLSNAM.

The wording for the attribute CLSNAM must be approved by TSMAD before use.

### 3.5 New Attribute - Symbol Instruction

#### FEATURE OBJECT ATTRIBUTES

Attribute: <b>Symbol Instruction</b>
--------------------------------------

Acronym: **SYMINS**  
Attribute type: S

Code: **192**

Definition:

This specifies the S-52 Presentation Library symbol instruction to be adopted in ECDIS for the new object class (as specified in the S-52 Symbol Library - Addendum to S-52 Presentation Library).

Remarks:

The string for the attribute SYMINS must be approved by CSMWG and TSMAD before use.

Point, simple and complex lines, area or text symbol instructions may be specified. If SYMINS is not populated, a default symbol is provided.

Symbol instructions are explained in the Presentation Library Users' Manual, Part A, sections 3.3 and 7 "DESCRIPTION OF THE SYMBOLOGY INSTRUCTIONS".

Note that the separator between two instructions is the character ';' (semi-colon).

Example:

SYMINS = SY(CHINFO11);LS(DASH,2,CHMGD)

#### 4. S-57 (EDITION 3.1.2) Appendix B.1 (*Product Specifications for ENC*)

The following clauses are supplementary to the "ENC Product Specification" document (Edition 2.0), and were implemented in Edition 3.1.1.

##### 3.3.1 New object classes and their geometric primitives permitted by this enhancement for use in ENC.

The following is a list of additional object classes allowed in an ENC and the geometric primitives allowed for each of them (P = point, L = line, A = area, N = none).

ARCSLN			A		ASLXIS		L			NEWOBJ	P	L	A	
--------	--	--	---	--	--------	--	---	--	--	--------	---	---	---	--

For reasons of backward compatibility with Edition 3.1, the new feature object classes which appear in S-57 3.1.1 which are listed above, must have their meaning described in at least one of the attributes INFORM or TXTDSC. For consistency, when one or both of these attributes is used, the text must commence with the approved object class name of the feature, such as 'Archipelagic Sea Lane'.

The 'New Object' must only be used in conjunction with an ENC Encoding Bulletin issued by the IHO. The Bulletin will provide the specifics on how to use the object class for a particular application. The 'New Object' must not be used under any other circumstances.

##### 3.5.2.1 New mandatory attributes

Object Class	Attributes					
ARCSLN	NATION	At least one of INFORM or TXTDSC				
ASLXIS	NATION	At least one of INFORM or TXTDSC				
NEWOBJ	CLSDEF	CLSNAME	At least one of INFORM or TXTDSC			
RESARE	INFORM or TXTDSC only mandatory when values 27 or 28 are used.		(as well as existing mandatory attributes)			

##### 3.5.7.1 New attribute values

For reasons of backward compatibility with Edition 3.1, the new attribute values which appear in S-57 3.1.1 which are listed below, must have their meaning described in the attributes INFORM or TXTDSC. For consistency, when one or both of these attributes is used, the text must commence with the name of the feature, such as 'Environmentally Sensitive Sea Area'.

CATREA 27: Environmentally Sensitive Sea Area (ESSA)  
28: Particularly Sensitive Sea Area (PSSA)

### 3.5.8 New attributes

Three new attributes are added and are of type "Free Text".

CLSDEF  
CLSNAM  
SYMINS

#### 6.3.2.1 Data Set Identification field – DSID (EN)

The STED subfield content must remain "03.1".

The PRED subfield content must remain "2.0".

There is no requirement to indicate the implementation of Supplement 2 through population of "STED:3.1.1;" in the COMT subfield. This is due to the implementation of new symbology introduced in Edition 3.4 (January 2008) of the IHO Presentation Library (S-52 Appendix 2, Edition 4.3 – IHO Colour and Symbol Specifications for ECDIS, Annex A).

#### 6.4.2.1 Data Set Identification field – DSID (ER)

The STED subfield content must remain "03.1".

The PRED subfield content must remain "2.0".

There is no requirement to indicate the implementation of Supplement 2 through population of "STED:3.1.1;" in the COMT subfield. This is due to the implementation of new symbology introduced in Edition 3.4 (January 2008) of the IHO Presentation Library (S-52 Appendix 2, Edition 4.3 – IHO Colour and Symbol Specifications for ECDIS, Annex A).

## 5. S-57 (EDITION 3.1.2) APPENDIX B.1, Annex A (Use of the Object Catalogue for ENC, Edition 2.1)

The following clauses are supplementary to the "Use of the Object Catalogue" document (Edition 2.1), and may be necessary for Edition 3.1.2 requirements.

---

### 10.5 Archipelagic Sea Lane

If it is required to encode an Archipelagic Sea Lane, it must be done using **ARCSLN** and/or **ASLXIS** objects, and possibly navigational aids objects.

The unique character of Archipelagic Sea Lanes (ASLs) is specified by UNCLOS Article 53 and Part H, General Provision of IMO Ships Routing.

The encoding of relationships between these objects is defined in clause 10.5.3.

Remarks:

- In some cases only accurate information on the axes (**ASLXIS**) may be available and in such cases the extents of the ASL (**ARCSLN**) may not be able to be encoded.

#### 10.5.1 Archipelagic Sea Lanes (see M-4 - B-435.10)

The object class **ARCSLN** must only be used to encode the area of an Archipelagic Sea Lane.

Geo object: Archipelagic Sea Lane (**ARCSLN**)  
 Attributes: DATEND DATSTA NATION NOBJNM OBJNAM

For reasons of backward compatibility with Edition 3.1, at least one of the attributes INFORM or TXTDSC must be populated with the object class name *Archipelagic Sea Lane* as the initial text entered.

#### 10.5.2 Archipelagic Sea Lane Axis (see M-4 - B-435.10)

The object class **ASLXIS** must only be used to encode the axes defining an Archipelagic Sea Lane.

Geo object: Archipelagic Sea Lane Axis (**ASLXIS**)  
 Attributes: DATEND DATSTA NATION NOBJNM OBJNAM

For reasons of backward compatibility with Edition 3.1, at least one of the attributes INFORM or TXTDSC must be populated with the object class name *Archipelagic Sea Lane Axis* as the initial text entered.

#### 10.5.3 Archipelagic Sea Lane systems

To encode an Archipelagic Sea Lane (ASL) system, the **ARCSLN**, **ASLXIS** object classes, and any navigational aids object classes (if they are stated in the regulation defining the ASL), should be aggregated using the collection object **C\_AGGR** (see clause 15). The attribute OBJNAM for the **C\_AGGR** object classes may be used to encode the name of the ASL (if applicable).

### 11.15 Environmentally Sensitive Sea Areas (see M-4 - B-437)

If it is required to encode an Environmentally Sensitive Sea Area, it must be done using a **RESARE** object (see clause 11.1), with attribute CATREA = 27 (ESSA) or 28 (PSSA).

An Environmentally Sensitive Sea Area that is shown on the source as a point symbol should be encoded using a small **RESARE** object.

### 12.5 Fog signals (see M4 - §451)

If it is required to encode a fog signal, it must be done using the object class **FOGSIG**.

Geo object: Fog signal (**FOGSIG**)  
 Attributes: CATFOG DATEND DATSTA NOBJNM OBJNAM  
**PEREND PERSTA** SIGFRQ SIGGEN SIGGRP  
 SIGPER SIGSEQ STATUS VALMXR INFORM  
 NINFOM

### 12.6 Topmarks (see M4 - §463)

If it is required to encode a topmark, it must be done using the object class **TOPMAR**.

Geo object: Topmark (**TOPMAR**)  
 Attributes: COLOUR COLPAT **DATEND DATSTA**  
 HEIGHT  
 MARSYS - the value is given on meta object **M\_NSYS** or MARSYS for the structure object  
**PEREND PERSTA** STATUS TOPSHP VERACC VERDAT  
~~VERLEN~~ INFORM NINFOM

### 12.7 Retro-reflectors

If it is required to encode a retro-reflector, it must be done using the object class **RETRFL**.

Geo object: Retro-reflector (**RETRFL**)  
 Attributes: COLOUR COLPAT **DATEND DATSTA** HEIGHT  
 MARSYS - the value is given on meta object **M\_NSYS** or MARSYS for the structure object  
**PEREND PERSTA** STATUS ~~VERACC~~ ~~VERDAT~~  
 INFORM - describes letters, patterns or numerals shown on the retro - reflector  
 NINFOM

### 12.10 Radar beacons (see M4 - §486)

If it is required to encode a radar beacon, it must be done using the object class **RTPBCN**.

Geo object: Radar transponder beacon (**RTPBCN**)  
 Attributes: CATRIB DATEND DATSTA NOBJNM OBJNAM **PEREND**  
**PERSTA** RADWAL SECTR1 SECTR2  
 SIGGRP - morse identification letter(s)  
 SIGSEQ STATUS VALMXR INFORM NINFOM

Remarks:

- The **RTPBCN** must only be used to encode the technical equipment itself, independent of the building or structure in which it is installed. If it is required to encode the building or structure (e.g. mast, tower, radar dome), it must be done using an appropriate object class (e.g. **BUISGL**, **LNDMRK**).
- If it is required to encode the bearing line and the recommended track for leading racons, it must be done as described in clause 10.1. Where the bearing line coincides with a leading line defined by lights or other visual features making up a range system, navigation lines and recommended tracks must not be duplicated. The objects making up the range system must be aggregated using the collection object **C\_AGGR** (see clause 10.1.2).
- The sweep period may be encoded using the attribute **INFORM**.

### 12.11.3 Radar station (see M4 - §487.3)

If it is required to encode a radar station, it must be done using the object class **RADSTA**.

Geo object: Radar station (**RADSTA**)  
 Attributes: CATRAS COMCHA DATEND DATSTA  
 HEIGHT - height of the emitting part of the radar  
 NOBJNM OBJNAM **PEREND PERSTA** STATUS  
~~VERACC~~ VALMXR ~~VERDAT~~ INFORM NINFOM

Remarks:

- The **RADSTA** must only be used to encode the technical equipment itself, independent of the building or structure in which it is installed. If it is required to encode the building or structure (e.g. mast, tower, radar dome) it must be done using an appropriate object class (e.g. **BUISGL**, **LNDMRK**).

## 16. New Object

If it is required to encode a new object specified by the IMO and that affects safety of navigation which cannot adequately be encoded by any existing S-57 E3.1 object class, it must be done using the feature object class **NEWOBJ**. The 'New Object' feature object class must only be used in conjunction with an Encoding Bulletin issued by the IHO. The Bulletin will provide the specifics on how to use the object class for a particular application. The 'New Object' feature object class must not be used under any other circumstances.

Geo Object: New Object (**NEWOBJ**)  
 Attributes: CLSDEF CLSNAM COLOUR COLPAT CONDTN CONRAD CONVIS  
 DATEND DATSTA NATION NOBJNM OBJNAM PEREND PERSTA  
 RESTRN STATUS WATLEV INFORM NINFOM NTXTDS SYMINS TXTDSC

Remarks:

- When approved for use, the attribute **CLSDEF** must be defined in the data itself and is the detailed definition of all objects comprising the new object class. It is comparable to the definition section of an existing object class in the object catalogue. All objects that belong to the same object class (**CLSNAM**) must use an identical definition and this definition must also be used for the proposal to the S-100 feature data dictionary manager.
- When approved for use, the attribute **CLSNAM** must also be defined in the data itself and contains the descriptive name of the object class. For an object class that is defined in an existing object catalogue, this is the name of the object class e.g. 'Depth Area'. **CLSNAM** must not be used for the common name of the real world object. Common names must be encoded by use of **OBJNAM** and or **NOBJNM**. **CLSNAM** is a generic name to categorize all objects of one class and therefore all objects that belong to the same object class must have an identical **CLSNAM**. The value used for

CLSNAM must also be used for the new feature object class when it is proposed to the S-100 feature data dictionary manager.

- At least one of INFORM or TXTDSC is mandatory, not both. INFORM is used to describe the feature for ECDIS systems that are not yet E3.1.1 compatible, as was done for the new attribute values for S-57 E3.1. For consistency, when one or both of these attributes is used, the text must commence with the approved object class name (CLSNAM) of the feature, such as 'Archipelagic Sea Lane'.
- This object class has default symbology in the S-52 Presentation Library Edition 3.4 (and later editions), however for features that are considered to affect safety of navigation, an existing symbol must be approved by TSMAD and CSMWG from the S-52 Symbol Library, in order to portray the feature more accurately on an ECDIS. If the attribute SYMINS is populated with a valid symbol instruction, this will override the default symbology. Note that there are separate symbol names for point, simple and complex lines, area and text symbology.
- A corresponding Encoding Bulletin will provide the specific attribute values (strings) and instructions on how to use the object class for a particular application. This object class must not be used without an ENC Encoding Bulletin issued by the IHO on the authority of TSMAD/CSMWG.
- In addition to the issue of the Encoding Bulletin, a new feature object class proposal (and new attributes if necessary) must also be made to the S-100 feature data dictionary manager. For future editions of the product specification, the new object class will be considered for inclusion in the object catalogue.

20<sup>th</sup> CHRIS MEETING  
Niterói, RJ, Brazil, 3-7 November 2008

Paper for Consideration by CHRIS-20

Chairman's Report of the Data Quality Working Group

<b>Submitted by:</b>	Shepard Smith, NOAA (USA)
<b>Executive Summary:</b>	This interim report describes the activities of the DQWG during the past year, makes recommendations concerning definitions within CATZOC, and makes recommendations for the continued work of the DQWG.
<b>Related Documents:</b>	Minutes of DQWG meeting in Bath, Minutes of DQWG meeting in New Hampshire (will be submitted in due course)
<b>Related Projects:</b>	

### Introduction / Background

The DQWG was re-commissioned at CHRIS-19 and a membership slate was nominated. It was envisioned that this WG would operate principally by email. It was clear by mid-year that due to lack of active participation and lack of momentum, we would need to schedule a face-to-face meeting. The chairman and vice-chair met with a very engaged group at the site of the Caris Conference in September in Bath, UK. A similar meeting is planned for Portsmouth, NH at the site of the Shallow Survey Conference. It is a priority for DQWG to increase active participation.

CHRIS referred several questions concerning data quality indicators in S-57 to DQWG, which included some recommendations for definition changes to CATZOC. These were considered at the Bath meeting and the DQWG recommendations are stated below.

### Analysis/Discussion

DQWG considered two issues concerning data quality indicators in S-57.

First, there is concern in many Hydrographic Offices with the *ZOC A1 and A2 "seafloor coverage" definitions in S-57, which currently describe a survey with feature detection as "All significant seafloor features detected and depths measured."* TSMAD suggested that the "All" be changed to "Most."

DQWG considers that "most" considerably undersells the level of care associated with feature detection surveys, and that, since it would be commonly understood to mean "more than half," it would be only marginally more useful to a transiting vessel than finding none of them. DQWG preferred an approach that mirrors S-44, "Survey conducted using detection systems, procedures, and trained personnel designed to detect and measure depths on significant seafloor features. Significant features are included on the chart as scale allows."

Second, S-44 ed 5 made some changes to modern survey specifications that make mapping to CATZOC awkward. DQWG considered some additional definition changes to CATZOC that will permit a cleaner mapping. It was a foremost requirement on our proposed changes that definitions could only be relaxed, not made more stringent, so as not to unduly inconvenience HOs that have populated their ENC's and databases with CATZOCs using the existing definition.

DQWG also considered portrayal issues with data quality indicators but have no recommendations to make at this time. It was felt that improvement to portrayal should wait until S-100/101 is adopted.

### **Year Ahead Work Plan**

The DQWG will hold another open meeting in Portsmouth, NH on October 20<sup>th</sup>. The Chair, and Vice-Chair will be present, as well as participants from Finland, Canada, and hopefully other HOs. It is the intent of this meeting to recruit additional working members, as well as elaborate on alternative data quality indicators or other structures for future inclusion in S-100/101.

DQWG will meet in Norfolk, Virginia at the North American Hydrographic Conference during the week of May 11-15.

It is our goal for the year ahead to outline the basic structure of a set of quality indicators in accordance with applicable ISO standards. Advocacy, refinement, testing, and demonstration will follow in 2010, with a complete recommendation to HSSC expected at HSSC-2.

### **Recommendations**

The DQWG recommends making the definition changes to CATZOC as detailed in Appendix 1.

### **Justification and Impacts**

The proposed changes to CATZOC address concerns that are preventing some HOs from populating CATZOC, and harmonize CATZOC with S-44 ed 5. It is expected that these changes will facilitate the wider adoption of CATZOC by member states.

### **Action Required of CHRIS**

The CHRIS is invited to amend S-57 as specified in Appendix 1 of this report.

The CHRIS is invited to endorse the proposed work plan (appendix 3) and continue the work of the DQWG for another year.

The CHRIS is invited to encourage Member States to nominate additional active members of DQWG.

DQWG Proposed Re-Alignment of CATZOC, changes are highlighted, old values in red

1	2	3		4	5
ZOC <sup>1</sup>	Position Accuracy <sup>2</sup>	Depth Accuracy <sup>3</sup>		Seafloor Coverage	Typical Survey Characteristics <sup>5</sup>
A1	± 5 m + 5% depth	0.50 + 1%d		Full area search undertaken. (All) Significant seafloor features detected <sup>4</sup> and depths measured.	Controlled, systematic survey <sup>6</sup> high position and depth accuracy achieved using DGPS or a minimum three high quality lines of position (LOP) and a multibeam, channel or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10	± 0.6		
		30	± 0.8		
A2	± 20 m	= 1.00 + 2%d		Full area search undertaken. (All) Significant seafloor features detected <sup>4</sup> and depths measured.	Controlled, systematic survey <sup>6</sup> achieving position and depth accuracy less than ZOC A1 and using a modern survey echosounder <sup>7</sup> and a sonar or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10	± 1.2		
		30	± 1.6		
B	± 50 m	= 1.00 + 2%d		Full area search not achieved; uncharted features, hazardous to surface navigation are not expected but may exist.	Controlled, systematic survey achieving similar depth but lesser position accuracies than ZOCA2, using a modern survey echosounder <sup>5</sup> , but no sonar or mechanical sweep system.
		Depth (m)	Accuracy (m)		
		10	± 1.2		
		30	± 1.6		
C	± 500 m	= 2.00 + 5%d		Full area search not achieved, depth anomalies may be expected.	Low accuracy survey or data collected on an opportunity basis such as soundings on passage.
		Depth (m)	Accuracy (m)		
		10	± 2.5		
		30	± 3.5		
D	worse than ZOC C	Worse Than ZOC C		Full area search not achieved, large depth anomalies may be expected.	Poor quality data or data that cannot be quality assessed due to lack of information.
		100	± 7.0		
		1000	± 52.0		
U	Unassessed - The quality of the bathymetric data has yet to be assessed				

Remarks:

**To decide on a ZOC Category, all conditions outlined in columns 2 to 4 of the table must be met.**

Footnote numbers quoted in the table have the following meanings:

1 The allocation of a ZOC indicates that particular data meets minimum criteria for position and depth accuracy and seafloor coverage defined in this Table. Data may be further qualified by Object Class "Quality of Data" (M\_QUAL) sub-attributes as follows:

a) Positional Accuracy (POSACC) and Sounding Accuracy (SOUACC) may be used to indicate that a higher position or depth accuracy has been achieved than defined in this Table (e.g. a survey where full seafloor coverage was not achieved could not be classified higher than ZOC B; however, if the position accuracy was, for instance, 15 metres, the sub-attribute POSACC could be used to indicate this).

b) Swept areas where the clearance depth is accurately known but the actual seabed depth is not accurately known may be accorded a higher ZOC (i.e. A1 or A2) providing positional and depth accuracies of the swept depth meets the criteria in this Table. In this instance, Depth Range Value 1 (DRVAL1) may be used to specify the swept depth. The position accuracy criteria apply to the boundaries of swept areas.

c) SURSTA, SUREND and TECSOU may be used to indicate the start and end dates of the survey and the technique of sounding measurement.

2 Position Accuracy of depicted soundings at 95% CI (2.45 sigma) with respect to the given datum. It is the cumulative error and includes survey, transformation and digitizing errors etc. Position accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

3 Depth accuracy of depicted soundings =  $a + (b\%d)/100$  at 95% CI (2.00 sigma), where d = depth in metres at the critical depth. Depth accuracy need not be rigorously computed for ZOCs B, C and D but may be estimated based on type of equipment, calibration regime, historical accuracy etc.

4 Significant seafloor features are defined as those rising above depicted depths by more than:

Depth	Significant Feature
a. <40 m	2 m
b. >40 m	10% depth

A full seafloor search indicates that a systematic survey was conducted using detection systems, depth measurement systems, procedures, and trained personnel designed to detect and measure depths on significant seafloor features. Significant features are included on the chart as scale allows. It is impossible to guarantee that no significant feature could remain undetected, and significant features may have become present in the area since the time of the survey.

#### Depth Significant Feature

a. <10 metres >0.1%depth,

b. 10 to 30 metres >1.0 metre,

c. >30 metres >(0.1%depth) minus 2.0 metres

5 Controlled, systematic (high accuracy) survey (ZOC A1, A2 and B) - a survey comprising planned survey lines, on a geodetic datum that can be transformed to WGS 84.

Position fixing (ZOC A1) must be strong with at least three high quality Lines of Position (LOP) or Differential GPS.

Modern survey echosounder - a high precision surveying depth measuring equipment, generally including all survey echosounders designed post 1970.

## Membership of DQWG

Member State	Name of Delegate	email
USA	LCdr Shepard SMITH (Chair)	<a href="mailto:shep.smith@noaa.gov">shep.smith@noaa.gov</a>
UK	Mr. Chris. HOWLETT (Vice Chair)	<a href="mailto:Chris.Howlett@ukho.gov.uk">Chris.Howlett@ukho.gov.uk</a>
Brazil	Lt. Christopher FLORENTINO Lt. Rafael Vieira de MORAES	<a href="mailto:christopher@chm.mar.mil.br">christopher@chm.mar.mil.br</a> <a href="mailto:rafael.vieira@chm.mar.mil.br">rafael.vieira@chm.mar.mil.br</a>
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Ecuador	Lt. Carlos ZAPATA C.	<a href="mailto:sec-hidrografia@inocar.mil.ec">sec-hidrografia@inocar.mil.ec</a>
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\*indicates that member has participated or expressed interest, but has not been formally assigned

## DQWG Proposed Work Plan - November 2008-November 2009

1. The tasks below are organized in accordance with the Terms of Reference.

**DQWG Tasks**

- A. Review ISO 19113, 19114, and 19115 and make recommendations for inclusion in S-100.  
 B. Monitor and further develop quality indicators for hydrographic data.  
 C. Review and revise as needed existing S-57 quality indicators  
 D. Review and revise presentation in S-52  
 E. Investigate ways of ensuring that ECDIS displays provide a clear warning or indication of the quality of the underlying survey data  
 F. Propose new data quality topics and other applications for consideration by CHRIS.

Task	Work Item	Priority H-high M-medium L-low	Milestones	Start Date	End Date	Status P-planned O-ongoing C-Completed	Contact Person	Affected Pubs/Standard	Remarks
A1	Review ISO standards	M		Dec 2008	April 2009	P	TBD		
A2	Make recommendations For inclusion in S-100				Nov. 2010	P	TBD	S-100	
B1	Re-evaluate customer requirements for data Quality indicators	M		Sept. 2008	Sept. 2009	O	DQWG		Recruit subject matter expert(s) to discuss at Norfolk meeting. Literature search.
B2	Brainstorm alternate approaches to data quality	M		Sept. 2008	Sept. 2009	O	DQWG		Open meetings at Caris and Shallow Survey
B3	Choose one approach	M			Sept 2009	P	DQWG		
C1	Recommend changes to S-57 CATZOC	H			Sept 08	C	DQWG		Contained in this report
D1	Review current functionality in ECDIS with current products	M		Dec 2008	May 2009	P	DQWG		Live and static displays, Potentially demo at May meeting

D2/E1	Develop logic tree for alarms in current and proposed approaches			May 2009	Sept 2009	P	DQWG		
E2	Find ECDIS or ECS partner for demos and experiments			July 2009	Dec 2009	P	DQWG		
E3	Develop a demonstration project			Dec 2009	Apr 2010	P	DQWG		

2. DQWG Meetings

- |    |                                  |                                       |
|----|----------------------------------|---------------------------------------|
| 1. | Date: 23 Sep 2008                | Location: Bath, UK (Kick-off meeting) |
| 2. | Date: 20 Oct 2008                | Location: Portsmouth, NH, USA         |
| 3. | Date: during week 11-15 May 2009 | Location: Norfolk, Virginia, USA      |

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Vice-chairman: Chris Howlett  
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