

**Joint TSMAD18 & DIPWG1 MEETING**  
**4<sup>th</sup> to 8<sup>th</sup> May 2009 (Ottawa, Canada)**

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.

## Appendix 1

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 30 100 1000	± 0.6 ± 0.8 ± 1.5 ± 10.5		
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 30 100 1000	± 1.2 ± 1.6 ± 3.0 ± 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 30 100 1000	± 1.2 ± 1.6 ± 3.0 ± 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 30 100 1000	± 2.5 ± 3.5 ± 7.0 ± 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.

Footnote numbers quoted in the table have the following meanings:

<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. 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 TECSO 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 =  $a + (b\%d)/100$  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.

#### 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

<sup>5</sup> 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>
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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

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|----|----------------------------------|---------------------------------------|
| 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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Secretary: Vacant

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