

ASA S12 Committee on Noise
Working Group (WG) 47 – Underwater Noise Measurement of Ships

Sixth Meeting June 4-5, 2008
Woods Hole Oceanographic Institution
Bigelow Building, Bigelow Conference Room

MEETING MINUTES
REVISION 1 – 07/29/2008
Prepared by Michael Bahtiarian

INTRODUCTION

The WG47 meeting started around 9:30am in Room 217 of the Bigelow Building at Woods Hole Oceanographic Institution. The meeting agenda and attendee list is attached at the end of the meeting minutes. After brief personal introductions, a summary of the last meeting in February (at FAU) was given. The Chair would like to thank Dr. George Frisk for facilitating the use of the conference room at WHOI.

TECHNICAL DISCUSSIONS

The first items that were covered were data window length, time sampling, number of runs and method for checking drift. During the first discussions, each topic was just covered technically without any discussion of specific text sections of the standard.

The chair showed a spreadsheet which computed Data Window Length (DWL) and Data Window Time (DWT). The spreadsheet is also attached with this memo. The problem with current approach (as determined by the chair) was that small fast vessels had DWT's that were considered to small (< 10 seconds). Likewise, large slow vessels had DWT's that were too high (> 100 seconds). The spreadsheet was reviewed by attendees. Duff Kirklewski (DK) suggested that we need to compute uncertainty in decibels based on sampling time and other parameters.

It was proposed by Greg Hassell (GH) that the CPA be either one ship length but no less than 100 meters. This helps with keeping sampling periods within the 10 to 100 second time frame. Everyone agreed (however this has other implications throughout the standard which were discussed during review of sections 4 and 5).

The number of runs for each condition was discussed. The Rev 2 document had 8 (4 port/4 starboard) for Grades A & B and 4 total for Grade C. It was felt by participants that 8 runs was too many and would take too much time. The group assembled decided to change that to a total of 4 runs per condition, 2 port & 2 starboard for Grades A & B. Grade C was left at 4 total, but at least one in each direction (i.e. 3P/1S, 1P/3S or 2P/2S). If differences are observed, perhaps due to wind and tide effects, or differences between P and S, then additional runs should be considered.

The next technical issue was that of drift error. The chair showed computation of error in decibels based on hydrophone drift causing a positional error (i.e. difference between actual and idealized CPA values). The spreadsheet is also attached. The computation was reviewed and shows that for 6 degree drift error is just about 0.5 dB. It was believed

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that maximum drift would be about 5-6 degrees. GH noted that computation is based on straight line “shape” of drifting cable when actual drift creates “catenary” shape of cable. It was originally believed that straight line assumption results in greater error, but after the meeting GH noted that it will underestimate the error. Chair agreed after some further sketching. The committee may need to review this further. At the meeting it was decided to not make adjustments for drift error up to 5 degrees. Further, the standard would not specify how to measure the drift or recommend what to do if greater than 5 degrees.

The use of narrowband data collection was discussed. This has been topic previously discussed. Rev 2 required collection of 1 Hertz resolution narrowband data from dc to 5,000 Hz for Grade A only. Grades B & C had listed narrowband data as needed. DK suggested this be changed to 1% consistent with MIL-STD-740-1 & 2. GH agreed that 1 Hz resolution was to fine for higher frequencies which would undergo a Doppler Shift of near 20 Hz.

After the meeting, DK provided the section of MIL-STD-740 which only requires 400 line analysis with bandwidth not to exceed 10% of the center frequency. The standard states preferred ranges are 0-400 Hz, 400 to 2000 Hz, 2000 to 10,000 Hz. Chair believes that this is out dated requirement and would be more cumbersome than acquisition of dc-5,000 Hz with > 4800 line analysis. In post meeting email DK suggested, 1% but not finer than 1 Hertz. Chair believes this needs to be revisited.

DETAILED REVIEW

Chair passed out the hard copies of Rev 2 and went over some ground rules on the review. Significant changes were made to Table 1, Grade Matrix Summary and Sections 4 and 5.1, 5.2 and 5.3. Sections 5.4 and the entire section 6 were not reviewed or revised in any way. Sections 7, 8, 9 and 10 remain unwritten. All of the changes are reflected in Revision 03, dated 06/04/2008. Detail minutes of the reason for each change were not recorded by the chair except as noted below.

Additional terms were added to Section 3, however no definitions were discussed. At the end of the meeting, GH and DK divided up the terms and will supply definitions by the September meeting.

It was mentioned that a section of safety should be prepared. The Chair suggested that this section go into Section 10 which is titled Application Guidance/General Notes. Chair suggests one of the sub-sections be titled “Safety”. Chair asked if Kevin O’Neal (KO) can prepare which would be a paragraph or two long.

CALIBRATION

Calibration requirements were changed to following. All Grades must have laboratory calibration to ANSI or ISO standard within previous 12 months. Grade A must have insert voltage calibration over the entire frequency range. Field calibration was defined

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as using separate sound source was not required for Grade A as such is not possible by US Navy. For Grades B & C insert voltage or field calibration at a minimum of one frequency was required. Definitions of insert voltage calibration and field calibration to be added to section 3.

PROCESSING/AVERAGING

After discussion between technical aspects and what is done by both UK and US Navy it was decided to use Linear or “equivalent exponential” processing with ≤ 1 second averaging time and $\geq 50\%$ overlap and Hanning Window. The new items were to allow exponential averaging which is used by UK with short enough sampling to not bias data to the last few seconds of the run. DK gave strong argument for having 67% overlap as this greatly minimizes troughs in the data. However, KO stated the US Navy uses 50%, thus compromise of $\geq 50\%$ overlap was decided.

The requirement to record tracking (i.e. location) and time stamp data synchronously with the acoustic data was extended down to Grade B. Previously it was just for Grade A. The chair was not in favor of this addition as it would increase complexity of Grade B measurements. That is the measurement cannot be done with COTS equipment and special software would be required. Jim Roche (JR) felt that such requirement would not be too difficult to match acoustic data with positions data (likely from GPS). GH and others agreed that such must be required for intended accuracy of Grade B. Chair agreed to wait and see how three grades will come together. Grade C would not require simultaneous recording of acoustic data and track. However, a sentence in the standard stating so was removed as it was believed not necessary to say what is not required.

RANGING

Some new terms were added to Section 3 and will need to be defined as they are used in the standard. They are “Slant Range” which is the straight line (diagonal) distance between the hydrophone and the ship (???). The ship that is having the underwater noise measured will be known as the “Vessel Under Test”. KO suggested “Test Vessel”, but could be confused with a support ship.

TABLE 2

Table two was modified as required to meet changes in the text. However after looking at what would be listed, it was decided to remove the Table. For now the Table is shown with ~~strikeout~~ font, and it was not actually delete using Track Edits. So if need to add back in it can be. A definition on omni-directional to be added to section 3.

TEST SITE; SECTION 5.1

This section has some major changes the result of which are significant shortening and simplifying of the section. Sections which were deleted covered specific required conditions of the test site (distances relative to vessel traffic and land) and background noise. These sections were deleted because they are not important. They were deleted in favor of statement that says it is up to the user to determine suitable site. The idea is that it could be near land (such as at Dabob Bay or Behm Canal) as long as there is enough

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room to operate the vessels, it could be near shipping (such as Halifax, DRDC) if taken into account, etc.

WATER DEPTH; SECTION 5.1

The issue of water depth has been important issue discussed in great detail at previous meetings. The Rev 2 standard had water depths of 3x, 2x, & 1x for Grades A, B & C, respectively. The revised minimum water depths are:

Grade A: greater of 200 m or 2 x overall ship length.

Grade B: greater of 150 m or 1.5 x overall ship length.

Grade C: greater of 50 meters or 0.5 x overall ship length.

These changes were needed to go along with CPA changes of the greater of 100 meters or 1x ship length. If above changes were not made and stay with ± 30 degree Data Window Angle then bottom hydrophones could be touching bottom. The idea of not using ± 30 degree Data Window Angle was discussed, but all felt it should stay.

HYDROPHONE DEPLOYMENT; SECTION 5.2

Like section 5.1 this section was shortened and simplified (see section 5.2 for details). One major change was to make Grade C hydrophone depth 15 degrees vs. previous 30 degrees to keep water depth shallow (or should I say not deep).

TEST COURSE, SECTION 5.3

Again, like sections 5.1 & 5.2 this section was shortened and simplified (see section 5.3 for details). One major change was use terms “COMEX” (commence exercise) & “FINEX” (finish exercise). Both terms regularly used by UK and US Navy and will be added to definitions. “COMEX” AND “FINEX” are not necessarily where data collection starts and ends. “COMEX” AND “FINEX” are to be added to Figure 3.

SOUTHALL/HATCH TELECONFERENCE

It should also be noted that Wednesday afternoon the committee had short conference call with member Dr. Brandon Southall (NOAA) and Dr. Leila Hatch (NOAA- Stewagen Bank). The purpose of the conference call was to get a briefing on the recent International Workshop on Shipping Noise and Marine Mammals, held by *Okeanos - Foundation for the Sea* in Hamburg, Germany, on April 21-24 2008. The meeting has issued a Statement of Participants calling for a reduction of underwater noise from ships in the 10 to 300 Hertz range.

The question was asked about need types of data needed by marine biologists to assess impact. Dr. Southall and Hatch felt that 1/3 octave would be sufficient. Assessment of tones could be done with 1/12th octave or narrowband.

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FUTURE MEETINGS

At the conclusion of the technical discussions, the chair discussed next meeting. He suggested idea of using WebEx to cover one section or even one paragraph per week during half hour to maximum one hour sessions. The sessions would be held at the same time every week. It was felt that around 11am (EST) would be good to allow US west coast (8am PST) and UK participants (5pm GMT) ability to be involved.

One of the previous meetings was held successfully (Nov 2007) by WebEx. Chair will need to look into possible funding of such endeavor. The physical next meeting was proposed for late September in Washington, DC.

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AGENDA

June 4th

- 9:00am: Start Meeting, Bigelow Conference Room, Bigelow Building
Introductions and updates from previous meeting(s), as necessary.
- 9:30am: Summary review of current draft (Rev 02) of standard.
Discuss other issues to be addressed during rest of the meeting.
- 10:00am Open discussion on:
- Data window length
 - Time sampling issues
 - Number of runs for each grade
 - Method for checking drift angle
- 12:00noon: Break for Lunch
- 1:30pm Finish discussion from 10am session.
- 2:00pm: Detail second review of section 4.0
- 3:00pm Detail second review of section 5.0
- 3-4pm *Conference call with Brandon Southall and/or Leilia Hatch wrt Okenos Underwater Noise Conference in Hamburg (alternate time is Thurs @11)*
- 4:00pm First review of section 6.0
- 5:00pm: Break for evening
- 6:00pm: Dinner out (Land Fall Restaurant)

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June 5th

- 9:00am: Continue review of sections 4, 5 & 6 as required.
- 10:00am: Review list of things & sections to be added into the standard. Discuss list of terms and who can provide definitions for each.
- 11:00am *Conference call with Brandon Southhall and/or Leilia Hatch wrt Underwater Noise Conference in Hamberg (alternate time to Wed).*
- 11:00am: Discussion
- 12:00noon: Break for lunch
- 1:00pm: Develop action list of section of standard needed to be worked on. Get volunteers associated with review writing of additional sections.
- 3:00pm: Discuss next meeting dates. End meeting.

ATTENDEE LIST

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