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MARITIME COMMAND ORDER

MARINE MAMMAL MITIGATION PROCEDURES (MMMP)

References: A. Marine Mammal Regulations, SOR/93-56 4 February 1993
B. Species at Risk Act
C. MARCORD 4-12 MARCOM Policy on Environmental Protection
D. DAOD 4003-0 Environmental Protection and Stewardship
E. DAOD 4003-2 Environmental Assessment
F. Formation Environmental Management System (EMS) Documents
G. NATO Undersea Conference on the Effects of Sound in the Water in Marine Mammals Lerici, IT, Jun 2007
H. NC 0547 Marine Mammals and Sonar
I. MARCORDs Vol 3A 46-3

INTRODUCTION

1. The purpose of this MARCORD is to give direction and implement SOPs when conducting Exercises-Operations that involve the use of Underwater Sound Generating Systems (Communications, Ship Active Sonars, active Sonobuoys or Helicopter Active Dipping Sonar's) that may pose a pervasive disturbance, harassment or injury risk to Marine Mammals (MM). There are no restrictions applied to the use of Sonar Systems in the passive mode or for Navigational Purposes. In addition, this policy also includes guidance for non-sonar activities such as weapons firings when in the area of Maritime Marine Mammals. Additional guidance for weapons firings can be found in Ref I.

SCOPE

2. The measures herein are consistent with Ref. D. These measures reflect the most accepted practices among NATO Navies and researchers as discussed at Ref G. This policy goes hand in hand with mitigation protocols and procedures in ship's Environmental Management System (EMS) Manual.

3. These Mitigation Procedures apply to all MARCOM ships, Submarines, Organic Helicopters, and Long Range Patrol Aircraft (LRPA) (when assigned in support of Maritime Forces) in all waters when conducting exercises/operations in a benign Underwater Warfare environment. It is DND's policy to respect host country protocols when operating in their waters. Where a difference exists, the more stringent protocols and procedures will be used. When on Operational Deployment, due consideration must be given to the tactical situation prior to the implementation of these mitigation procedures. These procedures also apply to all foreign naval units and assets under CF Control within the Canadian AOR. For visiting foreign naval units not under CF Control, formations are to inform the foreign units of our policies and request that they respect our protocols.

OVERVIEW

4. It is universally accepted that MM rely on underwater hearing for a variety of biological critical functions. Some MM strandings around the World has been linked to underwater noise. Some occurrences where active Sonar was used by exercising navies and research vessels have seen erratic marine mammal behaviour and stranding. While the scientific community broadly accepts that more research is still needed to understand the specific relationship of underwater noise on MM, NATO and other Allied countries and their Navies, accept the use of MM mitigation measures when using underwater generating systems.

5. Based on scientific data and accepting that other species may be more or less sensitive, it was agreed at Ref. G, to maintain a Sound Level (SL) of 160 dB re 1 Micro-Pascal at 1 metre for a 1 second sound duration exposure at destination as a reasonable and diligent planning figure for use in defining the boundary of a Mitigation Avoidance Zone (MAZ) when employing active sonar systems onboard naval ships and airborne assets.

6. Sound intensity underwater decreases with range due primarily to attenuation and geometric spreading losses. METOC centres on both coasts have computed the Transmission Loss (TL) at a number of sites in Canadian Operational Areas (OPAREAS). By considering the SL's of Canadian Active Sonar Systems and the estimated TL in the vast majority of cases in the Canadian OPAREAS, the following MAZ have been established:

a. SQS 510 4000 yds,

b. Thomson 2024 1000 yds,

c. AQS-502 1000 yds,

d. SLQ 25/25A 1000 yds (not applicable if HMS active)

e. DICASS Buoys 300 yds.

f. MH HELRAS TBD,

g. SSQ-565 Buoy TBD, and

h. DM 211 and other HE 6000 yds

7. IAW ref I, in the event marine mammals are detected in dangerous proximity to the line of fire (or the firing arc for missile firings), firing shall not be commenced until the marine mammals are clear of the line of fire or the firing arc or the marine mammals have not been sighted for ten minutes.

MITIGATION PROCEDURES GENERAL

8. The underlying principle of the MARCOM mitigation procedures will be the extra measures implemented to identify low risk areas where active sonar or other Underwater Sound Generating Systems may be used safely. This requires extra but reasonable efforts on the part of operational staffs and planners given the potential for these mammals to be present but undetected. Planners and Operators at all levels must heighten their awareness as to the likely location and presence of MM in their operating

locale and implement precautionary measures to avoid excessive sound exposures. These procedures will include taking into consideration MM habitat and migration routes into exercise planning, focused attention on MM visual and passive acoustic detection prior to the exercise, and the graduated increase in Sound Intensity (SI) from active Sonar to reduce its possible negative impact on MM.

PLANNING

9. Thoughtful and informed planning should significantly reduce the probability of MM encounters. The following considerations shall be incorporated into planning Naval exercises and operations involving active sonar use:

a. Employ OPAREA management tools, available through formation environment offices, to inform and identify MM seasonal migratory routes, habitat regions, breeding areas and timings;

b. To the greatest extent practicable, plan exercises for recognized military OPAREAS. Should this not be possible, select the lowest risk of encounter OPAREAS based on knowledge gained from OPAREA Management Tools;

c. When practicable, plan operations during daylight hours[1] to maximize MM detection opportunities. Such phenomena as Whales discharging air through their blow holes, Whales breaching, Dolphins and Porpoises surfacing, and feeding sea birds are often an indication of the presence of MM;

d. Use acoustic range prediction tools to determine individual ship and aggregate Task Force seasonal propagation TL plots. Avoid scheduling exercises/operations areas where the MAZ is predicted to be greater than normal;

e. Convey to coalition forces operating under the CF TACON-OPCON the mitigation procedures contained herein and be prepared to provide consorts with additional information obtained from formations (ref F);

f. Heighten operator awareness by conducting pre-sail exercise discussions among Command Teams to review shipboard Standard Operating Procedures (SOP's);

g. Review visual training aids (cue cards, video etc), and/or conduct acoustic familiarization training prior to exercise start (ensuring that lookouts are included in all visual recognition training scenario's);

h. When practicable, plan PIMs and exercises/operations to provide MM with avoidance escape routes; and

i. Collate all exercise records including visual monitoring recordings and sighting reports.

Note - if units are unable to comply with sub par h, they are to ensure adequate risk mitigation measures are in place.

[1] During conduct of an Exercise or Operation, in conditions of limited visibility (night, fog etc), Command is to make reasoned decision based upon most recent observation and reports of MM activity in the OPAREA, and adopt reasonable risk mitigation measures based upon predicted MM presence.

AT SEA EXECUTION

10. Discretion resides with the Commanding Officers (CO) to determine how best to proceed with scheduled events. In making any such determination, the CO must consider Bilateral or Multinational mitigation procedures provided by the host and participating Navies. Where a difference exists, the more stringent protocols and procedures will be used. In addition, the CO must consider the expected species of MM potentially encountered in the exercise OPAREA.

11. Units conducting Bilateral or Multinational operations, outside the Canadian AOR, in which there are limited MM mitigation procedures, will consider advising allies of the requirement for MARCOM units to comply with National procedures contained herein.

12. **Pre-Exercise Start Procedures**:

a. Conduct surveillance of exercise/operation area if possible. OOW, lookouts, and lifebuoy sentry to conduct and maintain visual and infrared, search for MM;

b. Maintain bridge and ops room radar, passive acoustic, sonobuoy, infrared, radar search, and underwater telephone listening watch to locate and monitor MM. Traditionally, the most effective sensors in detecting MM activity have been (in descending order) 1. Visual; 2. UWT below 12 kts; 3. Passive Sonobuoy; 4. CANTASS; 5. HMS Passive. Additionally, passive broadband sonar has been the most effective on submarines;

c. When available, make use of aerial vehicles, and underwater vehicles to locate and monitor MM;

d. Record all MM sightings/interactions in SDM VDR, ship's log, ops room log, sonar logs, and other exercise/operational reporting formats;

e. Convey MM sightings to consorts;

f. A minimum of 1 hour prior to event start, launch bathythermograph to calculate current sound velocity profile and compare with acoustic range prediction systems to assess potential for increased ranges beyond normal MAZ;

g. At a minimum of 30 minutes prior to energizing active sonar systems, set watch on passives systems to include UWT, Passive Sonobuoys, CANTASS (if deployed), and HMS passive to detect MM;

h. IAW EMCOM policy, maintain active radar watch to assist in spotting MM surfacing,

i. Be prepared to video record and/or photograph MM sightings;

j. Implement graduated ramp-up procedure for the SQS-510 sonar where possible; and

k. When exercising on a UWW range with fixed sensors, the OCE ensure that the range uses the sensors to monitor and track MMs, and provides associated information to exercise participants.

12. **Ramp-Up Procedures**: This practice assumes the principle that local MM will either avoid or become accustomed to the sonar's sounds and thus reduce the potential negative consequences on their health and safety. Because the SQS-510 sonar was not designed with a ramp-up mode capability, the ramp-up procedure described below provides what is achievable based on the current SQS-510 hardware configuration. Furthermore, the range of vocalization frequencies for a variety of MM species indicates that little is gained in varying between the 3 selectable SQS-510 frequencies. As a result, the SQS-510 sonar is to be employed in the 7.2 kHz, Mine Avoidance Linear Period (LPM) waveform mode, for the majority of the ramp-up period. This mode emits the least amount of energy for a given transmission mode. The 700 Hz sweep width is to be used as it minimizes the possibility of exciting any MM cavity resonance. Ships are to implement the SQS-510 sonar ramp-up procedures as follows:

a. **Phase 1: 0 to 5 minutes**;

i. Directional Transmission Wide (DTW);
ii. Low power;
iii. 1 emission in manual mode, in the exercise grid direction or, if already in the grid, in the direction of least MM encounters probability; and
iv. Ships are to listen for any MM feedback.

b. **Phase 2: 5 to 10 minutes**;

v. DTW;
vi. Low power;
vii. Range scale at maximum, in the exercise grid direction or, if already in the grid, in the direction of least MM encounters probability; and
viii. Operators are to maintain passive attention for MM feedback and direction of source.

c. **Phase 3: 10 to 15 minutes**:

ix. Omni transmit;
x. Low power;
xi. Range scale at maximum, and
xii. Operators are to maintain passive attention for MM feedback and direction of source.

d. **Phase 4: 15 to 17 minutes**;

xiii. DTW;
xiv. High power;
xv. Range scale at maximum, and
xvi. Operators are to maintain passive attention for MM feedback and direction of source.

e. **Phase 5: 18 to 20 minutes**;

xvii. Emit 1 Omni Transmission;
xviii. High power;
xix. Range scale at maximum, and
xx. Operators are to maintain passive attention for MM feedback and direction of source.

Note: If a unit joins a ship that has commenced or completed Ramp-Up Procedures, the joining unit may commence under water sound transmissions at a phase equal to or earlier of the former unit provided that the joining unit is within the MAZ of the former unit.

13. **Exercise/Operating Procedures**:

a. **Ship's**:

1. Commence scheduled event/serial without restrictions on sonar transmissions;

2. IAW EMCON policy established for the exercise, maintain active/passive sonar, radar, infrared and sonobuoy search, and UWT listening watch to locate and monitor MM;

3. OOW, Lookouts, and Lifebuoy sentry maintain visual and IR monitoring for MM;

4. Record all MM sightings/interaction in SDM VDR, Sonar logs, and other exercise/operational specific reporting formats;

5. Convey MM sightings to consorts;

6. To the greatest extent possible during range clearance procedures, check that weapon and expendable decoy splash points and predicted weapons track are clear of any sighted MM for a 4000 yd radius;

7. To the greatest extent possible during range clearance procedures, check that EMATT splash points and predicted track are clear of any MM for a 500 yd radius; and

8. Report all MM sightings IAW ref F.

b. **Submarine's**:

1. Commence scheduled event serial without restrictions on sonar transmissions;

2. IAW EMCON policy established for the exercise, maintain active/passive sonar, radar (if on surface or at periscope depth), infrared (if on surface or at periscope depth) search, and UWT listening watch to locate and monitor MM;

3. When on the surface maintain visual monitoring for MM;

4. Record all MM sightings/interaction in ships log, OOW narrative, Navigation logs, Sonar logs, and other exercise-operational specific reporting formats;

5. Convey MM sightings to consorts (when safe and practicable to do so);

6. To the greatest extent possible during range clearance procedures, check that weapon launch position and predicted track are clear of any sighted/tracked MM for a 4000 yd radius; and

7. To the greatest extent possible during range clearance procedures, check that SUBMATT/ Decoys/ Pyros launch position and predicted track (if applicable) are clear of any sighted/tracked MM for a 500 yd radius.

c. **Helicopters**:

1. Monitor exercise area for MM presence for a minimum 10-minute period before dipping with active sonar transducer in the water;

2. Helicopters shall not dip active sonar transducers within the MAZ of a MM;

3. To the greatest extent possible during range clearance procedures, check that EMATT, Sonobouy and pyro splash points, and predicted track are clear of any sighted MM for a 500 yd radius; and

4. To the greatest extent possible during range clearance procedures, check that weapon splash points and predicted weapons track are clear of any sighted MM for a 4000 yd radius.

d. **Long Range Patrol Aircraft (LRPA)**[2];

1. To the greatest extent possible during range clearance procedures, check that EMATT, Sonobuoy and pyro splash points, and predicted track are clear of any sighted MM for a 500 yd radius;

2. DICASS and other active sonobuoys buoys should not be deployed within the MAZ of a MM.; and

3. To the greatest extent possible during range clearance procedures, check that weapon splash points and predicted weapons track are clear of any sighted MM for a 4000 yd radius.[3]

14. Procedures when a MM is located within **MAZ**:

[2] In conditions of limited visibility of sea state (night, low cloud base, fog, operating above 5000ft etc), Command is to make a reasoned decision based upon most recent observations and reports of MM activity in OPAREA, and adopt reasonable risk mitigation measures based on predicted MM presence.

[3] Measures outlined should be followed if practicable to do so consistent with aircraft safety, sortie objectives and the prevailing tactical scenario.

a. To the greatest extent possible, suspend active sonar transmissions until MM is outside MAZ;

b. Establish MM position and track;

c. Convey MM last known position and track to participating units;

d. Helos conducting dipped sonar transducer operations are to suspend transmissions until MM moves outside 1000 yd radius of sonar transducer or break dip and relocate outside the MAZ;

e. Maintain passive listening watch on underwater warfare equipment;

f. Conduct tape or other electronic media recording of observed MM using ship, helo, and MPA sonar systems;

g. Document MM lat/long, state of visibility, type of MM sighted and mitigation action taken in appropriate reporting logs/documents;

h. Consider reducing ship's speed and course alterations to avoid closing MM;

i. So far as practicable manoeuvre to prevent CANTASS and/or Nixie crossing the path of MM;

j. Cease dropping SUS, E-SUS or explosive charges; and

k. Video record and/or photograph MM sightings.

15. **Procedures when MM is located within MAZ of a Submarine**:

a. To the greatest extent possible, suspend active sonar transmissions until MM is outside submarine MAZ;

b. Establish MM position and monitor;

c. Convey MM last known position to participating units (when safe and practicable to do so);

d. Conduct tape or electronic media recording of observed MM using passive sonar systems. Handle IAW security regulations; and

e. Document MM lat/long, type of encounter and mitigation action taken in appropriate reporting logs/documents.

16. **Post-Operation Analysis**:

a. Complete quick-look reports IAW exercise/operation directives;

b. Submit records, video, tape and/or electronic storage media recordings, photographs and other MM confirmation through the chain of command for post- analysis; and

c. Submit recommendations for amending MM mitigation procedures, if any, through the chain of Command.

EDUCATION

17. These measures to mitigate potential active sonar impacts on MM are the result of MARCOMs commitment to protect and sustain the environment where it operates and trains. To achieve and sustain this objective will require positive and proactive education of Operational planners, Ships, Helos, and MPA personnel, on the need for and content of these procedures. TEs tasked with training lookouts, Lifebuoy sentrys and OOWs are to contact Formation Environment offices to arrange for lectures and exercises. Training staffs are to amend QSPs, lesson plans and procedures IAW with these instructions. Sea Training staffs are to ensure that an Environmental Diligence Briefings (EDB) to Lookouts, Lifebuoy sentries, OOWs, CBT operators, including ships personnel is included as a WUPs lecture requirement. Formation Environment Offices will produce standard Ship Briefing Packages to be available upon request. Formation Environment Offices are also to work closely with formation Operational Planners to provide MM databases and OPAREA planning tools along with any applicable local training.