

Commander, U.S. Pacific Fleet Mariana Islands Range Complex Report

Prepared for and submitted to:

National Marine Fisheries Service
Office of Protected Resources

Prepared by:

Department of the Navy

In accordance with the Letter of Authorization
Under the MMPA and ITS authorization under
the ESA 12 August 2011

Annual Range Complex Exercise Report

16 February 2011 to 15 February 2012

**For The U.S. Navy
Mariana Islands Range Complex (MIRC)**

15 April 2012

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MARIANA ISLANDS RANGE COMPLEX

INTRODUCTION

The U.S. Navy prepared this Annual Range Complex Exercise Report covering the period from 16 February 2011 to 15 February 2012 in compliance with the National Marine Fisheries Service (NMFS) Final Rule under the Marine Mammal Protection Act (MMPA) for the Mariana Islands Range Complex (MIRC).

In the Mariana Islands Range Complex Letter of Authorization “Annual MIRC report”, the following report subsections were specified and are present within this report for the MIRC:

- (1) Mid-Frequency Active Sonar (MFAS)/High-Frequency Active Sonar (HFAS) Major Training Exercises for Reporting (MTER).
 - (i) Exercise Information (for each MTER).
 - (ii) Individual Marine Mammal Sighting Information (for each MTER).
 - (iii) Evaluation (based on data gathered during all MTER) of effectiveness of mitigation measures designed to avoid exposing marine mammals to MFAS. This evaluation shall identify the specific observations that support any conclusion the Navy reaches about the effectiveness of the mitigation.
- (2) Anti-submarine Warfare (ASW) Summary
 - (i) Total annual hours of each type of sonar source
 - (ii) Cumulative Impact Report
- (3) Sinking Exercises (SINKEX)
 - (i) Exercise information
 - (ii) Individual marine mammal observation information
- (4) Improved Extended Echo Ranging (IEER)/Advanced Extended Echo Ranging (AEER) Summary
 - (i) Total number of IEER and AEER events
 - (ii) Total expended/detonated rounds (buoys)
 - (iii) Total number of self-scuttled IEER rounds
- (5) Explosives Summary
 - (i) Total annual number of each type of explosive exercise
 - (ii) Total annual expended/detonated rounds for each explosive type

This Annual Report covers the period from 16 February 2011 to 15 February 2012, and the information represents the best practical data collection for this period. The data collection period for monitoring and reporting is not specifically stated in the MIRC Letter of Authorization (LOA) as it was for previous range complexes. In order to provide enough time to collect, compile, and validate the range data prior to the 15 April 2012 LOA renewal submission date, a data cutoff date of 15 February 2012 was chosen by the Commander, U.S. Pacific Fleet. This amount of time is consistent with other LOAs. In an effort to provide a better representation of annual exercise data for the MIRC, the Navy will in the future combine exercise data from 16 February 2011 to 15 February 2012 and compare it to the annual allocations provided in the MIRC Letter of Authorization. This representation of annual exercise data shall be repeated in future annual reports. To provide accounting for the entire five year period of the authorization, the Navy will also submit a final report at the end of the five years to provide comprehensive totals of authorized usage.

(1) MIRC – MFAS/HFAS Major Training Exercises

(i) Exercise information

Table M1-i. MTER conducted in the MIRC.

(i) Exercise	(ii) Date	(iii) Location	(iv) # and types of active sources used						(v) # and types of passive sources used						(vi) # and types of vessels and aircraft participating						(vii) Total hours of observation by watchstanders (hrs)	(viii) Total hours of all active sonar	(xi) Total hours each active source						(x) Wave height (high, low, and average) (ft)
			(iv)a SQS-53	(iv)b SQS-56	(iv)c BQQ-10	(iv)d AQS-13F	(iv)e MK-48*	(iv) f SQS e -62	(v)a SQS-53	(v)b SQS-56	(v)c SQR-19	(v)d BQQ-10	(v)e AQS-13F	(v)g TB-16	(v)h TB-29	CG	DDG	FFG	SH-60B	SH-60F			Submarines	P-3C MRPA	Non-ASW Ships	USNS	(ix)a SQS-53	(ix)b SQS-56	
No MTER conducted within the MIRC during this reporting period.																													

(ii) Individual marine mammal sighting information by exercise

Table M1-ii. MIRC MTER – Individual Marine Mammal Sighting Information:

(a) Location	(b) Species	(c) # of individuals	(d) Calves observed (y/n)	(e) Initial detection sensor	(f) Platform detection from	(g) Length of time observed (min)	(h) Wave height (ft)	(i) Visibility (nm)	(j) Sonar source in use (y/n)	(k) Range (yds)	(l) Mitigation implemented	(m) If hull mounted source in use, true bearing and animal travel	(n) Observed behavior
No MTER conducted within the MIRC during this reporting period.													

(iii) Evaluation of effectiveness (based on data gathered during all MTER)

Between 16 February 2011 and 15 February 2012, there were no major training exercises conducted in the Mariana Island Range Complex.

Mitigation Effectiveness Discussion

Due to the fact that MTER's were not conducted within the MIRC during this reporting period the effectiveness of the mitigations during one of these events cannot be evaluated.

Table M1-iii-1. Breakdown of marine mammals sighted in the MIRC during MTER at ranges less than 1000 yards concurrent with MFAS use.

Range of Marine Mammal Sighting		
< 200 yards	200 – 500 yards	500 – 1000 yards
No applicable sightings	No applicable sightings	No applicable sightings

Table M1-iii-2. MIRC MTER where sonar was on during detection of marine mammals at ranges less than 1,000 yards and mitigation conducted.

1) Range [MIRC (M)]	2) MTE	3) Month	4) Species sighted	5) # of marine mammals sighted	6) Platform	7) Length of time observed (min)	8) Range at which marine mammal sighted	9) Mitigation [secure (SD); power down (PD); maneuver ship (MAN) ¹]	10) Estimate MAX exposure PRIOR to mitigation (dB re 1uPa) ²	11) Number of minutes sonar mitigation applied	12) Estimate exposure AFTER mitigation (dB re 1uPa) ²	13) DISTANCE ship would have moved given length of mitigation and nominal 10-knot ship speed (yds)	14) If hull mounted source in use, true bearing, animal travel	15) Observed behavior
No applicable sightings														

Exposure assessment

Estimated exposures within 2000 yards can be determined based on standard formulas of how sound propagates in water. Spherical spreading is generally valid within 1000 yards from the sound source, and can be expressed as spreading loss (in dB from a source) equals $20\log R$ [with “R” being range from the source in yards (Urlick 1982)]. Spherical spreading loss in the first 1000 yards equates to 60 dB of loss. At ranges between 1000 and 2000 yards the sound waves can become trapped by the sea surface and bottom (depending on water depth and other sound propagation factors) and not expand vertically. The spreading wave then forms an expanding cylinder. Cylindrical spreading loss in dB between two points can be calculated by using the formula $(10\log R_2/R_1)$. Cylindrical spreading loss between 1000 and 2000 yards equates to an additional 3 dB of loss. By the time the sound wave has propagated to 2000 yards, the sonar signal strength has decreased by a total of at least 63 dB. Using the AN/SQS-53 sonar as an example transmitting at 235 dB subtracting the 63 dB of spreading loss equates to an estimated sonar Receive Level (RL) of 172 dB at 2000 yards. The spreading loss formulas are used to make very conservative assumptions about potential exposure. The formula is an estimation of spreading losses only and does not take into account other factors that could increase the total propagation losses such as oceanographic conditions, attenuation losses, scattering losses, and Navy-unique MFAS operating parameters which would result in slightly lower sonar transmit levels. Use of this approach to estimate potential RL at any given animal assumes the horizontal range from a visual sighting accounts for an animal across all depths at which an animal travels to predict the maximum, worst case potential exposure. In other words, this estimated worst case exposure is presented independent of the animal’s actual depth level, since a) time and depth of current and previous dives cannot be deduced from a limited surface sighting, and b) oceanographic and tactical conditions influence actual sound propagation at different depths. Given relative motion of ships and animals at sea, the time spent with any given exposure from surface ships is likely to be limited.

(2) MIRC – ASW Summary

(i) Total annual hours of each type of sonar source

(U) Total annual hours of each type of sonar source used within the MIRC between 16 February 2011 and 15 February 2012 is classified and is submitted to the National Marine Fisheries Service in a classified version of this report.

Table M2-i. Sonar authorization within the MIRC by source.

Authorized MFAS sources §218.100 (c)(1) of NMFS MIRC Final Rule	Feb 2011-Feb 2012	Annually Authorized	% Total Used of Total Authorized Annually
(i) AN/SQS-53 surface ship hull-mounted active sonar (hours)	*	2173 hours	*
(ii) AN/SQS-56 surface ship hull-mounted active sonar (hours)	*	141 hours	*
(iii) AN/SSQ-62 DICASS acoustic sonobuoy (# of buoys)	*	1654 buoys	*
(iv) AN/AQS-22 or 13 helicopter active dipping sonar (# of dips)	*	592 dips	*
(v) AN/BQQ-10 submarine active sonar (hours)	*	12 hours	*
(vi) Mk-48/Mk-46/Mk-54 torpedoes (# of torpedoes)	*	40 runs	*
(vii) AN/SSQ-110 (IEER) sonobuoy (# of buoys)	*	106 buoys	*
(viii) AN/SSQ-125 (AEER) sonobuoy (# of buoys)	*	106 buoys	*
(ix) Range Pingers	*	280 hours	*
(x) PUTR Transponder	*	280 hours	*

*Classified data is submitted to the National Marine Fisheries Service in a separate classified annual exercise report.

(ii) Cumulative Impact Report

From NMFS Final Rule: *“To the extent practical, the Navy, in coordination with NMFS, shall develop and implement a method of annually reporting non-major training (i.e. ULT) utilizing hull mounted sonar. The report shall present an annual (and seasonal where practicable) depiction of non-major training exercises geographically across MIRC. The Navy shall include (in the MIRC annual report) a brief annual progress update on the status of the development of an effective and unclassified method to report this information until an agreed-upon (with NMFS) method has been developed and implemented.”*

The precise locations and frequency of ASW training is classified and is contained in a separate classified annual exercise report. There is currently no method to declassify the sensitivity of this data in order to publish this type of information in an unclassified report. For this reason the only method available for this information to be disseminated for the foreseeable future is in the classified version of the annual exercise report.

(3) MIRC – Sinking Exercises (SINKEX)

(i) Exercise information

Table M3-i. Summary of SINKEX conducted in MIRC.

(a) Location	(b) Date/time exercise began/ended	(c) Total hours of observation before, during, and after exercise	(d) Total number and types of rounds expended/explosives detonated	(e) Number and types of passive acoustic sources used in exercise	(f) Total hours of passive acoustic search time	(g) Number and types of vessels and aircraft participating	(h) Wave height in ft (High, Low, Avg)	(i) Narrative description of sensors and platforms used for marine mammal detection and timeline illustrating how marine mammal detection was conducted
A SINKEX was not conducted within the MIRC during the reporting period.								

(ii) Individual marine mammal observation information

Table M3-ii. Mammal sighting information for SINKEX.

(a) Location	(b) Species	(c) Number of individuals	(d) Calves observed (y/n)	(e) Initial detection sensor	(f) Length of observation (min)	(g) Wave height	(h) Visibility	(i) Sighted before/during/after exercise, and time (min)	(j) Distance of mammal from detonation	(k) Observed behavior	(l) Mitigation implementation	(m) If observation occurs during detonation, indicate munitions type
A SINKEX was not conducted within the MIRC during the reporting period.												

(4) MIRC – IEER/AEER Summary

The annual summary of use within the MIRC Study Area for Improved Extended Echo-Ranging System (IEER) and Advanced Extended Echo-Ranging System (AEER) sonobuoys is classified and is submitted to the National Marine Fisheries Service in a separate classified report.

(5) MIRC – Explosives Summary

Table M5-1. Explosives usage in the MIRC.

(i) Total annual number of each type of explosive exercise			
Authorized Exercise	Total Exercise Amount Feb11-Feb12	Amt. Annual Authorized	% Total Used To Total Authorized
(A) Gunnery Exercises (S-S GUNEX)	*	12	*
(B) Bombing Exercise (BOMBEX)	*	4	*
(C) Sinking Exercise (SINKEX)	*	2	*
(D) Extended Echo Ranging and Improved Echo Ranging (IEER/AEER) Systems	*	106	*
(E) Demolitions (Underwater Demolition)	*	50	*
(F) Air to Surface Missile Exercises (A-S MISSILEX)	*	2	*
(ii) Total annual expended/detonated rounds for each explosive type			
Category	Authorized quantity/year	Total Amount Used Feb 2011-Feb 2012	
(A) 5” and 76 mm naval gunfire rounds	440	*	
(B) Bombs (Mk-82,83, 84, GBU-38, 32, 31)	4	*	
(C) SINKEX	HARPOON (10), 5” Rounds (800), HELLFIRE (4), MAVERICK (16), GBU-12 (20), GBU-10 (8), MK-48 (2), Underwater Demolitions (4)	*	
(D) IEER/AEER Systems	106	*	
(E) Demolitions	50	*	
(F) Maverick missiles	2	*	

*Classified data is submitted to the National Marine Fisheries Service in a separate classified annual exercise report.