



U.S. Coast Guard Marine Safety Office Portland, Maine

STATE OF REGULATORY COMPLIANCE WITH 406 MHZ EPIRB CARRIAGE REQUIREMENTS ON COMMERCIAL FISHING VESSELS IN NORTHERN NEW ENGLAND

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This paper investigates the incidence regulatory deficiencies involving 406 MHz Emergency Position Indicating Radio Beacons on commercial fishing vessels required to be equipped with these devices when operating in northern New England waters. The 406 MHz EPIRB is a highly effective distress beacon, and serves as a central mechanism in the offshore search and rescue system in the offshore waters of the United States. Commercial fishing vessels were first required to carry 406 MHz EPIRBs in 1991. As this equipment ages, Coast Guard commercial fishing safety personnel have observed an apparent rise in deficiencies with this equipment. These deficiencies may affect performance of the equipment in a distress situation and could contribute to increased difficulties in rectifying incidents of unintentional transmissions of this equipment.

Introduction

Commercial fishing vessels that operate beyond 3 nautical miles from land are required by federal regulation [1] to carry 406 MHz Emergency Position Indicating Radio Beacons (EPIRBs). These devices are intended to provide automatic distress transmissions in the event of a sinking, and provide rescue authorities with position and vessel identification information.

This paper documents a study conducted by Coast Guard Marine Safety Office Portland, Maine, to determine the state of compliance with 406 MHz EPIRB carriage requirements within the commercial fishing fleet of northern New England.

Background

A commercial fishing vessel operating from Cundy's Harbor, Maine sank suddenly on June 24, 1997 while operating in offshore waters [2]. The accident happened quickly with no warning, and the crew of two was forced to abandon the vessel without broadcasting a mayday. Although the crew was able to recover their 406 MHz EPIRB during the abandonment of the vessel, they soon found that the beacon would not function.

The failure of the EPIRB to operate should not have been a surprise to the crew. Several months prior to the sinking, a Coast Guard boarding team had notified the vessel operator that the beacon's battery had expired. The operator indicated that he had attempted to have the EPIRB battery



406 MHz EPIRBs are compact radio beacons intended to provide automated distress signaling in the event of sinking. The system is designed to alert search and rescue authorities of the name and description of the vessel in distress, and provide highly accurate position information to facilitate search and rescue efforts.

replaced following the Coast Guard boarding, but opted, based on the cost of the servicing, to place the EPIRB back on the vessel without replacing the battery.

This incident raised the interest of fishing vessel safety personnel from Marine Safety Office (MSO) Portland. Anecdotal observations of experienced vessel examiners indicated that non-compliance rates for 406 MHz EPIRBs were very high. Common reported deficiencies included expired batteries, expired hydrostatic release mechanisms, and non-registration of beacon unique identification codes, which effectively negates the value of the 406 MHz system vessel identification feature.

In January of 1998, the First Coast Guard District released information detailing operating costs expended by the Coast Guard in response to accidental EPIRB transmissions and other type of false distress transmissions [3]. This report indicated that in federal fiscal years 1995 and 1996, First Coast Guard District units responded to 138 transmissions of 406 MHz EPIRBs. One hundred thirty one of these transmissions were false or unintentional, resulting in over \$463,300 in operating costs incurred in the response to the transmissions and identification of the vessels not in distress.

In November of 1997, the Thirteenth Coast Guard District released information on EPIRB performance in the Pacific Northwest region of the United States [4]. This information indicated that during the 1996 and 1997, 20 commercial fishing vessels had sunk in that district, but only 11 of the incidents involved successful transmissions of properly registered 406 MHz EPIRBs. This performance indicated a 45% designed success rate of the 406 MHz system on commercial fishing vessels.

Study Methodology

Based on the anecdotal observations of fishing safety personnel and recognition of the tremendous financial costs to the Coast Guard associated with false or unintentional activation of EPIRBs, Marine Safety Office Portland initiated a study of 406 MHz EPIRB regulatory compliance on commercial fishing vessels. This study was conducted by examining EPIRBs and recording the results of each inspection point.

This study was conducted during a three month period commencing in December of 1997. The vessels involved were boarded on a voluntary basis for the purposes of inspecting their 406 MHz EPIRB. Forty eight vessels were approached in this effort. With one exception, all of the vessels approached agreed to participate in this limited examination of their 406 MHz EPIRB. The inspection points involved in this study included:

Type of EPIRB: All commercial fishing vessels that operate beyond the three nautical mile line are required to be equipped with a 406 MHz EPIRB [1]. Vessels 36 feet in length or longer are required to carry category 1 EPIRB's, meaning that the device is fitted with a hydrostatic release designed to automatically deploy in the event of a vessel sinking. Vessels less than 36 feet in length are permitted to carry a category 2 EPIRB. This category EPIRB is identical in function and performance to category 1 devices, except that the device requires manual deployment.

Hydrostatic release: For vessels equipped with a category 1 EPIRB fitted with a hydrostatic release, the release device must be maintained in accordance with their Coast Guard type approval [5]. Most manufacturers of 406 MHz EPIRB's make use of disposable type hydrostatic releases, which are required to be replaced 24 months following installation on the vessel.

Marking: 406 MHz EPIRBs are required to be marked with the name of the vessel on which they are fitted [6]. MSO Portland utilizes a compliance policy of accepting a NOAA registration label, which is marked with the name of the vessel, as being an acceptable compliance with this requirement.

NOAA registration: 406 MHz EPIRBs are required by federal regulation to be registered with NOAA so as to indicate which vessel is in distress in the event of transmission [7]. One of the most important features of the 406 MHz system is the unique identification code programmed into each 406 MHz microprocessor. For this system to operate as designed, the owner of 406 MHz EPIRB must register the beacon with the NOAA data base, indicating vessel description and emergency contact information.

Battery: 406 MHz EPIRBs are fitted with long-life batteries capable of powering the unit for hours in the event of system activation [5]. These batteries are designed to last 5 to 8 years, and the expiration date of these batteries are marked on the EPIRB housing. As EPIRBs were first required to be installed on commercial fishing vessels as early as 1991, many of these EPIRBs are approaching or are beyond the intended service life of the original batteries.

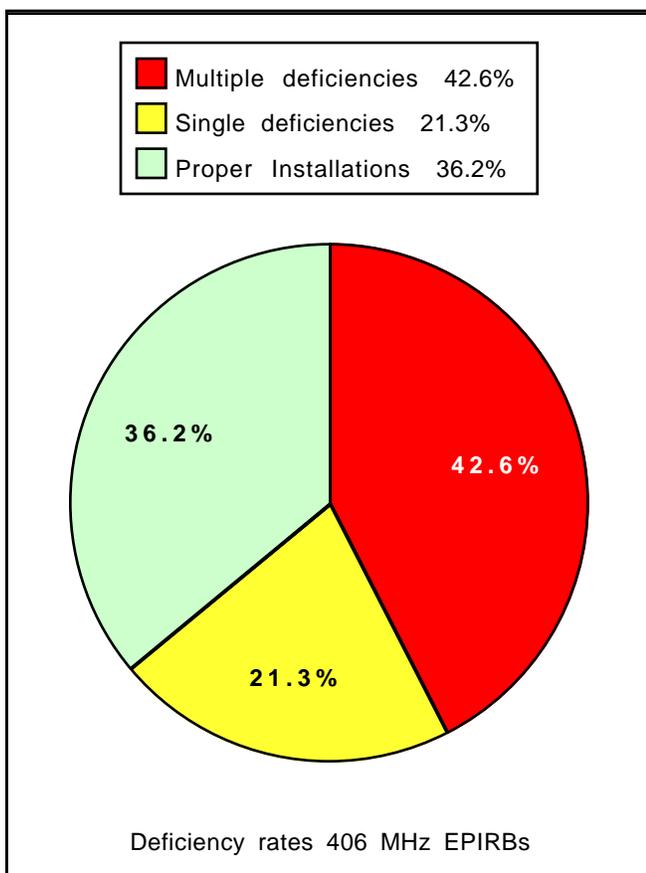
Stowage: Vessels fitted with category 1 EPIRBs (float free arrangement) are required to stow the EPIRB in a position where it will automatically deploy and float free in the event of a vessel sinking [8]. Vessels fitted with category 2 EPIRBs (manually deployed) are required to install the equipment in the immediate vicinity of the principal operating station.

Proper arming: Vessels fitted with category 1 EPIRBs are required to stow the EPIRB in the armed position. A 406 MHz EPIRB requires removal from the mounting bracket to activate the device; later models also require immersion in water.

Proper function on test cycle: Federal regulation requires vessel operators to test their EPIRB once every 30 days to ensure proper operation [10]. While certain manufacturers recommend longer periods between test cycles, all EPIRBs are fitted with circuits to manually test the device.

Study Results

Of the 47 vessels examined, at least one deficiency was found on 30 vessels (63.8%) of the total population examined. Multiple deficiencies were found on 20 vessels (42.6%). Two of the vessels (4.3%) examined were found to be not fitted with EPIRBs of any type, although they were required by regulation to be so equipped based on their operating area.



Of vessels studied, 63.9% were not equipped with satisfactory 406 MHz EPIRB installations, including 2 vessels that were not equipped with any type of EPIRB.

Individual deficiency rates, based on frequency of occurrence, were as follows:

Hydrostatic release: The leading deficiency in the inspected population was expired hydrostatic release mechanism. Eighteen (38.3%) of the EPIRBs examined had expired hydrostatic release mechanisms. The consequence of this deficiency is potentially very serious. Disposable type release mechanisms are required to be replaced after 24 months of service to prevent damage from exposure. Failure to replace these devices may result in damage rendering them inoperable, which would prevent automatic release of the EPIRB in the event of a vessel sinking.

Battery: Twelve (25.5%) of the vessels examined were equipped with EPIRBs with expired batteries. The consequence of this deficiency is very serious. Batteries beyond rated service life may have insufficient power to allow the EPIRB to transmit in a distress situation, or may lead to premature termination of signal during a distress situation, complicating search and rescue efforts.

NOAA registration: Eleven (23.4%) of the vessels examined were equipped with EPIRBs without NOAA database verification labels. The consequence of this deficiency is serious. In addition to depriving search and rescue efforts of critical vessel identification data, failure to properly register EPIRBs will complicate resolution of unintentional transmission incidents. These complications will require additional effort and cost to the Coast Guard.

Marking: Eight (17.0%) of the vessels examined were equipped with EPIRBs that were not marked with the name of the vessel in accordance with federal regulation. Marking of EPIRBs has possible marginal benefit in search and rescue cases, and in some cases could help deter theft of life saving equipment. Although required by regulation, the marking of an EPIRB with the vessel's name is significantly less important and superseded in purpose by the proper registration of the beacon's unique identifier code. Consequence of this deficiency is therefore negligible.

Beacon circuit testing: Five (10.6%) of the vessels examined were fitted with EPIRBs that failed to properly test during the inspection of the equipment. Consequence of this deficiency is extremely serious. An EPIRB that fails to test should be presumed as inoperable and not capable of transmitting a distress message. As EPIRBs contain no user serviceable parts, an EPIRB that fails to test requires servicing through manufacturer approved service facilities.

Beacon arming: Four (8.5%) of the vessels examined were fitted with EPIRBs that were stowed in an unarmed setting. Consequence of this failure is very serious. To automatically function in the event of a vessel sinking, 406 MHz EPIRBs must be stowed in an armed position to allow the beacon to transmit when released from the mounting bracket by the hydrostatic release. In the event of automatic deployment of an unarmed EPIRB, the beacon would not transmit a distress signal.

Improper type: Four (8.5%) of the vessels examined were fitted with improper types of EPIRBs (including two vessels fitted with no EPIRB at all). Improper EPIRB types involved two basic problems: vessels fitted with older class A and/or class B EPIRBs, which transmit on the 121.5/243 MHz distress frequencies, and vessels fitted with category 2 (manually deployed EPIRBs) when so required. Consequence of this deficiency is serious. The older 121.5/243 MHz distress network provides significantly less technical benefit to persons in distress than the 406 MHz system. Additionally, the 121.5/243 MHz system is prone to very expensive resolution of unintentional transmissions. The First Coast Guard District reported operating costs in excess of \$1,535,000 during federal fiscal years 1995 and 1996 to address 235 incidents of 121.5 and/or 243 MHz EPIRB transmissions, all of which were false alarm or unintentional transmission incidents.

Stowage: Two (6.4%) of the vessels examined were fitted with improperly stowed EPIRBs. Improper stowage of EPIRBs involves two basic problems, stowage of category 1 EPIRBs in positions that would interfere with the automatic deployment of the device, and category 2 EPIRBs stowed beyond immediate reach of the operating station. Consequence of this failure is serious. Entrapment of a beacon within a sinking hull would prevent operation of the equipment.

Note: The discrepancy rates listed above reflect actual detected deficiencies, and do not include, with the exception of proper type, the two vessels found to be not equipped with any type of EPIRB as part of this study.

Conclusions

Results of this study indicate that deficiencies with 406 MHz EPIRB carriage requirements appear to be widespread in the commercial fishing industry. Most of the noted deficiencies are potentially very serious, and could result in failure of a beacon to operate or function properly in the event of a distress condition.

The Commercial Fishing Vessel Safety Act of 1988 sought to reduce fatality rates in the commercial fishing industry primarily through the carriage of advanced maritime survival equipment. The 406 MHz EPIRB serves as central component in this regulatory effort. Intended to function automatically to provide quick notification of distress situations and to provide search and rescue units with highly accurate positioning information, the 406 MHz system is a central component of offshore search and rescue resource planning.

High rates of non-compliance observed in this study indicate that a significant number of vessels and persons may be operating without the protection intended to be provided by the regulations requiring vessel owners to equip their vessels with operable 406 MHz EPIRB's. Additionally, these high rates of non compliance indicate the potential for the Coast Guard to bear additional operating costs in distress situations where 406 MHz EPIRBs either fail to function completely or in part, and in the resolution of unintentional transmissions from 406 MHz EPIRBs.

References

- [1] 46 CFR 25.26-5
- [2] US Coast Guard Marine Casualty case MC97010352
- [3] First Coast Guard District proposal MAYDAY 2000 dated January 22, 1998
- [4] Thirteenth Coast Guard District letter on 406 MHz EPIRB failure rates, dated November 24, 1997
- [5] 46 CFR 28.140
- [6] 46 CFR 28.135
- [7] 47 CFR 80.1061(f)
- [8] 46 CFR 25-26-5(a)

	A	B	C	D	E	F	G	H	I	J
1	VESSEL NAME	TYPE	HYDRO	MARK	REG	BATT	STOW	ARMED	TEST	VIOS
2									42.55%	20
3	DEFIANCE				X	X				2
4	HEIDI ANNE									0
5	NORTH STAR									0
6	DOVKIE				X					1
7	MISS PAT			X	X		X			3
8	TWOFRIENDS		X							1
9	DEBORAH ANN									0
10	STEPHANIE VAUGHN									0
11	GENGEOPATTON									0
12	ADVENTURER		X	X		X				3
13	JAMIE & ASHLEY									0
14	TERESA & ALLYSON									0
15	LESLIE ANN									0
16	SUSAN & CAITLYN	X	X	X	X	X	X	X		7
17	ELLA CHRISTINE			X		X				2
18	LINDA MAVIS	X								1
19	CELTIC PRIDE		X							1
20	KATIE & SARAH		X		X					2
21	CRHISTINA CAROL					X		X	X	3
22	TORI T			X	X					2
23	PROWLER		X						X	2
24	PURSUIT		X	X	X					3
25	TARA LYNN II									0
26	BLACK BEAUTY		X							1
27	ELIZABETH									0
28	BARBARA E									0
29	JESSE									0
30	AFTA DAVID									0
31	MARY E		X							1
32	SEA LION VIII								X	1
33	MARGES MATE	X					X			2
34	MARGARET F		X			X				2
35	HELLFREEZESOVER		X	X	X	X				4
36	JULIE D			X	X					2
37	TIFFANY JEAN		X		X				X	3
38	MARY ELLEN									0
39	KAREN JO		X			X				2
40	SEVEN C'S		X		X	X				3
41	LIFE AFTER		X			X				2
42	TOP NOTCH		X							1
43	LADY MARIA	X				X		X		3
44	CASIAR		X							1
45	PERSISTENCE		X			X			X	3
46	JERRY & JOE							X		1
47	ROBERT MICHAEL									0
48	PATRICIA LEE									0
49	TARA LYNN									0
50		8.51%	38.30%	17.02%	23.40%	25.53%	6.38%	8.51%	10.64%	63.83%