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**DEVELOPMENTS IN GMDSS SERVICES, INCLUDING GUIDELINES ON  
MARITIME SAFETY INFORMATION (MSI)**

**Analysis of VHF DSC cases**

**Submitted by the United States**

**SUMMARY**

*Executive summary:* The United States Coast Guard performed a review and analysis of the VHF DSC distress calls received in 2019 to assess the effectiveness and performance trends of the DSC system. This document presents a summary of the findings, observations, and recommendations of the review.

*Strategic direction, if applicable:* 6

*Output:* 6.2

*Action to be taken:* Paragraph 11

*Related documents:* None

**Introduction**

1 The Global Maritime Distress and Safety System (GMDSS) identifies communication systems that provide international communication and distress notification. Since 1992, Digital Selective Calling (DSC) has been the international standard for providing predefined digital messages in various frequency ranges within the GMDSS. All VHF marine radios sold in the United States since 1999 are equipped with DSC. Earlier versions of the DSC-equipped VHF radios relied on a connection to a vessel's global positioning system (GPS) to receive and provide position information. Newer models, including handheld maritime VHF radios, are equipped with a GPS capability that provides the position to the DSC signal when the distress button is pressed on the radio. This document provides a statistical analysis of the DSC distress calls that were received, processed and documented by the United States. Coast Guard rescue coordination centres (RCCs), and Sector Command Centres (SCCs).

2 As maritime traffic increases and the cost of technology decreases, the use of advanced distress communication devices has increased. Over the last five years, notifications from VHF DSC radios have steadily increased. In 2019 the number of search and rescue (SAR)

cases recorded by the United States Coast Guard that originated from a VHF radio equipped with DSC reached 152, representing 12% of all SAR cases received by all radio communications that were documented by the Coast Guard.

3 An analysis of the DSC distress notifications received and resulting SAR cases documented by Coast Guard RCCs/SCCs was conducted to evaluate the DSC information received without a Maritime Mobile Service Identity (MMSI), un-located DSC notifications, and responses by SAR facilities to DSC-initiated SAR cases both with and without amplifying information. The information and analysis in this document is provided to assist in evaluating current standards and creating or revising regulations to improve the use of DSC as a means of maritime distress notification.

## **Discussion**

4 From 2015 to 2019, there has been a 75% increase in documented cases where VHF DSC has been the primary means of distress notification. The SAR Mission Coordinator (SMC) may close a SAR case when the person is located and delivered to a place of safety. Additionally, an SMC may suspend a search after considering all the known factors for the case and the SAR facilities on scene are unable to locate the person in distress. VHF DSC notifications, which include the position and accurate owner/operator information via the MMSI registration database, provide the SMC with the best information available to assess the severity of a SAR incident, determine the appropriate SAR emergency phase and coordinate the subsequent SAR operation. In 2019, 39% of the VHF DSC cases documented by the United States Coast Guard were not successful in locating or determining the registered ownership of the VHF DSC equipment that provided the distress alert. These cases remain open with active search operations being suspended.

5 This document concentrates on SAR cases that remain open with active SAR activities being suspended. These are the most difficult SAR cases to resolve due to the limited information provided by the alert, the time and effort required to research and investigate the notification, and then to effectively coordinate and conduct the SAR response. The Coast Guard documented 86 suspended SAR cases in 2019 that were the result of notifications received from VHF DSC equipment. An analysis of these suspended cases was conducted to identify trends and recommendations to aid in reducing the ratio of closed to suspended cases resulting from VHF DSC notifications. The analysis evaluated three types of VHF DSC notifications:

- notifications received with a searchable MMSI number;
- notifications received without an MMSI number (i.e. MMSI field filled with zeros); and
- notifications with an MMSI number that was clearly entered incorrectly.

6 Another critical element of VHF DSC information that assists with effective SAR operations is whether the distress alert includes the location of the incident. A VHF DSC distress alert with location information allows the RCC/SCC to dispatch a SAR facility quickly and directly to the location of the distress. Without the location information, the RCC/SCC is required to use alternative methods to determine the distress location (e.g. range ring analysis, RDF line of bearing, regional broadcasts that return location information for/from the distressed craft/person, etc.). The analysis of the suspended 2019 VHF DSC cases and notifications determined that only 29% of all VHF DSC notifications and cases were received with position information.

7 The use of an MMSI registration database provides the capability to quickly identify owner contact information. An analysis of documented cases and notifications identified that 39.9% of all VHF DSC alerts enabled the use of the United States and international MMSI databases to obtain owner information for the VHF DSC distress-alerting equipment.

8 The SMC coordinates the response to a distress notification when the location of persons in distress or the area to be searched is determined. If the location cannot be determined, an urgent marine information broadcast (UMIB) is issued to seek additional information from the source or any other recipient that has information concerning the notification/incident. If the SMC receives no additional information, the SAR case is suspended and the UMIB cancelled. The analysis of the 2019 cases and notifications generated from VHF DSC found only 24% of all cases or notifications yielded enough information to provide a location for the SMC to dispatch SAR facilities to assist the person in distress.

### *Observations*

9 In 2019 the number of SAR cases recorded by the United States Coast Guard that originated from a VHF radio equipped with DSC reached 152, representing 12% of all SAR cases received by all radio communications that were documented by the Coast Guard. Based on this analysis, the below observations are provided:

- .1 A measure of effectiveness for notifications is the validity and accuracy of the information received. Valid and accurate information allowed the RCC/SCC to quickly make a SAR emergency phase determination and provide SAR resources to ensure a person in distress is assisted. In voice communications, a high confidence factor in the information is provided directly from the person in distress and may be a factor in closing cases. A quick comparative analysis on the effectiveness of closing cases based on the notification from voice distress communication on VHF channel 16 versus those alerts received from VHF DSC identified that there were 40% more VHF DSC cases that remained open, but in a suspended status.
- .2 The initial perception was that MMSI information was not transmitted when a VHF DSC distress alert was initiated because comments in the notification and case data file indicated "no MMSI number". Upon further investigation, these statements were correlated to an MMSI of all zeros. This correlation was supported through a review of documentation provided in cases or notifications. Not all notifications or cases contained the available MMSI data. The electronic data received from VHF DSC alerts provides valuable information concerning the operator and location.
- .3 The analysis identified 35% of the SAR cases in which VHF DSC was the means for alerting the United States Coast Guard had an "unknown MMSI". Inaccurate registration or non-registration of the VHF DSC equipment by the owner/operator was the primary cause of this issue.
- .4 Currently, in order to initially operate an VHF DSC equipment, an MMSI is required to be entered. In cases where there is no MMSI or the MMSI does not conform to registration system requirements, the assumption is that the owner selects random numbers in order to allow the system to operate. In doing so, the owner, intentionally or without regard to system requirements, circumvents a core element of the system, which is the ability of the SAR system to identify the equipment and its owner in order to provide timely assistance when a person is in distress.

- .5 The analysis of DSC notifications indicated that 71% of the cases had no position information. Early versions of VHF DSC equipment were manufactured without an internal method of providing a position for a distress alert. It was recommended that owners connect the onboard GPS unit to the equipment in order for the VHF DSC to provide a position. However, there is no data available that identifies if these units are connected to a positioning source. Additionally, the instructions recommended that an electrician conduct the connection, which increased the cost for the consumer. Anecdotal information supports the view that many of these VHF DSC equipment were never supplied with input from an outside positioning source, which is critical for providing SAR assistance.
- .6 The analysis indicated that 76% of the cases and notifications were not associated with a response by SAR resources. The cases and notifications that fell into this category represent cases and notifications where the SMC evaluated the case factors and determined that the dispatch of SAR units and facilities was not warranted. It is important to note that there are many factors the SMC considers in making this decision. Each SAR case is evaluated on its own merit. The data also shows that approximately 60% of the cases were closed. Case file information provides many reasons for closing these cases. The most reported reason for closure was "accidental activation". Other interesting reasons included automated DSC activation when the equipment was powered up.

### *Recommendations*

10 The following recommendations were provided to the United States Maritime Advisory Council:

- .1 While conducting our analysis there were difficulties in identifying the MMSI number for a distress notification. The inclusion of MMSI information in VHF DSC notifications would assist in supplying meaningful information on cases. It is recommended that a required MMSI entry be added to the notification documentation for VHF DSC and other GMDSS distress alerts that utilize the MMSI. This new format for a notification entry requirement would assist in validating the identification of the sender and provide data on improper and erroneous MMSI use.
- .2 The intent of registration requirements are to promote the purchase and encourage the use of safety equipment. A remedy may require an increased education program, in addition to an active enforcement program, and related public awareness campaign to increase the number of properly registered VHF DSC equipment. It is recommended that the MMSI registration system is made simpler for the maritime user. An example of registration improvement may include a system where the manufacturer enters a unique MMSI (country code and serial number) in each radio before it leaves the factory, the owner then goes online and simply registers the ownership of the equipment.
- .3 Additionally, documented case information revealed that as vessel ownership changed over time, the ownership of the VHF DSC equipment was not updated. This requires the SMC during a SAR case to investigate the history of the vessel ownership to identify the current owner. This increases the time and effort to evaluate the notification, potentially delaying

a SAR response when the SAR authority is unable to accurately determine the location for the distress alert. A registration system for the ownership of installed VHF DSC equipment that is associated with the vessel registration may reduce the time required to identify ownership and ultimately reduce the number of cases associated with a VHF DSC notification that remain unresolved.

- .4 Documentation requirements for the SAR awareness stage notifications include the receiving system VHF DSC digital output. An additional requirement would be to add electronic documentation from the VHF DSC notification. The documentation should include the MMSI, position, and any other information captured by a system for the VHF DCS alert.
- .5 Public education and outreach materials need to be updated to describe the advantages for VHF DSC owners/operators to obtain an MMSI, to register their equipment, and on the use of the equipment's DSC functions. There is a need for recreational boaters to understand the use of the VHF DSC equipment, keep ownership and contact information up to date, and ensure the equipment provides position information when in distress. A successful education and outreach campaign, in conjunction with system and regulatory improvements, would result in fewer unresolved SAR cases.
- .6 Anecdotally, workload and effectiveness is negatively impacted by the current state of VHF DSC distress alerting. The analysis showed an exceptional amount of additional effort was required by SAR staff to identify elements of information that can be provided by the VHF DSC system and accurate registration databases. The long-term impact is that RCCs/SCCs are not fully documenting the actual caseload and information necessary to drive and support system improvements.
- .7 Analyses of distress notification and location devices are essential for SAR system improvements, but require time-consuming effort by SAR program analysts. Additional SAR staffing available to conduct SAR mission analyses will provide a deliberative process for system improvements and ensure supporting the global SAR system.

#### **Action requested of the Sub-Committee**

11 The Sub-Committee is invited to note the information provided in this document, and, in particular, the United States' invitation to other Member States to consider sharing similar information and performance data with a view to initiate discussion on means to improve MMSI registration and increase the percentage of cases where the VHF DSC distress alert provides useful location and operator related information in conducting a SAR response.

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