

NATIONAL TRANSPORTATION SAFETY BOARD
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(Information subject to editing)

Safety Study
An Assessment of the Effectiveness of the US Coast Guard Vessel Traffic Service System
NTSB/SS-16/01

This is a synopsis from the NTSB's Safety Study and does not include the Board's rationale for the conclusions and safety recommendations. NTSB staff is currently making final revisions to the report from which the attached conclusions and safety recommendations have been extracted. The final report and pertinent safety recommendation letters will be distributed to recommendation recipients as soon as possible. The attached information is subject to further review and editing.

EXECUTIVE SUMMARY

The US Coast Guard (the Coast Guard) vessel traffic service (VTS) is a shore-based surveillance and communications system with the authority to ensure the safe and efficient movement of vessel traffic in particularly hazardous or congested waterways in the United States. The system's primary mission is to reduce the risk of collisions, allisions, and groundings. To do this effectively, the system must be able to detect and resolve unsafe traffic situations in a timely manner. There are 12 Coast Guard VTS centers that make up the VTS system, and each center is responsible for managing the traffic that operates inside its designated VTS area. Since 1994, participation in this system has been mandatory for most types of power driven commercial vessels, towing vessels, and dredge platforms while operating inside a Coast Guard VTS area.

During the years 2010 through 2014, an average of 18% of all reportable collisions, allisions, and groundings involving vessels meeting the requirements of a VTS user occurred while they were operating inside a VTS area. The most common causal factor assigned to these accidents by the Coast Guard was inattention errors by the mariners involved, which suggests that an opportunity exists for the VTS system to further reduce the risk of these types of accidents by taking a more proactive role in traffic management. In this study, the National Transportation Safety Board (NTSB) examined the Coast Guard VTS system's ability to (1) detect and recognize traffic conflicts and other unsafe situations, (2) provide mariners with timely warning of such traffic conflicts and unsafe situations, and (3) control vessel traffic movements in the interest of safety.

Why the NTSB Did This Study

The Coast Guard is responsible for the oversight and management of navigation safety in the United States. The VTS system plays an important role in this process, as it is the only navigation safety component that involves direct interaction between mariners and the Coast Guard. Since the Coast Guard implemented its *Vessel Traffic Service National Standard Operating Procedures Manual (VTS NSOP)* in 2009, the NTSB has investigated six major commercial vessel accidents inside VTS areas, half of which resulted in a hazardous materials release. All of these accidents occurred under conditions that called for VTS action, but such

action was not taken or the need for action was not recognized. NTSB findings from these accidents suggested that the VTS system may not be effectively meeting its goal of reducing collisions, allisions, and groundings.

Between 2010 and 2014, collisions, allisions, and groundings inside VTS areas resulted in 2 fatalities, 179 injuries, and more than \$69 million in damage to vessels, facilities, infrastructure, and the environment. Therefore, the focus of this study was to assess the effectiveness of the Coast Guard's VTS system to improve maritime safety in the United States. Although NTSB investigations have often identified areas of concern at individual VTS centers, the extent to which such concerns exist across the entire VTS system had never been formally evaluated. As the Coast Guard's 12 VTS centers have been operational for at least 10 years, the NTSB believes that now is an appropriate time to evaluate the need for safety improvements across the VTS system.

The NTSB used a combination of quantitative and qualitative data sources and associated analytical methods to assess the effectiveness of the VTS system. The NTSB analyzed accident and vessel movement statistics and waterborne freight movement data for each VTS area, and used a questionnaire, site visits, and interviews to characterize the workforce and operations within the 12 VTS centers. In addition, industry associations, safety committees, and local waterway stakeholders provided comments and feedback on their experiences as users of the system. Finally, the NTSB conducted a comprehensive review of Coast Guard VTS statutory and regulatory requirements; national and local operating procedures; and personnel training, certification, and qualification standards; and it also collected similar information regarding vessel traffic management systems in Canada and Europe.

What the NTSB Found

The Coast Guard has not developed a standard method for measuring the collective safety performance of all 12 VTS centers as a VTS system. As a result, there were no standardized public data or statistics available for assessing the system's overall effectiveness. The Coast Guard *VTS NSOP* manual provides general requirements and guidance in key areas involving personnel, operations, and equipment; however, VTS directors largely interpret how to implement these requirements based on local conditions at the 12 VTS centers. There were inconsistencies in the collection and use of traffic, incident, and near miss event data by the centers, and few best practices or minimum standards of effectiveness that were being shared and consistently applied across the Coast Guard VTS system.

Although the VTS system has sufficient authority to manage vessel traffic, many watch supervisors and operators expressed reluctance to exercise their full authority and direct a vessel. This study found widespread variation in the understanding of Coast Guard VTS authority within the 12 VTS centers and across the VTS system, which has resulted in the inconsistent application of that authority over time. Decisions regarding how and when to exercise VTS authority have been influenced by local stakeholders, economic considerations, and varying management practices at the 12 VTS centers. Moreover, the Coast Guard's training and qualification process for its watch supervisors and operators has not ensured a consistent understanding and application of VTS authority, and this problem has been exacerbated by the regular turnover of

active duty personnel, which creates ongoing staffing and experience deficits in the VTS system's workforce.

The Coast Guard has long recognized the importance of safety risk management, but it has not been applying continuous risk assessment processes to its 12 VTS areas. Current procedures for the collection and quality control of activity and incident data do not support effective quantitative assessments of risk and safety performance within each VTS area or across the VTS system. Subsequently, these data are not regularly analyzed to identify and mitigate adverse safety trends, which has made it difficult (and in some cases impossible) to make statistically valid assessments of how well VTS centers are achieving their goal of reducing collisions, allisions, and groundings within their respective VTS areas.

FINDINGS

1. There is widespread variation in the interpretation of US Coast Guard vessel traffic service (VTS) authority within the VTS centers and across the VTS system, which results in inconsistent application of that authority.
2. The US Coast Guard is not using realistic and sufficient vessel traffic service (VTS) simulation training exercises, which would improve competency and proficiency among all watchstanders across the VTS system.
3. The quality of on-the-job training (OJT) provided to trainees has been inconsistent because the US Coast Guard does not require a minimum level of vessel traffic service operator work experience or instructor training as a prerequisite for all OJT mentors.
4. Because the US Coast Guard does not require all of its vessel traffic service (VTS) watch supervisors to achieve a VTS operator qualification or meet a minimum operator work experience requirement prior to selection, the Coast Guard cannot ensure that all of its watch supervisors are proficient in operator knowledge and skills, including detecting and recognizing traffic conflicts and other unsafe situations.
5. Because the US Coast Guard gives vessel traffic service watchstanders inconsistent guidance about their responsibility to provide navigational assistance whenever an unsafe situation is detected, watchstanders may be reluctant to provide this service.
6. Some US Coast Guard vessel traffic service watchstanders lack confidence applying the navigation rules and regulations when unsafe situations are detected because they do not have sufficient knowledge of or proficiency with the rules and regulations.
7. The US Coast Guard's current method of monitoring vessel communications on the bridge-to-bridge radio frequency is inadequate to identify unsafe situations in vessel traffic service areas, particularly during periods of low visibility or high traffic volume.
8. Cooperation between pilots and US Coast Guard vessel traffic service (VTS) watchstanders is often adversely affected by a negative perception of VTS expertise

because most VTS watchstanders are not licensed mariners with work experience on commercial vessels.

9. The US Coast Guard is not enforcing its requirement that vessel traffic service (VTS) watchstanders use standardized VTS phrases and message markers from the International Maritime Organization Standard Marine Communication Phrases, which can lead to miscommunication with mariners during safety critical situations.
10. The US Coast Guard may be limited in its ability to detect the potential for collisions, allisions, and groundings in vessel traffic service (VTS) areas when VTS watchstanders do not have accurate information regarding vessel size, tow size, and tow configuration for VTS users engaged in towing operations.
11. The US Coast Guard is not using its Ports and Waterways Safety Assessment process to conduct continuous risk assessments and mitigate adverse safety trends within Coast Guard vessel traffic service areas.
12. The US Coast Guard's collection and quality control of vessel traffic service (VTS) area activity and incident data do not support effective quantitative assessments of risk and safety performance within its VTS areas.
13. The US Coast Guard's vessel traffic service (VTS) monthly activity report incident data do not include geographic position information, which prevents the Coast Guard VTS program from using geographic analyses to identify and mitigate locations of high risk in VTS areas.
14. The US Coast Guard has not widely used regulatory vessel traffic management options, such as routing measures and vessel traffic service (VTS) *special areas*, to prevent vessel accidents in areas of demonstrated high risk across the VTS system.

RECOMMENDATIONS

To the US Coast Guard:

1. Revise and align Title 33 *Code of Federal Regulations* Part 161, the *Vessel Traffic Service [VTS] National Standard Operating Procedures Manual*, VTS center internal operating procedure manuals, and training curricula, as necessary, to ensure that VTS authority is consistently applied across the US Coast Guard VTS system.
2. Incorporate additional training that emphasizes realistic vessel traffic service (VTS) simulation exercises, including detecting and responding to unsafe traffic situations, in your initial training and proficiency requirements for all VTS watchstanders in the US Coast Guard VTS system.

3. Require standard on-the-job training (OJT) mentor selection criteria, including appropriate vessel traffic service operator work experience levels and instructor training requirements, for all OJT mentors.
4. Require all vessel traffic service (VTS) watch supervisors to achieve a VTS operator qualification and complete a minimum work experience requirement as an operator before serving as a supervisor.
5. Modify your *Vessel Traffic Service [VTS] National Standard Operating Procedures Manual*, VTS center internal operating procedure manuals, and training curricula, as necessary, to ensure that VTS watchstanders share a common understanding of how to identify and respond to situations requiring navigational assistance.
6. Ensure that vessel traffic service watchstanders are trained in and demonstrate proficiency with the navigation rules and regulations by passing the Coast Guard Deck Watch Officer exam, the Merchant Mariner Credentialing Rules of the Road exam, or another appropriate knowledge test.
7. Conduct or sponsor research, with input from appropriate subject matter experts, to develop more effective procedures or methods for monitoring vessel communications on the bridge-to-bridge radio frequency to identify and address developing unsafe situations in vessel traffic service areas.
8. Once the research recommended in Safety Recommendation M-16-XX (#7) is completed, revise your *Vessel Traffic Service [VTS] National Standard Operating Procedures Manual*, VTS center internal operating procedure manuals, and training curricula, as necessary.
9. Work with the American Pilots' Association and the American Waterways Operators to conduct or sponsor research to evaluate and determine the feasibility and benefits of professional mariner representation on the watchfloor at each of the US Coast Guard vessel traffic service (VTS) centers, and establish such representation at VTS centers, as appropriate, based on the findings of that research.
10. Revise your *Vessel Traffic Service [VTS] National Standard Operating Procedures Manual*, VTS center internal operating procedure manuals, training curricula, and VTS user manuals, as necessary, to ensure that VTS watchstanders use standard VTS communication phrasing and message markers from the International Maritime Organization Standard Marine Communication Phrases during radio communications with mariners when appropriate.
11. Work with the Radio Technical Commission for Maritime Services and the American Waterways Operators to modify regulations, procedures, and equipment standards, as necessary, to ensure that vessels engaged in towing operations broadcast accurate automatic identification system information regarding tow size and tow configuration as well as vessel size.

12. Develop a continuous risk assessment program to evaluate and mitigate safety risks for each vessel traffic service (VTS) area in the US Coast Guard VTS system that includes input from port and waterway stakeholders.
13. Develop a program for conducting periodic risk assessments of the entire US Coast Guard vessel traffic service system that includes input from port and waterway stakeholders to evaluate and mitigate system-wide safety risks.
14. Develop or revise, as necessary, your definitions of the activity and incident data collected by vessel traffic service (VTS) centers as necessary to ensure standardized and routine reporting across the entire US Coast Guard VTS system.
15. Establish a program to periodically analyze the activity and incident data collected by vessel traffic service (VTS) centers to assess the safety performance of each VTS center and the entire US Coast Guard VTS system.
16. Revise the vessel traffic service (VTS) monthly activity report requirements to include geographic coordinates for all incident-related data collected by the US Coast Guard VTS system.
17. Establish a program to periodically review each of the 12 vessel traffic service (VTS) areas and seek input from port and waterway stakeholders to identify areas of increased vessel conflicts or accidents that could benefit from the use of routing measures or VTS *special areas*, and establish such measures where appropriate.

To the American Pilots' Association:

18. Work with the US Coast Guard to conduct or sponsor research to evaluate and determine the feasibility and benefits of professional mariner representation on the watchfloor at each of the Coast Guard vessel traffic service (VTS) centers and establish such representation at VTS centers, as appropriate, based on the findings of that research.

To the American Waterways Operators:

19. Work with the US Coast Guard to conduct or sponsor research to evaluate and determine the feasibility and benefits of professional mariner representation on the watchfloor at each of the Coast Guard vessel traffic service (VTS) centers and establish such representation at VTS centers, as appropriate, based on the findings of that research.
20. Work with the US Coast Guard to modify regulations, procedures, and equipment standards, as necessary, to ensure that vessels engaged in towing operations broadcast accurate automatic identification system information regarding tow size and tow configuration as well as vessel size.

To the Radio Technical Commission for Maritime Services:

21. Work with the US Coast Guard to modify regulations, procedures, and equipment standards, as necessary, to ensure that vessels engaged in towing operations broadcast accurate automatic identification system information regarding tow size and tow configuration as well as vessel size.